

Theoria to theory; an international journal of science, philosophy, and contemplative religion.

London, Gordon and Breach Science Publishers.

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THEORIA to theory

**An International Journal of Science, Philosophy and
Contemplative Religion**

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Volume 13, Number 1 (1979)

Digitized by Google
ISSN 0049-3686

Original from
UNIVERSITY OF MICHIGAN

THEORIA to theory

An International Journal of Science, Philosophy and Contemplative Religion

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Theoria to theory

Attempts to see how imaginative insight can become working theory.

Is the product of a continuing dialogue between scientific specialists and philosophers on the one hand, and contemplatives of different traditions, Eastern as well as Western, on the other.

Believes that the Christian mystical tradition—background of the whole development of Western science and technology—demands at the very least another look.

Sees an urgent need for fundamental philosophical investigation into such questions within an enlarged scientific vision, without which so much of science is simply commercially profitable or experimentally convenient.

Looks at practical attempts to use technology in enhancing life rather than impoverishing its quality.

Considers the human treatment of human beings in education, health, and work.

Editorial correspondence, submitted articles, and books for review should be addressed to The Editor, *Theoria to Theory*, 20 Millington Road, Cambridge, CB3 9HP.

Subscription Rates *four issues per volume*

In Great Britain

Individuals who warrant the journal is for their own personal use, per volume, postpaid: £8.50
Libraries, research institutions and others, per volume, postpaid: £13.50

U. S. A. / Elsewhere

Individuals who warrant the journal is for their own personal use, per volume, postpaid: \$20.50/£11.50
Libraries, research institutions and others, per volume, postpaid: \$43.00/£24.00.

The subscription rates include a distributing charge of \$12.00 for postage and handling *or* airfreight to the U. S. A. and Canada.

Subscriptions should be sent to Gordon and Breach Science Publishers Ltd., 42 William IV Street, London WC2, England.

MAY 1979 issue

© 1979 The Epiphany Philosophers, Gordon and Breach Science Publishers Ltd., 42 William IV Street, London WC2

Printed in Great Britain at The Lavenham Press Limited, Lavenham, Suffolk.

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51
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University
of Michigan
Current Serials

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Editorial

In the past *Theoria to Theory* has taken up a kind of question which has eluded the straightforward type of solution usually favoured by academics. It has done so in the conviction that the professional academic will find it difficult to take on a certain kind of question which typically lies somewhere between religion and science, and which belongs to no obvious discipline. The question of death is one such. Death is obviously important, and yet it can hardly be counted an academic subject, including "academic" in its pejorative sense. It has attracted hardly any attention from contemporary philosophers, perhaps because it raises questions to which no ordinary sort of theory could be the answer.

The reasons often given for the neglect of the subject are on the whole not as impressive as the simple reason that it is a very difficult thing to think about, not only because human interests are involved, but because it focuses our thoughts about all of *life*. Raymond Moody in his book *Life After Life* gives two reasons why people do not want to think about death. "To spare ourselves this psychological trauma, we decide to try to avoid the topic as much as possible." This can hardly be true of intelligent people, and it is not as plausible as the second reason he gives. "For the most part, the words of human language allude to things of which we have experience through our physical senses. Death, though, is something which lies beyond the conscious experience of most of us because most of us have never been through it . . . we compare death or dying with the more pleasant things in our experience, things with which we are familiar." Moody's findings can enlarge our ways of thinking about death because they come from people who have been

Theoria to Theory

1979, Vol. 13, pp. 1–4 Gordon and Breach Science Publishers Ltd., 1979

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through some of the stages of dying. This is a kind of evidence which has always been available in a few rare cases, but modern methods of resuscitation make it more frequent and bring home the fact that clinical death is not nearly so easy to declare with certainty as has been supposed. We need to know more about the kind of borderline experiences Moody describes. In this number we have an article calling attention to Moody's findings, and another which shows some striking resemblances between these findings and the Dying Man's Prayer of the *Upanishads*.

One reason sometimes given for the neglect of the subject is, in the words of a recent writer, "the paucity of materials on death".[†] But whatever materials we have will demand interpretation, and this means that by itself the bare claim that we do or do not survive death cannot command great interest. This is something Moody tacitly acknowledges, and with this acknowledgement comes the disclaimer, "I am not trying to prove that there is life after death."

The special difficulties of the subject are not in fact due to any lack of material, although Moody does say that he was surprised to discover how few researchers have attempted the sort of investigation he was quite easily able to carry out. There is in fact an enormous amount of material on the subject, including a rich literature. The question is, how should all this be understood? What is missing is not more material, but more understanding. Poets know this, and we have taken the liberty of using again for our *Sentences* a poem of Henry Vaughan's which appeared some years ago in *T. to T.* His saying "So some strange thoughts transcend our wonted themes, And into glory peep" is indeed what we want to say, and which the experience of light on the part of Moody's subjects might have allowed them to say.

Perhaps what makes death hard to think about, and allows strong feelings and prejudices to collect, is not so much the absence of facts or the presence of religion, but the tendency of writers to concentrate their thoughts on just one aspect of the matter—survival. Do we survive death? This emphasis has affected much modern thinking

[†]Robert G. Olson, writing on "Death" in the *Encyclopedia of Philosophy*, ed. Paul Edwards.

about death. It makes of the questions which ought to be asked about death only questions about evidence for survival. Such an approach takes away much of the interest of Moody's reports.

Whatever the right way forward is, it will have to meet the sort of fact about death which makes it unique, even if, as Wittgenstein says, "Death is not an event in life: we do not live to experience death." Death is extraordinary, and it cannot easily be described in any ordinary ways. What tends to be described—what Moody's subjects describe—is still not death itself, but the events which accompany death, and they typically express the view that their experiences cannot really be described.

So if there are problems about death, life also is not understood. Death is not an extraordinary event which takes place against a backdrop of unproblematic life. Death is an extraordinary event in an extraordinary setting; at least in a setting which is no less extraordinary than death is itself. There is also the remarkable fact that there are some people for whom life and death are so much of a piece that they appear to be able to die, to "turn off" not by physical suicide but by a mental decision, without any fuss, when they judge that the right moment has come.

There are those who find in the idea of death nothing puzzling, who see in it only the idea of the cessation of life, by which they mean something biological. But here we have the assumption that life, including consciousness and therefore birth and growth is well understood. And they are not. If we cannot say what life is, we cannot say what death is either. The biological definition of death, death from so to speak an external point of view, cannot be the whole story. There is also the perspective of consciousness. The American undergraduate whose answer to Moody was a book called *Is There Life After Birth?* was in fact making a good philosophical point, not a bad joke.

All this does not point towards any sort of boundary beyond which empirical science may not advance. Rather it directs attention to a lack in our ordinary concepts. Indeed, these concepts are not even adequate to show how the thought of moving my arm sets my arm in motion, how in life I am related to my body. The supposedly extraordinary abilities which parapsychology investigates are in fact

no more extraordinary, though less familiar, than the ability of ordinary persons to move physical objects, in particular their own bodies, at will. No philosophical theory has ever done more than get a hand to the ability of human agents to do this sort of thing, or to the dramatic fact that there is consciousness at all, and that it is localized in my body as *my* consciousness. A more searching description of death will have to say something about this, about life, and do some justice to the almost mystical state in which it seems as astonishing as it is.

Discussion: Three Kinds of Rural Community
(An ex-mining town, a North Cotswold village,
a commune in a remote area of Scotland)

RAYMOND COCHRANE, CATHERINE INCHLEY,
RAY INCHLEY, KATE ROUSE.

R.C. I don't even know the name of your village, Catherine C.I. Radstock. But it isn't a village; it is a small mining town in North Somerset and the mines closed down, so we had a severe problem of unemployment. Because it was a small town (our population is about 6000) you would think it was easier; but planners made comments like "We must let the coal mines go back to nature", and "We want this all to be rural again", so we ended up with some of the same problems as villages are getting. Because I am a prospective Parliamentary candidate for N. Wilts, for my sins, I have to read a number of local newspapers, and I am coming to the conclusion that a lot of our problems in villages come from how we are interpreting the planning laws. So, Raymond, I'd like to hear about your village of Guiting Power and your Guiting Manor Trust, and what effect it has on employment and on the community as well as on the buildings (as I gather some of it is architectural) and then I want to see if what is happening in Guiting Power is the same as what is happening elsewhere.

R.C. I can tell you straight out it isn't. We haven't as yet an unemployment problem. We are a tiny community of 260 — the parish is 300 odd. We have a village school of 21 children and many services because we used to be a larger community. I don't think they intend to close the school and it is part of our job to see that the

Theoria to Theory

1979, Vol. 13, pp. 5–18 Gordon and Breach Science Publishers Ltd., 1979

Published by

population is such that we can maintain it with reasonable numbers.

If we had an unemployment problem we of the Trust would be prepared to foster local activities. At present our main concern is to find houses, especially for young married people.

C.I. What sort of jobs do the young marrieds do?

R.C. All sorts. Some of them go to Cheltenham 12 miles off. A considerable proportion work in the area: our Trust farming company employs ten people. We are a *working* village: I don't mind people going to work in Cheltenham so long as their roots are here.

C.I. What the Council for the Preservation of Rural England is saying, and I think they are right, is that a certain amount of commuting is all right, but there comes a stage where there are no longer any work relationships in the village, because not enough people work together.

R.C. There aren't very many working together here, but that doesn't seem to make any difference to the village, because their roots are here and there are a lot of activities. Although Guiting Power is so small, in the last century it averaged 600, and at one time went up to 800. It is in planners' terms a "model" village. It is a failed market town, and if you take the area round we run up to about 1000.

C.I. The crucial thing is to keep the young people. What are you doing for that? It is rare for people to move into villages.

R.C. I had better tell you how this topsy like Trust evolved.

All this began in 1958, when I was looking for a sizeable area of farmland for some R. and D. work on animal nutrition. (This was a quite separate story which does not here concern us). The Guiting Manor Estate was up for sale; it consisted of about 1,000 acres and some 50 odd houses. These latter were in varying stages of decrepitude as were all but one of the farm buildings. At first I was scared of the responsibilities involved and the immense amount of work which would be required for restoration and the provision of modern conveniences. But one day in May, standing in the Square, I felt that in some way the village—the village itself, not its people—was desperately asking for help, and help which I might be able to give it. It was a challenge.

I decided to take it up. Since my undergraduate days at Oxford, I had been a lover of the Cotswolds—the limestone, the burnt sienna soil, the cloudscape—and since a child I had been interested in architecture. Here was a chance to try to repay my debts, and to use my experience of building. There was no “do-goodery” about it, but I felt strongly that the tenants of the estate had had a raw deal since they were living in mediaeval rather than modern conditions, albeit for trivial rents. I feared—and feared with good reason—that if we didn’t do something about it, some speculator would buy the estate, obtain possession as soon as possible of the houses, tart them up, and sell them for what were even then relatively high prices. This would have been disastrous for Guiting Power, as it has been and is disastrous for so many villages in the Cotswolds and elsewhere. It is even more true now than it was then that rents bear no relation to freehold prices; thus more affluent outsiders buy up houses and cottages which the locals cannot begin to afford and the indigenous community is swamped.

We set to work, dealing first with the worst cottages of which eighteen had already been condemned and at least another six ought to have been. Additional priorities were the older people and houses fit for our farm workers. We offered the necessary land to the R.D.C., which then put us on the list for mains sewage, which we got in 1962.

My predecessor had been allowed to treat the whole estate as an agricultural one, presumably because he spent little on it and the agricultural tax reliefs were minimal. Obviously this could not continue. I therefore separated the agricultural estate, together with some dozen houses, from the thirty-six or so houses which had no agricultural connection. It was these last which I put into the Guiting Manor Trust. It was clear that there would not be any remotely reasonable financial return from them, after all this expenditure, and I kept them in my own hands and paid tax on rents at the “unearned” (my foot!) rates. Furthermore, on my death, there would be further taxation and no certainty that they would not have to be sold and therefore lost to the villagers. Such income as they now produced—which was very little for years but is now, thanks to rent rebates, not inconsiderable—would not be liable to

any tax if they were held by a charitable Trust. So the trust idea was the reasonable solution if the effort was not to be wasted and the most important part of the village conserved in perpetuity. The Trust has been, in fact, self-supporting or more than self-supporting since 1966.

Then another problem emerged. We own about half the houses in the village, but over forty are owner-occupied. About half of these are still owned by local people but, with one exception, all those sold during the past twenty years have been bought by outsiders. Local people just can't afford to buy them, and more affluent outsiders can. So now we have a population which consists roughly of 75% local people and 25% outsiders. This is, I think, a good proportion. New blood can help a village—I hope, as an outsider myself! The danger lies—and lies in the villages all around us—where there are too many outsiders and the true locals are confined to very sub-standard cottages and the council houses. The newcomers then begin to dominate, which a few of them think they were born to do! Hence all the snobberies which can ruin a community.

We therefore feel that it is the job of the Trust to ensure that about three-quarters of our village remains truly local and for locals. Which means building more houses to rent as the owner-occupied ones are sold. I had a great fight with the Charity Commission to ensure that we should have the right to build, not just to conserve. I think that I won this on aesthetic grounds. I pointed out that it was useless to conserve the older houses if the neighborhood could be ruined by speculative builders under the Community Land Act. And furthermore, having so strongly criticised most of the new houses in the area, we thought we should accept the challenge of doing better ourselves. With this policy, I can see Guiting eventually growing to something like its nineteenth century population of five to six hundred; which, having so many amenities, it could well justify.

These aims have become practical because in 1974 I conveyed the original agricultural estate, including the two main and ten other houses, to the Trust. This trebled its income and greatly increased its capital assets. Capital Transfer Tax would, in any event, have broken it up sooner or later had it remained in my hands. Now it

too — and a very lovely stretch of country it is — will be conserved for the benefit of the community. The land is mostly farmed by a company, of which the Trust is the largest individual shareholder, but in which senior farm staff have most of the other shares.

In all its functions, the Trust has aimed to provide capital rather than income; to fill gaps and to open vistas. We have done what the village couldn't do — or at least not without endless effort and delay; but we do not try to do what our people can very well do themselves. Thus we do not subscribe to local organisations, or contribute towards the upkeep of the village hall. But we do provide a sports-cum-recreation field adjacent to the hall, and we have recently provided further storage accommodation and insulation for it.

As one of our Trustees said recently, we should be finished if we tried to be paternalistic. Certainly Guiting Power, which has immense character (not to say cussedness at times!) would not stand for this. Nor should it. But there is much scope for ideas, initiative and background help, financial and otherwise, which we try to provide.

That, I think, is what privilege is for. It is something to be shared, and is not for selfish private consumption. Any advantage any of us have, whether inherited or acquired, material, intellectual or aesthetic, can be used to improve the quality of life in one way or another, *provided* that it is done on the basis of mutual liking and respect, never out of condescension. Everyone has the right to be *magisterial* in respect of his own expertise, in the hope that he will encourage others to learn his trade if they so wish, and beat him at it. But the dangers of an attitude based on supposed class superiority, are very real. If we all discharge our obligations — since all privilege involves obligations — no one is patronised and no one is demeaned; on the contrary, the life of all can be enhanced.

* * *

C.I. What I am interested in is how villages can get things started and produce changes. In our area they are frustrated by planning requirements. If you are a part time carpenter working

from your home and want to make some chairs for someone, you must go to the planning authority who will say this is a change of use to industrial use. If you are looking for a site, it doesn't matter so much. But you may be stuck and can only do it where you are living. We find in N. Wilts, people who are in process of creating something and are genuine locals are having extreme difficulties because they come into the wrong categories.

My first horror story is the rabbit farm which is not permitted because we are in the green belt, and my next is someone in a Wiltshire village who was a blacksmith employing two people; he wanted to expand and wasn't allowed to on the grounds that it was a change of use. So he moved to somewhere different, the two people concerned lost their local jobs, the blacksmith's forge went on the market and was bought up by a very nice older professional couple who turned it into an elegant village house. Bang had gone three jobs and the potential of expanding.

R.C. No one has come to us wanting to start things as far as I know. If one of our people came and said "I want to start a workshop" we would be very willing to play ball. I wouldn't anticipate that we would have any trouble and I would fight the planners if we did.

C.I. Even servicing jobs are being squeezed out. New people who come in think it is their business to keep villages in an atypical state of rural seclusion, and hit the roof about having a garage. I think we have got to produce a code of practice for people moving into villages. Good people moving in are welcome, but they should not think they are moving into a dead quiet genteel suburb, where no one is allowed to start anything. And these people—retired lieutenant colonels for instance—tend to be more vocal and they are thinking about the resale value of the land. The person who has lived in the village all his life doesn't care a damn about the resale value of the land, as he intends to be dead by the time it is sold. Do you have the same problem?

R.C. No, but we could easily have. I am 100% behind you on that. We want to keep the working village, not a village for retired people.

C.I. In Devon what they have got are villages biased by the

elderly. Elderly couples come and buy a bungalow, and all goes well until one of them dies and then there is the problem of their morale and lack of mobility, and they are in the depths of the country. There aren't young people around because the older couples have bought up the bungalows the young people should be renting. So we are having to kick up a fuss about allowing villages to expand to have enough young people even if they come in from outside.

R.C. In 1958 our tenants were 45% pensioners and now they are less than 25%, and our birth rate four years ago was four times the national average. Would you two say more about the Radstock business of getting people to engage in activities which build up the district, like the people who wanted to make the chairs, starting from where they were?

C.I. It's the question of how you actually get things going.

R.I. Radstock is topsy-turvy. The industry has left, and the population is generally in the old range. There are acres of derelict land left by industry. The problem is to put pressure on the authorities, the Council, the Railway Board, the Water Board to be allowed to do things on it. For instance, a park in the centre of the town. It is one of those "who does what" disputes. What I'm concerned about is the psychological effect of ripping the heart out of a community and allowing it to remain dormant for four or five years. The gap is too long.

The local authorities make it very difficult for anyone to help themselves. Our town centre is between a river that floods and what used to be an old railway line; and the coal mines and the railway have gone (the railway had only been kept because of the coal) and we only have a decaying centre and a depressed community. The church is away from the centre, and there isn't a market square. At least we are now in a position where we can do something about the centre of Radstock. But in four years the local authority hasn't even bought the land from the railway at a nominal price. Secondly, they have this feeling about it being rural, so people mustn't start things. Someone who wanted to build a factory on the site of a disused mine some way away was told they mustn't as it was scheduled as rural. If you try to start anything in a (real) rural area you are told you can't because the residents won't agree; so surely places where there have

been coal mines are very appropriate for this. Before the local government reorganization, we were a little urban district, and a little urban district would not have let its main town square go. There is plenty of vitality—we also have people who would go out with shot guns after the Nazis—but we are hedged around with restrictions because of local government reorganization. They could come to us and say “We are sorry; we can’t do anything about Radstock for five years. What would *you* like to do in the interval? Let’s have something temporary”. But you know the Freudian thing about people who like to hold on to things. That is my feeling about the planners in our area.

Before the mines closed, it was a mining community with most of the men working together and there are lots of little privately owned houses. The social services people say they have to spend less on Radstock because the mining community looks after its own people. Peoples’s married sons and daughters live within a mile or so, and people as they get older don’t want to leave. And the mining people always kept, say, a pig in the back garden.

R.I. The real problem is that you see what has been the life of the town declining. They not only lost their industry but at the same time they lost their local authority.

Anything that has to do with work comes under the County Planning Authority, which is too large a unit. The village or the urban district could deal with the priorities; not just on rubber stamp principles. In N. Wiltshire, which I know, there are enough retired majors on the County Council who can say, “No we don’t want this to be started. We are rural”.

Another thing Radstock has is a crafty set of people. Miners in the depression became adept at poaching and living off the land and off barter. This is relevant. There are lots of people doing things themselves on a barter system, so when you are on Social Security you aren’t getting anything back in money. I think they are quite right. They are basically creating part time jobs without the formalities. But if you live in a council house, you aren’t allowed to start a business from your house. Of course people do things—one in particular does hairdressing. But I think we should have a provision in the act that if you yourself do such things in your own house, it

does not count as “change of use”. At the stage where someone else comes in it may, as then there might be a nuisance value. For instance, you need a cheaply rentable workshop and you can start selling from it by yourself. There may come a later stage where it could come under industrial use. Maybe there is a role here for the Radstock Co-op, it is profitable, it has three farms, it is tied up with the locality, and it is interested in helping people. We might get them in on creating workshops to let out.

We need the local authority and the laws to ease up on the very, very small business, so that you can get things started.

You want to have a *low* industrial rate till a thing is viable.

C.I. Now we have a third strand to bring in. If Britain is going to have a large number of unemployed people, and you have got young people who want to start something not just in an ordinary back street workshop, how can a situation be promoted in which they can get going. Here we have Kate Rouse, who was concerned with a commune that made pottery, but that failed.

K.R. The place was on the Kintyre Peninsula in Scotland, near Campbeltown. It started with two people going there and taking a winter let, because it is an area of very great natural beauty. In the winter holiday cottages were let cheaply. There is no work there—there is a decayed fishing industry—everything is decayed. So we decided if we wanted to live there we must start our own business and the only skill we had was making pottery. It wasn't a precise scheme—it grew. One person bought a farm house that became the living centre. The pottery was set up in the kennels of the local estate (the owner lived away in the North of England).

R.C. So you started with pottery in the kennels and you had an absentee landlord? Did you have a factor (land agent)? Was he interested?

K.R. In a way; but not very enthusiastic.

R.C. Did you have local materials?

K.R. One of us made sheep skin rugs, and another took whisky bottles and flattened them to make ash trays. But the clay for the pottery came from Stoke-on-Trent. That was one of the reasons why the pottery failed as a business. It started at the time when prices for carriage were beginning to go up, and finally they were more than

the cost of the clay. We tried to find local sources, but there weren't any which could be considered for a business venture. There were small pockets of clay around.

R.C. Campbeltown is bound to have a couple of craft shops. Did you sell pots in them? Or sheepskin rugs?

K.R. Not sheeps skin rugs in Campbeltown. There were two crafts shops, one an actual craft shop and the other a sort of knick knack shop. There was a craft centre on the side of the road halfway between the pottery and Campbeltown, and they were helpful to us. But the problem was to make enough money to support the people who made the pottery.

C.I. How many were there of you?

K.R. Sixteen, but we weren't all involved in the pottery. Some of us were married and some had children, and some were related and some not; it was a complete rambling group of people who arrived in various ways. We also made jewellery and shawls – a lot of the goods we sold in our own shop in a nearby fishing town. People worked at times on fishing boats and in the Forestry and mending roads – anything that came along. And a couple were on the Social Security: in the main Social Security was not used, although Family Income Supplement augmented the income from the business. We learnt to live as self-sufficiently and as frugally as possible.

C.I. I am convinced that one of the biggest problems in any of these crafts is the marketing. We were talking to someone who was doing knitting, and she had contacts in America who could sell high quality knitted goods, and there were plenty of knitters in our area. Also now that transport costs are so great, if you can find something your area wants, it is going to be worth while to make it locally. An example I have is grave vases. We have a cousin who runs a market garden and flower business in Westbury in Wiltshire. They do flowers for funerals and graves, and his wife said "We can't get any grave vases, there used to be a company which made them for much of England. But now it costs a great deal to transport small packages; no one wants many grave vases, so the small orders, and hence the company have ceased". My reaction was that grave vases were what the local pottery should be doing and they could make them entirely personal for the grave – the right colours, and so

on. It might not be a big market, but a very genuine one that connected up with their area. But I have yet to see them making grave vases and selling them round Wiltshire.

Tell us, Kate, about your problems of marketing. Isn't the essence of marketing that you see a corner in something not supplied and supply it Without demand you really haven't a product at all.

K.R. We used to go to trade fairs and we used to do trips round Scotland from craft shop to craft shop showing our things. We also had our own shop in which we used to sell other crafts from other studios. People used to come up to us and say "Could you make Loch Ness monsters?"

R.I. To put whisky in?

K.R. They wanted thousands and thousands, and we couldn't make them. About a proposition like making grave vases: I would go to the potters and say "I have been asked if we can make grave vases", and they would say "We just aren't geared up to mass production, this is a craft show not a factory". This was difficult, because they were quite right, and yet we had to have income. Also the public aren't prepared to pay in many cases the realistic price for an individually produced article.

C.I. Conservatism in potters?

K.R. Exactly. They were interested in the artistic part, not in the production part. For example, mugs. People would have bought mugs, but they refused to make them because they said "If we start making mugs we will be making them for the rest of our lives".

R.C. They could have done the hell of a trade on the Jubilee business.

C.I. It is no use starting a commune unless you realise that the interaction between what people are prepared to pay you for and what you are prepared to make is the essence of the matter. Craftsmen can then get a lot of their pleasure out of making what they have an order for very well indeed.

I went round co-ops in Guatemala and I think we ought to take some of the knowledge that is coming out of under-developed countries on this. They have the same sort of problem there as we have in some of our rural areas. We should be thinking in terms of producers' co-ops with pretty snappy managers, but still co-ops, so

that they are not a power structure. In an increasingly mass produced world the craftsman can produce a non-mass produced article, but it must be what you actually want. I also have a moral thing about this—I don't think people should be living on social security if half the time they could be making mugs that would sell.

R.C. What you really want is to take the arty out of crafty.

C.I. How much of your pottery did you actually sell?

K.R. We sold virtually everything we made all over Scotland, and even nationally, but that was a problem because we had to pack it, and people got very irate because they got crates of smashed stuff, especially in the beginning, but we did get that sorted out. The other thing was delivery dates, and there the problem was the seasonal aspect of this type of venture (tourist trade); everybody wanted everything at once; also the natural slowness of the actual process of making a pot. You had the potters delivering the goods three or four weeks late; it was difficult for the potters and everyone else to relate the craft studio to the hub bub of the outside world of commerce which created problems sometimes.

R.I. So you didn't really have a marketing problem: you had a potter problem.

R.C. There were two problems; the potters weren't interested in doing stuff that would bring in money, and we were in the wrong place. You were in Scotland, and the clay was near Stoke-on-Trent, so we had to bring clay up and pots down.

C.I. This comes back to my problem, about starting from a village in question. If you start where people are living and have been living for some time they don't get the feeling they might move out again. Your people all left, didn't they?

K.R. The effort involved just wasn't producing enough to live on, so the business partners split up and two of the potters came down south. The other two retained the business still under the auspices of the Highlands and Island Development Board, yet with a much smaller character, and as such is still viable. I think the whole business aspects of the studio were the main failings—the pottery itself was beautiful—plus of course the distance from markets and sources.

C.I. In Guatemala that would have strangled the village

industry. But they had a good marketable product in weaving, a genuine cottage industry, and at the crucial moment they set it up with a co-operative, getting one of their people trained for the management and to do all the paperwork. That made it more viable.

K.R. We had three partners, two potters and one business partner. But the business partner had another full time job, to get money to live on and pay for his mortgage, as he didn't have an income from the pottery—he put his energies into it with an eye to the future.

C.I. What was basically wrong was that people went there because it was such a beautiful place, instead of going to a place that had some clay and that one hoped might be beautiful. Now if you grow up in a village, you will look at what can be a local product with a local source of supply.

R.I. The problem is that in this country you don't have very many producer co-operatives. One of the services the Co-operative Movement will give for people trying to set them up is expert advice on how to do the books and deal with statutory bodies which can be very daunting. A hundred years ago there were consumer co-operatives started up in this country by the dozen and they ran successfully. If we could only get producer co-operatives that would be all right; but the biggest problem is the administration, with all our rules and regulations. And this country has the most crazy distribution system in the world. It needs to be rationalized but I hate to use that word as it comes to mean bureaucratized. We cart china clay from Cornwall to Stoke-on-Trent to make cups and saucers to ship down to Penzance. We need to look at the places where the materials are found and there is manpower to produce the goods. The other thing is the market forces as they are today. Half of middle-men are parasites living off the producer and the consumer, and they largely determine the prices you can obtain for your goods.

C.I. We had a lovely example: Wellow Crafts. Wellow is a commuting village near Bath; someone with a marketing skill started the thing off, and got hold of a listed building and set it up as a craft shop. She found there were many people around who were making high quality craft products and wanted to sell them not

necessarily making a tremendous lot of money because they were doing it as a hobby and making a little money anyway. It did enable people who were retired to make a bit more and it gave satisfaction to the producer that the high class patchwork cushions, for instance, went to someone who liked them — they had already swamped their own families with patchwork cushions. It also essentially started a village club. At the craft centre they ran courses and charged for lectures.

R.C. There is another terribly important thing we are up against here. You either have highly paid social workers, employed by the county or you have voluntary people who are given little or no expenses, and that means only the well-to-do do the voluntary work; the village people can't afford to do it.

C.I. Hospitals have dealt with this by having voluntary people who drive patients in their cars and get paid their expenses. The ambulance drivers say nastily that you will get some people brought into hospital and you cannot tell who is the patient and who is the driver.

R.I. When there has been an accident I'll listen to them. Till then, why should highly paid ambulance men go on like this, when you aren't talking about their sort of cases? It seems to me we want a half-way stage over the voluntary services.

C.I. We should be encouraging an intermediate stage where expenses are concerned.

R.I. A few years ago we had a village hall with slatted seat chairs: when you sat on them you got a corrugated back side. The committee were bumbling about how to get some new chairs. I said, why don't we cook some food — sausages and bacon — for tourists going by in their cars? We started only on Saturdays, and then we couldn't control the crowds. We had buses pulling in. Then the council people and the public health people moved in. They tackled one woman, who said "You don't come in my house; why should you come here. I have brought up six boys and none of them have died of food poisoning. Why should I poison any of these people?" But everything had to be according to regulations, so it didn't go on any more. Still we bought 150 new chairs out of the racket. It showed how you can do something for the community, keep people busy, and supply a need.

Quantum gravity

CHRIS ISHAM

(Introduction by Chris Clarke)

At a recent meeting of the Theoria group, one day was devoted to following up the discussion on black holes reported in T. to T. Below we give an introductory summary of some of the main ideas of quantum theory and fields, based on the morning discussions. This is followed by Chris Isham's afternoon talk on the "state of the art" in quantum gravity.

1. QUANTUM THEORY AND FIELDS

Before considering quantum gravity itself, it will be useful to examine the background of quantum theory in general, and its difference from "classical" (pre-quantum) physics. Quantum theory is not a particular physical theory (in the sense of electromagnetic theory, or gravitation theory) but more a type of approach that was developed to deal with physical behaviour at atomic length-scales, or smaller.

Classical theory regards the universe as consisting of *things*; more particularly, of particles and fields. Particles are thought of either as mathematical points or as impenetrable "billiard balls". But a field is a more subtle concept: it is a disposition at each point in space to produce a certain effect. For instance, the electromagnetic field round a charged body has a magnitude and a direction at each point, defined by the magnitude and direction of the electric force that would be felt by a particle with unit charge (a "test particle") if

Theoria to Theory

1979, Vol. 13, pp. 19–27 Gordon and Breach Science Publishers Ltd., 1979

Published by

it were placed at the point in question. Similarly, the gravitational field of a massive body is given in Newtonian theory by the gravitational force on a unit mass. (In practice most physicists secretly think of the field as a sort of “stuff” put out by the body producing the field, and this stuff “pushes” the test particle; but this mechanical analogy is of limited use in developing a detailed theory — as the history of nineteenth century aether-theories shows.)

Whether we are dealing with fields or particles, in classical physics they are given objects which we can investigate with arbitrarily high precision. The physicist believes (however little ground he may have) that he can “in principle” observe in complete detail such things as the field round a magnet. This is not the case with quantum theory, which deals not with things but with *states*. This abstract concept vaguely corresponds to the idea of a “state of affairs” but with the essential difference that one cannot, even “in principle” observe a quantum state in complete detail. There is a strict limit to the amount of information that can be observed about a state, and any observation of it destroys it.

For example, if one injects an electron into a vacuum chamber in a particular specified way, then in quantum theory terminology one has prepared a state; one has set up an isolated subatomic system. This state then determines the probabilities of the various results you might obtain if you were to perform a measurement on the system, such as observing the electron’s position. The state does not *determine* the results of an observation, in general. Consequently one is not encouraged to think of the state as being a concrete state of affairs, as in the classical case, although there is a wide spread of opinion as to what sort of objective reality, if any, can be ascribed to quantum states.

The claim that we have direct access to a universe of objective things is, in the end, no more possible to substantiate in classical physics than it is in quantum physics: the difference is that in classical physics the precariousness of the claim can be ignored without altering one’s ability to do physics successfully; but in quantum physics the fact that there are no “things” but only abstract states, which merely give probabilistic tendencies to one’s observations, is an essential part of the formalism of the theory. So it

is almost impossible to do quantum theory without being to some extent self-conscious of the assumptions one is making about what the universe is, or is not, and our active role in observing it.

To construct a particular physical theory within the general framework of quantum theory one has to find a mathematical description of the states and of the observations one can make on them, so that the total mathematical structure corresponds to (or is at least analogous to) a known classical system. For example, to set up a quantum description of a particle one looks for a scheme that contains mathematical representations of observations or of position, momentum, energy and so on, demanding that the relationship between these quantities in quantum theory should mirror, in a way that can be precisely defined, the relationship between the corresponding quantities in classical theory. When one comes to test the theory by experiment, then one must identify certain experiments as measurements of position, momentum and so on (usually relying on a mixture of past experience and classical arguments), and then see whether there is an exact numerical fit between what comes out of the mathematical representation of these observations and the results of the observations themselves.

If we are concerned with a particle, or a few particles, fixed in number, this is comparatively easy. But when we want to describe a field in quantum theory then we have to represent an infinite number of possible observations that one might make, corresponding to the infinite possible complexity of the field, which can vary almost arbitrarily from point to point. So the resulting theory, called a *quantum field theory*, inevitably comes to involve rather sophisticated mathematical techniques.

“Quantum gravity” would be the particular quantum field theory appropriate to describing the gravitational field, and it is to this that we turn next.

C.C.

THE PROBLEM OF GRAVITY

At present there is no quantum theory of gravity. But there is a general desire to invent a theory which, at the very least, would

enable you to make statements about general relativity in situations where quantum theory should apply, and vice versa. And it may be that a totally new theory of physics is needed which would have both these other theories as limits.

The first paper I know of on quantum gravity was written in the 1920s by someone who attempted to apply the old Bohr theory of the atom to gravity. But the main theory-building activity has taken place in the last 20-30 years.

The trouble starts because, in ordinary quantum theory, there is no algorithm (i.e. mathematical procedure) that enables you to apply quantum theory to a classical field. Superficially there is a method, but when you try to apply it the mathematics yields absolute rubbish. Now, people have resolved this problem for electrodynamics (the theory of electromagnetism and electrons) – in fact several Nobel prizes have been awarded for thinking out a cunning way of removing the infinite answers that a superficial application of the method at first produces. When you come to study a new physical field, such as gravity, you start off with a set of classical equations and then try to include quantum mechanics. But, a priori, it is not clear whether you are going to be able to apply the procedure that worked with electrodynamics. And this is particularly uncertain in the case of general relativity because here the gravitational field is technically of a different sort from the electromagnetic field; it has a different role to play in the theory.

People who work in the theory fall into two categories: those who believe that the usual algorithm will work, and those who think it won't. The first category consists, by and large, of elementary particle physicists and the second of general relativists. But the bulk of recent activity has been done by the particle physicists (who outnumber the relativists by about ten to one): over the last 20 years they have attempted to apply to general relativity the same set of rules that worked with electrodynamics. And they fail – in the most catastrophic way imaginable: whenever you try and work out anything at all you get an infinite answer; almost everything is infinite! And when you try the techniques that removed the infinities from electrodynamics they don't work, because the infinities come a different type – roughly speaking there is (infinity), (infinity)²,

(infinity)³ and so on—and every one of them crops up in quantum gravity as done by the particle physicists, giving a system that is completely unusable.

If you are a particle physicist this is a major catastrophe; because you have not done anything wrong. You've taken ordinary general relativity, which relativists tell you is right, you've taken ordinary quantum theory, and you've put the two together in a way which is not a priori particularly objectionable—but then you have this rubbish coming out at the other end. At the back of all our attempts to quantize gravity is this actual contradiction there seems to be between the two theories.

The point of view of particle physicists (who are very dogmatic and won't yield to anyone) is simply to proceed with your rules and algorithms and just try to botch them up so that they do work: and it's not a trivial exercise! Suppose someone presents you with an infinite answer. Well, “infinity minus infinity = 0”, so the obvious thing you try and do is to put some more structure into the theory so as to produce *more* infinities that cancel out the ones you have already got; and if you're very careful you can arrange that “infinity minus infinity = 1/196” or something interesting like that.

It is important to realise that in the case of electrodynamics this device does work. If you evaluate the magnetic moment of the electron using this theory you get infinity; but when you subtract off another infinity you get an answer which agrees with experiment to many decimal places. So a lot of effort now is going into producing so called “unified field theories” which will have in them not just the structure of general relativity but certain other very special basic fundamental fields. These will be the substratum of the whole of physics, as far as the particle physicists are concerned (they have a very limited view of the world, of course!) And the idea is to choose these other fields in such a way that you get “infinity minus infinity = 1/196”. There's no reason to believe that this is possible, but nevertheless they keep trying.

If you are a classical general relativist (the second of the two categories of people I mentioned) your reaction to this is that you should not be constructing a theory in this way at all: you are taking a theory (general relativity) which is basically geometrical—to do

with curved spaces—and you are trying to apply to it a quantum theory which is geared to working in flat space. This may sound a minor technical difficulty, but in fact it's a very profound difference in the mathematics that is used and in your whole approach. So a lot of general relativists believe that you really need to rethink the whole conceptual structure: you need to analyse right down to a basic level what is meant by quantum theory and general relativity; and perhaps what will appear at the end of this is a new view of space-time itself.

A vital point comes in here: if you take the fundamental constant involved in quantum theory, which is Planck's constant; the fundamental constant of general relativity, Newton's constant G ; and the velocity of light c which occurs everywhere, then you can make a quantity $\sqrt{(GH/c^3)}$ that has the units of length: it is the only fundamental length that there is in physics, and it should set the scale at which quantum effects become important. Its value is 10^{-33} cm[†], which is very, very small indeed. The feeling around at the moment (apart from the people with their infinities who don't believe in this sort of thing) is that down at this length, the *Planck length*, the whole concept of space-time structure breaks down. Larger than this, space and time are macroscopic: space and time mean the same things at 10^{-20} cm as they do in this room; but below 10^{-33} cm the conventional conceptual structure of space and time disappears and must be replaced.

To get a feel for the order of magnitude involved, you can convert a length into a mass or an energy. The mass associated with 10^{-33} cm is 10^{-5} gm. That means you need to take a piece of mass of 10^{-5} gm and completely annihilate it into energy[‡] in order to probe this sort of distance; in terms of particle accelerators it corresponds to an energy of 10^{28} eV—14 orders of magnitude higher than any particle accelerator in the world. So we are talking about regions which in the foreseeable future are not going to be accessible to direct experiment. This is one of the things that underlies all work in quantum gravity: that it is not in any way directly experimentally testable.

[†]That is, 0.000000000000000000000000000001 cm.

[‡]In one single particle-event, not in many events like and H-bomb.

Because of this, everyone who works in this field works entirely by analogy with other theories. The particle physicists say “look, this did work for electrodynamics; let’s try the same sort of algorithms here”. But the people who are more interested in fiddling with the conceptual structure have nothing to go on at all. There is no experiment to guide you: the best you can hope for is a theory that is mathematically consistent, so that you don’t get these spurious infinities. It is almost an impossible job, because you have no idea what you want to do. There is nothing like the hydrogen-atom spectrum, which started quantum theory off; no Michelson-Morely experiment which founded relativity — nothing! So doing research in this is not like doing research in any other branch of physics: you have used up all the analogies from other theories and have a virgin canvas. You are guided purely by a sort of mystical sense of what ought to be right. Not unnaturally, people disagree violently as to what this is!

One might ask, if the chance of getting experimental feedback is so slim, what is the point of it all? One answer would be that if you are a mathematician faced with these infinities then it is psychologically impossible just to leave them there. But also, there’s a bit more to it than I have just described. These remarks about lack of experimental verification are based on the observation that the Planck length is very small, and so presumably the results are going to be very small. But we know from quantum theory that very often the results depend on, for example, the logarithm of a basic constant. Now the logarithm has the very nice property that as the constant becomes small, the logarithm becomes very large in magnitude. And this might happen here: people did some calculations to show that in a certain way you could get quite large results which depended on $\log G$. It seems that these infinite numbers, if controlled and made finite in a way that has been suggested, could contribute an amount to the mass of the electron of perhaps $2/11$ of its total mass — quite a large number, coming out via a logarithm. That sort of effect is very important because it means that there may if only we knew it, already be experimental tests of quantum gravity, but we don’t know them because we don’t yet know what the theory actually is.

Where do we go from here? If the particle physicists' approach is not going to work, then I am inclined to the view that the space-time structure itself breaks down. The continuum disappears: that is the heart of the matter. These infinities come about, roughly speaking, from taking $1/x$ and letting x go to 0. If there is no continuum then you cannot let x go smoothly to 0: it stops at the planck length, so that you do not get an infinite answer, only a large one. The infinities are telling us that something funny happens at this distance.

The currently fashionable way of describing what happens here is called "quantum topology". It is based on the fact that General Relativity has more in it than I have considered so far. The gravitational field is a geometrical structure, and the space on which this field sits is not merely curved but may be topologically different from flat space; in the same way, say, as a sphere and an American doughnut are different—one cannot be deformed into the other. Quite a lot of people (at least one and possibly two) believe that at 10^{-33} cm something happens to the topology of space and time. Although on the large it appears to be a topologically flat space, with just a few ripples, at 10^{-33} cm holes get punched out; the space-time structure itself gets mangled.

This sort of concept is what Hawking is aiming at at the moment. It was first suggested about 20 years ago by Wheeler, but it's only because of developments in the last 5 years—oddly enough in strong interaction physics—that there are now techniques that enable us to start discussing this type of problem mathematically. The techniques were quite easy to apply to strong interactions but they are much harder for quantum gravity.

Strong interactions are the strongest forces in nature, and bind together the particles in the nucleus of the atom. People now think in terms of these particles being made up of more basic ones called quarks, and in the current theory what holds the quarks together is a field called a "gluon". The mathematical attributes of this gluon are similar to those of gravity, only simpler. Now people have found that the topological configurations, the number of twists—like a Möbius strip—in the field, is found to be of direct relevance to the physics.

The sort of topological change that Stephen Hawking, for example, thinks of is where little black holes keep appearing and disappearing. The topological structure of a black hole is not quite the same as that of Euclidean space, although it is not very different. The idea is in a way similar to Wheeler's, except that Hawking doesn't distinguish between space and time in the way he did. Space time is made up of a frothy foam of appearing and disappearing black holes—and that's a direct analogue of what's been done in quark theory, where the gluon field does have such a structure. Though in the gluon field, instead of holes one has things more like Möbius-band twists, called instantons. You can think of a gas of instantons which holds the quarks together; but, you see, it is not a gas in physical space. Within the space in which it does sit it has some of the properties which a gas would have, were it in physical space.

Though whether this will get us to a really viable theory of quantum gravity remains to be seen.

Notes

1. The use of the word "gas" in this context is really rather problematical. This is especially true in the general relativity case, but even in strong interactions it is stretching analogy to its limits. Instantons are solutions to certain types of field equations (with imaginary time) which are localised in space and (imaginary) time. It is possible to conceive of solutions which describe a collection of these localised "objects" distributed throughout spacetime and which only interact with each other over short distances. In this sense one might use the term "gas" but for a non-specialist the concept is likely to be confusing. Physicists originally explained the behaviour of a real gas as being like that of a collection of very small, hard molecules in a box. These collided elastically with the walls of their box and with each other. With the advent of quantum mechanics, discrete "quanta" or packets of energy were talked of in a similar way. For example the vibrations of the fixed atoms of a crystal exist in distinguishable modes with energies. These quanta of vibration have the properties of being localised within the crystal, of being distinct from each other, and of interacting with each other occasionally, i.e. "colliding" although they are obviously not solid objects. These are just those dynamical properties which characterise the molecules of a gas.

'Eastern mysticism' and the nature of mysticism

GEORGE FEUERSTEIN

The widely (mis-)used concept of 'eastern mysticism' is, in my opinion, of doubtful analytical value, and to indicate this I have made use of single quotation marks in the title. This implies a firm rejection of the popular, though I believe mistaken, assumption that 'eastern mysticism' constitutes some sort of organic whole which can usefully be contrasted to a similarly synthetic entity called 'western mysticism' which is often and erroneously identified with 'Christian mysticism' *per se*. I am not aware of a single critical principle which would allow us to look upon the multitudinous mystical traditions of the East as a unitary whole. Nor do I think that the mystical teachings of Europe and the two Americas could readily be summated under a single denominator. Of course, there are a number of features with reference to at any rate some of which we can classify these traditions as 'mystical' in the first place.

What, for instance, would justify us to group together the mysticism of C. Castaneda's¹ Don Juan with the teachings of Meister Eckehart? Or the 'pop' mysticism of a Timothy Leary² or John C. Lilly³ with the love mysticism of St. Teresa? On the eastern side, again, what is the significant common denominator between the mysticism of a Patañjali, a Lao-tzu or a Rūmī? Even if there existed a significant bond of similarities, this will have to be demonstrated rather than postulated.

In other words, the umbrella concepts of 'oriental' and 'occidental' merely beg the question. These are type concepts which are profoundly problematical; neither can be said to denote a genuine

Theoria to Theory

1979, Vol. 13, pp. 29–46 Gordon and Breach Science Publishers Ltd., 1979

Published by

homogeneous class. Where exactly, in space and time, lie the boundaries between the Orient and the Occident? My refusal to operate with these two types does not imply a rejection of type construction *tout à fait*. On the contrary, I believe that typologies are of great heuristic value in all comparative research, and I merely plead for more meaningful constructs. I feel that the widely practised juxtaposition of 'eastern' and 'western mysticism' is symptomatic of the general inadequacy of much past and present comparative research on mysticism.

This brings me to the key concept of 'mysticism' itself. Considering that W. R. Inge⁴, almost eight decades ago, listed no less than twenty-six definitions which have since then been multiplied a great many times, it may seem naïve or at least unwise to attempt yet another definition of mysticism. Yet such a definition seems crucial to a framework purporting to be conceptually clear. Clearly, definition need not be the type of air-tight conceptual demarcation which it is commonly held to be. As M. Polanyi points out: "Definitions only shift the tacit coefficient of meaning; they reduce it but cannot eliminate it."⁵ Far from being purely objective structures, definitions entail a personal element, a 'tacit coefficient', which M. Polanyi equates with an 'act of confidence'.

We are surely not at the beginning of the study of mysticism which would make us shy away from an attempt to define it conceptually, and neither can we foresee any end to such a study, unless we *a priori* deny mysticism all existence in the human culture of the future.

The problem of defining 'mysticism' is itself as old as the study of the phenomenon thus labelled. In view of the current, largely pejorative, usage of this word, it would ideally be advisable to dispense with it altogether, but I fear it might be too late for this. My misgivings hold particularly for the English language which does not have the advantage of the distinction in German between *Mystik* and *Mystizismus*. Confused in popular imagination with irrationality, spiritualism, occultism, hypnotism and magic, it is important to demarcate the concept of 'mysticism' if it is to retain any analytical value and to avoid this kind of misleading homonymy.

In defining mysticism we need not, I think, succumb to either the Charybdis of strict essentialism or the Scylla of extreme Wittgensteinian anti-essentialism. This can be avoided by a restatement of the definitional criteria in terms of combinations of necessary and sufficient properties which may either be conjunctive (“and”) sets or disjunctive (“or”) sets and which, in addition, may or may not be open to future change.⁶

Glancing through Inge’s above-mentioned compilation of definitions, which are representative of the plethora of subsequent definitions, one finds that these can be grouped into six broad types (though other classifications are possible and perhaps equally plausible):

- 1) experiential definitions (e.g. “the union of the soul with God”)
- 2) psychological definitions (e.g. “an inner attitude, a feeling, motivation or other content of consciousness”)
- 3) ideological definitions (e.g. “a way of life, philosophy”)
- 4) institutional definitions (e.g. “a branch of religion”)
- 5) moral definitions (e.g. E. Récéjac’s “tendency to approach the Absolute morally”)
- 6) psychiatric definitions (e.g. “schizophrenia”)

Not all the definitions cited by Inge are simple and some extended over several of the above categories. W. R. Inge (p. 336) perceived a typological rift between the definitions proposed by the earlier Christian scholastics and later writers. He says: “. . . the sharp distinction between natural and supernatural, which is set up by the scholastic mystics, carries with it a craving for physical ‘mystical phenomena’ to support the belief in supernatural interventions. These miracles, though not mentioned in the earlier definitions, have come to be considered an integral part of Mysticism [. . .] those who take this view of ‘la mystique divine’ are constrained to admit by the side of true mystical facts a parallel class of ‘contrefaçons diaboliques’”.

Most contemporary writers on mysticism have happily surpassed this crude theological dualism in favour of a somewhat less dogmatic stance. Nevertheless, there persists a certain blindness towards the inescapable fact that even the most sophisticated definitions of mysticism generally still entail ontological and

epistemological assertions of one kind or another. My own personal ontological commitment is readily apparent from the following definition which is admittedly tortuous but hopefully useful:

Mysticism is a system of enduring noetic, emotive, attitudinal, volitional and behavioural variables pertaining to an individual or a group of individuals, centering on the recognition of a class of personal experiences, to which they are held to be conducive, of cognitive unity or identity with a transphenomenal referent (however conceived) which is intuited as overwhelmingly real and held to be desirable for itself.

In contrast to the superabundant atomistic definitions of mysticism which identify it with a single, isolated feature such as a special experience or feeling or—in the intellectualist interpretation—a particular philosophy or ideology, etc., I wish to emphasise the empirical complexity and intrinsic organicity of mysticism by referring to it as a “system”. The term “system” is used in a general sense as “a network of interconnected variables” which may or may not be consciously integrated into an overarching philosophy. The stipulation that these variables should be *enduring* introduces the time dimension which, I think, is crucial. This has, in fact, always and in most traditions been formally or tacitly recognised in the characterisation of mystical life as a “path” or “road” or, actively speaking, as a “journey” or “pilgrimage”—that is to say as a graduated endeavour.

Even the masters of the southern branch of the Chinese Ch'an tradition, well-known for their insistence that enlightenment is not achieved in stages but in a sudden flash, employ a variety of *kung-an* (Jap.: *koan*) intended to push the intellect to its natural limits, to wear it out and silence it so as not to impede spontaneous self-illumination. The interesting metaphysical position of this school is beautifully illustrated in the story of the selection of the sixth patriarch. When the fifth patriarch, Hung-jen, made it known that he was looking for his spiritual successor, his most promising disciple Shen-hsiu submitted the following stanza to demonstrate his qualifications:⁷

The body is the tree of enlightenment,
And the mind is like a bright mirror stand,
Always cleanse them diligently, and not let
dust fall on them.

A short while later a second stanza was posted next to it:

Enlightenment is not a tree to begin with,
Nor is the mind a mirror stand,
Since originally there was nothing, whereon would
the dust fall?

Traditionally, the composer of these lines was none other than the famous 11th century master Hui-neng who was promptly, though secretly, installed as the sixth patriarch. Two centuries earlier, the buddhist *tantrika* Saraha expressed a very similar view:⁸

What is the use of austerities?
What is the use of going on pilgrimage?
Is release achieved by bathing in water?
(*Dohākoṣa*, vs. 15)

Abandon such false attachments and renounce such
illusion!
Than knowledge of This there is nothing else.
Other than This no one can know.
(*Dohakoṣa*, vs. 16)

Yet even though Saraha ridicules the struggle of the ordinary *yogin* to liberate himself by means of the conventional methods recommended in the scriptures, he nonetheless admonishes the seeker *not* to sit at home and also *not* to adopt the life of a forest hermit (vs. 103).

These are pertinent examples of a situation where the student of mysticism must prudently distinguish between the metaphysical assumptions of a particular tradition and the actual behavioural reality – a distinction with which the anthropologist is perhaps more familiar than the historian of religion.

The insistence on temporal continuity in feeling, thought and conduct immediately excludes those apparently numerous cases where spontaneous transpersonal experiencing has not had any long-term effect, that is to say, where it has not made a noticeable difference to the person in question and was little more than a pleasant or possibly even puzzling interlude in his quotidian existence. The spontaneous mystical experience of the juvenile Gautama, mentioned in *Majjhima-Nikāya* I.246, is an interesting borderline case insofar as it was not followed by an immediate

metanoia. However, as we know, Gautama did not win through to his later *bodhi* experience which transformed him into a *buddha* until he remembered his childhood experience. It was then that he desisted from his rather fierce asceticism and instead turned his entire attention to the voiding of his consciousness.

The present definition also automatically excludes, as indeed it should, the empirical investigation of mysticism and the laboratory produced altered states of consciousness where these are not accompanied by permanent personality changes in the sense that the subject becomes motivated to reorientate his entire life in the light of his mystical experience, thereby rendering the recurrence of transpersonal experiencing more probable.

In this connection I wish to draw attention to W. N. Pahnke's⁹ fascinating experiment in which psilocybin was administered to a group of Christian theology students in a distinctly religious setting and whose responses to the experimentally induced experience were followed up over a period of six months. Remarkably enough, the control group which was given nicotinic acid not only failed to experience the same range and intensity of mystical phenomena such as external/internal unity, space-time transcendence, sense of sacredness, paradoxicality etc. — to mention a few of the analytical categories used by Pahnke — they also did not show a comparable degree of persistent positive change in attitude and behaviour. In Pahnke's (p. 312) own words, "the experimenter was left with the impression that the experience had made a profound impact (especially in terms of religious feeling and thinking) on the lives of eight out of ten of the subjects who had been given psilocybin". However, before one can decide whether or not these positively affected individuals could be considered mystics, the interviewing responses would have to be carefully studied. Counter to such past and current thinking about mysticism, I do not subscribe to the popular notion which equates *mystical* with *religious* experience. Hence although there may have been a religious pay-off from the experimental experience, it should not be presupposed that the positive changes which Pahnke noticed amount to a "conversion" to mysticism in each and every case.

Mystical experience, as I see it, consists in a radical cognitive shift

whose essential characteristic is a distinct effacement of the natural boundaries between the experiencing subject and the experienced object, but without loss of awareness. As Meister Eckehart put it so graphically:

How wonderful: to stand outside as well as in, to grasp and be grasped, to behold and oneself to be the beheld, to hold and be held—that is the goal . . .¹⁰

The mystical literature of the world is replete with descriptions of this fundamental phenomenon (*Urphänomen*) of subject-object transcendence, and I need not here recapitulate the excellent analytical observations by C. Albrecht, C. Naranjo, R. E. Ornstein, F. Heiler, E. Underhill and others.¹¹

A basic distinction must be made between the invariant features of the mystical or transpersonal consciousness, as brought out by diligent phenomenological analysis, and the conceptualisation of the mystical experience. As has become transparent from recent experimental research on drug-induced altered states of consciousness, mystical experiences are not the sole prerogative of religious individuals. This has caused tremendous difficulties to those who maintained, on an *a priori* basis, that authentic mystical experiencing can only occur within a religious context. Indeed there are still many who tenaciously refuse to accept that mysticism need not assume religious forms, and that we must conceive of the possibility of a purely secular type of mysticism. In point of fact, without this admission we would be unable to accommodate, for instance, J. Krishnamurti's or Sarahapada's teachings into the category of mysticism. Nevertheless, it remains true that past and present mysticism is largely of a religious nature, that is to say, is informed by the attitudes, beliefs, values and practices common to the mystic's particular religious community.

Now, I do not believe that the differences in conceptualisation between a religious and a secular mystic or between religious mystics of clashing persuasion are merely a question of linguistic idiosyncrasy. The categories employed to "slice up" or "factor out" reality—be it the reality of workaday life or of mystical experiencing—are by no means arbitrary labels. Experimentally it makes a difference whether the content of the mystical experience is conceptualised as a personal force or as a void (*śūnya*), as omnipresent

love or as the absence of all emotionality. It is my conviction that the linguistic categories *may* reflect actual discontinuities in the experience of the transphenomenal referent and, conversely, to a certain extent *may* even predetermine the form of the mystical encounter. Consequently I disavow the widely entertained view according to which mystical experiencing is all one and the same. Contrarily, I assert with R. Otto¹² and R. C. Zaehner,¹³ *inter alia*, that mystical experiencing is highly differentiated. Without this assumption the comparative study of mysticism is incapable of transcending Christian, Hindu or Buddhist apologetics and dogmatism. It is obvious from these comments that those who simply equate the study of mysticism with the psychology of mystical experience are as mistaken as those who feel that mysticism can be exhaustively dealt with on the level of ideology. Being a highly polymorphous phenomenon, only a multidisciplinary approach would seem to do full justice to it—a point which has not been sufficiently appreciated as yet.

Repugnant as the idea of drug-induced mystical states may be to the committed Christian, it is by now established fact that certain chemical substances can—not necessarily *must*—bring about significant changes in consciousness displaying all the properties commonly associated with the mystical state. To the agnostic scientist this does not really come as a great surprise. However, the die-hard positivist or behaviorist has as much trouble to explain *away*, rather than explain, this phenomenon as has the Christian theologian to whom mystical experience is exclusively due to divine grace. The metaphysics of the former demands that all mystical experiences be relegated to the realm of verbal garbage, chemical reactions or behavioural disorder. The more traditional metaphysics of the latter, on the other hand, constrains the theologian to reclassify, and condemn, drug-induced mystical experiences as “imitations” of the genuine *unio mystica*. This position comes dangerously close to the earlier scholastic notion of “contrefaçons diaboliques”. The conventional association of mystical experiencing with the concept of the divine makes a *religieux* predisposed to also seek a divine cause for that experience. This is an understandable error but one which is evidently out of place in critical research on mysticism.

As any survey of the world's mystical traditions bears out, human ingenuity has utilised a wide range of "triggers" to achieve a disruption of the normal flow of consciousness in order to initiate a radically different form of cognition. The term "trigger" was, to my knowledge, first used by M. Laski¹⁴ who understood by it "certain objects, events and ideas" which spontaneously induce altered states of consciousness or, in Laski's phraseology, "ecstasies". However, in adopting this term I mean to extend it also to instances of intentional induction such as by means of a course of spiritual disciplines or through drugs. The trigger "sets the stage" as it were for the transformation of the modal consciousness into the mystic consciousness. In no way do I wish to suggest that the trigger is a sufficient cause for the occurrence of mystical experiencing.

As the by now fairly extensive experiments with the so-called psychedelic or hallucinogenic drugs, like LSD-25, mescaline or marijuana, have demonstrated beyond all doubt, there is no one-to-one correlation between the drugs' chemical composition and the resultant state of consciousness. On the contrary, there is ample evidence that the unpredictable individual nuances in drug-induced experiences are the result of a great many intervening variables which fall into two major categories, viz. the psychological make-up of the subject (known in scientific jargon as the "set") and the environmental conditions (or the "setting"). Some experiences turn out positive, healthy, desirable; others are downright failures ("bad trips"). It is significant that, according to the consensus of opinion, only in the very rarest cases—and then apparently not without due preparation in terms of personality integration—are the higher mystical states accessible in this manner. At any rate, those who wish to avail themselves of the explanation of mystical experiencing by divine intervention ("grace") should find it reassuring that there does not appear to be a simple specifiable causal nexus between trigger and resultant state of consciousness. In saying this I do not wish to deny that "grace" *may* correspond with an actual experience in the mystical state. Still, I am hesitant to accept this concept as a universal *causa efficiens* in mysticism.

Drugs belong to the category of artificial triggers, together with an immense variety of other ingenious devices. Artefacts are

endemic to mysticism as a concerted endeavour to reproduce mystical consciousness. In India, especially, drugs have been widely exploited in the mystical traditions to help the mystic break through the confines of the ordinary consciousness. Since R. G. Wasson's¹⁵ searching study, we know that the *soma* plant which played an important role in the archaic mysticism of the ṛgvedic priesthood very probably had hallucinogenic properties. In fact, Wasson identified it with *Amanita muscaria* (fly agaric) whose mysterious effects have been known and enjoyed in other parts of the world as well. Although it is mistaken to describe the early vedic religion *in toto* as "sacrificial mysticism", as did S. Dasgupta,¹⁶ there are certain hymns in the *R̥gveda* which embody attitudes and ideals and speak of practices and experiences that satisfy the criteria for inclusion into the category of mysticism as understood here. This material has been ably presented and analysed in a recent study by J. Miller.¹⁷ The heyday of drug use and abuse in India came with the turn of the first millennium A.D. which saw the rise of the so-called Tantrism described by M. Eliade¹⁸ as a "pan-Indian movement" which transformed the practice dimension of Hinduism and Buddhism by the unashamed introduction of triggers hitherto regarded as inexpedient or morally condemnable.

But to move away from drugs to more conventional triggers: meditative absorption constitutes the core of the exercitium in most, if not all, mystical traditions. The elaborate systems of meditation, evolved by Hindu and Buddhist mystics over many centuries, have become well known throughout the western hemisphere. By comparison the rich Christian heritage of meditational disciplines has fallen into relative desuetude — partly because whatever has survived of the great mystical culture of medieval Europe is too introvertive and too quietistic to make an impact on contemporary life and also partly no doubt because of a general disillusionment with, and alienation from, Christianity as such. Today Patañjali's eightfold Yoga is better known than, say, the exercises of St. Ignatius. There is much talk and occasionally even understanding of *dhyāna* or *zazen*, *samādhi* or *satori*, the *Bhagavad-Gītā*'s ideal of 'actionless ness in action' or the corresponding Taoist *wei-wu-wei*. But how few are aware that all these elements have been expressed, often with

extraordinary beauty and power, in Meister Eckehart's sermons or in *The Cloud of Unknowing*.

The allurements of Zen, Tantrism, Taoism, Sufism and, in particular, Yoga unquestionably lies in the fact that these traditions offer a wealth of practices on which the technology-conscious European neophyte can test his wit, skill and endurance. Moreover, there is no dearth of teachers—some genuine but most, it seems, barely qualified—who are willing to proselytise. This great popularity has in many instances led to the vulgarisation of the original teachings. Of all these traditions the sublime system of Haṭhayoga has undoubtedly suffered the greatest degree of distortion at the hands of its western adherents. In its original conception, Hathayoga was—like all other branches of the ramifying Yoga movement—propagated as a way of achieving the transmutation of consciousness (*citta*) into pure awareness (*cit*).

Haṭhayoga represents the concluding phase of a formidable tradition within Tantrism which sought to effect a complete *Umwertung* of the physical dimension, especially the human body. In conscious opposition to almost all other Indian traditions which perpetuated the idea of the utter worthlessness, impurity and detestableness of the body, the *gurus* of Hathayoga preached that the body was the tabernacle of the Divine. They decried all maltreatment of the physical frame through excessive mortification or sheer neglect and demanded that its powers should be harnessed and properly cultivated so as to make the body a worthier receptacle of the Supreme. Though basically sound, this new approach caused a great influx into Yoga of less healthy elements from the sphere of popular magic which has brought Hathayoga, and Tantrism in general, into disrepute not only in India itself but unfortunately also with European scholars.

In order to “steel” or, as the texts have it, “cook” the body so as to make it pliable to the will of the *yogin*, the masters of Haṭhayoga developed a unique series of purification practices (*śadhana*), postures (*āsana* and *mudrā*) and breathing techniques (*prāṇāyāma*). Their chief purpose is to mobilise the dormant psycho-energy locked up in the body. What an actual arousal of this so-called “serpent power” (*kuṇḍalīnī-śakti*) may involve has been vividly described by

Gopi Krishna¹⁹ whose staggering experience, incidentally, threw him off balance for many years.

The tantric teachers did not see themselves so much in the role of innovators but as translators of age-old doctrines and practices which had lost their efficacy with the onset of the “dark age” (*kāli-yuga*), the present cosmico-historical stage. This is the last of a cycle of four “world ages” and the nadir of spiritual degeneracy. According to this model, not unknown to other cultures of the ancient world, human history is depicted as a progressive moving away from man’s original natural proximity to the transcendental reality. In the *kāli-yuga* the conditions are least conducive to the cultivation of the mystic life, and for this reason the tantric masters show little prudishness in their choice of methods; anything goes, or almost anything. Among their stock-in-trade are *māntra*-recitation, psycho-cosmographic devices (known as *yantra* and *maṇḍala*), special hand and bodily gestures (*mudrā*), visualisation techniques (*dhyāna*) and not least the notorious *pañca-tattva* ritual. This ritual involves, in the “left-hand” schools at least, the actual not merely metaphoric performance of five acts condemned by the puritanical orthodoxy, viz. the taking of wine, meat, fish and an aphrodisiac and finally sexual intercourse. The *tantrikas*, in fact, seek to make use of the whole gamut of human emotion, especially the strong negative feelings of rage, fear, hatred and disgust. In the spirit of existentialism they believe that man can find his true nature, that is, determine his essential being with every breath he takes. This same striking latitudinarianism has moved the tantric teachers to condemn caste segregation and the general low regard for the female sex.

Equally typical of this catholicity are the teachings of those who, like the masters of the *sahaja-yāna*, deny that Reality can be reached by any external means and who poke fun at the *yogins* and *sadhus* addicted to this or that practice. According to their metaphysics, man is not divorced from the Real to set it up as a goal and aspire to it by means of physical or mental disciplines. All it takes to realise the Non-dual is to discontinue the habit of seeing everywhere duality. To quote one more stanza from Saraha’s cycle:²⁰

There's nothing to be negated, nothing to be
 Affirmed or grasped; for It can never be conceived.
 By the fragmentations of the intellect are the deluded
 Fettered; undivided and pure remains spontaneity.
 ('King Dohās', vs. 35)

One can appreciate Sarahapāda's lofty idealism and even agree with him when he censures those who get so involved with their exercises and gadgets that they lose sight of the original purpose. However, the question remains: How, practically speaking, do we in fact cease to construct our phenomenal universe? Few are born natural mystics, and the mere conviction of the truth of Saraha's axiom cannot by itself magically remove the familiar world of space and time. This is recognised by the great *guru* when he stipulates in his *Dohākoṣa* (vs. 17) that a teacher is absolutely essential.

Close to the spirit of Saraha's teaching is the Ch'an (Jap. Zen) school, founded by Bodhidharma in the earlier part of the 6th century A.D. Here meditation (*ch'an* = *dhyāna*) is held to be the principal means whereby the impediments to the realisation of one's perfect congenital Buddhahood can be removed. But, again, other suitable triggers are resorted to. As the sixth patriarch Hui-neng observed, he has no system to teach but avails himself of any device which he sees fit for the occasion in order to enlighten his disciples and liberate them from their self-inflicted bondage to duality. One must cross the bridge somehow, and it does not matter how.

One of the most widely employed triggers to force the mind out of its habitual way of thinking and perceiving is the well-known *Kung-an* (Jap. *koan*). This consists in a word or phrase meant to confound the unenlightened neophyte—a riddle which cannot be solved by discursive reasoning. Some of the over 1700 *kung-an* known to the Chinese—Japanese tradition are intuitively graspable, others are totally unintelligible. Their alogicality and mind-baffling paradoxicality have the sole purpose of pushing the intellect to the point where consciousness suddenly undergoes a radical transmutation in the experience of *wu* (Jap. *satori*), which has been described as a transient foretaste of the reality of permanent Buddhahood. The rapid question-answer session between teacher

and student, known as *wen-ta* (Jap. *mondo*), is a related trigger favoured by the masters of the southern school.

Again and again the Ch'an teachers preach that the truth lies within oneself. Dogmas, formulas and paths merely serve to entangle the student still further in the deceptive realm of duality. Sometimes a shout, a laugh or a sudden blow may bring about what years of assiduous dedication to meditation or self-castigation have failed to procure.

In Classical Yoga the dynamics of mysticism is pictured as unfolding between two complementary poles, which bear the technical designations *vairāgya* and *abhyāsa* respectively. The concept of *abhyāsa*, literally meaning "application, dedication to, exertion", covers the whole gamut of practices through which the *yogin* hopes to achieve the purification, stabilisation and ultimately suspension of the ordinary consciousness. *Vairāgya*, on the other hand, is simply "dispassion", in Buddhism also known as *vitṛṣṇā* or "non-thirsting". Often interpreted as the physical abandonment of mundane existence, it is primarily an inward act of letting go or, as M. Weber once phrased it, "internal asceticism" (*innerweltliche Askese*).

It is synonymous with Meister Eckhart's key concept of *gelāzenheit*. The great christian mystic and theologian never tired of extolling the virtue of inner distance from wordly things and concerns as a *conditio sine qua non* of the life in and with God.

As much as you go out of all things that much, not more and not less, God enters with all of his, insofar as you in every respect completely give up what is yours.²¹

This *metanoia* or turning away from the finite towards the infinite is instrumental in realising the crowning ideal of *abegescheidenheit* (isolation) which is the Meister's favourite theme. Together with humility and repentance, *gelāzenheit* effects the gradual transformation of the *homo exterior* into the *homo interior* who experiences the peace of God.

I take this inner reversal to be a universal feature of all authentic forms of mysticism, though it may not always be clothed in such heavily religious terms. I am thinking, for instance, of Timothy Leary's²² triadic prescription "drop out — turn on — tune in". "Dropping out" is here evidently functionally homologous to the yogic

“dispassion” or “inner renunciation” in what he would call “straight” mysticism. It means, in his own words, “detach yourself from the external social drama which is as dehydrated and ersatz as TV” (p. 183). What this involves in the radical vision of the drug apostle is plain from the following slogan-like admonition: “Quit school. Quit your job. Don’t vote. Avoid all politics”—with the proviso “Make your drop-out invisible. No rebellion—please!” (p. 185). But to be fair to T. Leary, there is another side to these external acts of withdrawal or defiance (depending on the perspective one takes) as can be seen from the following statement: “Unhook the ambitions and the symbolic drives and the mental connexions which keep you addicted and tied to the immediate tribal game.” (p. 288.)

It is this attitude which separates the mystic from the sensation-monger who seeks, usually with the help of drugs, mystical experiences for their own sake. A. Maslow makes some very pertinent and insightful observations on this point: “Out of the joy and wonder of his ecstasies and peak experiences he may be tempted to *seek* them, *ad hoc*, and to value them exclusively as the only, or at least the highest, goods of life, giving up other criteria of right and wrong. Focused on these wonderful subjective experiences, he may run the danger of turning away from the world and from other people in search for triggers to peak experiences, *any* triggers [. . .] and finally even perhaps *using* other people as triggers [. . .] In a word, he may become not only selfish, but also evil.”²³ As the history of mysticism evinces, the danger of confusing the means with the end is ubiquitous. It is not the delights of mystical experiencing which the genuine mystic finds so desirable; rather, as I have tried to capture in my definition, his motivation and gratification lie in the transphenomenal referent of that experience—be it encountered and conceptualised as God, Ātman, Brahman, Allāh, Puruṣa, Nirvāṇa, Tao or Śūnya.

As I have indicated above these various designations must not be understood as simple synonyms which necessarily have an identical referent. Firstly mystical experiencing has been shown to be considerably differentiated. Secondly, interpretation constitutes, in a certain sense, an active ingredient in mystical experiencing. This does not mean that because a mystic is a convinced theist his

experience will *necessarily* assume the form of an encounter with a personal God, or that because a mystic conceives the ultimate Real as Voidness (*śūnyatā*) that he therefore predetermines the nature of his mystical experience. A theist may well have a mystical experience which does not fit easily into his cognitive map, and the *śūnya-vādin* is equally liable to have experiences which seemingly clash with his theoretical ideal of the Void. Even more strikingly confessed atheists and agnostics have been known to have revised their philosophy in the light of a personal, distinctly theistic mystical experience. On the other hand, the mystic's conceptual framework is not entirely irrelevant to the mystical experience, if only in the sense that he will tend to actively seek out the kind of mystical encounter which, in his appraisal, has ontological priority—whilst perhaps passively rejecting all “lesser” experiencing.

Although mystical experiencing has often been hailed, especially by the traditionalists, as transcending the mind, the available evidence suggests that this is only conditionally true. It seems that mystics are varyingly sensitive to different aspects or modes of the transphenomenal reality. Perhaps A. Moore was hinting at this when writing: “The attainment is correlative to the seeking, the possession to the wanting. Mystical union is correlative to, at the same time that it is a surpassing of, life in this world, and we have no reason to think it could exist in the absence of such a life. The mystic takes his ball of yarn with him.”²⁴

These mystically experienced modes of Reality are not the “mansions” of St. Teresa’s “Interior Castle”, but something more fundamental. For, whereas St. Teresa admits of many different approaches towards spiritual perfection but still insists on the unity and singularity of the ultimate goal of “spiritual marriage”, I propose that the terminal state itself is multiform. Reality, in other words, is pluristructural. Implicit in this view is the idea that there may not exist an objective *scala perfectionis* but that the stages or degrees of mystic interiorisation are probably relative to the mystic's metaphysical model. It follows from this that any attempt at constructing a systematic ontology from the data of the phenomenology of mystical experiencing is likely to be abortive. This is especially true by virtue of the fact that mystics are only rarely good

phenomenologists and use language to arouse and stimulate rather than to describe and communicate. Nonetheless, this relativising of mystical experiencing must not be confounded with total subjectivity since it is most emphatically *not* hallucinatory. In this way, I believe, I am able to take the mystics seriously without having to evade the fact of the multiformity of their experiencing.

Notes

This is a slightly modified and abridged version of a paper read in German at the Eckehart symposium held in Erfurt 13th to 18th February 1978. Grateful acknowledgement is made to the British Academy for a generous travel grant enabling me to participate in this conference.

1. C. Casteneda, *The Teachings of Don Juan* (Berkeley/Los Angeles, 1971).
2. T. Leary, *The Politics of Ecstasy* (St. Albans: Paladin, 1970).
3. J. C. Lilly, *The Center of the Cyclone* (New York, 1972).
4. W. R. Inge, *Christian Mysticism* (London, 1918⁴).
5. M. Polanyi, *Personal Knowledge: Towards a Post-Critical Philosophy* (London, repro. 1973), p. 250.
6. See M. W. Beal, 'Essentialism and Closed Concepts', *Ratio*, 16 (1974), pp. 190-205.
7. This and the next stanza are taken from K. Ch'en, *Buddhism in China: A Historical Survey* (Princeton, 1972²), p. 355 where also the story can be found.
8. The translation is D. Snellgrove's, excerpted from E. Conze et al. (eds.), *Buddhist Texts Through the Ages* (New York: Harper Torchbook, 1964), p. 226.
9. W. N. Pahnke, 'Drugs and Mysticism', *International Journal of Parapsychology*, 8, (1966), pp. 295-314.
10. Sermon 28 in the edition by J. Quint, *Meister Eckehart: Deutsche Predigten und Traktate* (München, 1963²), p. 285.
11. See C. Albrecht, *Psychologie des mystischen Bewusstseins* (Bremen, 1951); C. Naranjo, 'Meditation: Its Spirit and Techniques', part I of C. Naranjo & R. E. Ornstein, *On the Psychology of Meditation* (London, 1972); R. E. Ornstein, 'The Techniques of Meditation and Their Implications for Modern Psychology', part II of *On the Psychology of Meditation* (London, 1972); F. Heiler, *Das Gebet* (München, 1923); E. Underhill, *Mysticism: A Study in the Nature and Development of Man's Spiritual Consciousness* (New York, 1955).
12. R. Otto, *Mysticism East and West: A Comparative Analysis of the Nature of Mysticism* (New York, 1959).
13. R. C. Zaehner, *Mysticism: Sacred and Profane* (New York, 1961).
14. M. Laski, *Ecstasy: A Study of Some Secular and Religious Experiences* (London, repr. 1965), p. 16.
15. R. G. Wasson, *Soma: Divine Mushroom of Immortality* (New York, 1968).

16. S. Dasgupta, *Hindu Mysticism* (Chicago, 1927).
17. J. Miller, *The Vedas: Harmony, Meditation and Fulfilment* (London, 1974).
18. M. Eliade, *Yoga: Immortality and Freedom* (London, 1958).
19. Gopi Krishna, *Kundalini: Evolutionary Energy in Man* (London, 1971).
20. Excerpted from H. V. Guenther, *The Royal Song of Saraha: A Study in the History of Buddhist Thought* (Berkeley/London, 1973²), p. 70.
21. *Reden der Unterweisung*, edition by J. Quint, *op. cit.*, p. 57.
22. T. Leary, *op. cit.*
23. A. Maslow, *The Farther Reaches of Human Nature* (Harmondsworth: Pelican, 1973), p. 362.
24. A. Moore, 'Mysticism and Philosophy', *The Monist*, 59:4 (1976), p. 504.

Experiences of death and dying

I. The investigations of Raymond A. Moody

JOAN MILLER

Interest in the possibilities of life after death has been stimulated recently by the books of Dr R. A. Moody, Jr. who has researched into the experiences of patients who have been pronounced clinically dead. His books *Life after Life* and *Reflections on Life after Life*, record the accounts of a number of persons who having been close to death survived contrary to all expectations. Dr Moody's interest was aroused when he found the near-death experiences related to him showed great similarities despite the fact that they came from people of highly varied religious, social, and educational backgrounds. The experiences investigated by Dr Moody fall into three distinct categories:

1 The experiences of persons who were resuscitated after having been thought, adjudged, or pronounced clinically dead by their doctors.

2 The experiences of persons who, in the course of accidents or severe injury or illness, came very close to physical death.

3 The experiences of persons who, as they died, told them to other persons who were present. Later on these other people reported the content of the death experience to him.

In his first book Dr Moody identifies fifteen components of the near-death experience. His investigations showed that despite the striking similarities among various accounts, no two of them are precisely identical. Although no one person reported every com-

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ponent, the majority reported most of them. The components are as follows:

1) Ineffability. People reported there were no words to express their experience.

2) Hearing themselves pronounced dead by doctors or other spectators.

3) Feelings of peace and quiet.

4) Noise. In many cases various unusual auditory sensations are reported to occur at or near death, buzzing or ringing, or some kind of music.

5) The sensation of being pulled through a dark tunnel or space of some sort.

6) The experience of observing the physical body from a point outside it. During such episodes many have a desperate desire to get back into their body but they don't know how to do so. In a few cases the dying persons said they did not feel they were in any kind of "body" at all; they felt they were "pure consciousness", but the majority of cases reported they found themselves in another body upon release from the physical one although they could not describe it. No one else hears or sees the new body; it lacks solidity, in that physical objects appear to move through it, and it is weightless and timeless.

7) In this disembodied state a person is cut off from others. He can see other people and understand their thoughts completely but they are not able to see or hear him. So profound feelings of isolation and loneliness set in.

8) In this situation they then may become aware of other spiritual beings in their vicinity who have come to help them. Sometimes they are deceased relatives or friends, at other times it is an unidentified spiritual being.

9) A very common element in the accounts, and one which has a profound effect, is the encounter with a very bright light, those experiencing it somehow know it is a personal being, a being of light which emanates warmth and love.

10) The being presents to the person a panoramic review of his life. In being presented with what he has done in his life the person finds the review very real and vivid, although extraordinarily rapid.

11) Some people reported that during their near-death experience they seemed to be approaching a border or limit of some kind.

12) Coming Back. Often persons did not want to come back but did so to complete something they had left unfinished. Others decided to return, and others were allowed to return because they had to help people still living. Few experienced the actual re-entry into their physical bodies.

13) People who have been through an experience of this type have no doubt about its reality and its importance. Most, realising that reports would not be well received, are reluctant to talk about it to others.

14) Many people thought their near-death experience had made them more reflective and concerned with philosophical issues. Almost everyone stressed the importance of cultivating love for others, and many emphasised the importance of seeking knowledge.

15) After a near-death experience people report they are no longer afraid of death.

Four additional elements are mentioned by Dr Moody in his second book. He noticed these as a result of investigating further accounts of near-death experiences. Each of the new elements were reported by more than one person, but were not as common as the original fifteen. With the exception of the "supernatural rescues", all of the elements occurred exclusively in the reports of subjects who had near-death encounters of extreme duration. The additional elements were:

1) Glimpses of a separate realm of existence in which all knowledge, past, present and future, seemed to co-exist in a sort of timeless state. All commented that this experience was ultimately inexpressible and all agreed that the feeling of complete knowledge did not persist after their return. They all felt it was an encouragement to learn in this life.

2) Glimpses of a "heavy realm", described as "a city of light".

3) Encounters with a groups of confused spirits who were unable to surrender their attachment to the physical world, and as a result, could not progress. These spirits appeared "dull", and they were doomed to be in this perplexed state until they had solved their problems.

4) **Supernatural Rescues.** Several persons reported they had been saved from physical death by the interposition of some spiritual agent or being, and they all felt they had been saved from death for a purpose.

Many of the components of these experiences reported by people who had been near death are to be found in a wide variety of literature which has concerned itself with experiences thought to be beyond ordinary physical life in the world: for example, the Bible, Plato (in the *Phaedo*, *Gorgias*, and *The Republic*), and *The Tibetan Book of the Dead*. In more recent times "out of the body experiences" have been related by R. Monroe in *Journeys out of the Body*, and by John Lilly in *The Centre of the Cyclone*, the experience of the latter having taken place under the influence of LSD. An account of what happened after death by a person who actually died is given in a book called *Testimony of Light* by Helen Greaves. The book is a collection of scripts received by clairaudience by Helen Greaves from Frances Banks, an ex-Nun, who died in November 1965, and described as instances of "telepathy between the living and the dead". It is of interest here to note that several of the components of near-death experiences recounted by Dr Moody can be found in the communications of Frances Banks. She mentions for instance, the hearing and observing of people and events going on around them by persons as they died, the growth in knowledge and the presence and significance of Light. However while the fact that these experiences occurred is hardly to be doubted, there is no such certainty about their significance, which is yet to be assessed. They do not in themselves offer proofs of immortality, perhaps rather they are pointing towards a particular, peculiar, state of consciousness.

Dr Moody himself mentions (*Life after Life*, p. 155) that in the case of near-death experiences "all sorts of possible explanations" present themselves. He discusses some of the explanations at the end of *Life after Life*, where he classifies various explanations as Supernatural, Natural (Scientific) and Psychological, and examines examples of each in connection with near-death experiences. In each case he concludes that none of them account sufficiently for the data he has collected, and that a great deal more needs to be

done before a satisfactory explanation of near-death experiences is available.

In the Natural (Scientific) Explanations section he considers the Pharmacological Explanation in which it is suggested that near-death experiences are caused by therapeutic drugs administered to the person at the time of his crisis. He does not dispute that certain drugs cause delusional and hallucinatory mental states and experiences, but points out that in many of the cases of near-death experiences he has collated no drugs had in fact been administered to the persons concerned; indeed in some cases the experience occurred long before the person received any sort of medical attention. An interesting consideration is the link between near-death experiences and isolation research, but, as Dr Moody says, since the diverse mental phenomena occurring in conditions of isolation cannot be explained by current psychological theories, it is not very helpful to substitute one mystery for another.

As a doctor, Moody is aware that his books do not constitute a scientific study, and as a philosopher he insists that he is not under the delusion that he has proven there is life after death. However, he is in no doubt that the reports of near-death experiences he has collected are very significant, even though he realises that acceptable interpretations of the phenomena are yet to be found.

Experiences of death and dying

II. The “Dying man’s prayer” in the Īśa Upaniṣad

ARVIND SHARMA

I

Hinduism does not seem to contain a text comparable to the Tibetan Book of the Dead,¹ notwithstanding its firm belief in re-incarnation. There are, however, some verses contained in the Īśa Upaniṣad, namely Verses 15-18 which “are uttered at the time of death. Even to-day they are used by the Hindus in their funeral rites”² and may indeed be referred to as “a dying person’s prayer”.³ these verses are as follows:

15. hiranmayena pātreṇa satyasyāpihitam mukham tat tvam pusan apāvṛṇu satyadharmāya dṛṣṭaye.

15. The face of truth is covered with a golden disc. Unveil it, O Pusan, so that I who love the truth may see it.

16. pūṣann ekarṣe yama sūrya prājāpatya vyūha raśmīn samūha tejah yat te rūpaṁ kalyāṇatamaṁ tat te paśyāmi yo sāv asau puruṣaḥ, so’ham asmi.

16. O Pusan, the sole seer, O Controller, O Sun, offspring of *Prājā-pati*, spread forth your rays and gather up your radiant light that I may behold you of loveliest form. Whosoever is that person (yonder) that also am I.

17. vāyur anilam amṛtam athedam bhasmāntaṁ śarīram aum krato smara kṛtam smara krato smara kṛtam smara.

17. May this life enter into the immortal breath; then may this body end in ashes. O Intelligence, remember, remember what has been done. Remember, O Intelligence, what has been done, Remember.

18. agne naya supathā rāye asmān viśvāni deva vayunāni vidvān yuyodhyasmaj juharāṇam eno bhūyiṣṭhām te nama-uktim vidhema.

18. O Agni, lead us, along the auspicious path to prosperity, O God, who knowest all our deeds. Take away from us deceitful sins. We shall offer many prayers unto thee.⁴

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1979, Vol. 13, pp. 53–58 Gordon and Breach Science Publishers Ltd., 1979

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Until now these verses have been regarded as either rather obscure, or mystical in significance. It will be contended in this paper, however, that recent researches in the realm of near-death experiences, as represented by such works as *Life after Life* by Raymond A. Moody, Jr.,⁵ and *The Centre of the Cyclone* by John C. Lilly⁶ may throw fresh light on the interpretation of these verses.

II

In order to realize the full significance of these modern discoveries for the interpretation of the ancient text and to allow room for the cross-cultural applicability of modern findings, the specifically Hindu elements of the dying man's prayer need to be identified. These elements seem to be represented by the first line of verse 17 and by verse 18, which contain clear allusions to the Hindu rite of cremation.

It may also be argued that the first part of the first line of verse 17, which R. E. Hume translates as "[My] breath (*vāyu*) to the immortal wind (*anila*)!" may similarly refer not to a Hindu rite so much as the latter part of the line does but to a typical Hindu motif. R. E. Hume remarks that: "This formula recurs at Brih 5.15. The idea that at death the several parts of microcosmic man revert to the corresponding elements of the macrocosm is expressed several times in Sanskrit literature. With the specific mention here, compare "his spirit (*ātman*) to the wind (*vāta*)" in the Cremation Hymn RV.10.16.3a; "with his breath (*prana*) to wind (*vāyu*)", Śat. Br. 10.3.3.8; "his breath (*prāṇa*) to wind (*vāta*)", Brih. 3.2.13; and even of the sacrificial animal, "its breath (*prāṇa*) to wind (*vāta*)" Ait. Br. 2.6" (*op. cit.*, p. 365, fn. 1).

If these elements of cultural overlay are now removed, then one obtains the following picture:

- 1) the dying man encounters bright light ("golden disc");⁷
- 2) he identifies it with the sun;
- 3) he asks the sun to gather up that light so that he may behold its loveliest form;

- 4) he asserts that the luminous "person" out there is the same as he himself; and
 5) he is called upon to remember what he has done.

III

The accounts of near-death experiences are full of descriptions of an encounter with a bright light (though *after* a passage through darkness to which the verse does not seem to refer).⁸ Dr. Raymond A. Moody offers the following account of "The Being of Light":

What is perhaps the most incredible common element in the accounts I have studied, and is certainly the element which has the most profound effect upon the individual, is the encounter with a very bright light. Typically, at its first appearance this light is very dim, but it rapidly gets brighter until it reaches an unearthly brilliance. Yet, even though this light (usually said to be white or "clear") is of an indescribable brilliance, many make the specific point that it does not in any way hurt their eyes, or dazzle them, or keep them from seeing other things around them (perhaps because at this point they don't have physical "eyes" to be dazzled).

Despite the light's unusual manifestation, however, not one person has expressed any doubt whatsoever that it was a being, a being of light. Not only that, it is a personal being. It has a very definite personality. The love and the warmth which emanate from this being to the dying person are utterly beyond words, and he feels completely surrounded by it and taken up in it, completely at ease and accepted in the presence of this being. He senses an irresistible magnetic attraction to this light. He is ineluctably drawn to it.⁹

The next point to note is that:

Interestingly, while the above description of the being of light is utterly invariable, the identification of the being varies from individual to individual and seems to be largely a function of the religious background, training, or beliefs of a person involved. Thus, most of those who are Christians in training or belief identify the light as Christ and sometimes draw Biblical parallels in support of their interpretation. A Jewish man and woman identified the light as an "angel". It was clear, though, in both cases, that the subjects did not mean to imply that the being had wings, played a harp, or even had a human shape or appearance. There was only the light. What each was trying to get across was that they took the being to be an emissary or a guide. A man who had had no religious beliefs or training at all prior to his experience simply identified what he saw as "a being of light". The same label was used by one lady of the Christian faith, who apparently did not feel any compulsion at all to call the light "Christ".¹⁰

This enables the second point in the sequence to be clarified. A person's identification of the light seems to be conditioned by his religious background. Small wonder, then, that the "dead" Hindu should see the sun in the light.¹¹

The next step, that of asking the sun as the source of light to withdraw the rays to reveal His identity does not seem to have a parallel in modern accounts. This might be taken as a natural consequence of the fact that the dead man "senses an irresistible attraction to this light. He is ineluctably drawn to it"¹² — and might want to know what it is, which represents a higher stage of curiosity. This stage, however, does not seem to be reflected in the available accounts.

The next stage, however, of the assertion (Number 4 in the Upanishads picture) that the dead person and the luminosity are the "same" receives some striking corroboration from John C. Lilly's experiments with LSD. He describes his near-death experience under the influence of the drug thus:

I am in a large empty place with nothing in any direction except light. There is a golden light permeating the whole space everywhere in all directions, out to infinity. I am a single point of consciousness, of feeling, of knowledge. I know that I am. That is all. It is a very peaceful, awesome, and reverential space that I am in. I have no body, I have no need for a body. There is no body. I am just I. Complete with love, warmth, and radiance.

Suddenly in the distance appear two similar points of consciousness, sources of radiance, of love, of warmth. I feel their presence, I see their presence, without eyes, without a body. I know they are there, so they are there. As they move towards me, I feel more and more of each of them, interpenetrating my very being. They transmit comforting, reverential, awesome thoughts. I realize that they are beings far greater than I. They begin to teach me. They tell me I can stay in this place, that I have left my body, but that I can return to it if I wish. They then show me what would happen if I left my body back there — an alternative path for me to take. They also show me where I can go if I stay in this place. They tell me that it is not yet time for me to leave my body permanently, that I still have an option to go back to it. . . . They further communicate to me that if I go back to my body as I developed further, *I eventually would perceive the oneness of them and of me, and of many others.*¹³

In this account there are two luminous images instead of one, but otherwise the experience seems to be a commentary on Verse 16 quoted above.

As a final point one may note the emphasis on remembrance in verse 17. Now it is well-known that one of the experiences the dead man has with the Being of Light is that he has his whole life recalled in front of him as it were. Dr Raymond A. Moody, Jr., deals with this phenomenon under the title of "the Review".

In this background the emphasis in verse 17 on "remember, remember what has been done" takes on a special significance. Similarly, the repeated mention of Intelligence takes on a new meaning when we are told that some people characterize this flashback on life "as an *educational effort* on the part of the being of light. As they witness the being seems to stress the importance of two things in life: Learning to love other people and acquiring knowledge".¹⁴

From this point of view, the use of the word *kratu*¹⁵ in verse 17 may be of some significance as well. S. Radhakrishnan translates it as "intelligence"¹⁶ but Robert Ernest Hume renders it as "Purpose".¹⁷ If, with this sense of the word we look "at a representative type"¹⁸ of the experience of the Review with the "Being of Light", one is told that "When the light appeared, the first thing he said to me was 'What do you have to show me that you've done with your life?' or something to that effect".¹⁹ This question could be rephrased as: has your life been to any purpose?

In any case, it is clear that if the "Dying Man's Prayer" of the *Īśa Upaniṣad* is divested of its Hindu cultural component and related to the evidence from near-death experiences with which transpersonal psychology has been made familiar by the works of Dr. Raymond A. Moody, Jr., Dr. John C. Lilly, etc., then it is possible to see the Dying Man's Prayer as corresponding fairly closely to these experiences. These verses of the *Upaniṣad*, to the best of our knowledge, have not hitherto been approached from this view. It was the purpose of this paper to demonstrate the potential fruitfulness of such an approach.

Notes

1. See W. Y. Evans-Wentz (ed.) *The Tibetan Book of the Dead* (New York: Oxford University Press, 1957). For a more modern rendering of this work finally written down, apparently, in the eighth century A.D." see Francesco

- Freemantle and Chogyam Trungpa, *The Tibetan Book of the Dead* (London: Shambhala, 1975).
2. S. Radhakrishnan, *The Principal Upanisads* (London: George Allen & Unwin Ltd., 1953) p. 577.
 3. Robert Ernest Hume, *The Thirteen Principal Upanishads* (Oxford University Press, 1968) p. 364.
 4. S. Radhakrishnan, *op. cit.*, p. 577.
 5. Raymond A. Moody, Jr., *Life after Life* (Bantam edition, 1976).
 6. John C. Lilly, *The Centre of the Cyclone* (Herts: Paladin Frogmore, 1974).
 7. This point about the colour of this light as described in first-hand near-death accounts is worth noting. The light is sometimes described as yellowish (Raymond A. Moody, Jr., *op. cit.*, p. 63) or brilliant (*ibid.*, p. 77) which would correspond to the expression *hiranyamaya* or golden (also see *ibid.*, p. 76: "The whole things was permeated with the most gorgeous light—a living, golden yellow glow, a pale colour, not like the harsh gold colour we know on earth"). It may be pointed out here that from the point of view of sequence of events describe here, the fact that in the Eighth Chapter of the Bhagavadgita the talk of dying (VIII. 5-7) is immediately followed by the description of the Supreme Person (VIII. 8) as one "sun-coloured beyond the darkness" (VIII. 9) may not be without significance.
 8. See Raymond A. Moody, Jr., *op. cit.*, pp 30-34. Nor is there any reference in these verses to the buzzing sound (*ibid.*, p. 29) or the hearing of music (*ibid.*, p. 62).
 9. *Ibid.*, pp. 58-59.
 10. *Ibid.*, p. 59.
 11. On sun-worship in the Vedic age see A. A. Macdonell, *The Vedic Mythology* (Delhi: Indological Book House, 1971) p. 29 ff; Benjamin Walker, *The Hindu World Vol. II* (New York: Frederick A. Praeger, 1968) pp. 457-458; R. C. Majumdar, ed., *The Vedic Age* (London: George Allen & Unwin, 1957) pp. 366-367.
 12. Raymond A. Moody, Jr., *op. cit.*, p. 59.
 13. John C. Lilly, *op. cit.*, pp. 38-39, emphasis added. Also see p. 64. It may be added that at least in one case the light was encountered when the person was "Sick" rather than "dead" (see Raymond A. Moody, Jr., *op. cit.*, p. 102).
 14. Raymond A. Moody, Jr., *op. cit.*, p. 65.
 15. See Otto Böthlingk and Rudolph Roth, *Sanskrit-Wörterbuch, Zweiter Theil* (Wiesbaden: Antiquarial Otto Harrassowitz, 1966) p. 473.
 16. S. Radhakrishnan, *op. cit.*, p. 577.
 17. Robert Ernest Hume, *op. cit.*, p. 365.
 18. Raymond A. Moody, *op. cit.*, p. 65.
 19. *Ibid.*, pp. 65-66.

Further reflections on the nature of metaphysical enquiry

G. H. SPINNEY

As one who shares, in the main, Timothy Sprigge's views about the nature of metaphysics, expressed in his articles in *T to T* XII, ii, and also, let it be said, his panpsychist view of nature, so far as there disclosed, my main wish is to give support to his thesis. However, while I realise that there are severe limitations of space in an article of this sort, it was my feeling that he did not carry his analysis of what metaphysics is, far enough, and, as a result, much of the distinctive character of this thought process was not discussed.

I will recapitulate his arguments briefly. He sets out to defend metaphysics from the customary charge that it makes *a priori* pronouncements about the nature of things without having at its disposal any special method of its own that might be calculated to acquire new facts. He offers a number of examples of what he suggests are valid metaphysical arguments and finds in them two types of reasoning. The first of these is dialectical and mainly *a priori*, and consists in testing the coherence of common concepts, and trying to fit them on to the facts of experience, and, where they prove incoherent, or do not fit, suggesting new concepts to replace them. The second stresses the superiority of concepts that are graspable in essence and accessible to intuition, like the "clear and distinct ideas" of the 17th century. Metaphysics, he says, sets as its goal the description of reality in the terms of concepts of this kind.

Let us take his first type of reasoning. He makes a start from the fairly generally held position that "all we know about physical reality, as such, is either a matter of the way it presents itself to our

Theoria to Theory

1979, Vol. 13, pp. 59—68

Published by

Gordon and Breach Science Publishers Ltd., 1979

senses or a matter of its formal structure, or both". Such a position, he argues, implies that there is some "noumenal reality" — the thing in-itself — lying beyond our physical descriptions and measurements, which is the target of these descriptions and the field of application of the formal relations we measure. But this view does not cohere with our other common belief that reality is adequately characterised by these descriptions and measurements, and we are led, therefore, to ask ourselves what this noumenal reality can possibly be. To answer he employs a metaphysical argument. He proposes that if we are to try to envisage noumenal reality we had best extrapolate widely the subjective concept of being a "centre of experience" that we use for our own case and for that of some higher animals, and thus find some distant analogue of sentience in appropriate units of the physical world. The same argument, applied to Nature as a whole, would suggest that cosmic unity might similarly be traced to a Cosmic Experience, which both includes and transcends all other centres of experience.

I apologise for the inadequacy of this brief summary, which does no justice at all to the arguments, but we are concerned here only with their nature, not their force. The method used here, he says, is not unlike philosophical analysis, in that we are examining the meaning of concepts, but differs in this, that when they appear to be unsatisfactory, metaphysics is prepared to suggest new ones to replace them, whereas the Analyst does not, in theory, concern himself about the field of application of his concepts, nor even whether they have any application at all.

In the current view, this role of forming new concepts in place of old ones that do not fit exactly, is considered to belong to the special branches of Science or the Humanities, which are regarded as the only First Order studies. But it is possible to argue that there are concepts so central and fundamental that they affect all our processes of observing and knowing, in whatever field they take place. If we are to presume to review and suggest alterations to these, the work could only be allotted to some kind of master discipline which would include all branches of human enquiry as its sub-disciplines.

On his showing, this master discipline is metaphysics. I think that

we might object here, that if there is need and scope for a master discipline, working at this very general level—as I am sure there is—it would be best to revert to the older practice and call it philosophy. Metaphysics has always been regarded as a special kind of philosophy. The Scientist, after all, is in constant process of revising his concepts where they do not fit exactly, yet he would not feel happy at being described as pursuing metaphysics. Nor would the Positivist, who seeks to purge all our concepts of their veiled metaphysical implications.

I suggest that what makes the arguments sketched out here metaphysical is not their dialectical, nor their revisionary nature, but the manner in which they form their new concepts. This is implied in the second type of argument that Mr. Sprigge finds in his examples. He contrasts pragmatic and literal truth. Pragmatic truth about the physical world will enable man to get to the moon, but it will do little to advance his understanding of the intrinsic nature of the things he is dealing with, as the continuing crisis in the conceptualization of quantum physics shows.

When we form the confident hypothesis that animals, being possessed of sensory organs resembling our own, enjoy some kind of perceptual experience, analogous to ours, we are grasping after literal truth. Literal truth, if we could reach it, would tell us, not how animals react as seen from an observer's view point, but what the animal itself experiences during the reaction. It is a characteristic of metaphysical enquiry, he says, to pursue literal truth, whereas science is primarily concerned with pragmatic truth.

Now we could reasonably comment that, if this is so, we are entitled to ask how metaphysics hopes to reach literal truth. It has, after all, always been the chief ground of objection of critics that metaphysics does not reveal its method. The main example of our everyday use of metaphysics has always been the way we form the concept of Other Minds, but the writer in his article absolves himself from dealing with this problem (p. 140), and proposes to treat the existence of companion centres of experience as a certainty. But is not this movement of thought the very heart of metaphysical reasoning? Is it not similar thinking that lies hidden in the assumption that physical reality must have a noumenal aspect, and

will be brought into the open if (as he does) we propose to find some form of sentience in the unit centres of the physical world, and ultimately in the whole Cosmos? If we are to explain what metaphysics is and to justify its method, we can hardly omit to discuss the way we form the concept of Other Minds. The only argument offered in the article in favour of taking this step, when looking for literal truth, is this, that a concept which we can grasp as an imaginary extension of something we already know, is for that reason to be preferred to one that is constructed of abstractions which we have no reason to believe can stand up on their own.

“Being” for us, must start from our own self centred experience. If we feel the need to postulate other instances of “being” outside our own, we had best use the only model we possess, i.e. some form of sentience. This mainly ontological argument, as he says, extends to relations as well, which must be seen as ultimately dependent on a cosmic whole of experience within which they are given concreteness. This, I believe, is a strong argument, not unlike Whitehead’s Ontological Principle, and containing also the threat of Occam’s Razor, but it forms only part of what I would call the metaphysical attitude, which has deeper roots.

Why, for example, do we feel obliged to complicate our picture of reality so much by looking for noumenal reality, or literal truth, behind pragmatic truth? Once we start doing this we can bring the ontological argument into play, it is true, but why do we reject solipsism as a solution in the first place? Further, whence comes our deep sense of certainty about Other Minds? It is something, it seems, that has to grow with experience, as developmental studies with infants show, but if noumenal reality is altogether inaccessible, no multiplication of experiments would bring it nearer. What feature of experience is taken to confirm the existence of noumenal reality, and thus becomes cumulative through repetition?

I feel sure that Mr. Sprigge will have answers to these questions in the panpsychist scheme on which he is working, and that it was tactical considerations that excluded them from the context of this short article. But it seems to me that some reference to them, in summary form at least, ought to be included in any description or defence of metaphysical method.

Having raised these matters, I feel bound to attempt some of the answers here, even though the issues are so vast that the unavoidable compression may make what I have to say barely intelligible.

I have no quarrel with the view that finds the characteristic thought movement of metaphysics that by which we infer the existence of Other minds, and by which we pursue literal truth. This must have been part of man's equipment in facing life long before philosophers began to enquire into its logical basis.

But when we begin to analyse and unpack the significance of the steps we take in forming the concept, it is evident that we are dealing with an attitude to experience so primary that a whole philosophy can be traced as its necessary or probable consequence. It is this that makes attempts to say what metaphysics is, so difficult. There is nowhere to stop. Ideally, since metaphysics is an attempt to form concepts that fit experience, there could only be one valid metaphysical scheme, the one that best interprets experiential fact to the capacities of the human mind. But since we vary in our estimation of what is important, or what fits or does not fit the facts, many different systems of metaphysical philosophy have been, and no doubt always will be, put forward, all regarded as the natural consequences of the primary step. All that I can try to do here is to say a little about the basic metaphysical attitude, and refrain from being carried on into describing the system that appears to me to follow from it.

The key concept in all this is that of the "centre of experience". When we advance our aim beyond that of describing accurately what "appears" to us, or to a standard observer, and begin to try to describe nature in terms of centres of experience (as we do in the case of Other Minds) we start a revolution not unlike the Copernican one, escaping from the grip of a basically egocentric view into a form of pluralism. The concept of a centre of experience involves the Subject—Object dualism with a "subject" at the centre and an "objective" circumference. In using this as a paradigm of being we do not merely countenance dualism in our own conscious experience: we split the universe into potential subjects and objects. This changes the whole character of our philosophies, which now have to exhibit how subject and object become united to form sensory fact, how the free

initiative of many separate subjects becomes collectively absorbed in Universal Law, how Mind alters Matter, and Matter, Mind, and so on—all the baffling antinomies that philosophy has thrown up. Metaphysics, I believe, can provide solutions of these antinomies, but only if we are prepared to admit a degree of dualism into our logic as well. This is the sticking point on which the traditionalists will not budge, and it is this that is responsible for the present stalemate. We can approach an understanding of this best, I believe, by considering how we reach the concept of Other Minds. At the risk of seeming tedious, I offer my version of this, because I believe that reflection on this issue brings out most clearly the unavoidable dualism of this step.

That there is a paradox involved in sensory experience is evident from the distinction between phenomenal and noumenal reality with which Mr. Sprigge began his chain of arguments. Percepts, feelings, the describable phenomena that go to make up sensory experience, are linkage concepts which describe the reaction of a subject to the action of an object of some sort. The phenomenon as such, is homogeneous in texture and contains no border lines marking off where subject ends and object begins. The paradox arises when we ask ourselves, where, then, the dualism of Subject—Object comes from? What makes us believe that when we have the sensation we describe as e.g. “touching a hard cold object”, we are not just exploring another recess of our personality, but engaging in commerce with some “noumenal reality” that indicates its presence to us in this way? This feeling of contact with an extraneous something is clear and undeniable. It would seem that any analysis of experience that takes account only of the phenomenal data of sensory observation is omitting an important range of facts: one that makes all the difference between a closed world of self exploration and the pluralistic world we know. Positivism and traditional scientific method do their utmost to exclude or minimise any reference to the subject-object distinction and its implications—with very good reason, of course—but metaphysics is prepared to grasp this nettle and face the consequences, which are far reaching and in many ways shocking to our normal habits of thought.

The first step on the road to metaphysics is taken when we

acknowledge that the facts require that there be some category of experience that is totally distinct from the phenomenal, and allows us to perceive the Subject—Object dualism. Such a category is dynamic rather than merely presentational (to use a Whiteheadian term) and is concerned with the control of change. It is a complex of many aspects, combining initiative, choice, aim and creativity. We could describe it loosely as the “conative pattern” of experience.

Recognition that change does not just roll on automatically, but is subject to our control, opens up the correlative observation that this control is by no means absolute, but restricted by severe limitations originating outside ourselves. It is at this point that the decisive metaphysical move is made. We interpret the resistance that we find by making an imaginary inversion of our own power to control change. It is as though (we say) that power were being turned back upon ourselves from an alien source. By experimentation we can set up a dialogue with this source, and, in the case where we are dealing with Other minds, we begin to recognise a close similarity of conative pattern with our own. It is this reciprocity of initiative and recognizable harmony of aim that forms the cumulative element that allows us to build up our feeling of certainty that we are communicating with Other Minds. As we move down the scale of biological complexity towards the physical world, this feeling of certainty dips steeply, and many people believe that the analogy ceases to pay dividends at various points.

The metaphysician, however, stands firmly on the view that some generic similarity exists between all true units that exert influence on change, and that this brings them within the category of being “experient”, i.e. having centric, self-referent being.

On this showing, the two major steps out of which the metaphysical attitude grows are, (1) the admission that experience contains a divisive, subjective aspect as well as a linking, phenomenal one, and (2) the identification of objectivity as being a form of subjectivity in reverse. Stated thus, they seem deceptively simple, but on examination they will be found to require a change in our normal logical attitude which has wide implications for any philosophical scheme developed on this basis. In essence the two steps recommended, (1) that we should recognise the presence of a

second, non-sensory dimension of experience and, 2) we should project this two-dimensional situation on to reality as a whole. The result of doing this will be to alter the target of all our descriptions, which will no longer be aimed solely at recording the qualitative and quantitative aspects of phenomena, as viewed by a standard observer, but will attempt also to infer the nature of the conative pattern that is responsible for them. The process of events will no longer be regarded as merely a succession of instrumentally standardised observations: we must also see them as the meeting and resolution of contrary aims, initiatives and pressures derived from the centres of experience involved.

It should be clear by now in what direction this is leading. The way is being opened to introduce a measure of dualism, or, more strictly, pluralism, to counterbalance the monism of scientific law.

No form of philosophy, of course, can dispense altogether with a dualistic element of some sort, which is necessary to supply the tension which pattern requires, but the metaphysical attitude is to bring this element into equal prominence with monism in its schemes.

Consider it in this way. The traditional point of view of classical physics was to regard the purely empirical element in experience — that, for example, that arranges the colours of the spectrum in the particular order that we find, or ensures that it is Brown rather than Smith who is in a particular spot at a particular time — as being a residual consequence of the primordial disposition of particles when the universe was first formed. The laws of Nature lay down the possible thematic variations, but the theme itself was held to be a thing apart, unexplainable, undiscussable. But if the physical world is to be populated by mini “centres of experience”, if centres of experience contain subjectivity, and if subjectivity involves power to choose, power to initiate, power to aim, power to steer the course of events, we get, not a dead mummified dualism, living on its past, but a live one, in which there is room for constant peripheral adjustment to universal centric control.

Under the conventional view, the empirical brute fact of creation occurred in a flash at the beginning, whereas, under this view, creation goes on in and around us perpetually to the end of time. By

“creation” here, I mean that an element of the unpredictable — an uncaused cause, if you like — arising from the freedom of individual centres, enters at some point into every change, along with the orderly component of universal law. It is the blending of these two constituents that makes up the unique flavour of the causal bond in contradistinction from the logical bond.

This type of balance between uniformity and pluralism has long been foreshadowed by the discovery of the statistical basis of empirical physical laws, but scientific theory has not been able to embrace it because of the logical difficulties involved.

We must now consider these. The proposal to validate the claims of subjectivity as a channel of novelty appears to introduce a puzzling contradiction. If there is a dimension of experience in which I stand apart as a free agent both from the sensory impressions that crowd my life, and from their putative source, a totally extraneous noumenal object, how am I supposed to be aware of those impressions and that object? Does not knowledge involve relationship, some kind of joining of hands? How can I both be separate from, and joined to, the same thing at the same time? For joined I must be in some sense. I could only recognise objective pressures as being a kind of subjectivity in reverse if there were some common medium, some lingua franca through which communication can take place. We appear to be involved here in a denial of the Principle of Contradiction, and with it, it would seem, of all rational argument.

Objections of this kind are frequently directed against the use of subjective concepts such as the Self, the Will, Mind and the like, and because no satisfactory answer can be given in terms of orthodox monistic logic — let this be freely admitted — it has been considered advisable either to leave such concepts out of philosophic discourse, or to place such restrictions on their use that most of the meaning we usually put into them becomes lost. The metaphysical reaction to this, and many similar cases of philosophic antithesis, where complete deadlock has been reached, is to recommend a widening of our logical attitude. When we face deadlock between two contrary positions the alternatives normally presented to us are either to take one side or the other, or to adopt some form of

negativism, or to take the pragmatic attitude of working with both sides in turn, while contriving to keep them apart. Metaphysics rejects all of these alternatives, is prepared to face the fact that the world contains dualistic as well as monistic elements, and tries to find concepts that not only permit the two contraries to coexist, but represent them as interdependent the one on the other. Where are such concepts to be found? This is the point where one is in danger of being carried away into a description of a metaphysical system, and I must therefore cut myself short here. But I may perhaps be allowed to say that in my view the concept of organism is best fitted to act as the vehicle for the mono-dualistic logic that is required.

There is nothing recondite about the method of metaphysics. It is simply a matter of looking within one's own experience and applying what we find to a wider context. Whenever we experience a conflict of aims or desires and succeed in resolving them, whenever, indeed, we "make up our mind", we have insight into the nature of organic control, as a harmony established between three elements, two on a lower level and one on a higher level, that contains and transcends them. In a theological context, in accepting and becoming one with God's will, I experience the same harmony from a different perspective. To try to explain how this "triadic" logic, if I may so call it, may be applied to the meetings of all pairs of dialectical opposites both in scientific contexts and in those of the Humanities, is what metaphysics is all about.

Summing up the paper, I agree with Timothy Sprigge that metaphysics is revisionary rather than solely analytic, and that its pursuit of the Thing-in-itself, literal truth, is its distinctive mark, but I think it essential to add that this aim derives from a general attitude, which is prepared to introduce dualism far more prominently into its schemes than is usually done, and to base itself on a widened logic that accommodates this change, notably in restricting the application of the Principle of Contradiction.

We should not disguise from ourselves that if we are to overcome our present conceptual deadlock, we have some hard decisions to take, and the sooner metaphysics is allowed to suggest what these are, the sooner shall we be able to prepare our minds to take them.

Comment: **Schizophrenia and mysticism**

The discussion on *Schizophrenia and Mysticism* (Theoria to Theory XII, i) lacks any definition of schizophrenia. It is not simply pedantry to draw attention to this fact. Unfortunately there is considerable disagreement among “experts” as to how strictly the term should be used. At one extreme the term is applied to a rather small group of people who show *first rank* symptoms of schizophrenia. This is the use of the term that prevails for the most part in Western Europe. However, there are also other psychiatrists, especially in the USA and USSR, who apply the term to a much wider group of strange, withdrawn people.

Now, the validity of comments made about schizophrenia may well depend on the way the term is being applied. My own guess, for what it is worth, is that biochemical abnormalities are more likely to be typical of narrowly-defined than of broadly-defined schizophrenia. It may also be that the narrowly-defined schizophrenics would have less capacity for mystical development than those who fall into the broader group. However, my point is simply that you can't sensibly discuss schizophrenia without saying which way you are using the term. The only hint on this matter is the statement (by Q) that 5% of people become schizophrenic. This suggests a broad definition.

One final comment. The statement by S.P. that schizophrenia usually starts in intelligent young adults may be misleading. The available data indicates that the test results of schizophrenics show a distribution of intelligence similar to that of the normal population. If anything they seem to be slightly *less* intelligent on average,

Theoria to Theory

1979, Vol. 13, pp. 69–70 Gordon and Breach Science Publishers Ltd., 1979

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though this is open to debate. The general tenor of the discussion suggests that much of the experience of the participants has been with schizophrenics who are more talented than most.

FRASER WATTS
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Comment: Teaching Creativity

Tudor Rickards has concentrated in the Discussion in *T. to T.* XII, iii, on the problem of teaching creativity and the senses in which it is meaningful to talk about creativity as a faculty which can be developed. One question which arises from this concerns the organisational implications. The method of teaching creativity involves taking people out of an environment where roles, attitudes and expectations are well defined, and placing them in a position which prompts novel insights and conjecture. But how can people trained in this way fit into the routines of an organisation? Is it, for example, desirable for specialists in creativity to be given "trouble shooter" role within the organisation, rather as Henry Ford used to wander round his factory? Or is it better to give a large number of people in the organisation some training in creativity so that they can bring to their own particular roles novel attitudes and an innovatory spirit? It would be useful, I think, if Tudor at some time could say what sort of impact people who had undergone creative training had on their organisations.

ALBERT WEALE

*Department of Politics
University of York*

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1979, Vol. 13, p. 71 Gordon and Breach Science Publishers Ltd., 1979

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Sentences

I From the *I Ching*

*"A shoal of fishes. Favour comes through the court ladies.
Everything acts to further."*

*Into the space of the question comes "a shoal of fishes".
Phosphorescent. As a thought. Quick. To catch them.*

*And there's an answer in the weaves they work
Which they again unweave soon as woven.*

*I am answered, but still in quest. Impossible inquest
Where the fish, self-kindled, dart upon darkness.*

* * * * *

*And then the court ladies come, with their ten thousand
Prescribed graces and their eighty thousand obediences.*

*They pause before the tank. They giggle a little
And chink silver bangles. Teeth. Just to laugh with
Each of their childhoods cramped into tiny slippers.*

*But when the fish dart so, that impossible thought
Could almost come to them—to kick their clogs off
And run, naked in the place such quick thoughts
Come from. "Everything acts to further."*

PAUL MATTHEWS

Theoria to Theory Published by
1979, Vol. 13, pp. 73–75 Gordon and Breach Science Publishers Ltd. 1979

II Friends Departed

*They are all gone into the world of light!
And I alone sit ling'ring here;
Their very memory is fair and bright,
And my sad thoughts doth clear.*

*It glows and glitters in my cloudy breast,
Like stars upon some gloomy grove,
Or those faint beams in which this hill is drest
After the sun's remove.*

*I see them walking in an air of glory,
Whose light doth trample on my days:
My days, which are at best but dull and hoary,
Mere glimmering and decays.*

*O holy Hope! and high Humility,
High as the heavens above!
These are your walks, and you have show'd them me,
To kindle my cold love.*

*Dear, beauteous Death! the jewel of the Just,
Shining nowhere, but in the dark;
What mysteries do lie beyond thy dust,
Could man outlook that mark!*

*He that hath found some fledged bird's nest may know,
At first sight, if the bird be flown;
But what fair well or grove he sings in now,
That is to him unknown.*

*And yet as Angels in some brighter dreams
Call to the soul, when man doth sleep:
So some strange thoughts transcend our wonted themes,
And into glory peep.*

*If a star were confined into a tomb,
 Her captive flames must needs burn there;
 But when the hand that lock'd her up gives room,
 She'll shine through all the sphere.*

*O Father of eternal life, and all
 Created glories under Thee!
 Resume Thy spirit from this world of thrall
 Into true liberty.*

*Either disperse these mists, which blot and fill
 My perspective still as they pass:
 Or else remove me hence unto that hill,
 Where I shall need no glass.*

HENRY VAUGHAN

Notes on contributors

RAYMOND COCHRANE read Philosophy, Politics and Economics at Oxford, but owing to T.B. became a dirty boot farmer, specialising in cattle breeding, on which subject he has written and lectured widely. His eclectic interests, ranging from biology to architecture, have proved useful in *Guiting Power*.

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Theoria to Theory

1979, Vol. 13, pp. 77–79 Gordon and Breach Science Publishers Ltd., 1979

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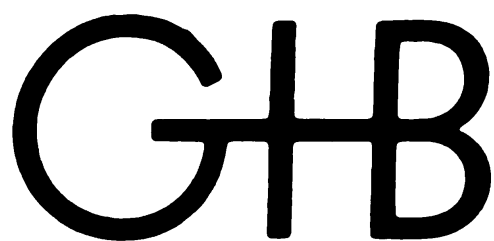
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The cover designs for this volume are by Nic MacLeod.



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THEORIA to theory

VOLUME 13, NUMBER 1

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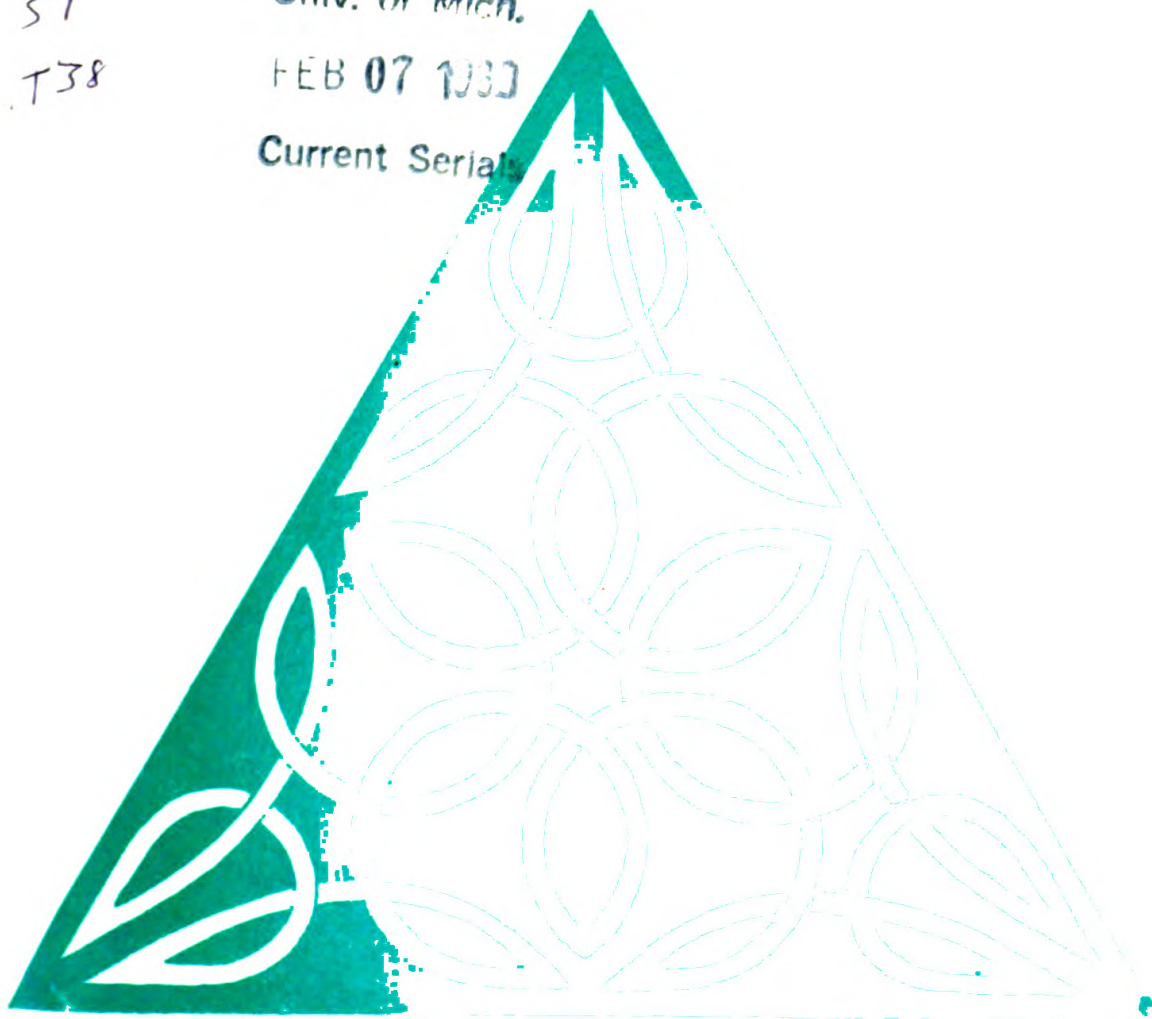
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THEORIA to theory

**An International Journal of Science, Philosophy and
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Current Serials



Volume 13, Number 3 (1979)

Original from
UNIVERSITY OF MICHIGAN

THEORIA to theory

An International Journal of Science, Philosophy and Contemplative Religion

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Subscription Rates *four issues per volume*

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Individuals who warrant the journal is for their own personal use, per volume, postpaid: £8.50

Libraries, research institutions and others, per volume, postpaid: £13.50

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Individuals who warrant the journal is for their own personal use, per volume, postpaid: \$20.50/£11.50

Libraries, research institutions and others, per volume, postpaid: \$43.00/£24.00.

The subscription rates include a distributing charge of \$15.00 for postage and handling.

Subscriptions should be sent to Gordon and Breach Science Publishers Ltd., 42 William IV Street, London WC2, England.

DECEMBER 1979 issue

1979 The Epiphany Philosophers, Gordon and Breach Science Publishers Ltd., 42 William IV Street, London WC2.

Printed in Great Britain at The Lavenham Press Limited, Lavenham, Suffolk.

Original from
UNIVERSITY OF MICHIGAN

Editorial

IN THIS NUMBER we continue the discussion of Neo-Darwinism by publishing three pieces of comment on our last dialogue. Anthony Manser, a philosopher, has published an article critical of Darwinism on "The Concept of Evolution" which has attracted attention, and to which he refers in his comment. Another critic of the claims of current biological orthodoxy is Richard Spilsbury, the author of *Providence Lost: A Critique of Darwinism*, which was one of the pieces of reading (another was Norman Macbeth's *Darwin Retried*) which caused us to take up the discussion of Neo-Darwinism in the first place. Tony Nuttall is someone who feels a general disquiet about scientific reductionism, and the restrictive effect of scientific orthodoxy on people's thinking. We intend to follow this up in the next number with further comments, which will turn more directly to interpretations of modern genetics.

We are also publishing an interview which Bob Smith, who has taken part in a number of T. to T. discussions, had with Brian Spear and Simon Conradie, two teachers of Transcendental Meditation in South Africa, who claim that T.M. training can enable people to levitate. They explain how they see the significance of this in the context of what they call concentration into pure consciousness. We are aware that this raises questions which are not in fact answered in this discussion, and nor could they be, short of allowing impartial observers to assess what is happening during flying sessions. At present access to these sessions apparently depends on taking a special course, and at a considerable fee.

In contrast we have an account by Jim Garrison of a demonstration which he and some of us in the Editorial Group attended in June. In

this case what happened was publicly observed, and the firewalker, Vernon Craig, allowed doctors to examine his feet immediately before and after the walk. Some of us who went with Jim would like to underline what he says in his account about Vernon Craig's natural and relaxed demeanor. And yet at the same time what Craig did depended on his achieving considerable inner concentration, in which he could be free of any fear of the fire. We were told that he had been virtually in retreat for three days previously. There was something very impressive about the combination of detachment, courage and strength of purpose which he showed. These are as much moral as mental qualities. But the extent to which the mental can affect the physical—if this is what was happening—has always been remarkable. All the same, it has hardly affected a basically materialist research programme in e.g. physiology and experimental psychology. Why is this? It is because there is no overall alternative theory in these fields. Signs and wonders have a tendency to make people opt for dualism of the mental and the physical. But this position is not a rich or suggestive one for future physiological research, notwithstanding the efforts of people such as Popper and Eccles in their significantly titled *The Self and Its Brain*.[†]

That these reports appear under the same cover with our further discussion of Neo-Darwinism reflects the underlying concern of T. to T. for an interpretation of science broad enough to include an enlarged physiology of the organism. Physics has advanced well beyond common sense, whether of the dualist or materialist kind, and biology must do the same. A new series of books trying to make this advance has begun to appear, whose strategy is to develop a new concept of the human organism. In this strategy extraordinary facts are set in the context of the general extraordinariness of the human organism.

The series is called *A New Image of Man in Medicine*, Vol. I: "Towards a Man-Centred Medical Science"; Vol. II: "Basis of an Individual Physiology"; Vol. III: "The Concept of Health" (Mt.

[†] Karl R. Popper and John C. Eccles, *The Self and Its Brain: An Argument for Interactionism*, Springer International, 1977.

Kisco, N.Y., Futura 1977, 1979, 1980). This is a deliberate attempt to work out some of the details of an overall alternative theory, based in part on the new idea of functional physiological systems. Karl Schaefer, Professor of Physiology at Brown University, is the general editor. He has been a director for the U.S. Navy of the Biomedical Dept. in the Submarine Medical Research Laboratory in Groton Ct., and he discusses "Individual Respiratory Pattern Affecting Metabolic Processes and CNS Functions." Prof. Rohen of the Dept. of Anatomy at the University of Erlangen in Germany discusses the idea of a functional system, and Prof. Linder of the Dept. of Nutrition at M.I.T. gives an overview of the biochemical bases for diversity and individuality in human metabolism, and this is relevant to a phenomenon such as fire-walking. She divides the large metabolic differences in the human population into three main groups: inherited differences, differences caused by present circumstances, and those which derive from our own decisions and efforts, and studies them in relation to the metabolism specifically of iron "to show how individual variables interact to create large differences in metabolism among the human population, and even in the same person from one time to another." Biochemical individuality, as it is now called,[†] has long been familiar in immunology. But it has been taken for granted and used by immunologists rather than being understood.

There are other articles and discussions in *A New Image of Man in Medicine* which will be of great interest to T. to T. readers, and we may be able to review it at length in the future. For the moment we welcome it as a serious and responsible attempt to create some of the concepts required for an enlarged physiology, which may provide one of the factors in the widening of science which has been one of the main aims of this journal.

[†] See e.g. R. J. Williams, *Biochemical Individuality*, N.Y., Wiley, 1956.

Discussion:

Levitation

Bob Smith raised this matter with two teachers of Transcendental Meditation, Simon Conradie and Brian Spear, whom he met in Johannesburg earlier this year. (Simon is the National Director of TM in South Africa.)

Bob: Some of us feel that at present religion is almost lost except among certain rare people or in difficult-to-discover monastic situations and so on. We feel that what religion should be is a deeper experience and a real experience (not a theory) of what the world is and what man is. One isn't so sure about the experiencing of what God is because that's more elusive and controversial. Partly it's a matter of definition, because we all label our experiences in different ways, but certainly a deeper feeling of what the world is and what man is. What am I? What roots do I have?

Brian: I think we can find interesting parallels between what you are trying to discover and what we here are scientifically verifying, and I think we can start immediately by throwing this into the boiling pot: that in building bridges between religion and science I think we should study the behaviour of someone who is successful in his or her religion. I don't mean going to church once a week, but being religious within himself and having a particular behaviour pattern as a result, having certain virtues flowing from within — virtues of compassion, harmony, understanding or friendliness, virtues to which we are all aspiring.

Bob: And those virtues are what you mean when you use the phrase "being successful in religion"?

Brian: That is the way I see religion — to be successful is to have developed those virtues, not to *be* developing them but to *have* developed them. Our movement has done a lot of work on the

correlation of behaviour and physiology, and we are continually finding that the state of the body is indicative of the character of the individual and vice versa. Particularly there's been a lot of research done with brain-wave functioning, and it has been found that when the brain becomes coherent according to the electro-encephalographic measurement, certain "virtues" of harmony are revealed in that scientific measurement.

Bob: Do you mean virtues of harmony in the brain pattern or in the behaviour of the person?

Brian: The behaviour is a direct result of the harmony within because it is from there that everything in the individual radiates.

Simon: We would say that we explore from both the objective and the subjective sides. Traditionally science is wary of subjective exploration because our subjectivity changes, our moods change from time to time, and the reason why we rely on objectivity is that we can rely on certain degrees or limits of invariance. We may say we know something to be true within those limits.

Bob: The quality of being repeatable?

Simon: Right, systematic work, verifiable by a number of people under different conditions. We could and we should, later on, bring in the effect of consciousness on scientific experiment because this is certainly something important, the range of the subjective and the objective. But what we set out to do is to have a systematic, verifiable, repeatable technique of exploring the knower, exploring the subjectivity. Along with that exploration of subjectivity we conduct traditional objective explorations to see if, as the individual is experiencing changes in his or her subjectivity, there are changes to be observed objectively which go along with them. This is what Brian has been saying about changes of feeling reflected by changes without. Actually the changes within cause the changes without, although science looks at it the other way.

Bob: Actually it's reciprocal, isn't it? If you take so many micrograms of LSD . . . pow! Or if you chop somebody's head off, you change his consciousness.

Simon: You can't separate mind and body, but we feel from our experience that consciousness is a more powerful changing agent than physiology.

Now the purpose of this exploration is to gain complete subjective knowledge (which includes objective knowledge). We say that in theory there are various levels of thinking, and that normally man only appreciates his ordinary, gross consciousness or thinking level, but actually, in the process of a thought arising, it goes through many stages of development, and its ultimate origin is in fact an area that we term pure consciousness. It is an area of subjective invariance, an unchanging experience. So the purpose is to establish the full range of subjectivity, the full range of possibilities of subjective experience, to have it stabilised and most importantly to have that level of pure awareness that is without any conditioning.

Bob: Can I correlate this with the mystical term “oceanic awareness”?

Simon: It is an experience of unboundedness, limitlessness of space and time, an awareness of all possibilities, of complete correlation, of harmony and relationship, which “Oceanic” would describe very well. Now that level is actually invariant, and what we are essentially setting out to do is to reach that level repeatedly, at first quite briefly. Later on, as the physiology becomes adapted to functioning in that way, the experience becomes more and more stable until it is a permanent reality. Then one has, so to speak, complete knowledge of the self. Pure consciousness *is* the self, as we use the term.

Bob: I would have thought that it was the origin of the self, or perhaps (I don’t know the correct metaphor) the building material of the self.

Brian: We should distinguish between the two aspects of the self — the individual aspect which is intellect, senses, feelings, body, brain; and then the Self which is on a more universal level.

Bob: Are you saying there is only one Self manifesting through many individuals?

Simon: Essentially it does boil down to this, but the individual experience is different. My experience of self is through my nervous system, intellect. Everything fulfils everything else on the basis of the two aspects of self, universal and individual.

Bob: And pure consciousness?

Simon: Pure consciousness is a term that needs some explai

ation. Generally we associate consciousness with some objective content and we usually hear the term linked with some other word — political consciousness or industrial consciousness — or with pain or pleasure or some object of perception. By contrast, let me explain the process of TM. One takes a thought at the ordinary conscious level and one has the experience, “I am thinking this thought.” So there is the “I” value and the thought which is the object. Then one starts to experience the thought on more refined levels. It is a process of transcending the thinking experience. The mind steps down to more infant stages of the thought (and this is a completely effortless, natural process), then the most infant stage is reached, and finally the mind even steps down off that, and there is no objectivity at all, no thought, just awareness, with no objective content.

Bob: I would have thought that if you get below the root of the thought then you’d lose the identity of the thinker.

Simon: This is what intellectually one might feel, but we have to jump the intellect, because it’s rather like trying to apply the rules relating to dream experience in a waking state — one would have a completely aberrated behaviour. Similarly, one must not apply the experience of the waking state to the experience of pure consciousness. When one experiences it, it is completely simple, completely innocent.

Bob: Presumably when you’re in it, there is no knower who says, “Here I am in it.”

Brian: “Knowingness”, I think, is better than “knower”. It transcends the individual knower and you find yourself another kind of knower. That is why most philosophies are such total contradictions because one moment they are speaking from an individual point of view and another moment they are speaking from a universal point of view, and these two contradict each other in the intellect, whereas as an experience there is no contradiction whatever.

Bob: When you are in this state of pure awareness, have you any option to move around or do anything?

Simon: In fact all options are available because it is an unconditioned state.

Bob: I believe many mystical states are such that while you are there, almost a definition of the state is that you are everything and you are all-knowing, so there is no question of choice.

Brian: It is nothing, but at the same time it's everything, as there is no boundary there, no set pattern. One can select any pattern — there is complete freedom.

Bob: And one of the patterns you choose would be levitating?

Simon: Yes. Now the purpose of levitation is to concentrate that field of all choices into what we might say is the limited field of everyday activity. We can actually see this clearly if we examine what happens in the experience subjectively and objectively of someone who is meditating and then doing TM sidhi[†] techniques of which levitation is one. When the individual meditates, the mind settles down, and when transcendence is reached, when the mind has that pure awareness, then we find that the brain physiology goes into a very simple kind of functioning. The brain's EEG patterns become very simple but extremely coherent, very orderly across the brain both in space and in time. In fact, if you are interested we can give you a mathematical definition of this coherence. What happens basically is that all the different components of the brain-waves are in phase. So this is a very pure, very innocent, very simple state, and it contrasts with the experience of everyday activity, when the mind is active and the functioning of the mind, the body and the brain is complex. For somebody who is solving problems the brain shows very complex activities.

Bob: I would see this as being identified with a complex outer situation.

Simon: Right. The simplicity and innocence have been lost. Now what happens when one performs the TM sidhi programme is that one takes the mind to that level of simplicity and one activates it there. Instead of activating it in the ordinary state, we activate it in a state of complete harmony, so its activity is complex while at the same time it maintains its coherence. We find this experimentally and it feels true subjectively. One meditates and one

[†] Sidhis (siddhis) are exceptional powers which appear to be of a paranormal kind (Ed.)

feels that harmony, but it's a very simple kind of harmony—it's lively, but simple, innocent, pure. Then one has the choice. One moves the harmony and one has the experience of this wholeness moving in this direction or that direction. This correlates very well with the EEG patterns. So the purpose here is to take harmony and make it active so that even in the midst of the most dynamic activity, the possibility of limitless choice is not lost.

Brian: When this experience becomes real to someone, then the total abstraction we've been discussing is experienced very concretely. We have monitored the psychology, the physiology and the behaviour of people when they have been experiencing this state on a regular basis, and we have found that quite spontaneously their physiology changes, the condition of their body begins to alter quite dramatically and rapidly, and their psychology begins to change too. Those virtues which I first mentioned start to develop spontaneously; and after about twelve years now of research there is no doubt that these changes are totally natural and verifiable in thousands of meditators. People with regular experience of this state begin to live a life of purity, and their moral values begin to change from within, not through outer learning. We believe that all knowledge is structured within us, mainly through intuition, and this becomes clearer: the more we experience pure consciousness, the more the blocks in the mind and body fade away. The result is a movement towards full potential of the mind and body, which some people feel is a movement towards a religious existence. Those who are moving in this way find that they start to make fewer mistakes, break fewer laws and actually begin to see what it is like to live a life of perfection.

Simon: We should add that this refinement of consciousness and physiology is not, from our point of view, to be done in the context of any one particular religion or philosophical set because the idea is that if the individual grows in his own inner awareness, and in the capability of his body to support that awareness, he will discover in himself those values which are a part of his own tradition.

Bob: This is a wonderful ideal, but on the other hand, one of the points that is often made is the relationship between your

hypnotist methods and self-hypnosis. A hypnotist sometimes uses a pendulum to achieve his aim, and the mantram repetition seems to be a very similar mechanism. I wonder if any research has been done on the physiology of hypnotic states?

Brian: I believe some has been done—in 1972 I think—Keith Wallace did something on metabolic states, and what he found was that for the average subject of hypnosis, if anything the metabolism rises. The subject is told to think he is in a completely relaxed condition, but scientifically speaking it is verifiable that this is not the case. In fact, if anything, the body is in a state of excitation, and this brings about an imbalance between mind/body co-ordination; whereas in TM the mind goes to a state of restfulness and records pure consciousness, coherence and a deep state of rest. In fact, performance of the TM sidhis is contingent upon the high degree of mind/body co-ordination displayed in the state of pure consciousness. I want to emphasise—we do *not* offer anyone a philosophy, nor any code of behaviour or lifestyle. Everybody's values are found within.

Simon: We should say, though, that we do offer an understanding of the process, but that understanding needn't be accepted blindly, because in fact we give it so that it can be verified by experience. If what we are saying is correct, it will be verifiable in practice.

Bob: You probably know the name Jeanne Dixon?

Simon: Yes.

Bob: In one of her visions, the Anti-Christ appears, but he is not recognised. At the end of his coming to power there is a situation in which the peoples of the world are all content. She saw them following in procession through very beautiful scenery in harmony with the world and with each other. They pass a very lovely valley with steep mountains on one side of it and occasionally, without being noticed, an individual comes out from the procession and starts struggling up one of these side valleys into the mountains. Now, what you would seem to be saying is that you would finish up in a state similar to that procession of people. There would be a population which is contented with each other, in harmony with nature. But . . . there is something wrong. Is it too easy? Or is it a

reversion to a state of harmony that existed in the garden of Eden which we left and are returning to, without having changed anything as a result of having left? It could be seen as a temptation to realise only a lesser potential, while not noticing a greater one.

Simon: Intimacy with nature comes through the development of potential. Some degree of relationship with nature could exist without full potential, but in fact we must develop fully. With that comes natural balance with all the laws of nature.

Bob: And since you have no philosophy you can't speak for the Maharishi in saying why we got out of harmony in the first place?

Simon: He does use the term "stress". I haven't heard him give any reason why, he just says we find ourselves in this condition and we want to move away to a fuller and fuller potential.

Bob: Now *why* do we want to move away from the stress?

Simon: Stress is that which blocks the usage of full potential. It must be both good and bad. Stress is due to some overload of experience which causes disturbances which may be psychological but are always physiological. It is necessary to have some kind of stimulus in order to be creative. Our research into the origin of stress has shown that good stress can have as much effect on the physiology as bad stress. Now we aim to dissolve the psychological and physiological constraints of stress, while at the same time making maximum use of any kind of input that comes with it.

Bob: There is the expression "the death-cell philosophers", people like Arthur Koestler, Victor Frankl and so on. Many people in concentration camps simply crack up. They make nothing of the experience, they just cave in. But the ones who have a certain strength are able to summon up a depth of response in themselves which will match the tension of stress outside. Through this they will have achieved an experience which I think a lot of esoteric schools say we all have to go through.

Simon: Our interpretation of that would be that the person who went under was completely stressed and could not respond to the environment. In fact, oversteering is a state rather than a specific reaction and that is in fact what you see. It is a state of inertia. Now a person who has the creativity to respond to the challenge loses past constraints. We could say that is what we are aiming for, that the

person should meet that challenge and rise above it. The purpose is to free the person's capability so that he can enjoy and use as a stepping-stone any challenge which comes to him.

Bob: Can I come back now to the physics of levitating? There are one or two very naive questions I'd like to ask just to get an idea of what levitating is. May I take it for granted that you won't demonstrate it?

Simon: We can, but we only do so when its holistic effect can be demonstrated as well. In other words, what levitation sets out to do can be demonstrated along with the physical phenomenon of someone leaving the ground. The sole purpose is to demonstrate that levitation has a very powerful integrating effect on the mind, body and behaviour.

Bob: Do you mean you only do it in a laboratory with monitoring and so on?

Simon: Right. There has been a series of tests conducted to show people that we can demonstrate and we will demonstrate. But most people never get away from the idea that the phenomenon is important, whereas it is entirely secondary. It is the development of pure consciousness which is important, and that should be demonstrated to whatever degree we can.

Bob: I take it that you're both flying?

Simon: Oh yes, every day.

Bob: You lift the body clothed. One doesn't know what is operating, a field of force, or a change of image; could you, for example, levitate with suitcases which are too heavy to lift at all, normally?

Simon: I haven't tried that.

Bob: Could you be literally holding weights?

Simon: I see no reason why not.

Bob: You see, if it's an "anti-gravity force" then the more weight you have the more difficult it would be, but if it's simply a clear visualisation then weight is quite irrelevant.

Simon: What do you mean by visualisation?

Bob: I mean transcending the level of forces, energy fields and matter, and operating on reality through images.

I heard of one person who levitated (not a TM person) by

visualising very clearly that the ground with the soil and grass and so on was a foot above his head. He focussed this very clearly and then he “fell down” to a foot off the floor.

Brian: I don't understand this idea of visualisation so I can't really talk about it, but the involvement with TM sidhis is desire. On the level of mind, the area of fulfilment of desire is there – all desires are fulfilled.

Simon: There is not a process of creating a vision of the idea, it's much more abstract than that. In fact, when you read Patanjali you will see that he simply gives you the formula which tells you what you have to do. But it's a very different thing to know what to do with it because the formula is totally unrelated to the phenomenon. It is beyond the intellect and exceedingly difficult to talk about.

Bob: So when you are flying, there isn't any force flying you up? Your hair doesn't go up?

Simon: Your hair might go up while you're coming down! There is a subjective feeling of force within, but it is often, in my experience, just a feeling of lightness, of the body taking on a different quality which changes with a rush, an experience of force. That is the subjective experience of it, one can actually feel it.

Brian: It's also an experience of pure happiness, of bliss when you succeed.

Simon: And of the bliss moving. One actually feels the wholeness of the bliss moving one.

Bob: Earlier this morning you mentioned an eighth of a second. You obviously don't just fly for an eighth of a second.

Brian: The brainwaves are coherent in the mind for about an eighth of a second. For that period nature can fulfil your desire. Depending on the individual makeup, people have different experiences. Some people don't go very high; others do, with better mental or mind-wave co-ordination. There are people who just go straight up.

Bob: For those who stay up, is this a fleeting experience or can you sustain it?

Simon: This is one of the reasons why we perform TM sidhis. How long you stay up is a function of two things – the individual's coherence, and the coherence in the environment.

Bob: Immediate environment?

Simon: Wider environment as well. I would say ultimately the widest. This is what we find, that in a place where the environment is pure, people are staying up longer. Also, if the same individual moves from one environment to a purer one, he can stay up longer.

Bob: Then you do best in a TM centre where harmony is established already?

Simon: Yes. This we find in Switzerland where TM sidhis have been performed for some years and the environment is very pure. People stay up much more. We find here that mainly people go two foot up and maybe five, six, eight foot along. That's about the limit of what we find here. That same individual might go to Switzerland and fly farther. There are some people sitting in the air for some period of time.

Bob: So the usual thing is simply to move up and down again?

Simon: That's the present state of the art, you might say.

Bob: Does this supply an indirect method of, so to speak, metering world harmony? Is there any evidence that the world is coming more into harmony, or losing harmony?

Simon: Well, I know that Maharishi really regards this as a measure. What he said when people started leaving the ground in numbers was that it was really an indication of the purity of the environment rather than the purity of the individual, and that is what encouraged him. He felt that world harmony was really rising.

Bob: I'd like to come back to this question of the purpose of the sidhis because I think all the traditional esoteric teachings would say that one is aiming for spirituality and spiritual qualities of strength and courage and compassion, and I think they would consider flying one of the psychic phenomena which should be ignored. They say, "Do not get entangled, do not get fascinated. Go on past, and if it happens, ignore it."

Simon: The success of the sidhis depends upon the degree of pure consciousness present, pure consciousness unconditioned and non-phenomenal. The purpose of the sidhi is to integrate the pure consciousness with outer activity. The phenomenon is purely a by-product, it is merely the outer manifestation of the inner integration.

Bob: I would have thought that when we meet with different situations in everyday life, the opportunities to integrate with pure consciousness are there in front of you, in family situations, for example, and that you don't have to supply artificial goals such as flying. You said that pure consciousness has to be integrated with the diversity of the external phenomenal world, and that sidhis are one way of sending out a pattern from pure consciousness into manifestation.

Simon: You could put it like that. It is true that everyday activities do that, but what we find is that the sidhis are quicker and more powerful, because they work from that essential aspect on its own. They lead *from* the unified state of consciousness into diversity, not vice versa.

Bob: So the things which you are trying to integrate are the different levels within yourself from pure consciousness to the body? You feel that by generating, or creating, if you like, phenomena you are strengthening the link between body and pure consciousness?

Simon: No! By strengthening the link between body and pure consciousness we are creating phenomena. The phenomenon is a by-product.

Bob: But it isn't entirely a by-product, because you choose to fly. Can you choose to meditate up into pure consciousness and not fly?

Simon: Oh, yes, but having achieved pure consciousness, the *activating* of it—which is what the sidhi does—ensures rapid integration. Flying will result. The subjective experience often is to notice a tremendous feeling of a wholeness. Inner integration is really what one notices. Many people who are trained in the technique and fly for the first time are convinced that they didn't move. All they noticed was the inner event of wholeness, being structured.

Bob: And in principle if you are willing to go more slowly you could achieve the same purity and integration without any phenomena?

Simon: Without performing the sidhi techniques? Yes. It would take a bit longer but you could achieve it through meditation if you wished. Also what happens physiologically is that the sidhis tend to open up different neural pathways. Certain sidhis have specific

functions and produce specific effects in physiology, but really what we're concerned about is in the consciousness.

Brian: Is that clear?

Bob: Well, I suppose it will never be completely clear until I start flying myself.

Simon: I had a battle with my intellect when I first took off. My intellect just wouldn't believe it. "It didn't happen! You made it up!" It was only with repeated practice that my intellect came to accept it and I had to re-integrate it into my experience. What really made it happen quickly was that the inner value (as opposed to the outer value) is more greatly appreciated during flying.

Bob: Can this ever go wrong? I mean that in Subud, for example, which is another technique of development, there were a number of cases of "Subud psychosis" with people releasing too much too fast, really not able to cope and finishing up in hospital. Could you get shocked by flying, for example, if you suddenly found yourself up there?

Simon: People won't get that high if there is not that degree of integration.

Bob: You haven't had any casualties?

Brian: Someone did break a leg because he fell down on it. That's why we fly in lotus position, because the legs are out of the way.

Bob: Do you not choose to come down? You choose to go up, and maybe the concentration breaks?

Simon: The coming down is due to a breakdown in coherence. As the activity increases so the coherence cannot be maintained and one comes down. Then, as the activity decreases, coherence builds up again and one goes up again.

Bob: So the ones who fly high are in a certain risk of falling quite a long way, if they break coherence suddenly?

Simon: If the coherence was complete then it would be maintained completely, by intention, and that is enlightenment.

Bob: So for a beginner whose coherence may break, you're saying they wouldn't fly very high?

Simon: No. The whole thing is really very natural. It only doesn't seem to be natural when one looks at it from normal experience.

Meeting a firewalker

JIM GARRISON

THE 1976 *Guinness Book of Records* asserts that “the highest temperature endured in a firewalk is 1,183 degrees F. for 25 feet by ‘Komar’ of Wooster, Ohio, at the Phoenix Seminar, Arizona, on March 7, 1975. The temperature was measured by a pyrometer.”

On Saturday, June 2, 1979, on the backlawn of Claregate College in Potters Bar, Great Britain, Komar performed this feat again. The event was organized by the principal of Claregate, Dr. Douglas Baker, who specifically stated that his concern was to “interest Western medicine in the power of mind over matter.” Attending the occasion were several persons from this Theoria to Theory group.

Prior to the firewalking, an explanatory lecture was given by Dr. Baker to the approximately 200 people who had come. He began by acknowledging that what we were about to witness was a subject of a “fringe science phenomenon for which there is as yet no scientific explanation.” Possibilities of pain control could be conceived through the inhibition of nervous reactions or through volitional suppression, said Dr. Baker, but the real problem lay beyond the question of pain control in the question of how flesh can withstand heat of over 1,000 degrees F.

This is only a problem given the assumptions and operative biases of western science, however: both the knowledge and the practice of this phenomenon have existed in the East for millenia. Dr. Baker offered to us the explanation of the yogis, particularly that of Swami Rama, who introduced the concept of biofeedback to the West. Biofeedback involves the monitoring of different wave patterns and pulses throughout the body, particularly in the brain in order to

inform the person of his or her overall physical and emotional health. According to Swami Rama, flesh can withstand heat if the person involved understands the force fields of aetheric energy vibrating through his or her body which can be strengthened to protect any given limb or organ from damage.

The yogis maintain that our physical body is only one particular manifestation of what we really are. A more fundamental manifestation is that of a “force field of energy, a subtle substance that forms our aetheric body and which irradiates outward as *prana*.” Known as “the breath of God”, *prana* comes from the sun, and although invisible like sunlight, permeates our entire physical manifestation and can be pumped into the nervous system and into the various organs if one is attuned to its presence.

The *prana* is organized into seven “energy vortexes” called *chakras*, which are situated along our cerebral-spinal system from the crown of the head to the lower tip of the spine at the coccyx bone. Each of the seven *chakras* irradiates outward and through permeation controls its particular aspect of the physical body. Each organ or tissue is fed by its appropriate energy centre which gives it its particular “integrity”.

Because *Prana* and the *chakra* centres are composed of irradiating light, they are influenced not by our physical manifestation but by our emotional and mental states. This is to say, that something such as an emotional trauma would influence the *prana/chakra* complex. This in turn would upset the aetheric equilibrium that keeps any particular organ in tune with itself and in harmony with the rest of the body. The Chakra System is the connecting link between emotions and illness, the catalytic ingredient in all psychosomatic diseases.

The key to *prana* and *chakra* purity is meditation. Dr. Baker’s understanding of meditation was that it involves a “withdrawal”, a “dying daily” to those aspects of ego attachment that upset our spiritual equilibrium. This withdrawal of sensory apprehension, however, paradoxically opens us up to more aetheric energy, to more *prana*. With meditation, therefore, comes *kundalini*, the fire of the Spirit. Divinity is fire, and whoever can bring down this fire, whoever can control fire – the basis of the aether/*prana* complex in

the body—holds the key to such feats as firewalking. In effect, proclaimed Dr. Baker, “Komar has the ability to bring down fire. He meets fire with fire.”

At this point Dr. Baker concluded his remarks and introduced Komar whose real name is Vernon Craig. He was a balding, pot bellied man in forties, wearing a red open-necked sports shirt and black trousers. He spoke vigorously, indicating no apparent emotional or physical apprehension at the prospect of walking over a bed of fire. His first words were that the dynamic that had characterized his life was one in which, as he put it, “I want to create more than I started with.” His joy was in helping people improve their personal lives, a purpose that had given him opportunity to be a five state Director in the United States for Senator Ted Kennedy’s program for helping the mentally retarded. It was while he was working in the mental retardation program, he told us, that he began to demonstrate pain control techniques and finally firewalking. His purpose was to challenge his audiences with the fact that “people can turn off pain if they want to.” His final words before walking off stage were “Firewalking is like anything in life you want to do—just takes a little up here.” He pointed to his head and chuckled.

The lecture was adjourned at this point and we walked the fifty metres over to an elmwood fire on the lawn. Standing ten feet away, just behind the ropes encircling the area, I could feel the intensity of the heat. Boys with rakes were sent in to level the embers out to about 6 to 8 inches in depths. At first they could hardly get close enough to do their raking. the embers were so hot. While they attempted to rake, Dr. Baker fielded questions from the audience. I kept my eye on Vernon, still behind the ropes with the rest of us. He alternated between staring fixedly at the bed of embers and pacing back and forth, all the while smoking Camel unfiltered cigarettes and swigging a can of Coca Cola. Dr. Baker explained that it took Vernon three days of “withdrawal” before each firewalk to attain the level of deep concentration required, although at no point during the entire proceedings did Vernon appear either withdrawn or abnormal in any way. He was certainly in deep concentration, particularly when gazing into the fire, and generally appeared

serious and contemplative. In fact the only time I observed any change in serious expression was when a man in the audience asked where Vernon withdrew to. At this Vernon slightly smiled.

After a brief statement to the audience, Vernon sat down and took off his shoes and socks, welcoming any doctors or interested people to touch his feet. I did so. They felt and smelled like any normal feet after you take your shoes off. Vernon then stepped inside the ropes, still with a lit cigarette and a can of Coke. He spent about five minutes staring into the fire, walking up to it and then back again, all the while drawing on his cigarette and drinking his Coke.

He finally finished his cigarette, threw his half finished Coke back over his shoulder, and, placing his hands on his hips, began to look very intently at the fire. The audience was totally silent. Then Vernon raised his right hand and with determined strides walked over the bed of embers to the other side. The distance was approximately 20 feet.

Once back to the podium, he sat down again and welcomed anyone to examine his feet. Again I did so. Whereas before they were reddish, smelly and warm, they were now white and very cold. There were no burn marks of any kind. A doctor took his pulse. It was 80 beats per minute.

While most of the people adjourned for tea, several of us grouped around and fell into conversation with him. He revealed that he used no mantra, concentrating rather on eradicating everything from his mind – including the fire. “The key”, he said, “is to get rid of the existence of the fire,” adding that “If there is any fear, everything is lost.” In order to get to this point he would walk up and down in front of the fire until he could feel the heat no more. At that point he could walk over the embers without either burn or pain. Although he stated that this was not self-hypnosis nor was a breathing technique involved, he did share with us that when a young boy he found a book on yoga in a garbage can. He practised the breathing techniques described in it until he mastered them. He then laughed and said that when people asked him who his guru was he would answer that his guru was a garbage can.

When during his work with Kennedy's mental retardation

program the question of pain control came up, Vernon related that he “simply knew I could do it if I wanted to.” Other than this, he showed little knowledge or curiosity about the esoterica involved with such ‘miraculous’ feats as firewalking. He basically content, he said, to live a normal life as a retail cheese merchant in Ohio, selling cuckoo clocks on the side. As he sat there, still barefoot, a cigarette in one hand and a Coke in the other, I believed him.

Neo-Darwinism

We have asked various people to contribute to the discussion which appeared in XIII ii. The pieces that follow are first instalments of what we hope will be a continuing debate. Tony Nuttall is Professor of English and Pro-Vice-Chancellor of the University of Sussex. Anthony Manser is Professor of Philosophy in the University of Southampton, and has written critical articles on evolutionary theories, the two major ones being 'The Concept of Evolution' in Philosophy, Jan 1965 and 'Function and Explanation', Aristotelian Society Supplementary Volume XLVII, 1973. Richard Spilsbury is a former lecturer in Philosophy, whose book "Providence Lost: a Critique of Darwinism" helped spark off our debate.

I TONY NUTTALL

IN THE HISTORY OF IDEAS, Darwinism stands as the great answer to the teleological system of Paley. Before Darwin it seemed obvious to ordinarily intelligent people that the complex forms of adaptation we observe in the natural world imply an intelligent creator, working to a given end. The whole force of Darwinism lay in its seeming power to account for the same phenomena, without once invoking intelligence or purpose, but on the contrary with the simplest of premises: like begets like; small mutations occur; the less fit to survive are eliminated. The power of Darwin to refute Paley falls away as soon as it is conceded that natural selection accounts for only part of what we observe in nature; it was the spectacular union of exhaustive explanation with a severe restriction of premises which routed the theologians.

Theoria to Theory. 1979, Vol. 13, pp. 197 – 206
0049-3686/79/1303-0197\$04.50/0

Published by
Gordon and Breach Science Publishers Inc. 1979

In this discussion it would appear that Neo-Darwinism lacks the comprehensive confidence of earlier versions of the theory (I will say nothing here of the doubts which assailed Darwin himself). But the presupposed antitheses of the debate appear to have shifted. If Paley were to read, say, the observations of Deborah Charlesworth, he would doubtless interpret each of her expressions of scientific modesty (her emphasis on the piece-meal character of current biology, her recognition of the various discontinuities in the explanatory chain extending from the molecular level to the phenotype) as a virtual confession that, for all she knows to the contrary, some mighty intelligence may after all be at work in the organisation of nature. Yet Deborah Charlesworth herself seems only half aware of this as a conceivable implication of her views. For example, she makes strangely heavy weather of the notion of *function* as employed by Darwinians. Surely anyone acquainted with the polemical history of Darwinism would know, as a matter of course, that Darwinians habitually (and without any theoretical inconsistency) employ the terms of teleology as a metaphor (or a sort of conceptual shorthand). Thus Darwinians are entirely happy to say, among friends, that the bird's wing is "for" flying, while remaining clearly aware that this language does not commit them categorically to teleology, but is in fact a means of referring shortly to the phenomena of adaptation which arise from natural selection. Ms. Charlesworth's answer could really have been very simple: "function" in a Darwinian context means, not "that for which x is designed", but "what x does"; the giraffes long neck enables it to reach high leaves; *that* is its function. Instead of saying this Ms. Charlesworth, having rejected teleology, being asked to explain her own use of "function", lamely refers the word back to its historical origins and – of all things – to "the notion of a Designer". In the observations of Brian Goodwin and Gerry Webster the new antithesis of Darwinism begins to take shape: not teleology, but a new universe of mathematical ratios. As the chasms in the causal chain yawn ever wider, the mind discovers a new species of satisfaction in the discovery of mathematical coherence in the given forms of nature.

This change of the very ground of argument is both deeply imaginative and liberating, yet I must confess a certain hostility to

it. Gerry Webster and Brian Goodwin are both clearly influenced by structuralism, a movement of thought of such radical generality that it has changed the colour of disciplines as far apart as literary criticism, philosophy, anthropology, linguistics and biology. Central to structuralism is an (unexplained) flight from the notion not only of purpose but of *cause* itself. For the structuralist literary critic "literature writes itself"; the patterns shift and change and are variously overlaid, one on another, but to do other than acquiesce in their variety, to seek an extrinsic determinant is somehow *tabu*. It is further characteristic of structuralism to relish the emptiness of the conventions it identifies, to stress their gratuitous character, to choose models from the world of play rather than the world of work. Gerry Webster's ill-starred attempt in the present discussion to liken the formal regularities he is pursuing to the rules of a game is in my view a pure consequence of the *rhetoric* of structuralism and wholly lacks a rational foundation. In some respects one is tempted to say that the theory they advance recalls a particular half-way house briefly occupied by Kepler in the course of his attack on the problem of planetary motion, that is, his attempt to assimilate the behaviour of the Planets to the mathematics of the Five Perfect Solids — a kind of Platonic or Pythagorean aestheticism to sustain the mind through a famine of causal explanation. But the analogy is unfair. It is not only the picturesque early notions of Kepler which have this a-causal, mathematical character but his triumphant formulations of the basis of planetary acceleration and deceleration, and the same is true of Newton himself. Newton never found the cause of gravity, but rather found its law.

Yet a sense persists that the quest for causes, where discoverable, has been, so to speak, the guts of scientific progress. One remark by Gerry Webster (about "explanations" collapsing into "correlations") suggests that his turning away from causes springs from a Humean intuition that so called causes are in any case no more than habitual correlations. Yet Hume's observation is very much that of the Olympian watching philosopher rather than the practical scientist. He observes that A again and again goes with B; it does not occur to him, as it would occur at once to a scientist, to extend his hand and *remove* A on select occasions and see if, on those occasions, B fails to

follow. It is by such acts of intervention that we may on occasion legitimately replace the bloodless notion of correlation with the stronger notion of cause. It is accordingly no accident that seventeenth century astronomy was a-causal, since in astronomy controlled experiment was notably impossible. But biology is and was otherwise.

I therefore hope that the formal findings of Gerry Webster and Brian Goodwin will one day be set more firmly in a renewed context of causal explanation. In particular I hope that the somewhat inert programme of "supplementing" Darwinism will resolve itself either into confirmation or disconfirmation of the Darwinian scheme. Either possibility is immensely more exciting than the current neutrality. It may be that the Darwinian principle of reducibility to random determinants is now in serious danger of being overthrown (I note that Jonathan Westphal, confronted with the new non-assertive language of correlation, had the spirit to ask whether the mouse manufactures different DNA because it is a mouse, rather than being a mouse because it has different DNA). Gerry Webster's remark that "Darwinism is perfectly OK on the preservation of adapted forms" is in fact open to doubt. That like should (usually) beget like is not explained by Darwinism but is on the contrary one of its premises. The efforts of Neo-Darwinism to establish the mechanisms of continuity at the micro-level have so far been only partly successful. In fact the extraordinary persistence, beneath the spectacular adaptive modifications, of homologous structures, through all the endless shocks of the molecular environment, is itself remarkable and has been felt by some to *require* an independent explanation. The supply of organisms on which natural selection operates is in fact not *wholly* random but is, quite obviously, rule-governed. Here the ghost of Paley might wish to intervene! To ascribe the continuity to the genes may be not far removed (as Jonathan Westphal hinted) from a *petitio principii*, in so far as "gene" remains a theoretical concept and means "whatever would produce this result". Where genes are identified, one is sometimes confronted (seemingly) with examples of homology being swiftly recovered in cases where genetic continuity has definitely been broken (I am thinking here of T. H. Morgan's notorious discovery in

1929 that the genetic pool for loss of eyes in fruitflies could be identified, and yet from that pool fruit flies with eyes were subsequently bred. I am told that if one takes the eye-producing tissue from a fruitfly embryo (which now grows up minus one eye) and places it in the abdominal cavity of an adult fruitfly it then develops (in response to a simple stimulus) into a wing-like structure. It would not be difficult to add further examples, in which it seems more natural to say that the pattern imposes itself on the material constituents than to say that the material constituents naturally and fortuitously produce a pattern.

I am in no position to say that any such reversal of Darwinian causality is imminent or even likely. The nature of genotypical formation seems to be still mysterious. The committed Darwinian may argue that those gene-complexes which result in stable organisms survive while others do not; others, less committed, have suggested that genotypes may mutate and develop according to quite different principles. If the mathematical ratios discerned by Brian Goodwin are of great intricacy and beauty, this may be a reason for evoking some independent principle of causal explanation and so eroding the claims of classical Darwinism to exhaust the field. Or it may not. Certainly I am in no position to offer an opinion. Instead I content myself with the observation that, as long as one restricts oneself to "correlation" and flinches from the question of what causes what, the hypothesis of inverse determinism must rank equally with Darwinian theory. Changes no less catastrophic have come and gone in other sciences. Physicists once employed a similar axiom of reducibility whereby the movements of large-scale bodies would prove to be wholly predictable from the movements of the primary constituents of matter (themselves subject to Newtonian law). Yet physics itself is now radically indeterminist at the primary level, and the question "What then is the source of physical predictability at the macro-level?", though ignored, remains a question of potential urgency.

I have several times in this comment invoked — half-facetiously — the spirit of Paley. I have done so, not because I think his hypothesis of a single divine creator has any hope of being rationally rehabilitated, but because of something which makes him more

closely akin to his great antagonist Darwin than to one who might at first sight look like an ally, that is, the modern structuralist; I mean *his hunger to know why*.

II ANTHONY MANSER

One of the problems that faces all those who try to be scientific about biology is the enormous variety of living creatures. However, this great variety is not entirely bewildering, for from quite an early stage in man's observation of the living world it proved possible to classify its denizens into groups, species, which shared a great many common characteristics. These seemed to have a common form or shape, even though they might differ in colour. Indeed there is a sense in which at least the members of species that lived on land and could move demonstrated, by their mating habits, that they were to be grouped together and separated from other, less similar, creatures. Species seemed to be a natural way of classifying. Once this had been seen, it was not a very great step in some cases to see that higher orders of classification were possible, that, in spite of differences in size, cats had more in common with lions than either did with rabbits or deer. Given that many creatures reproduce sexually it was highly likely that species should exist and persist over time. But it was less obvious that species should fall into groups. If the living world had been created by an infinite God, there seemed no good reason why he should use the same pattern for a number of different species, rather than creating each entirely different from any other. Thus what I am here arguing is that the very fact that classification can be applied to species, as well as to individuals, already points towards the possibility that one species could develop from another.

A theory of evolution then might be said to be implicit in Linnaean classification; the merit of Darwin was that he suggested a non-teleological mechanism whereby this might occur. As I have argued elsewhere ('The Concept of Evolution', *Philosophy*, 1965, pp. 18-34), the important feature of Darwin's theory is that it establishes that the methods of natural science are applicable to

biology, that we need no special 'vitalist' principles to deal with living organisms. It is worth stressing how successful physiology and biochemistry have been in explaining the actual mechanisms by which animals and plants operate. A very great deal is known about the detailed chemical processes which go on in converting food into bodily requirements etc. Thus it is ironical that this scientific success has not led to a similar detailed knowledge of the way in which species come into being. At least I take this to be the burden of Gerry Webster's remark: 'It seems to me that Darwinism is perfectly O.K. on the preservation of adapted forms; it just has nothing much to say about the origin of species'. And this is borne out by later remarks, where the same complaint is made about neo-Darwinism, e.g. by Deborah Charlesworth: 'No. I think that neo-Darwinists would not claim to be able to explain mice as such, only certain features of mice.'

There does seem to be a measure of agreement that neo-Darwinism could cope with the splitting of one species into two, for example how two races of one species might eventually, perhaps as the result of geographical isolation, build up a barrier against interbreeding and so become separate species. This was the sort of thing that Darwin was concerned with, and Neo-Darwinism, I presume, does provide a more detailed account of the mechanism of such changes. What is not explained is 'why there are mice and elephants and rabbits and human beings, which are all different and yet the same'. Part of the difficulty is that these are different genera or families, not just different species of animal. Little has been written about the evolution of such higher groupings, though it is often assumed that the processes which give rise to differing species will also account for these. Certainly it is possible to look on all vertebrates as sharing a common form, as being variations on a single theme, and hence to accept the idea that they have arisen from a single ancestral species. Such similarities are a powerful reason for accepting an evolutionary theory. The difficulty, as the symposiasts point out, is that although it is possible to see how an account in historical terms might be given, at the moment there seems no possibility of prediction. In other words, evolutionary theory, of any type, seems not to match up to other scientific

theories. As Deborah Charlesworth says, as we have only one example of the development of the kidney, it is impossible to see why it evolved rather than anything else, why the same (or similar) function was not performed by a quite different type of organ.

I do detect some confusion in the symposium at this point. It may be possible to give a mathematical account of the development of an organism, but I am not sure whether this will be any more than a particularly elaborate description rather than a method enabling us to predict from initial conditions what the final organism will look like. I suspect that this applies to many of the suggested applications of catastrophe theory, though I do not want to argue this point here. This is partly because of my mathematical ignorance, but also because of a doubt about the value of formal solutions at the present stage. Further, the circularity in definitions which is always a danger in discussions of evolution, as the symposiasts are well aware, is liable to crop up in a hidden manner in the mathematical examples. What still strikes me as central here is the historical element. On the earth we are faced with a particular set of organisms which appear to be related. It is quite possible that on other planets quite different types have arisen. Only if we were aware of such would there be a possibility of looking for general laws of evolution. It is not obvious that the vertebrate system implies four rather than six limbs, and easy to imagine that the reason for this particular number developing here was an historical accident, and a trivial one at that. Survival has always been a chancy matter. If we had found several other planets with life and each had four limbed land-dwellers, there would be grounds for suspecting that some law-like regularity was involved.

We are unlikely to have such evidence available for the foreseeable future, and at present it seems improbable that we will be able to produce new genera or families by experimental means. Hence I suspect that we will continue to be faced with the need to rely on historical accounts of the rise of particular families of organisms, even though we can explain in normal scientific terms the functioning of any organism. But the fact that we can do this does imply that the need to rely on history is a product of our ignorance or on the possibility of accidents playing a vital role give the complexity of the

whole system. There is no need to invoke any explanatory principles outside those of the rest of science, even if we cannot show this in detail. However, this should give confidence in the continued research along present lines.

One final and tentative point. Throughout the discussion and my remarks the assumption has been that it is quite clear what an individual organism is, and that we can talk of an organism and its environment. At this point there arise problems about adaptation, where it is pointed out that circularity again arises. But there is an important sense in which separation of organism and environment is a result of our way of looking at things. I feel inclined to say the relation between the two is an internal one, so the circularity need not be vicious. Clearly more needs to be said about this.

III RICHARD SPILSBURY

“Nobody disbelieves evolution”, Jonathan Westphal says. No scientist, at least. But the consensus is not complete, Sartre, for one, thinks that the notion of evolution might be superseded by the next century. Though he has never to my knowledge made clear his views on evolution, he would obviously object to evolutionary explanations of human behaviour that might be used as evolutionary *excuses*; that is, to any form of evolutionary determinism which implies that men are driven to act in certain ways by their ancestral history, over which they have no control.

The future credibility of evolution may depend on the meaning that one gives to this term. At present it is difficult to draw a sharp distinction between belief in evolution, and belief in a particular explanation of evolution, such as Neo-Darwinism. The whole notion of evolution has been darwinized. Chambers Dictionary defines *evolution* as the doctrine according to which higher forms of life have gradually arisen out of lower. This gradualism, or step by step process of change, is written into the notion, and is connected with the view that evolution proceeds by the selection of ‘minor’ variations, and that large genetic jumps are lethal. But the assumption that new forms of life have always arisen gradually often appears

implausible, especially in the case of man with his jumped up brain and unique cultural creativeness that is continuous through many generations, so that what was previously created becomes a fresh creative source and incitement, as exemplified in the development of language and other forms of invention, the adaptive function of which is not always evident. The assumption of universal gradualism seems to me one of the most vulnerable aspects of evolutionary thought, and may be abandoned 'by the next century'. This is not to deny that Neo-Darwinism can 'in principle' (blessed phrase) account for man's appearance, with the aid of special assumptions; but as these cannot be tested in a decisive way, it is better to remain agnostic. One may think of gradualism as more of an explanatory convention or convenience than a natural law. It is an assumption that has been dropped in many fields. Embryonic development appears to be a gradual process of change towards the adult form, but the metamorphosis of caterpillar into butterfly appears as a marked discontinuity. Without observational knowledge of their life history one would never guess that the one had developed from the other, or was capable of doing so.

Given such different phenotypes (and 'ecotypes') as butterfly and caterpillar, one may well wonder how the same genotype can be thought to determine both. The problematical relationship between phenotype and genotype is one of the questions raised in this Symposium on Neo-Darwinism. Granted that classical genetics was concerned with differences of detail, is there any evidence that the organism as a whole is determined by its genome working in a certain environment? Can phenotypic sameness be attributed to genetic sameness? The answer appears to be yes, in the case of twins that develop from a single fertilised egg. But it would be possible to suppose that the genetic sameness determines only detailed points of resemblance, such as eye colour and nose shape, and not the general form and organs. This would imply a double determination of the organism and its development, possibly some form of field — particle duality.

Sociobiology and social behaviour in men and animals

GODWIN SOGOLO

STUDENTS OF CULTURE are now increasingly becoming more interested in soliciting aid from the biological sciences. They see, as it were, a rising hope which seems to flower from some kind of correlation between their concerns and those of biologists. This is understandable. For, after all, assumptions about the biological antecedents of human culture have never been strongly disputed even before nineteenth century Social Darwinism. Indeed, the transition from traditional ethology to the newly emerging field of sociobiology takes all this as given. It seems that human culture, is, at least to a certain extent, a product of man's biological heritage.

There is therefore some rationale for injecting biological thinking into sociological analysis and also perhaps some plausibility in the suggestion that certain techniques and ideas by which biological systems are explained may be borrowed and adequately utilized in the explanation of human social systems. In fact, this may be done with reference to the grounds which biologists and sociologists share in common. But yet, a point arises at which a line of demarcation must be drawn—a borderline no matter how thin, at which both disciplines part company. However, writers often become so fascinated by that which is common between both they they go in full force for a merger of biology and sociology or assimilate the latter into the former. This results in greater difficulties than those that initially drew attention. This paper examines some of such difficulties which inevitably arise in an attempt to draw on certain

biological ideas which are taken to provide a solution to persistent problems facing sociological theories. I shall argue that V. Pratt's "A Biological Approach to Sociological Functionalism" provides us with a good example of this. But, because the weaknesses of Pratt's idea arise from the wider presuppositions of sociobiology, the discussion will embrace a general analysis of this new field.

Pratt's main concern is to defend classical societal functionalism against the charge of teleology. And to do this he builds his armoury on the foundation of the biological theory of group selection. Much as he would go along with the critics of classical functionalism in rejecting society treated as an "intelligent purposer", his more fundamental rejection is of the claim that the approach inevitably commits us to this picture. Pratt maintains that classical functionalism does not in fact commit us to seeing the individual always as a conscious intelligent purposer. He then suggests an alternative whose plausibility he tries to demonstrate by an appeal to "biological theory and evidence".² It is the possibility that "the individual unconsciously recognizes the needs of his group and directs his behaviour so that they are met".³ Once this possibility is established, says Pratt, the major problems of classical functionalism dissolve.

Pratt does not think that there is any difficulty in substantiating his new way-out once we appeal to views such as those of V. C. Wynne-Edwards, who focuses on the group as the primary unit of natural selection instead of the Darwinian individual. Surely, biologists have demonstrated the potency of the mechanism of group selection, and all it needs is "an effectively isolated set of genes" based on what Wynne-Edwards describes as the existence of "discrete local populations or groups, each of which is self-perpetuating and capable of maintaining its integrity".⁴ With this type of group structure there is not much dispute as to the origin of patterns of behaviour whose functions are defined in terms of group survival.

Thus far, I think Wynne-Edwards and Pratt are essentially right. Undoubtedly, this line of argument could be used in effectively freeing classical societal functionalism from its main charge if we ignore (but can we really ignore it?) such strong arguments as G. C. Williams against the potency of group selection.⁵ What I want to question however is these authors' further argument by extra-

polation, something similar to Haldane's "Argument from Animals to Men".⁶ For their "evidence" in favour of group selection at the human level is mainly by reference to socially organized groups of non-human animals in which, for instance, an individual gives warning signals which "militate against its own individual prospects of escape . . . but promote the escape of the group as a whole".⁷

Biologists claim that there is a good deal of evidence for the evolution of this behaviour pattern in animals. But the question remains as to how far this pattern of behaviour can be seen to be identical with human altruistic behaviour and to what extent the biological explanatory model can be drawn upon in the explanation of human social behaviour. Most sociobiologists, including Pratt and Wynne-Edwards, think that by borrowing from what we know about animal social behaviour a great deal can be known about human social behaviour for "the characteristic situation is the same as we normally find among underdeveloped populations".⁸ (I shall return to this implied distinction between "developed" and "underdeveloped" human populations later in the paper). Meanwhile I want to examine the wider implications of this move from arguments about animal groups to arguments about human groups.

Chiefly, I shall seek to establish that such a move is fallacious on the following grounds:-

- 1) That it obliterates certain essential characters that differentiate the human from the non-human by misapplying the very notion of "unconscious motivation" and by confusing biological reciprocity among animals with moral altruism;
- 2) that it wrongly assumes that because the human being, through natural selection, has been endowed with certain capabilities which make culture possible, every development subsequent upon this must be a direct product of natural selection;
- 3) and finally that certain versions of the thesis imply essential qualitative differences between members of the human species by attributing to unconscious motivation in "underdeveloped" human groups the same items which are claimed to be products of conscious human planning in developed societies.

The implications of the above, I shall conclude, make the move from the animal to the human untenable and therefore render the bio-

logical approach impotent in its bid to solve the problems of classical functionalism.

One of the central presuppositions of classical societal functionalism which gives the doctrine its strong appeal and for which modern sociologists stick to it is that it implies group goal-directedness. Yet it is the same notion of goal-directedness, because it is thought to entail teleology, that constitutes its greatest weakness. The entire confusion arises from the connections that are taken to exist between function, goal and purpose. And on this Pratt is surely right to point out that, while a functional activity necessarily involves goal-directedness, not all goal-directed activities are purposive.

Systems are only susceptible to functional analysis, it is thus suggested, where they may be said to pursue goals . . . the category of behaviour which marks systems out as appropriate for functional analysis is wider than the category of purposeful behaviour . . . Being purposeful, in other words, is just one way of being "goal-directed": and it is therefore possible to identify behaviour as goal-directed without the implication that it has been initiated by an agent pursuing an antecedently conceived aim.⁹

The reason for this kind of distinction, one imagines, is for one to know fairly precisely in what sense terms such as "goal", "function" and "purpose" are applicable to various objects of analysis. Surely, one can talk of the goal of a the mostat without in any way suggesting that this object is capable of consciously entertaining some purpose. Nor would a biologist seriously attribute conscious purposiveness to behaviour such as that of an amoeba trying to engulf some food substance.

On Being Human

Normally, it is only in connection with human behaviour that we use "function" and "goal" in the unique sense that the agent is capable of consciously recognizing and directing his behaviour toward the achievement of certain ends. Such a restrictive use tends to suggest that all humans share certain objective qualities to the exclusion of non-humans. The question then arises as to what it is that makes the human human. Are there any defining characteristics which every human must possess if he is to be so called? Wittgenstein

with his example of games has shown the futility of this kind of enterprise. All games do not need to have some common and peculiar features for them to be referred to as games. What they have, he suggests, is simply a family resemblance and what non-games lack is a share in this family association.

Wittgenstein's suggestion is that instead of searching for some defining characteristics, what is found often are merely accompanying features. And according to J. Hospers, a mere accompanying characteristic as opposed to a defining one is not difficult to identify:

When D always accompanies A, B, C, we may think that it belongs in the definition. But let us then ask ourselves, "Even though D always accompanies A, B, and C, if sometimes D did not accompany A, B, and C, would the thing in question still be called an X?" If the answer is yes, the characteristic is still accompanying and not defining.

How, for instance, would this test go with the suggestion that to be human a thing must be of a certain anatomical structure—that a thing (as has often been suggested) must have legs and arms? The implication of this is that if somebody were to have these parts amputated he would cease to be human even though he possessed all other "essential" features. But this is unacceptable, Lamé men, one-eyed men, etc., are generally classified as humans and hence legs, arms, eyes and other anatomical features must be seen as mere accompanying rather than defining features of the human. The result, of course, is that we must (as we normally do) admit into our conception of the human varied shapes and sizes. In fact similar conclusions follow if we take what are generally regarded as psychological criteria for being human. I am referring to such claims as "to be human is to be self-determining and rule-following". The obvious objections to this is simply that infants, lunatics and some seniles normally regarded as human beings fail to meet such criteria.

It seems therefore that we must admit to some extent Pratt's type of "continuities" between the human and the non-human since some characteristics are not easily drawn upon for a clear-cut distinction. But the absence of some common and peculiar features by which an object can be identified does not mean that we cannot

recognize what that thing *typically* is. We can provide a definition of a thing in the sense of “what is typically regarded as that thing” without being able to list specific features by which that thing can be recognized or without insisting that that thing necessarily shares some common features with other things of that class. In this kind of definition reference may be made to certain accompanying characteristics which add up to form what could be taken as a “paradigm case” of that thing. This is what obtains in most of our everyday language usage of general terms. We define the human mainly in terms of what is taken to be typical of that species. And this does not entail that absence of one or more specific features would rule out a thing from that category. That a typical human being is held to have two legs and two hands does not rule out a man whose one leg is amputated from being human. Nor would infants and lunatics be excluded simply because a human being is held to be a rational entity.

The problem of how words relate to reality has been for long a puzzle to philosophers. It is true that terms such as “human”, “man”, “person”, etc. have stipulative definitions in the sense that they probably started as arbitrary symbols. But as R. Bierstedt rightly points out, they do not remain as mere arbitrary systems of names because a word that originated “by stipulation and to which we have arbitrarily given a meaning comes, through use and repetition, to be regarded as necessarily having that meaning”.¹¹ Not only is such a word conventionally tied to a meaning, it is also gradually regarded as standing for some objective reality. And this makes it difficult to arrive at some universally acceptable criteria either as giving the meaning a term stands for or what reality it represents. Thus the rationale for applying most common terms may be seen to reside in convention rather than in some objective criteria.

A conventional usage is in a sense a kind of reportive definition stating that a word is taken to mean such and such. The only sense in which the truth of such a definition can be questioned is whether or not it is the case that the word is so used. If I say “a man is a rational animal” in the reportive sense, the truth of this definition can only be questioned by asking whether or not man is generally

taken to be a rational animal. It is not whether he is really a rational animal. But were we to take this as a real definition in which "a man is a rational animal" would mean that he possesses some objective property, namely rationality, the truth of such a definition can be questioned by demanding evidence of such a property. However, one begins to wonder how much meaningful contributions this kind of logical quibbling about conceptual usage can make in the social sciences. In fact, many sociologists are beginning to abandon this kind of rigorous but fruitless exercise by merely accepting as given conventionally accepted or standardized usage of certain terms. The problem in the past has been one of seeing every definition as having ontological implications as if a term cannot be meaningfully used without empirical knowledge of the phenomena in question.

Since our main concern is to find areas of discourse which are distinctively applicable only to humans, let us start with one of the most conventionally accepted notions of the human and examine this in relation to some of the correlations often made by sociologists who embrace the biological approach. Generally, a human being is taken to be a moral animal. And because morality is defined generally in conscious rational terms it follows that a human being is a conscious rational entity—consciousness here being understood in terms of self-reflection. All of this sociobiologists seem to ignore in their efforts to bridge the gap between human activities and the activities of non-human animals. The argument often advanced for this is that by observation the activities of the two categories of beings are in no way different. This is like saying, for instance, that because two people perform identical actions such as presenting a bank clerk with a cheque, and receiving money from him in return both acts must be legitimate activities of two business men. Surely they are not necessarily so, One might be an illegal act of a thief and the other a legal transaction of an honest businessman. The move therefore from an observable activity to judgement of the nature of the actor can only be tenable if the act is not placed in its total context.

Yet, for the sociobiologist, when, for instance, an individual animal gives a warning signal which promotes the escape of the

group even at the expense of its own life, this behaviour pattern, we are told, is similar and can be explained in the same terms as the whole range of human altruistic behaviour.¹² Both, according to Pratt, for example, can be explained in terms of genetic self-interest. As long as members of the group bear the same genes apparently altruistic behaviour is, so to speak, a direct investment of the individual's own gene. This is similar to the kind of interpretation Edward Wilson is said to have given for the behaviour of a man who won a Carnegie Gold Medal for rescuing a drowning victim. The man's action in Wilson's explanation was due to gene self-interest. But Wilson's medal-winner (like most people would perhaps) not only had difficulties in understanding this kind of explanation but was dismayed that his rational well-thought out action should be seen in terms of biological determinism, Wilson writes:

He found it difficult to grasp the notion that somehow his act was preordained through genes. I convinced him that the impulse and emotion behind his rational choice though genetically determined, in no way detracted from the rationality and value of his altruistic act.¹³

Undoubtedly, it is no easy task trying to argue that all human charitable acts are rooted in gene selfishness without throwing aside that which is fundamentally human. What most sociobiologists like Wilson do therefore is to try to reconcile genetic determinism with free rational choice. This attempt at reconciliation alone is a recognition of the weaknesses of the biological approach. Sociobiologists, I am sure, recognize this although they make no serious efforts to convince us of the place of rational deliberation in what is often regarded as "unconscious recognition" and pursuit of socially benefitting goals. Pratt, for instance says no more than that if natural selection was "operative during the long pre-historical ages of human evolution", then there must have been "written into his species character motivations" which explain his social behaviour.¹⁴ The mistake of this reductionist view is that it fails to take into account the unique characteristics of man. Man is the only species whose social behaviour cannot be said to depend on inherited traits. Typically, he is very adaptable (culturally) and lacks fixed patterns of behaviour. Thus his potentialities for flexibility and his capacity

for reasoning rather than his biology explain his social behaviour. And any approach that fails to take seriously this rational capacity and power of self-criticism and seeks to explain human social behaviour in terms of genetic programming blurs the distinction between the human and the non-human.

But where exactly does the source of the mistakes of this kind of "biologized ethics" lie? And what makes us think that from what we know of animal group-oriented behaviour we can explain human altruistic behaviour? Granted that the biological heredity of man is transmitted by mechanisms similar to those operative in other animals, can it be said therefore that all products of such operations are identical? The errors of sociobiologists, I suggest, stem from the answer they give to the last of these three questions. They fail to make a distinction between the kinds of behaviour that is properly described as animal behaviour and those that are human. One particular area where this is manifest is their discussion of altruism. They confuse what Barkow describes as "biological altruism" with "moral altruism".

If I save a stranger from drowning and he later rescues me, this is biological (in this case reciprocal) altruism. If it is unlikely that he will ever reciprocate my act of bravery and he is no kin of mine, I have not committed biological altruism. . . the act is moral altruism.¹⁵

Barkow surely is right in pointing out this distinction but he is wrong in using the absence of reciprocity as a mark of identifying moral altruism. I may perform an act of goodwill toward a stranger with the expectation that the same be done to anyone (including myself) in a similar circumstance. This expectation alone does not make my act amoral. Nor does some future actualization of reciprocity count in our evaluation of such an act.

On the contrary, I think what makes my act moral or indeed the action of a man who rescues another from drowning is that he can *foresee* the consequences in terms of the risk involved vis-a-vis possible reciprocal returns on the basis of which he can act or refuse to act bravely to save the victim. In other words what makes the act moral is that it involves choice. And as far as we know an animal cannot do this. Which is why we often hesitate (except meta-

physically speaking) to describe the action of an animal as brave or courageous since it has no choice but to act the way it acts. Human actions or most human actions are results of conscious motivations clearly apprehended and directed toward set goals. And this is what gives them their merit as moral behaviour.

But it would be naive to dismiss outright the notion of an “unconscious motivation” as inapplicable to all areas of human behaviour. It is a notion which has an important use in sociological terms but it has to be seen mainly as a heuristic device. For instance, in the Durkheimian thesis of collective consciousness in which society seems to think for the individual, it makes sense, perhaps as a way of making a coherent analysis of the individual’s social behaviour, to say he “unconsciously pursues” social goals. Beyond this we cannot read into it any ontological implications nor see the social whole as some moral agent and the individual a passive tool ready to be manipulated. Even the Freudian version of “the unconscious” as an internal directing force behind human activities remains merely as a conceptual scheme rather than a workable hypothesis to be extended to cover all human overtly expressed moral behaviour.

It is necessary to distinguish between the Freudian notion of “unconscious intention” and the kind of non-psychoanalytic interpretation sociobiologists give to it. For Freud the “unconscious” is tied with certain inner mental attitudes, wishes, fears, anxieties and the like which direct our actions even though we are not aware of them. His theory has great clinical relevance and because he sees these mental activities mainly in their neurotic contexts, Freud’s notion of the unconscious might rightly be said to be more applicable to abnormal rather than to normal human behaviour. The sociobiologist on the other hand is mainly concerned with normal human social behaviour, although his notion of the “unconscious” still shares with the Freudian notion the implication that the human being for most of the time is merely an object of causal manipulation; that his apparently intentional act is to be explained in terms of some internal directives of which he is unaware.

Hamlyn has described a non-psychoanalytic sense in which the notion of “unconscious intention” can be plausibly interpreted and this seems to be closer to the sociobiologists’ use than any other version.

He admits of the ambiguity of the notion but points out one possible interpretation. According to him:

Where the action of which the agent is apparently unaware is complex and skilled enough for it to be implausible that it should be carried out unintentionally or by accident, and where the apparent ignorance on the part of the agent of what he is doing is so absolute that it is implausible that the action should be the result of incompetence or mere habit, it may well seem from the regularity of the behaviour that the only remaining explanation is that the agent intends to perform this action on each occasion, but does not know that he does.¹⁶

And in addition to this Hamlyn points out that since knowing X does not necessarily imply being conscious of X,¹⁷ there is plausibility in saying that a man may knowingly (know his intention) do something and yet he may not be conscious that he does.¹⁸ Gustafson thinks this is not easy to establish "how one can be acting with the intention to Q though ignorant of the fact that one is doing so",¹⁹ unless the unconscious is understood to refer to "intention-in-action" rather than "intention-with-which" the man acted. Problems arise, according to Gustafson, because writers always interpret the notion of unconscious intention in the latter sense.

I think Gustafson completely misses the point by introducing "intention-in-action" sense of unconscious intention which he surprisingly admits, is from "the spectator's point of view" rather than from "the agent's point of view" (p. 180). But he anticipates rightly the objection that "intentions in actions could never be the agent's intention" whether conscious or unconscious. This at least is evidence that he tries to explore sufficiently the implications of his argument. He however fails to answer the objection. Surely, whatever intentions Gustafson had in selecting a nail for his picture frame, whether avowed at the time of acting or by subsequent citation of thought remains his (agent's) intention and not those-in-action whatever that may mean. Intentions given on the basis of subsequent analysis may or may not be the same with an agent's avowed intentions but in either case such intentions are never plausibly detached from the actor.

Were Gustafson right in his notion of intention-in-action which renders secondary the agent's role in the explanation of unconscious intentional actions we would accept the sociobiologists' correlating

between animal social behaviour and human social behaviour. But as I have tried to show his interpretation falls beyond the bounds of intelligibility. So we seem to be stuck with our “intention-with-which” sense of unconscious intention no matter how problematic this seems to us. And of course, problems need not rise if all that is meant when an agent is said to have unconscious intention is simply that he was ignorant of his intention at the time of acting. Such ignorance could be due to several factors, habit for instance as MacIntyre suggests:

Clearly a man may intend to go through a series of actions which have become habitual to him. So he may perform them without thinking about them, as a man may eat his dinner while thinking about stock market prices. But a man who eats his dinner thus, does not eat it unintentionally, as he might through similar absentmindedness, drink his neighbour’s coffee unintentionally. He intended to eat his dinner, but he never formulated his intention in his mind. So a man may intend to do something and do it, without any inner mental planning constituting “his intention.”²⁰

One can hardly disagree with MacIntyre’s interpretation except that he seems to revert once more to Gustafson’s position by concluding that “when we say he intended to . . . we mean that we recognize a pattern of purpose in his actions whatever he said to himself about them”.²¹ I suggest that the purpose in his action which he did not consciously formulate at the time of acting is one which he only, the actor and not we as spectators, can bring out by reminiscence. In other words, what was absent when he acted and which he now supplies by rediscovery is his avowal of his intention and not his knowledge of it. His intention has always been there; so also his knowledge of his intention; but his consciousness of his knowledge of his intention was absent. This I take as the meaning of a man having an unconscious intention to Q. The issue of whether his avowed intention by subsequent citation was ever “there” at the time of acting cannot be established outside the agent’s further analysis. He alone can tell if it was a case of self-deception or genuine confusion arising from mixed motives or that it was an instance of a completely unintentional act.

When earlier we discussed the distinctive features of the human, it was granted that only this species is capable of self-reflection; that

a typical human being is able to re-examine his acts and bring out to his awareness that which was apparently not known to him when he acted. To this extent we may also grant that there is plausibility in seeing some of his actions as being unconsciously directed to certain ends. What I have suggested above is that this "unconsciousness" amounts merely to some kind of inattention on the part of man to what he knows at the time of acting. The issue now is one of how much plausibility there is in analysing animal behaviour in these terms. This sounds like reversing the procedure of the sociobiologist who normally would start from what may be meaningfully said of the animal and then explore the possibility of extending it to the sphere of the human. But this need not bother us since the main point of the argument is simply to establish that even when the same expressions and terms are used in either cases the meaning implied stands different. Men and animals may be said to act with unconscious intentions toward achieving certain goals but in different senses.

The relevance of Gustafson's distinction between "intention-in-action" and "intention-with which" is here apparent. Since animals cannot be said to reflect on their behaviour in order to bring out the intentions with which they act and their "intention" is always from the analyst's viewpoint intention-in-action sense of unconscious intention seems the only possible use. So following the procedure of the sociobiologist and starting from the animal we may say that certain animal social behaviour is unconsciously directed towards goals of the group. And this can only mean "purposiveness" which is read into the action by the spectator after a careful analysis. J. A. Passmore defines it thus: "a course of action is 'intended' whenever it shows a pattern, working towards a satisfying culminating point which can be picked out as its 'purpose' or the 'intention behind the action'".²² Taken in this sense unconscious intention may be plausibly used in describing the activities of a variety of things since the main criteria used are coherence in behaviour pattern and what Braithwaite describes as "persistence towards the goal under varying conditions".²³ This rather loose sense of teleology which seems to accommodate even the activities of inanimate objects only makes sense because it describes the activities per se without reference to

the agents. The difficulties of doing this I have already pointed out with regards to human behaviour but whether or not the same may be said of non-human activities is subject to further analysis. Suffice it to say that adherents of the biological approach need a sufficient clarity in this direction before they can proceed to make a meaningful analysis of human social behaviour.

The above difficulties apart, one more issue remains to be cleared, particularly about those sociobiologists interested in applying their theories to pre-literate "underdeveloped" human groups. They coin terms such as "Bioanthropology", "Biosocial Anthropology" "Anthrobiology" to refer to this new discipline which seeks to explain in biological terms what they regard as the unique social behaviour of some particular groups of humans. Like the views of Wynne-Edwards and Pratt the whole idea is that because the social structure of pre-literate human society is so akin to that of socially organized groups of animals the same mechanisms are thought to be operative in the evolution of the two. Which, of course, carries with it the implication that modern industrial man to a great extent has freed himself from the clutches of biological determinism, so much so that foresight and planning are mainly responsible for changes in his society. For the "underdeveloped" man such changes are due to the pressure which biological selection exerts on him.

According to Wynne-Edwards, for instance, once we have been able to accept the effectiveness of group-selection in bringing about certain patterns of social behaviour in animals, this same mechanism will explain the evolution of social behaviour in underdeveloped human groups since "the characteristic situations are the same". Basil Mitchell who does not accept Lorenz's view that moral codes in general are biologically determined nevertheless holds at the same time that even "if the concept of natural selection can be stretched far enough to account for the moral codes of closed societies it cannot be made to cover 'open moralities'",²⁵ (his interpretation of a closed society being an underdeveloped simple one unaffected by industrialization). And similar arguments are contained in Pratt's solution to the problems of teleology in classical functionalism. According to him the problems usually associated with conscious purposefulness among modern social anthropologists need not arise

because the features of "primitive" societies can be explained in the same terms as those of animal societies. Even the whole idea of an unconscious operation of cultural phenomena as expounded by Lévi-Strauss draws mainly on "primitive" data (mostly from Boas) to the exclusion of other kinds of sociological evidence.

Now, all of the above claims seem to be based on what might be properly referred to as a conjectural unilinear theory of human evolution which goes like this: All men began from some common starting point, sharing certain precultural universals. At one point along the evolutionary ladder, the suggestion seems to be, some groups of men took a leap leaving the others almost where they started. Those at the forefront represent today's Western populations who, having left behind their inherited traits, developed new techniques and methods which subsequently have become vehicles for further changes. Others, as it were, have remained relatively static, still at the mercy of their biological givens. They lack any kind of conscious appraisal and critical evaluation of their situation, the supposition being that like other non-human animals nature "thinks" for and directs them. Or should we say in Pratt's words. "it's all done by wires"? For this is clearly implied in the claim that this category of men "unconsciously recognize" the needs of their society and work towards their fulfilment.

There is here a very inviting tendency to be drawn into an ideological warfare, that is to say, with the possible interpretation that such a biological approach to anthropological views entails a kind of mutation always in the direction of superior intelligence. The claim, as many critics put it, is that there is in it an assumption of qualitative differences which imply the superiority of some races over others. This is mistaken. Unlike the kind of uproar generated by the genetics of Jensen and Eysenck, bio-anthropological views make no claim of superiority in innate intellectual capacity between one group and another. Nor do they imply the superiority of one culture over another. It is true such views speak of levels of complexity between different cultural set ups. But no evaluative inference can be drawn from this since to be more complex is not necessarily to be superior.

What appears as their central theme, the plausibility of which I

am questioning, is the claim that irrespective of levels of complexity, different cultures may have evolved through different paths—one involving consciousness, planning, choosing, etc., and the other unconsciousness, instinct and unreasoned blind pursuit of goals. Which sounds very much like saying that some human cultures evolve by human processes and others by non-human processes. What gives the latter any human characteristics remains a puzzle since, according to the point made earlier, all human products of the type in question must of necessity be an outcome of some conscious reflective process. And the problem magnifies unless we are prepared to take to a new model of classification, a hierarchical one in which the human species is seen in developmental stages of the subhuman—proto-human proper human sequence. This again I take to be most unwelcome to many anthropologists whose main objective is to establish the universality of mankind.

But all such uneasy suggestions need not arise if biosocial anthropologists, particularly those who come in defence of the teleological implications of societal functionalism, recognize that it is a universal human trait that most often men act for reasons or principles which they are unable to spell out. Or where they are able to overtly state such principles, the need often does not arise for so doing except when they are driven to it. This seems to be what it means when human beings are said to be unconscious of the reasons behind their actions. Surely they know such reasons. But they are unable either to express them or they just feel no need to do so. The point is that this being a universal characteristic of all humans the distinction between cultures on the ground of presence or absence of conscious reflection fails to hold. The reason it holds as the basis of the dichotomy between human beings and non-human animals is that the latter do not belong to the category of entities that can be said to know or reflect on their behaviour. What often is attributed to them in the appellation of “intention” or “motivation” if not merely metaphorical is indeed an unacceptable anthropomorphism by the behaviour analysts.

I have tried in this paper to establish that the main error of the biological approach to sociological explanation lies in an insufficient exploration of the notion of “unconscious intention or motivation”.

Its indiscriminate application to human and animal behaviour, I have pointed out, is traceable to failure to distinguish between different categories of social behaviour (biological altruism and moral altruism) and that this again is due to initial failure to identify certain features that are typically definitive of the human. All such mistakes widely shared by sociobiology, I have tried to show, become more glaring in the biological approach to anthropological materials. Is the aid so kindly offered by the biological sciences after all necessary?

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Psychological theory and the religious mind

IV. Factors affecting the meaningfulness of religious ideas

FRASER N. WATTS

IT IS DIFFICULT for even a casual observer of how religious language is used to resist the conclusion that it often has little meaning for those using it. I should make it clear at the outset that I am not raising the question that the logical positivists raised about whether religious language has meaning in the philosophical sense. Rather, I am concerned with its psychological meaningfulness or significance to the people who use it. There is no simple answer to this question of whether religious language is psychologically meaningful. It varies from person to person and from occasion to occasion. My purpose in this article is to see what can be said from the standpoint of general psychological theory about the conditions affecting the subjective or psychological meaningfulness of religious ideas, and what can be done to enhance their meaningfulness.

Perhaps the classic approach to this subject is that of Cardinal Newman (1870). Newman suggests that the same proposition can be held in either a real or notional way. This depends on whether or not the terms of the proposition arouse a 'living image'. Propositions apprehended in a real way are 'more vivid and forcible'. Newman perhaps puts more weight on the quality of imagery than it will bear. I shall argue later that there is indeed a contingent association between imagery and what Newman call real assent, but I doubt

whether the connection is close enough for it to be of any value in a definition. On the other hand, one of the helpful points implicit in Newman's treatment of the subject is the implicit recognition that the same proposition can be held in different ways. Of two propositions, the first can be real to one person, and the second real to another, though it is probably correct, as Newman suggests, that some propositions are more likely than others to be held in a real way.

Newman was not solely concerned with religious belief, though it was the basis of his interest in the subject, as it is mine. However, the questions raised are general ones about the way in which beliefs are held. We can see this by looking at a parallel issue that arises in the sphere of insight in psychotherapy. The analogy between religious and psychotherapeutic insight will provide a way of approaching the central questions of what is involved in holding a religious belief in a meaningful way and what can be done to enhance the meaningfulness of religious beliefs.

Psychoanalysts have often made a distinction between two different kinds of 'insight' that can be obtained by patients in therapy. It is a topic that was not much considered by Freud himself, but has been developed by a number of subsequent writers (see Sandler et al., 1973, Chapter 10). The contrast is between insight that is merely intellectual or neutral (i.e. the equivalent of notional assent in Newman's terminology) and a second type of insight that has been variously described as true, effective, dynamic or emotional. There are several points being made in this distinction. It is being suggested that merely intellectual insight is of little therapeutic value. A therapist can put a novel idea to the patient about his problems, the idea can be correct, and the patient can accept it as such, but all this is not enough to give it any therapeutic value. Effective insight depends on more than this. Notice that the same idea could be either an intellectual or an effective insight. It is a distinction relating to the quality of the insight rather than its content.

It has been suggested that one of the important features of effective insight is that it is emotional, as opposed to merely intellectual insight. The point is not that effective insight is

non-intellectual. Indeed, as Zilboorg (1952) has argued, true insight cannot be partial, either merely intellectual or merely emotional. The point is rather that effective insight is emotional in a way that intellectual insight is not. But what way is this? What exactly is emotional about effective insight? A distinction can be made (Reid and Finesinger, 1952) between whether the insight is *about* emotion or whether it *generates* emotion. Reid and Finesinger adopted the first of these usages, but this can be and has been criticised. It muddles up the questions of the content and quality of insights, and appears to leave no scope for speaking of therapeutically neutral insights about emotional processes, though such insights are a common-place of psychotherapy. My own view is that it is nearer the mark to suggest that emotional insights generate emotion or, to put the point more precisely, that general emotional reactions will be congruent with an emotional insight but may be incongruent with an intellectual insight. I suggest that similar points can be made about many kinds of belief. There has been much interest recently (Rachman, 1974) in congruence, or 'synchrony' as it has been called by psychologists, between various aspects of fear. It is very common for someone to have an intellectual belief that spiders are harmless but nevertheless to be thrown into a state of panic by actually seeing one. It is another question again whether the actions of the person concerned will be aligned with his beliefs or his emotional reactions. The point I wish to make is that a 'merely intellectual' belief that spiders are harmless may well be incongruent with the associated emotional or behavioural reactions but that there is another way of holding the belief that *will* have implications for emotional and behavioural reactions. Beliefs held in this way are like true or effective insights in psychotherapy or in Newman's terminology, like propositions that command real assent.

What more can be said about this mode of holding beliefs, other than its tendency to be congruent with emotional and behavioural reactions? The other important line of thinking in psychoanalytic theorising about the differences between intellectual or effective insight turns to the *grounds* of these insights. The proposition that must be examined is that there is an experiential basis for effective insight that is characteristically not found for intellectual insight.

Gendlin (1962) has provided the fullest and most general discussion of this claim. He suggests that in intellectual insight, patients have a 'symbolization' (i.e. an articulate conceptualization) of their problems, though this symbolisation is not based on experience and so does not correspond to any 'felt meanings'. The reverse situation also arises in psychotherapy. Patients sometimes refer to a powerful emotional experience without as yet being able to identify the emotion or the cause of it ('..... I feel very stirred up about something at the moment, but I am not sure what it is'). Gendlin would say that in this case there was a 'felt meaning' without any 'symbolisation'. Lest there is any misunderstanding it should be pointed out that this unsymbolised experience is not 'pure' experience. In Gendlin's terminology the moment of effective insight occurs in psychotherapy when felt meanings are symbolized. Characteristically it is those experiences that are most difficult to symbolise that provide the most powerfully therapeutic insights.

There is nothing unique to psychotherapy about this sequence of unsymbolised experience leading to a moment of insight when symbolisation is eventually achieved. Creative discoveries are also characterised by a similar hunch or intimation that something new is about to be discovered when the matter has been thought through. The pre-insight stage may be less emotional than in psychotherapy, but that simply reflects the different content of the insight and does not necessarily imply any difference in the process involved. An illuminating discussion of the essentially similar psychological processes involved in creative and religious insight has been provided by Havens (1968, Chapter 5).

It is in the contemplative religious tradition that unsymbolized, or at least very incompletely symbolised experience, plays an especially important role. Contemplation attaches particular importance to a path of 'unknowing'. This generally can be taken as referring to the achievement of a kind of religious experience that one refrains from symbolising to anything more than a minimal degree. It is not simply that contemplative experience is best not symbolized; the claim is that it cannot be adequately symbolised. This is typified by contemplatives' attitudes towards conceptual distinctions. Eckhart for example describes a state of absolute detachment, a "simple core

which is the still desert onto which no distinctions can ever creep". It is "neither this nor that".

In this condition it is perhaps possible to employ what psychologists (e.g. Turvey, 1974) have called tacit knowing, which may be quantitatively and qualitatively different from normal articulate modes of knowing. However, as I pointed out in the last article in this series, it cannot necessarily be assumed that the tacit knowing of contemplation is like the tacit knowing that can be studied in psychological laboratories. In any case, mystics seem to have exaggerated the extent to which their direct experience of God *cannot* be symbolised. It seems to be correct that the initial experienced is unsymbolised, and that the attempt to symbolise it is a difficult and demanding one, but so is it difficult and demanding with psychotherapeutic insight and with creative insight. However, it does not seem impossible to do this in any of these cases. Indeed the volumes written about mystical experience testify to the possibility of symbolising it at least to some extent.

My interest in all this is with the difference between on the one hand religious insight that has no experiential basis, and on the other religious insight that arises from an effort to symbolise personal religious experience that was initially unsymbolised. My suggestion is that in the former we have something that parallels merely intellectual insight in psychotherapy, whereas with the latter we have something parallel to effective insight. It must be admitted straight away that any religious person, inheriting and benefiting from a religious tradition, will have a large proportion of religious insight that is equivalent to intellectual insight. However, perhaps even a small proportion of personally symbolised insight, if it is integrated into that person's general religious thinking, can have an important impact on quality of assent in the religious belief system as a whole.

I shall now consider, from a psychological point of view, what differences can be predicted between religious beliefs that arise at least in part from the symbolisation of personal religious experience, and those that do not have any such basis. One can begin with predictions that flow from the analogy with intellectual and effective insight. Religious insight (like therapeutic insight) that has been

chiselled out of experience will have more personal consequences than merely intellectual or 'notional' religious insight. Emotional and behavioural reactions are more likely to be congruent with beliefs that have been formed in this way. Even a casual experience of contemplative religious literature would reveal the extent to which an insight into the nature of God and a passionate love of God are bound together. Also the behavioural consequences of religious experience can be very marked and lead, either suddenly or gradually, to a transformation of life-style and personality. These predictions follow straight-forwardly from the analogy with therapeutic insight.

However, I wish to give particular emphasis to predictions about the cognitive organisation of religious insights that have an origin in experience of the sort that I have indicated. There seem to be different styles of cognitive organisation associated with pre-symbolic and symbol insight. Symbolic insights that have been formed directly out of previously unsymbolised experience are likely to retain properties that betray their origin, and which will differentiate them from insights that have been acquired at a verbal or intellectual level.

To lead into this it will be helpful to consider a theoretical suggestion put forward by Ucric Neisser (1963), a much respected scientific authority in this field of cognitive psychology, about the crucial difference between what has been called 'preconscious' and 'conscious' thinking. He suggests that preconscious thinking is multiple, whereas conscious thinking is linear. By this he means that in the former we find a profusion of simultaneous lines of thought coexisting in an apparently confused way, whereas in conscious thinking we have a single well-ordered describable sequence of thoughts. My suggestion is that insight that has been chiselled out of unsymbolised experience tends to show signs of its origin in multiple rather than sequential thinking.

It is not difficult to see why creative insights should often emerge out of such 'multiple' or 'broad-attention' thinking in which a variety of different strands of thought can be sustained simultaneously. Creative insights so often depend on relating previously unrelated ideas, and a kind of thinking which has multiplicity as

one of its characteristics is well suited to the formation of such insights. It is one of the recurrent features of mystical experience (James, 1960) that it produces a sense of the unity and relatedness of things, and it is therefore likely that this mystical insight will also arise out of a kind of thinking that is multiply organised. Someone who is thinking in multiple strands of thought at a pre-conscious level will find it possible to grasp the interrelatedness of all things in a way that will be much more difficult for sequential thinking. This emphasis on unity is likely to remain as a prominent feature of religious thinking that arises directly from the symbolisation of personal experience, but to be less marked in religious ideas that have been acquired second-hand. Incidentally it is clear that this kind of multiple thinking is more likely to occur when arousal levels are relatively low (Dixon, 1971, Chapter 9 and 10). It may be one of the functions of meditation to lower arousal and so facilitate this multiple thinking.

Dixon (1971) also summarised evidence that this kind of 'multiple' or 'broad attention' thinking results in ideas having relatively rich associations. This is in no way surprising. Following from this it is a reasonable hypothesis that ideas that have played a central role in multiple thought activity will tend to retain some of these associations when employed in the conscious formulation of insights. The significance of this is apparent when it is also pointed out that the number of associations has been a traditional and well established index of the relative meaningfulness of words in experimental psychology (Saltz, 1971). From this the prediction follows that religious insights that arise directly from pre-symbolised thinking are likely to be more meaningful at the conscious level.

Further, religious insights with such an origin are likely to reflect their multiple or associational character in their use of metaphor. C. S. Lewis (1939) suggested a helpful distinction between 'master's' and 'pupil's' metaphors. In the former case the metaphor is introduced to help to explain an idea that could perfectly well be formulated in other terms; in the latter the metaphor is the only way of reaching the idea and is, for the time being at least, indispensable to it. It seems likely that the latter kind of metaphor will be relatively predominant in insights that have a direct origin in

multiple thinking. We can sharpen up this prediction in the light of some experimental work on the use of metaphor in psychotherapy, and how it relates to effective insights there. In this work (Pollio et al., 1977) a triple distinction has been made between novel metaphors, frozen or trite metaphors, and literal language. This classification is easier to apply in empirical work than is that of Lewis. The interest of the work of Paivo et al., lies in their investigation of the kind of language associated with the emergence of therapeutic insights in psychotherapy. These tend to be marked by either high levels of novel figurative activity or high levels of literal statements, but are never associated with a profusion of frozen or trite metaphors. There seems to be a sequence through the course of psychotherapy in which important insights are first born as novel metaphors and are subsequently explicated in literal statements. Both the birth and the explication involve a degree of effort and prove to be therapeutically worthwhile.

In Lewis' terms the novel metaphors were clearly originally 'pupil's' metaphors, and this empirical work supports the prediction that such metaphors will be important in meaningful insights. It is possible, though less certain, that 'master's' metaphors will tend to be trite and unimportant in insight. What might not have been anticipated from Lewis' view of language is the association between literal language and insight. Indeed it is an interesting question whether this would apply to religious insight in the way it apparently does to therapeutic insight. It depends on how far religious insights are capable of literal explication at all, a very debatable point, and the key question on which the recently fashionable exercise of theological demythologisation stands or falls.

Next it can be predicted that meaningful insights will have a central place in a person's construct system. What is involved here can best be seen in terms of the psychology of personal constructs (Bannister and Fransella, 1971). 'Constructs' are dichotomous classificatory principles that are used in describing people, things, events etc. People differ considerably in the constructs they habitually use, and this is often a revealing aspect of their personalities. Further, people differ in how far their personal constructs are related to each other in a 'tight' construct system

or how far constructs are independent of each other. Also within anyone person's construct system there will be some that are closely related to others, and some that are relatively independent. It generally seems to be the case that ideas that are very significant for a person will be integrated into a tightly-knit complex of associated constructs. This would be the prediction about meaningful religious ideas. On the other hand it is likely that many religious ideas, having little subjective meaningfulness, will be relatively independent of the general body of personal constructs (e.g. holy-profane). We are probably dealing here with a kind of meaningfulness that is associated not so much with experiential and frequently metaphorical insights, as with their explication into literal statements. This is probably true for both religious and therapeutic insights. Nevertheless, the experiential origin is probably a necessary precondition for the process of literal explication.

The balance of novel metaphor, trite metaphor and literal statement, more than most of the features of the meaningful use of language that have been mentioned, is particularly conspicuous in the public use of religious language. It seems that people are often able to tell with impressive accuracy whether religious talk is meaningful to the speaker or not. Probably the amount and kind of metaphor is one of the signs on which this discrimination is based. Another would be the tone of voice. There is characteristic tone of voice associated with useful self-exploration in psychotherapy (Rice and Wagstaff, 1967). No doubt the tone of voice used in religious talk also betrays whether or not the speaker has experienced what he is talking about. The difference in tone of voice is analogous to that between reading and spontaneous speech.

But more important than whether or not it is possible for a listener to tell whether or not religious language is meaningful for the speaker is the practical question of how religious language can become meaningful for the user. The fact has to be faced that for most people religious insight does not emerge from personal experience to any significant extent. Certainly it hardly ever begins in this way. Nearly all religious people find themselves beginning with what can be called "intellectual insights" which they must subsequently seek to invest with subjective meaningfulness as best they can or perhaps discard if they cannot.

Now, it is clear that the way people use language will have important implications for the degree of meaningfulness it has for them. There are two psychological phenomena that illustrate this point, known respectively as 'semantic processing' and 'semantic satiation', both of which have important implications for anyone who is concerned about the meaningfulness of religious language.

The importance of semantic processing was discovered within the context of research on memory (Craik and Lockhart, 1972; Jenkins, 1974). If people focus their attention on superficial aspects of words such as their phonetic or acoustic properties, their memory for them is relatively poor. In contrast, if they concentrate on the meanings of the words (i.e. process them 'semantically') their recall is much better. This work has aroused a good deal of interest in psychology because of the way it undermines mechanistic theories of memory that were prevalent until recently. But in the present context it is the practical implications of the work that matter. It seems that there is a good deal of variation in the amount of semantic processing of words in natural situations, quite outside the laboratories of experimental psychologists. The fairly common phenomenon of reading a page of print and realising at the end that one has no idea of the content is an example of poor semantic processing. Such experience become more common in states of fatigue, depression and so on. My suggestion is that much of the use of religious language in prayer and liturgy is accompanied by relatively little attention to the meanings of the word, i.e. the degree of semantic processing is poor. Instead the words are processed largely at a superficial level.

One of the reasons for this appears to be over-familiarity with the words. This raises the question of semantic satiation (Amster, 1964; Esposito and Pelton, 1971). Again it is fairly common experience that if one takes a word and repeats it over and over for a while, or if one stares fixedly at a word for a few minutes, attention shifts to the acoustic or orthographic features and the word loses its subjective meaningfulness. Though the use of words in liturgy is not as intensive as in these artificial situations, I think it is a reasonable hypothesis that a similar phenomenon of semantic satiation can take place in this situation through too frequent repetition. However,

semantic satiation is not an inevitable consequence of the over frequent use of words. If people do something that reminds them of the meaning of the word, semantic satiation is less likely to take place. A laboratory example of this is that if people do appropriate actions while repeating words like 'push' or 'lift' these words do not lose their subjective meaningfulness as quickly (Werner and Kaplan, 1963). A number of tasks have been found that successfully direct attention to the meaning of the words such as rating the words for pleasantness, writing down associated words, thinking of associated visual images (Jenkins, 1974). Any such task has a powerful effect on memory for the words, an effect which incidentally is significantly greater than simply trying one's best to remember them, or repeating them in rote fashion. There thus seems considerable scope for directing attention to the meanings of words, and for maintaining their subjective meaningfulness under adverse conditions.

It is not difficult to point to a number of aspects of religious language and the way it is used that are adverse from this point of view. The language tends to be abstract rather than concrete; the terms of religious language do not lend themselves to ostensive definition. It is well established that abstract terms have fewer associated words or images. In this sense they have less subjective meaningfulness, and are less easily remembered (Paivio, 1972). In Newman's language such terms are less likely to arouse a 'living image'. It is clear that propositions comprised of such terms are less likely to retain their meaningfulness, though Newman perhaps went too far in suggesting an exact relationship between 'real' assent and terms that arouse 'living images'. My point would be rather that it is relatively easy to repeat abstract terms without giving any attention to related words or images, and that repetition without such associations tends to decrease the subjective meaningfulness of the terms.

Conversely if we wish to retain or rediscover the meaningfulness of such language we will use it sparingly, dwelling on associations and images as much as possible. This is exactly what happens in contemplative prayer. The advice of Ignatius Loyola about the use of words of the "Our Father" is typical. The person using this

method “says *Father*, and rests on the consideration of this word for so long a time as he finds meanings, comparisons, relish and consolation in considerations belonging to such a word”. In this way, he thinks “quietly and simply of each word, drawing out the meaning of it”. Other methods make similar use of mental pictures or exercises involving imagery from the various senses to set something of importance before the person who prays, experience it as vividly as possible, grasping its significance and responding to it. In each case very few words or images are used. There is no hurry to pass on from one to the next. Time is spent grasping the full significance of each one. In the terminology I have been using this clearly represents an attempt to do the deepest possible semantic processing of the words or images that are used.

The choice between the use of words or images represents an interesting psychological question. (See Richardson, 1969). There are stable differences between people in their preferred mode of imagery. For example about a third of research scientists seem to use visual imagery habitually, about a third verbal imagery, and the remainder use either a mixture of the two or no conscious imagery at all (Roe, 1951). There seem to be different physiological states associated with the two main kinds of imagery, visual imagery having a particular association with regular breathing and alpha brain-waves. As these are common physiological aspects of the meditation state, it might be thought that visual imagery would be especially helpful in meditation. Another important question is which modality best produces relatively stable imagery, as effective meditation is hindered if one idea or image too quickly leads to another one. My impression is that visual imagery is preferable on this criterios too, though there appears to be no empirical test of this. It may however be best for people who have a strong propensity to use verbal imagery to continue to do so in meditation, rather than to try to switch over to visual imagery.

If a person's religious insight has arisen from a personal effort to symbolise a religious experience that was originally 'pre-conscious', it will be relatively resistant to the kind of loss of meaningfulness I have been discussing, and these methods of ensuring the deepest possible level of semantic processing will not be of so much practical

importance. However, as most people's religious insight will not have such a basis in experience, and will contain a profusion of 'trite' metaphors, it will be necessary for them to make good use of these methods of semantic processing to enrich the subjective meaningfulness of religious insight. Though the traditional methods of mental prayer clearly represent an attempt to do this, I think there may be some advantage in putting the matter in the modern, scientific language. Perhaps it will help more people to see what is at issue. Certainly if there is to be much future for the religious understanding of the world, there needs to be a much more concerted effort to develop a rich understanding of the significance of religious concepts. One can hope that this series of articles, which has had the aim of mapping traditional religious ideas into the language of contemporary psychology, has helped in integrating at least a few central religious ideas into our general scientific construct system, and so contributed to the enhancement of their meaningfulness.

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Review

Self-Knowledge and Social Relations: Groundwork of Universal Community

by John King-Farlow

Science History Publications, New York 1978 (distr. by W. Dawson Publishing, Folkestone), £8.50

AS IS SUGGESTED by the title and sub-title of this work, its author applies himself to one of the fundamental questions of philosophical enquiry, *viz.* the relation between self-knowledge and our social environment. This question, of course, has a long history and King-Farlow himself traces it back to Socrates and Plato.

In the preface, the author states that the book is dedicated to twin themes: (a) that philosophy “should often be seen in close relation to our most urgent practical problems” and (b) that questions about moral, political and social values should lead us from a genuinely practice-oriented ethics to theoretical formulations about language, logic and mind. The book represents a masterful attempt to show us how such a programme could be handled.

King-Farlow, who incidentally was last year’s President of the Canadian Philosophical Association, begins by tacitly accepting the optimist and idealist view, that self-knowledge *can* transform our social relationships. However, his acceptance is not unqualified. He brings the apparatus of linguistic philosophy to bear on the concept of self-knowledge and shows the composite nature of this notion. Fortunately, his analysis does not leave us with the usual conceptual debris, but gives rise to an important insight which is then systematically worked out in the chapters to come, namely that we have several models about consciousness at hand and that greater

Theoria to Theory, 1979, Vol. 13, pp. 239–241
0049-3686/79/1303-0239\$04.50/0

Published by
Gordon and Breach Science Publishers Inc. 1979

conceptual flexibility can possibly help to improve the ways in which we think of ourselves and others. He proceeds with his elaboration of this key theme on the understanding that it is possible to construct what he calls a 'transcendental groundwork for universal community'. However, he is anxious to distinguish his approach from Kantian and neo-Kantian 'negative transcendentalism' which always argues for the supremacy of a single feature of experience instead of allowing 'forms of life' with their own intrinsic coherence and intelligibility.

From this broad integrative, 'holistic' stance, King-Farlow immediately launches himself into the thick of the argument when he finds fault with Karl Popper's conception of the 'open society'. He rightly points out that Popper tends to play down the ideal of 'community between persons' involving affection, concern, fraternal curiosity etc., and he pleads for a richer account which takes proper cognizance of the psychological, social and moral development of man and his capability for empathy and imagination.

This leads over to an initial confrontation with the omnipresent notion of 'pure reason' and its sociological correlate in the doctrine of the individual as an atomistic, autonomous unit. In these the author perceives not only the root of much of the malaise in present-day philosophising but also in our political and social life in general. He rejects the egocentrism and anthropocentrism which are the proxies of 'pure reason' and instead calls for the adoption of the following two tenets: (a) the principle of seeking cultural continuity in human variation and (b) the principle of self-enlargement through the contemplation of possible worlds. Thus one may perhaps, in the author's own words, "see the world both in more detached and in more truly social or unifying ways".

This then is the outline of the approach as given out in the Introduction. It is painstakingly developed and substantiated in the subsequent chapters of the book. In doing so King-Farlow avails himself of various tools including those of linguistic analysis and symbolic logic. The main body of the work falls into four parts. The first section deals with 'The Bondage of Anthropocentrism' (ca 50pp) and is essentially a detailed discussion of the views by Peter Geach (*Mental Acts*) and other apriorist theories on non-human

intelligence, grammar, society and intelligibility. The second part is a 'Critique of Egocentric Reason' (ca. 30pp) in which the author makes a move towards a monistic model of interpersonal discourse without sacrificing the advantages of pluralism. The third section treats of 'Monism, Logic and Language' (ca 40pp) and vindicates the monistic ontology (understood quantitatively: there is but one genuine individual or substance). This is perhaps the most difficult portion of the book to read, at least for the general reader who is not initiated into the mysteries of symbolic logic. The concluding part is entitled 'Monads in Universal Community' (ca. 60 pp) and commences with a review of Leibniz's monadology and its contemporary critics (such as Bertrand Russell, H. Ishiguro etc.), which has the express purpose of demonstrating that the exploration of alternative ontologies can fruitfully contribute towards a sounder view of the moral relations pertaining within the 'universal community'. It includes an examination of the concepts of 'pain', 'well-being' and 'obligation' (to past and future beings), and ends with possible Draconian measures to secure the survival of our species.

King-Farlow has furnished us with his own critique of pure reason and its characteristic modes of thought and social forms. This is a bold, and I think successful, attempt at humanising philosophy. It is a book not only for the fellow-philosopher, the politician and the social planner (whom the author has foremost in his mind), but for any thinking and feeling human being concerned with his individual fate in an increasingly complex and labyrinthine society and also with the ever more precarious future of mankind as such.

GEORG FEUERSTEIN

Comment

Meditation and the perception of self

IN 'MEDITATION AND PERCEPTION', Part III of *Psychological Theory and the Religious Mind (Theoria to Theory)* Fraser Watts shows how psychological theories of perception and research studies on meditation combine to provide some insight into the kind of perceptual style on which religious perceptiveness is thought to depend. In this context, he examines the effect meditation practice has upon perceptions of external objects and perceptions of others. Psychological research has shown, however, that perception of the self and the inner world of experience also appears to change as a result of meditation practice, and in this comment upon Fraser Watts' discussion I hope to show that this inner perception may be equally important in the spiritual life. Quite how this perception of the self changes and the effect it has upon behaviour, however, is more difficult to discover, but recent research within psychology has examined in more detail the subjective experiences of practising meditators.

The results of a large-scale questionnaire survey of meditators who practised a form of mantra meditation (West, 1978) suggested that a number of individuals experienced increases in 'personal growth and awareness' as a result of meditation and that some had experiences in meditation which were strikingly similar to states of consciousness described by mystics from other cultures and times, e.g.

'Lose all sense of feeling in my body and thoughtless, timeless moments occur' and 'Blissful state (bodyless) of being.'

To try to understand how meditation can produce such states and how the regular practice of meditation can lead to changes in the

individual's relationship with the self and with the self in relation to the environment, it is fruitful to examine the usual mode of interaction we have with ourselves.

Normally, our experience of ourselves is a consequence of our actions upon and reactions to the environment. An example may illustrate this point. The reader's experience of him or herself while reading this article is a product or sum of his or her action of reading (with the inherent activities of sitting, automatic eye movement, logical functioning, assimilation and turning of pages) and his or her reaction to the material (agreeing, disagreeing, confusion, etc.). Along with these actions and reactions are the mood of the individual, which affects total subjective feeling and thinking state, fatigue or freshness, hunger or fullness. This is isolating just a few aspects of those things which make up the individual's experience at any one time. Necessarily, this means also the individual's experience of himself or herself, since we cannot experience the environment directly—we can only experience our actions upon and reactions to our environment (including the internal environment). Thus, the experience of oneself is undergoing constant change. There are times when awareness of oneself or the experience of oneself may be accentuated—an example might be whilst sitting on a quiet hilltop, alone in the countryside on a still summer's day and becoming aware of one's existence in relation to nature. Many have experienced such increases in awareness of existence and self. Perhaps an opposite experience might occur when we are absorbed in a television programme. Minimum awareness or experience of oneself presumably takes place during sleep. The important point is that our experience of ourselves is generally a result of an infinite number of changing factors which are determined by our environment and our action upon, and reaction to, that environment both internal and external.

What is to be advanced here is the idea that in meditation this mode of experiencing is altered. Our experience of ourselves is no longer so determined by our environment. It has been suggested that the external environment becomes less important during meditation and that the internal environment becomes more important. External stimuli are reduced to a minimum and often,

awareness of the whole body recedes. The meditator reports an increased awareness of thoughts and a slowing of thought activity. The meditator has become more aware of one aspect of himself or herself and remains separated from the influence of the external environment. The experience of time — another influencing factor — also diminishes, alterations in time perception during meditation being frequently reported (West, 1978). In this way, the meditator is experiencing only his or her own internal environment, awareness of the external environment having diminished.

This idea of meditation as a technique which produces a more direct and less qualified experience of oneself can be taken further. During meditation, thought activity appears to slow, even though the meditator remains 'awake'. Thus, the internal environment appears to become less active or to put it another way, less noisy. And so individuals experience themselves with still fewer environmental influences. In this way the individual comes to know the experience of 'self' better and presumably with meditation practice, the knowledge becomes firmer. This would explain the 'psychological differentiation' that results from meditation practice, referred to by Fraser Watts and other authors (e.g. Deikman, 1963; Pelletier, 1974).

How could the reported thoughtless and timeless moments, which are a significant feature of many meditation systems and which are held to be of such importance, arise according to the theory outlined above? The slowing of thought activity during meditation must sometimes appear to be complete, so that thought appears to stop altogether. It is compelling to accept that such a phenomenon does occur, since so many meditators in so many different systems report it (including a number of the respondents in the questionnaire survey referred to above). When thought appears to stop, the meditator is still conscious and aware since the experience is lucidly remembered. In this state meditators are not conscious or aware of thoughts, they are not conscious or aware of individual aspects of their immediate or removed environment. They say they are simply aware and conscious. They are not acting upon or reacting to, they are simply . . . being. They are just aware of a total experience of existing, where time, environment, thoughts etc. have no signifi-

cance. It is this total awareness of being which seems to be described by so many authors, mystics and meditators. Examples of such descriptions exist in the writings of Wordsworth and Tennyson. Compare the frustration of Hume (1961) in his search for self and the description of Mahesh Yogi in how to reach the Absolute:

I always stumble on some particular perception or other, of heat or cold, light or shade, love or hatred, pain or pleasure. I never catch *myself* at any time without a perception, and can never observe anything but the perception. (Hume, quoted in Stace, 1961, p. 87).

Proceeding towards the subtler layers of the expressions of creative intelligence within the mind, we experience a tender field of feeling. Deep within the tenderness of feeling, we experience the "myness" of feeling. We say "I feel like this", "I feel", "I feel feelings". So the "I" in the seat of all "myness" is . . . located within the feeling. Deep within the I is a . . . level of creative intelligence which is "I-ness". The "I-ness" is almost the abstract value of individual existence, intelligence. And deep within, that individual "I-ness" is boundless — the unmanifest, non-changing, immortal, eternal reality (Mahesh Yogi, quoted in Bloomfield *et al.*, 1976, p. 162).

Both emphasise the need to experience the self alone, separate from the distractions of the environment. It may be that this pure experience of the self, which appears to be so rewarding to those who report it, is important for stability in life. The repeated experience during meditation may become more and more firmly held in everyday behaviour.

Techniques of meditation are usually seen as a way of imbuing the practitioner with the qualities characteristic of 'higher states of consciousness' which will eventually be achieved after long and regular practice, e.g. "The experienced practitioner of Zen does not depend upon sitting in quietude on his cushion. States of consciousness at first attained only in the meditation hall become continuous, regardless of what other activities he may be engaged in." (Sasaki, 1965). The evidence of psychological research cited by Fraser Watts suggests that changes in perception outside of meditation occur as a result of regular practice. This is supplemented by the growing body of research evidence which suggests that changes in physiological functioning in the direction of lowered arousal outside of meditation, also occurs (Orme-Johnson, 1973; Glueck and Streoebel, 1975; West, 1979).

If then, behind all action and reaction, there remains an awareness of the self and existence *separate from all action and reaction*, the individual may become less susceptible to the defeats and stresses of life, though at the same time retaining the sensitivity and empathy with others that Fraser Watts refers to. Indeed, there is some experimental evidence within psychology which shows that regular meditation practice leads to faster recovery following stressful incidents (Goleman and Schwartz, 1976). It may be that stresses and defeats are placed in a different perspective and become less important alongside this permanent awareness of the self and existence. Carrington (1977) has described her experience of herself during meditation thus:

As I sit here quietly in my meditation, I exist even though I am separate from others . . . I am now a being unto myself . . . I am separate from lover, friend, mother, father, therapist, whomever . . . but in my meditation I do not sense this separateness as loneliness, I know it as closeness to myself and to life . . . (p. 325)

It may be that this sureness of the sense of self and being provides a little security in a world full of fears and dangers and which begins for the individual with the separation from the womb and which ends in the unknown blackness of death.

The absorption in awareness only of being has also been described as merging with the 'one', the state of nothingness and no-mind, unity and pure awareness. This state appears to be the mystical state of consciousness described by so many writers from so many religions and which is identified variously as the experience of "The One", Unity, Being and God. Thus, although one might interpret these experiences as de-automatized knowledge of the self, they are interpreted equally validly by writers from many religions as facilitating the sense of unity with God.

Meditation practice, as Fraser Watts shows, appears to have an effect upon the perception of others and of the outer world. Equally though, it appears to produce changes in perceptions of the self and of the inner world. The combination and interactions of these perceptions may then indeed help the practised meditator to achieve a sense of unity with others, and may also help to directly

facilitate the sense of unity with God, which is seen as the highest goal of meditation:

Spiritual teachers of all ages have been unanimous in declaring that we come to know God through meditation. Through direct experience we may reach a state of consciousness with the ultimate reality and divine dimension of the universe. In that state all the long sought answers are given, along with peace of mind and heart, (White, 1974).

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Comment

Experiences of death and dying

IT IS INTERESTING to see how medical research into near death experience is confirming age-long traditions; but care should be taken not to narrow the field of enquiry too much, otherwise there will be a risk of the same imbalance as we find in western psychology as a whole, where so much is based on observations of the mentally ill.

There are many kinds of out-of-the-body experience, reached through drugs, sensory deprivation, meditation, aesthetic creation and mystical experience, and each adds something to our understanding of the nature of consciousness.

In a recent issue of "Light" (journal of the College of Psychic Studies) which concentrated on death and survival, Kelvin Spencer, writing on science and survival suggested that emphasis was being laid on the wrong questions and the wrong methods. "So long", he says, "as conventional wisdom shuns the idea of disembodied MIND, we shall make . . . little progress in bridging the gap between earthly personality and its post-mortem manifestation." He therefore suggests that it is the whole range of OOBES (out of the body experiences); that need studying, and that if we do so, the barrier against taking seriously the idea that people's minds can temporarily leave their bodies and roam freely in space will be overcome. This would begin to remove the mental block against the idea of survival. Luckily we have plenty of OOBES evidence from all periods and cultures, and it is quite time that Dr. Robert Crookall's pioneering work on the subject found a wider audience. Over a period of twenty years he has written more than a dozen books

recording OOBÉ's received by people in health and sickness, in all kinds of conditions and backgrounds. They range from "*The Supreme Adventure*," (J. Clarke 1961) to "*What Happens When You Die*" (Colin Smythe 1978).

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Sentences

Desire is a wildfire that burns and burns and finally consumes us. Aspiration is a glowing fire that secretly and sacredly uplifts our consciousness and finally liberates us.

Thirst for the Highest is aspiration. Thirst for the lowest is annihilation.

Desire is expectation. No expectation, no frustration. Desire killed, true happiness built. Aspiration is surrender, and surrender is man's conscious oneness with God's Will.

As war brings the commerce of a country to a standstill, even so our tremendous inclination toward the pleasures of ignorance brings all our inner spiritual movements to a standstill.

* * * * *

If you want to have the inner peace, then you must follow the path of spirituality. Spirituality is the answer. There are three ages of man: under-age, over-age and average. To the under-age, spirituality is hocus-pocus. To the over-age, spirituality is something dry, uncertain and obscure. And to the average, spirituality is self-oblivion, self-negation and self-annihilation.

But a true seeker will say that spirituality is something normal, natural, spontaneous, fertile, clear, luminous, divinely self-conscious, and self-creating. If you have a spiritual teacher to help and guide you, then you are very lucky. Listen to him always, until you breathe your last. If you stop taking advice from him, then yours will be the loss and not his.

* * * * *

If you don't have a spiritual Master and if you don't care for one, then at every moment please listen to the dictates of your soul in absolute silence. Peace you want and need. To have peace, you must have free access to your soul. To have free access to your soul, you must have inner silence. To have inner silence, you need aspiration. To have aspiration, you need God's Grace. To have God's Grace, you must feel that you are God's and God's alone, always!

* * * * *

An aspirant has to be sincere, not only in his inner life but also in his outer life, until he breathes his last. Sincerity is the fertile ground in the aspirant's heart. His sincerity is God's matchless Smile. His sincerity is God's peerless Pride.

Sincerity can be developed. It can be developed like a muscle. There are some people who are naturally sincere, and others who are naturally insincere. Those who are sincere from the dawn of their lives are blessed. But those who are insincere from their very birth need not and must not curse themselves. They can be sincere if they want to. The moment they truly want to be sincere, God in His Infinite Compassion will help them. With His deepest Joy, Pride and Concern He will help them.

Spirituality needs and demands sincerity from the beginning to the end. Spirituality and sincerity can never be separated. If one really cares for the spiritual life, if one feels that spirituality is the only answer, then I wish to say that sincerity is the key that opens the door of spirituality. There is no other key; there can be no other key.

"Let us be pure. The Supreme will love us." If there is no purity in the aspirant's inner or outer life, then the aspirant is no better than an animal. Without purity he cannot retain any of the spiritual gifts he receives. Everything will disappear and everything will disappoint the seeker if he is wanting in purity. But if he is flooded with purity, the divine qualities will all eventually enter into him.†

† From *The Inner Promise* by Sri Chinmoy, published by Wildwood House Ltd. London, and Simon and Schuster, New York Sri Chinmoy. Printed with acknowledgements.

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Theoria to Theory, 1979, Vol. 13, pp. 253 – 254
0049-2686/79/1303-0253\$04.50/0

Published by
Gordon and Breach Science Publishers Inc. 1979

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For the contributors to the comments on the Neo-Darwinism Discussion, see note at head of the comments.

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Subscriptions: to either editor.

**DATE OF FIRST ISSUE: APRIL 1978
TO APPEAR TWICE YEARLY**

THEORIA to theory

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**An International Journal of Science, Philosophy and
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Subscription Rates *four issues per volume*

In Great Britain

Individuals who warrant the journal is for their own personal use, per volume, postpaid: £13.50
Libraries, research institutions and others, per volume, postpaid: £30.00

The above prices apply only to the U.K. and are the 'base' prices for this journal. The price in U.S. dollars will be adjusted every three months according to currency fluctuations. Please write for details of current dollar prices.

The subscription rates include a distributing charge of £7.00 for postage and handling.

Subscriptions should be sent to Gordon and Breach Science Publishers Ltd., 42 William IV Street, London WC2, England.

APRIL 1980 issue

1980 The Epiphany Philosophers, Gordon and Breach Science Publishers Ltd., 42 William IV Street, London WC2.

Printed in Great Britain at The Lavenham Press Limited, Lavenham, Suffolk.

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Editorial

Unthinking routine is increasingly cutting off both science and religion from their sources. In science the pressure to make the right kind of noises is very great. This has partly to do with the way scientific research is organized and funded, but also with the attitude individuals take towards their work, career advancement, and so on. In religion the matter is perhaps more complicated. Apart from fanatics and those who refuse to think critically about their beliefs, the position might be described this way: science is indeed, as Popper has said, “the greatest spiritual movement of our day” (*The Open Society and its Enemies I*, p. 283 n. 6). But how many religious people, still more theologians, really feel this and are consciously living in a world in which it is true? And if the routine view of science were the whole of the picture, it would cease to be true.

So we need periodically to explain why we publish articles in T. to T. which are neither contributions to “hard science” (whatever that is) on the one hand, nor on the other hand help to dress up the old half-understood propositions of traditional religion.

The present number, for example, contains an article by an Indian Jesuit describing the original view of *karma* in the Upanishads and Gita, and a discussion about the social effects of micro-processors. There is also an article by Chris Evans of the National Physical Laboratory on how talking to a computer can actually further human communication. He describes how people who had psycho-therapeutic sessions with a computer reported that they could let down their guard and not be frightened to say what they would not like to say to a human being. Chris Evans was an enthusiastic

supporter of T. to T. from the beginning until his death in October, and we are publishing this article in his memory.

Though it may not appear on the surface, there is in fact a connection between these pieces. Both the pictures of a cosmos governed by the working of *karma* as causal law and the picture of a society increasingly invaded by machines have inspired a special and similar kind of fear. The difficulty is not the one suggested by scientific materialism, of fitting freedom into a deterministic world. It is rather that in these pictures no room seems to be allowed for any way in which human initiative could develop. The efforts of individual human beings seem peripheral in the overall pattern envisaged both in *karma* and in a world run by perfect technology. In *karma* initiative is present, but finally *ineffective*, and the wise man surrenders it. So in the East this initiative is something to be overcome and escaped from into another kind of freedom, in the loss of the separate self. In the West personal initiative is rather something to be prized, and understanding the workings of nature can give it a greater purchase on the world. This is not only a practical and manipulative interest, but a passion for understanding which is at the spiritual source of science.

Our discussion on the use of micro-processors directs itself to the question whether they destroy human initiative, and shows ways in which their use can in fact enhance it. There are indeed social, political and technical problems in this. But they are problems to be dealt with, not inevitable forces to be submitted to. So the fear associated both with *karma* and with the advance of technology is perhaps a fatalist metaphysical fear of a universe determined by laws of cause and effect. Those who live with a philosophy of *karma* have sought, and believed they have found ways of liberation; those who work with machines can find ways of using them to enlarge the scope of their freedom. These facts show that people do not sit down under this metaphysical fear; nor need they. There are better kinds of metaphysics.

Discussion: Will micro-processors destroy human initiative?

TUDOR RICKARDS and JOAN MILLER talks to members of the Editorial Board Q.1 and Q.2

Q. 1. We hear the expression “micro-processor revolution” What does this amount to? Some people talk as though micro-processors will take over almost everything that affects human life, and while some are enthusiastic about this, many are extremely apprehensive.

You, Tudor, and your colleagues in the Manchester Business School are highly concerned with this. Can you start our discussion by saying just what a micro-processor is and what you think it can do and what it can't do?

T.R. I don't know an exact definition of a micro-processor or that anyone has found one. My interpretation is that it is a dense integrated circuit that can respond to electronic input. Silicon chips can be programmed to produce a fixed repetitive activity. They can also be made more flexible by being externally programmed, which gives tremendous potentiality. There is a core programme and variable ones that can be plugged in. These chips are very small, and they are robust because the electronic circuitry is laid down without movable parts. You can etch out the circuitry from a large photograph and reduce it in size. The photographs I have seen remind one of railway sidings. So a micro-processor is a control system related to a particular application. It can be connected with other apparatus, for instance digital display units on petrol pumps.

Q.2. Then we need a word to distinguish between a micro-processor and a mini-computer, and indeed now a micro-computer.

T.R. The currently used word is "system". The micro-processor is an integrated circuit in a system.

Q.2. I don't buy "system", as a mini-computer is also a system. You want to say that there is something in which the micro-processor is a stage, whereas the mini-computer is self-standing. You press a button on the petrol pump and the micro-processing stage controls how much petrol comes out and shows how much it is on the display.

T.R. These types of chips are called "dedicated" micro-processors because they are committed to their pre-programmed ranges of duties — such as operating a petrol pump or a washing machine. There is no sharp dividing line between dedicated micro-processors and micro-computers — it is purely a matter of degree and definition. A micro-processor is the building block out of which micro-computers are built. A *dedicated micro-processor* is one that is given a limited set of instructions (programmes) to enable it to carry out a specific task or set of tasks, e.g. a washing machine. A micro-computer is like a blank sheet of paper on which the operator can write at will. A micro-computer is able to do anything a dedicated micro-processor can do but it can be reprogrammed at any time.

The key is that a dedicated micro-processor is designed at the outset to do a specific task, the micro-computer can be directed, at will, to carry out tasks which were not necessarily contemplated at the design stage.

J.M. The real discovery was that of semi-conductors used for transistors. The thing was there in principle, and the difference in micro-processing was in printing on to silicon and shrinking it smaller and smaller, so that you could print the whole circuit on tiny slivers.

T.R. Incidentally there is widespread confusion between silicon and silicone. Silicon is what the chips are made from. It is an inorganic crystal lattice whereas silicone is a linear, semi-organic polymer which can be used for polishing tables, in lubrication and so on.

Q.2. In so far as you are using control units, you are increasing the repetitive side of life. In so far as you have a technology with flexibility and power, you can increase initiative. These are two opposite tendencies. The petrol pump was a mechanism already, but an inflexible one. Now that you can put information into it, it becomes a more flexible one, easier to use. Can we sort out this distinction in the use of micro-processors?

T.R. The essential thing is that these things can assist us in any sort of repetitive operation, counting, weighing, measuring, and so personalise the way in which you use the whole system in which these operations occur.

Q.2. So where there are machines which are difficult to use the micro-processor can make it altogether more serviceable, especially for the elderly and disabled.

T.M. It is the same as with programmed learning. This sounded terribly repetitive and mechanistic but it gives everyone a flexibility in learning. Thanks to the micro-processor we will be seeing learning centres in the high street within eighteen months. You will be able to walk in, select a subject, and work with the computer for as long as you need (and can afford).

Q.2. When Pat Suppes in Stanford had programmed learning of language for kids, I was asked in and found these kids were exceedingly happy. Each was developing his own vocabulary and had put a name "Moggie" or "Doggie" and such on his terminal and painted it on with a picture. People then said "these kids are setting up idols". But no more than with their teddy bears — they had their terminals instead. The terminal was giving individual tuition to that kid. Moggie would help him with his particular spelling difficulty. But the kids worked very slowly compared with what they would do with a good teacher, and didn't really get to speaking the language. I think there are a lot of skills like this that human beings intuitively feel machines don't give you and this is part of the opposition to micro-processors.

Q.1. You are interested, Tudor, in decision making. There are attempts to simulate this with models. Could micro-processors be used in such models for decision making?

T.R. I believe such systems already exist. We were talking

about opportunities of individual personalised use for micro-processors. You have the paradox of a rigid machine giving flexibility of use. The sewing machine is an example; you can put in different programme sets of instructions. Then there are games like chess, and T.V. games of tennis and football.

To come back to applications: there is tremendous scope wherever you want cheap rapid control, and there are social implications from that. Micro-processors will reduce the number of boring repetitive tasks that society needs.

Q.2. One thing the micro-processor can do is the boring repetitive task, and the other is when what was a boring task, like filling up with petrol, becomes far more flexible.

In the factory, the micro-processor can take over boring tasks but are they necessarily repetitive ones?

Q.1. Could you have a micro-processor for sorting out bad peas from good peas, which was a job I did once at Smedley's. You have peas rolling down a conveyor belt, which is very slow moving so that the peas roll slowly and turn in front of you, and you are supposed to rip off the ones with black spots. You get quite dizzy. I have heard they have now got a scanning device to spot those peas and whip them off.

J.M. The scanning is done by a radio-active device which trips an electronic mechanism on the machine which directs the peas; if it scans one kind they are sent down one way and the others are sent down another.

Q.1. This was exceedingly repetitive.

Q.2. In one sense it was and in another not. I remember someone having to spot bad cherries, and they said what was so awful was you were looking for a variety of signs of a bad cherry, so in the Civil Servants' sense you were having to make momentous decisions.

Q.1. I was once told in factory work the girls said that the tasks which were purely repetitive weren't nearly as bad as the things which were trivial and boring but you had to keep your mind on them. That was the very devil. In the purely repetitive jobs you could be talking to your neighbour or thinking about what you were going to do in the evening, or what you would have for supper. If the micro-processors can look after things that have to keep your

attention fixed but have no intrinsic interest, that would be something worth having.

There was a book "Democracy and Industry" by Constance Reaveley and John Rivington ("Constance Reaveley" is the pseudonym of our friend Mary Glover, who has taken part in some of these discussions). They say that as a repetitive job goes round and round, any irritation you are feeling gets caught up remorselessly in the repetitions of the circle. If the micro-processor can take these over, it would be liberating. Take the task to pieces and see what parts of it are helot activities which the micro-processor could take over.

T.R. This may be desirable, but I think what is most likely to happen is that you will get redundancy from some jobs that are perfectly defensible. Also there are a large number of people whose jobs require virtually no training, and have a high level of repetition — jobs on most production lines packaging, fish fingers for instance.

J.M. Production line jobs are highly geared to machines from the beginning to the end; the great problem is that any part of a machine is liable to break down, and when this happens someone has to jump in and stop the whole machine. A decision has to be made about at what stage you are going to stop it, and this happens almost daily. So far it is only human beings who can decide when the thing has got to be shut off. People are monitoring at various spots — for instance, when the paper in a packaging machine breaks the machine can run on for a considerable time, delivering unpacked goods unless it is served quickly. In a bakery five minutes can spoil a whole batch, and the complete machine has got to be cleared out before another production run. Any machine requires someone to watch and feed-in, to ensure tht the right quantities of materials are fed in. This can be computerized, but something can always go wrong. Incidentally there can be all sorts of accidents, when the machine has to be stopped, cleared out, cleaned, which usually means removing the guards, and scotching the micro-switches.

T.R. There is the question of the proportion of staff allocated to maintainance as compared with people actually engaged in production.

J.M. There is always a provision for maintenance staff, but where initiative comes in is that for various reasons people on the line don't want to call in the maintenance staff when something goes wrong, but they want to put it right themselves, and this is a major cause of accidents. Then they get into trouble with the firm, because there is a rule that if a machine goes wrong, "do not touch, call maintenance." When a machine, especially a programmed machine, is running there is virtually no problem, the problems arise when something interrupts the run.

T.R. I have noticed that a major reason why machines go wrong is because they get out of gear with the capacity of the people dealing with the through-put. People may be supposed to pack twenty fish fingers and only do eighteen.

J.M. Normally they wouldn't have to do the packaging. All they would have to do is to take the packs off at the end. Suppose the machine was making chocolates and there was a fault at the enrobing stage; this is the point where the chocolate has to be put on the centres. If there is a hold-up here, somewhere on the line, it would suddenly be realised that all the centres were going out without any chocolate.

Q.2. This may be why people enjoy factory work; there is this continual excitement.

J.M. Oh yes, there is always something. And things aren't spotted soon enough, for instance that someone has been too slow at the feed-in point.

T.R. The management will see bottlenecks to efficiency. If these can be reduced to routine tasks, they can say "this is where we would like to see micro-processor technology".

J.M. I would think that a micro-processor might monitor a machine and switch off at the critical point. Then the people could come and put it right.

T.R. At present it is socially accepted that people have tea breaks, and efficiency falls before and takes time to build up after breaks. Also people are reluctant to go on shifts lasting till 11 p.m. because pubs close at 10.30. It isn't beyond possibility that the micro-processors could keep the machines running over these times.

Q.2. I am learning that we have let ourselves be conned by

words like “repetitive” tasks. There is the spice of danger; when things go wrong, people don’t wait for the maintenance men, but try to put it right. So the work isn’t soul-destroying — it can be highly responsible. Micro-processors may be turning people out of interesting though dangerous jobs. There is a great difference in kinds of production processes. The old boring jobs are still there, but I see we ought not to have a blanket notion of a production line.

T.R. Some of my friends in Unilever seem to be living a very happy life in a soap factory which is a community. They are involved in wrapping bars of soap.

Q.1. What is so bad is to have the sort of job that if you don’t do it in time everything balls up. Is this common?

J.M. Not much depends on people doing something in time, except in monitoring and stopping the machine. What is distorted out of all proportion is the talk about assembly lines for cars. This is a very peculiar thing, more related to bloody-mindedness of people in the assembly shop than to the fact of the conveyor, which is terribly slow.

Q.1. Could you then recommend greater automation of car assembly?

J.M. It is being done in Italy and Sweden. In Sweden you also have smaller units, reorganized so that instead of everyone doing one bit, you have smaller teams making all of one car.

Q.1. Then how likely is it that micro-processors will cause unemployment?

J.M. You will still need your tool makers who are the elite but a number of those in actual machine working could be replaced. But these are mostly the people who haven’t gone into apprenticeships and are unskilled, and would have to change to precision work for which they aren’t trained.

A basic problem is the shutting down of a works in a place like Corby — where a work force of 6000 in a one industry town becomes unemployed. I don’t see how there could be a learning programme for all these people until they have got an idea of what sort of industry is to replace the steel and the kind of re-training required. The problem is sharpened in places with older type industries where people have a history of working in one particular industr

for instance in old type mines in South Wales. They don't take to other industries. The reason why industries go to the South East is partly because the work force is more flexible.

Another way in which unemployment would be created is that owing to efficiency, you could have fewer factories producing enough for the country's needs.

Q.1. Then how much in fact can we say there is a micro-processor revolution?

T.R. Last week I attended a seminar on their development and the general consensus was that the Americans were pushing ahead with applications, and the development is coming from very bright young science graduates actively looking for commercial opportunities. In England the impression was that the bright young science graduates who knew about micro-process technology were not looking for applications because the big companies were discouraging them. So there is a feeling that, for all the money the Government has put in, we are going to miss the boat.

Q.2. Is it the small scale firms, not the large scale, which will take it up?

T.R. The prediction is that we aren't going to spawn off a lot of small businesses developing micro-processor applications.

Q.2. I think people are scared in Britain because of the threat of unemployment. If we are not careful we are going to get a huge negativity. There are going to be a lot of altruists bringing up human interests, and people who might turn what is called the micro-processor revolution to extreme good don't get going.

T.R. There could be courses to help the people, for instance in back street sewing shops, who are producing ideas.

Q.2. One way micro-processing has got in is in modern sewing machines. We mentioned that they are now programmed and you can set them to do, for instance, one kind of embroidery.

Q.1. I remember Schumacher's television programme which showed a woman putting a collar on a shirt by sewing machine, and he said "How much more creative it was when people did it by hand". But there isn't anything all that creative about putting on a collar. You can distinguish the things it really is a help to do on a machine, and making, for instance, a very original bit of embroidery.

Q.2. If people learnt to write their own programmes this could itself be a creative activity. Translators get uptight about the idea of machine translation until they are encouraged to make programmes themselves and then they get excited. They then feel it is their thing, and not something that is being wished on them.

T.R. People sometimes talk as though creativity began and ended with having a new concept, not with the way the concept is developed and applied. You need just as much creativity to see how a new idea can be developed and made socially acceptable. If our discussion is about what might happen as a result of introducing micro-processors, it is a bit as though people 150 years ago said "What is going to happen as a result of the Industrial Revolution?" The answer comes from interactions between the technology, people's needs, political decisions. So we have to ask what are the sort of needs this technology might meet.

Q.2. Getting rid of one evil may produce another, and this can be the effect of just making micro-processors do repetitive jobs. There has to be time and effort also put into seeing a number of ingenious applications to help new ideas to become viable commercially in smaller concerns. So do you think the growing point is looking for needs?

T.R. By and large, successful innovations come from spotting needs to be serviced and plugging the technology into them, rather than saying, "Here is an exciting piece of technology, surely the world needs it", and you end up with Concorde. I'd start with needs of the inner cities, and asking which of them might be tackled with the help of micro-processors. One that has already been spotted is traffic flow.

Q.2. Remembering there are pedestrians and bicycles.

T.R. Also micro-processors could be used to monitor the well-being of senior citizens, especially in inner cities. Electronic devices have been installed in some old people's flats that monitor heart beats, temperature levels, smoke in the air, and report by bleep.

J.M. This would be fine and make it possible for more old people to stay at home. But to instal it with the central console costs a lot of money.

T.R. Elderly people have objected to this because it is so

impersonal and the system was installed without the participation of the users.

Q.2. We should suspect things which are wished on people. They want to have things they can use themselves. How possible is it for ordinary people to experiment with micro-processing devices? How expensive are they?

T.R. There are a large number of programmed chips available and you can get and assemble some of them. You solder them. I see it as rather like Leggo. You don't need to know much more than you would to put bits of Leggo together. So kids might invent all sorts of applications. I have a colleague whose boy makes all sorts of interesting hovercraft with micro-processors in them which he gets his father to buy at £5 each. You can get the basic materials for about £200.

Q.2. As children's playthings go, they still aren't cheap.

T.R. They are coming down.

J.M. But you can't just buy a micro-processor: it has to be designed for and related to the particular thing you want it to do.

Q.2. Could you get boxes of things you could put together like Leggo, and see what you could turn them into?

T.R. If you had a basic package, which you could buy, you could write your programme and then get the hardware reprogrammed to make another generation of micro-processors. That is where the flexibility comes in. At the moment it isn't transparent enough for people to play with, but it may get to this. There already exists a set of combined micro-processors called the Pet which could be used for things like doing accounts — a home accountant.

J.M. You have started with an idea of what has to be done, not sitting in a vacuum playing with the stuff.

Q.2. The business of having an idea and not having an idea isn't just a dichotomy. There can be dreams of ideas which people can firm up through being given something to play with. This is happening now with desk computers. Can Tudor say how far it could be possible with the components of micro-processing? You need the fiddling about stage, and it looks as if micro-processors were difficult things to fiddle with.

T.R. I'm not sure we are there yet. You have to use the creativity within a framework that is already set up.

Q.2. When they instituted display terminals in Stanford University there were crowds of students round every terminal, and they were all playing Star Wars. But it looks as if micro-processing was still too complicated for people to play about with. The danger is that it will be used to do the simple things, but there is a potential that isn't being developed because this play stage hasn't been mastered.

Q.1. But mass unemployment isn't going to be taken up by what people can do by fiddling about. This might produce a few applications which could produce new enterprises for a few people, but there is still the question of getting into mass production where the end product is needed. Even if unemployment is to be helped by developing small industries, they have got to be able to take off and become commercial.

Q.2. One in ten, at least may. There was a valley in Sweden which became automated, and it was taxed to help small industries to start which couldn't yet quite pay. Given the social effects of micro-processors, there could be a Luddite reaction against them unless new ideas come in that haven't yet been thought. At present the new ideas and ingenuity is on the technological side: they are needed on the social side.

POSTSCRIPT

We asked Ray Inchley, who took part in the Discussion "Three Kinds of Rural Community" in T. to T. XIII i to comment on this discussion. He is a former miners' leader who has been concerned with the effects of unemployment in North Somerset after the closure of the pits. He is now working as a postman.

I see Micro-Processors as an extension to all the other technological advances of the last twenty eight years. We now have coal mines where the product is not touched by hand. There is no reason why we cannot put Micro-Processors to work in the same way

to reduce labour costs and take out much of the hard work. But there are problems that will have to be considered before we can accept the Micro-Processors unconditionally. Our social order is in my view too rigid; for example if Micro-Processors are going to cause more people to be out of work, we must make allowances in the way we consider unemployment. Could you have a job for say two days a week? National insurance contributions and a host of benefits depend on one being in full time employment. We could give the option to people over 55 to be unemployed on a reduced pay for three years, after which they would be thoroughly unemployed. Or they could be given the option of having the money in a lump sum, instead of spread over three years, so that they could set themselves up. Our present attitudes are a hang over from the 1930's. People should be able to consider the possibility of changing their skills at least three times in their working lives. There might be day release schemes where people can train. It is no good talking about retraining unless they know what they might retrain for. This should apply also to the people who provide services. There should be at least three things they can do. There could be exchange programmes between industries and services.

Micro-Processors will introduce new systems of control e.g. the electronic cash till gives a complete list of data of all the transactions for the day, and gives the change. This is o.k. for large concerns. Can the corner shop afford to buy one? Will tax officials want to see the till roll to assess VAT in the future? There is a danger that Micro-Processors will introduce a uniformity that will make life more difficult in some cases for small business.

If we see the Micro-Processor as likely to cause more unemployment, at the same time it will reduce the number of points of human contact. For example, I want petrol I go to one of the serve yourself filling stations, fill up the tank and give my £10 note to the electronic till, the till then gives me the change. *But* I want my battery checked, and there is no one there! We must see that sufficient points of human contact are available. In my view, with Micro-Processors displacing labour, we will need more human contact points in order to remain sane. Keep an eye on the human

factor, and don't destroy the human motive force in what you are doing. Pressing buttons can have a reducing effect.

As to the unemployment which will follow, there will be a need for more consultation before Micro-Processors are introduced. Such consultation must be carried on in "man in the street" language so that the consequences are fully understood. The discussion will then go on in an informal way in the pub or club. This will build up trust. If Micro-Processors are hoisted upon a factory without consultation we will have fear. If people get bloody-minded they can jam machines up at colossal cost. In consultations every person employed in the factory has a contribution to make and must be encouraged to make it. To do this with present attitudes between class, sex, white collar and blue collar would be impossible. We must all have an open minded approach.

In the past 20 years there has been a massive growth in administration. Head offices have moved to London, instead of being run from the local community. People want to work sensibly but they feel they are being run remotely. Our class structure (skilled, unskilled, semi-skilled) makes for a hierarchy which needs breaking down, starting from the management. You can't deal with the Micro-Processor revolution without considering its effects in depth.

There is no doubt that with each new development its application *must* be considered in relation to what is acceptable by society. I do not think that today we can have mass employment on the scale of the 30's. People, yes ordinary people, are more in control of the destiny of the nation than they used to be; a group of workers could make us suddenly find we are without electricity, and then what?

It would be a disaster if we cannot take advantage of electronic developments because we are not prepared to adjust our historic prejudices.

Improving the communication between people and computers

CHRISTOPHER EVANS

INTRODUCTION – THE PRESENT LIMITATION

This paper describes some of the efforts of a psychologist working in the increasingly important field of man-computer interaction, and in particular in the area of computer usage by totally naive users. It is an aspect of computer science where, I believe, psychologists will in due course be able to make a major contribution but in which, regrettably, they have shown relatively little interest up to the present time. Perhaps part of the reason for this has been the tremendous pace of computer development, a pace which leaves most non-computer people with the feeling that the topic is so abstruse and complicated that it can only be tackled by computer experts. Unfortunately, as I will endeavour to demonstrate in this paper, the computer expert may be the least well qualified individual to tackle the problems of man-computer interaction. Whether this is true or not, it is certainly an area where technical expertise and mathematical sophistication may be a hindrance rather than a help, and where the obvious and the commonsense approaches may be the least successful.

It is almost impossible to overstate the achievements of computer designers and engineers in the past quarter of a century—the total span of the history of computers — which have probably never been matched in scientific history. Possible exceptions might include the Manhattan Project at Los Alamos, which gave the world nuclear

Theoria to Theory, 1980, Vol. 13, pp. 271 – 294
0049-3686/80/1304-0271\$04.50/0

Published by
Gordon and Breach Science Publishers Inc. 1980

energy control, or Project Apollo which put man on the moon. No better illustration of the pace of development can be given than the statement that probably half the participants at this Conference have in their possession pocket calculators with twice the power and dozens of times the speed of the first big computers, such as ENIAC, EDSAC and the like and at thousandths of the cost. But having admitted and applauded this tremendous technological achievement, it is also important to realise that the achievement has come about because computer designers and engineers have been single-minded and pragmatic in their approach, aiming at the triple goals of making computers (1) reliable, (2) powerful, and (3) cheap. The factor of smallness has come along as a kind of useful bonus. But while their single-mindedness has helped them to great achievements, it has also, somewhat paradoxically, introduced a special and unexpected problem.

The difficulty is that having been given the job of making reliable, powerful and cheap computers they went ahead and did just that, and having done it they handed them over to the public at large and effectively said, "Now do what you want or what you can with them". After this they went on to design even more reliable, powerful and less expensive supercomputers. The end product of all this, of course, has been that the world has become flooded with reliable, powerful and cheap computers, only a fraction of which are used really effectively and a larger number of which are barely used at all except in what one might describe as a sledgehammer-to-kill-a-flea mode. Furthermore, there is every indication at the present rate of progress, which is pretty well exponential, that more and more of these devices will come on the market, increasingly far ahead of the operating power of their users. In other words the computer industry is a truly classic example of a technology outstripping the current potential of the public that it is supposed to serve.

THE MAIN REASON—FAILURE BY PSYCHOLOGISTS

The trouble is that one cannot really assign blame to the designers and engineers for this hiatus, for they after all were only doing what

they were told. Nor can one blame the software experts who, in my view, are responsible for some really remarkable achievements, more or less in spite of the engineers who built the computers they had somehow to program. Who can one blame then? I regret to say that I believe the fault principally lies with psychologists who have failed in their duty on a number of counts.

First and foremost, they have simply failed to get to grips with computers. By this I mean that they have failed to understand them, failed to learn how to use them and failed to see the stupendous challenge that they pose in the intellectual domain. Secondly, those psychologists who have given computers something more than a passing nod, have tended to see them only as adjuncts to routine psychological experiments or for processing the kind of complex statistical data which psychological experimentation often seems to generate. Thirdly, and perhaps this is less reprehensible failure since even computer scientists are guilty of it, they have not recognised that the principal problem of computing science today is no longer an engineering one but a psychological one, and that one of the really important areas where late twentieth century psychology can make a real contribution is in improving the communication between man and computer. Here incidentally we are not talking about communication simply as a matter of manipulation of knobs and the inspection of dials, but rather at a social and intellectual level as well. To me, as a psychologist, it seems appalling that this challenging goal — improving the effectiveness of man-computer interaction at all levels of impact — is mainly being tackled today by imaginative computer specialists and sophisticated programmers. What this means is that a great section of what is really the subject matter of psychology is in danger of being taken over by engineers and mathematicians. These misgivings of course only apply if one holds the view that psychology is essentially the study of mental activity, of thinking, reasoning, imagination and creativity, which I myself believe it to be.

Happily I do not believe that this shortsightedness on the part of psychology will continue indefinitely, and it may well change in the fairly near future. In the first place a new generation of psychologists is emerging who see the department computer as something

more than just another big calculating machine and who are not only drawn to it as a model-building and theory-testing device but, more importantly, see it as essentially a communication tool. In the second place the next decade is likely to see computer hardware become so widespread and so cheap that quite staggering amounts of effort will have to be channelled into developing software to match, and also to solving the essentially psychological problems which are involved in tailoring this new computer power to the requirements of the naive user. When we reach the point, which may not be too far off, when hardware is so cheap to produce that it can be given away and the only services that computer companies will want to sell are those concerned with the supply of software, then the really big markets will be the man-in-the-street – or more generally the world of non-computer experts. Then will arise the question of what uses these proliferating computers can be put to, and also how closely and effectively they can co-operate with human beings. At this point, in my view, the psychologist will be more or less forced into the field of man-computer interaction – or, to use a phrase which I believe will be more relevant by then, man-computer psychology.

It should be clear from the above remarks that I am a computer enthusiast, or to be more accurate that I am enthusiastic about what computers might come to be. I am confident that their development constitutes mankind's most significant single invention, and that the synergistic partnership between man and computer will have a far greater effect on society than did the great man-machine partnerships of the Industrial Revolution. At the National Physical Laboratory, my work attempts to anticipate some of the problems and possibilities of man-computer synergy, and to do this I have concentrated on areas where the interaction is between computers and more or less totally naive users. In order to facilitate this I have wherever possible conducted my experiments outside the Laboratory, which is of course filled with highly experienced users and more or less devoid of naive users – at least in the accepted sense of the word.

THE DEVELOPMENT OF THIS WORK AT N.P.L.

When I was asked to form the man-machine interaction group, as it was then called about five years ago, I felt intuitively that the really exciting future was in applications for naive users, though at the time it was not at all obvious to me what these applications might be. Curiously, the first clue came to me as the result of watching a movie — specifically Kubrick's '2001', based on a short story by Arthur C. Clarke. Without going into the specific details of the movie, a key sequence was a vigorous interaction between the crew of a spaceship and the heuristic computer which controlled it. The interaction was notable in two respects. Firstly, the computer understood conversational human speech, and spoke to the crew in conversational English, using the middle class American accent which is already a characteristic of speech synthesisers today. Secondly, the computer became so involved with its human charges that it set out to destroy them. Most non-computer experts incidentally took this conversational exchange between man and computer as nothing more than an imaginative example of science-fiction, never to become science-fact. As someone actively engaged, even at that time, in the growing field of man-computer interaction, and as someone with responsibility for a research project on the recognition of the human voice by computer, I was personally confident that heuristic conversational exchanges of the kind depicted in Kubrick's movie would be possible by the year 2001, if not earlier, though one would hope that the nature of the exchanges would be less trivial. However, this did raise a train of thought — did one really want to address computers, and be addressed by them, in this particular way? Leaving aesthetic considerations aside for the moment, and considering purely practical ones, was talking really the best way of getting information into a computer and getting information back out of it? Of course, the answer to this question depends very much on the nature of the information, and the particular task to be performed. But nevertheless, it seemed to me that there was a significant and immediately explorable area of research which could act as the starting point for a fresh approach to the problem of man-computer interaction. Only later, incidentally, did I

discover that Professor Chapanis had been equally influenced by this seminal movie, as the raw material of his paper to this Conference reveals.

My first step was to set in motion a psychological study of the acceptability of the voice output from machines. It has always struck me as being possibly significant that my own experience of talking machines, and apparently other people's experience of them, had been less than satisfactory. I am referring, of course, to telephone answering machines which have a relatively poor performance record, and a high rate of user rejection. The question arose, why is this so? What is it about these harmless, totally well-meaning gadgets that drives people to reject them and even on occasions be rude to them? The question was in fact far from trivial, and lent itself to a simple experiment with a telephone answering machine on my own office telephone. The study involved recording people's responses to a number of different 'voice personalities'. "Personality one" was my own voice speaking in a formal, rather stilted manner — typical of most answering machine speech. The second was my own voice speaking in a casual informal manner, the third was a girl's voice speaking in a formal manner, the fourth a girl's voice in an informal manner. I even added a fifth "personality", which consisted of a machine-like voice — in fact it was pseudo-synthetic speech — because it occurred to me that the key might lie in insuring that one's machines always spoke like 'machines'. Part of the reason for rejection of human-like voice personalities might be that the callers expectations were always being dashed when they realised that the machine could not live up to its initial pretensions. The results of the experiment, covering no fewer than 500 calls, revealed a clear preference for the second of the two experimental personalities, that of my own, speaking in a casual informal manner. Subsequent studies have suggested to me that the closer the personality of the voice employed matches what the caller expects to hear, the greater the prospect of effective communication via the telephone answering machine. Worst of the five personalities by far, incidentally, was the pseudo machine voice which received a greater percentage of hang-ups and derogatory remarks.

Publication of details of this experiment led to the suggestion by

Professor Wilfrid Card of the University of Glasgow that a talking machine of some kind might be put to good use interviewing patients attending for routine screening at hospitals. Card's main avenue of interest was in fact computer diagnosis, but correctly realising that this was some distance off, he felt that one should initially experiment with automating the medical interview — the first stage in diagnosis. My own view at the time was that speech synthesis was in such a creaky state that experiments interviewing patients by a "talking computer" in a large and busy hospital — specifically the Southern General in Glasgow — would be pretty well doomed to failure. I did however feel that it would be worthwhile investigating the possibility of interviewing the patients via a standard teletype terminal connected to a commercial time-sharing bureau (to avoid the capital cost of installing a special purpose computer). This itself led to an interesting new line of research, much of it systems-oriented and concerned with purely technical aspects of the terminal and the operation of the computer. But an important slice of the problem involved a study of the psychology of communication between man and computer, at the time more or less terra incognita. Perhaps put in more general terms, one might say that the problem was essentially this: "How should a computer address a human being in order to extract from him personal details, and in order to ensure that the human being is prepared to continue communicating at all times?"

The investigation of this problem led to a number of surprises which on analysis can be grouped under ten headings. I list them in detail below because they not only give a good indication of the evolution of the research project, but because they also say a good deal about the nature of man-computer interaction, particularly with naive users, and help to remind one that in relatively unexplored areas of research it is unwise to take anything for granted. Indeed, one might almost say that what one expects to be true, or the things that one is particularly confident about often turn out to be the least predictable. But before going into the surprises I would just like to summarise the problem at issue by saying that the project involved programming a computer and providing an appropriate terminal to interview patients in a hospital, the whole interview to

be conducted by the computer without any familiarization or prior training of the patients, and with no medical staff or attendants present.

TEN FINDINGS ABOUT INTERACTION WITH NAIVE USERS

The surprises can be expressed in terms of a series of findings, some of which are qualitative in nature and others quantitative. All of which have direct relevance to the study of man-computer interaction.

Finding 1: The relative lack of information about the problem area.

Naively I had assumed that a literature search would bring me a mass of information about automated history-taking, the strategy of medical interviewing, and the optimum methods of presenting an automated questionnaire to a patient. In fact, I found a good deal about computer diagnosis which seemed to be the area on which the greatest effort had been concentrated, but little on the art and technique of computer interviewing itself. Such work as had been done had been performed in the United States of America, and here these mainly involved the use of a dedicated computer controlling a slide projector or microfiche display with the questions flashing up on a screen, and seemed to be out of the realm of economic possibility within the English hospital system.

Finding 2: The difficulty of establishing exactly how to take a medical history.

With a naivety which I was to find applied in most of the research problems in this area, I had assumed that the simplest way to find out how to take a medical history would be to ask the experts themselves -- the doctors or specialists. Indeed, they all believed that they could tell me, but when they came to try to do so they found to their own great surprise that they could not. They seemed not to have difficulty in getting the first two or three questions in the

sequence correct, but after about this point they began to find themselves getting muddled. In the end I had to resort to the practice of sitting in on a series of consulting sessions with a notebook, charting the progress of each interview as it occurred. After a number of sessions my notes were comprehensive enough for me to be able to build up a general strategy, from which I later discovered that it was possible to draw up a flow diagram. And of course once I had a flow diagram I knew that I would in principle be able to write a computer program (Fig. 1). The specialists' failure to be able to explain to me how they conducted a perfectly routine interview seemed at first to be inexplicable. Later of course I realised that they probably did not have the kind of map in their heads that would allow them to reel off what was effectively a complex flow diagram. When a doctor interviews someone, his strategy requires the presence of a second person — the interviewee — and without this second person what is essentially a two-way dialogue could not possibly emerge. Incidentally, I believe that this finding has relevance not only to man-computer interaction but also to any area where one attempts to model the skills or tactics of an expert; in other words one should not really expect the expert to be able to give a good or clear account of his skills, and one will almost always have to resort to observation and objective study.

Finding 3: The simplicity of the structure of a medical interview

My working assumption on commencing these studies was one which I believe would be shared by most people without any formal medical training, and possibly even by those who have been so trained. This was the assumption that medical interviewing — taking a “history”, which is the first stage in the process leading up to medical diagnosis — was a complex process, filled with elaborate branching structures and conditional strategies. It soon became obvious that quite the contrary was the case, and I found that I was able to reduce the whole process to quite a simple flow-diagram from which quite a simple computer program could easily be written. This, incidentally, gave me my first hint of what I have now come to accept as fact, and a very interesting fact indeed — that in

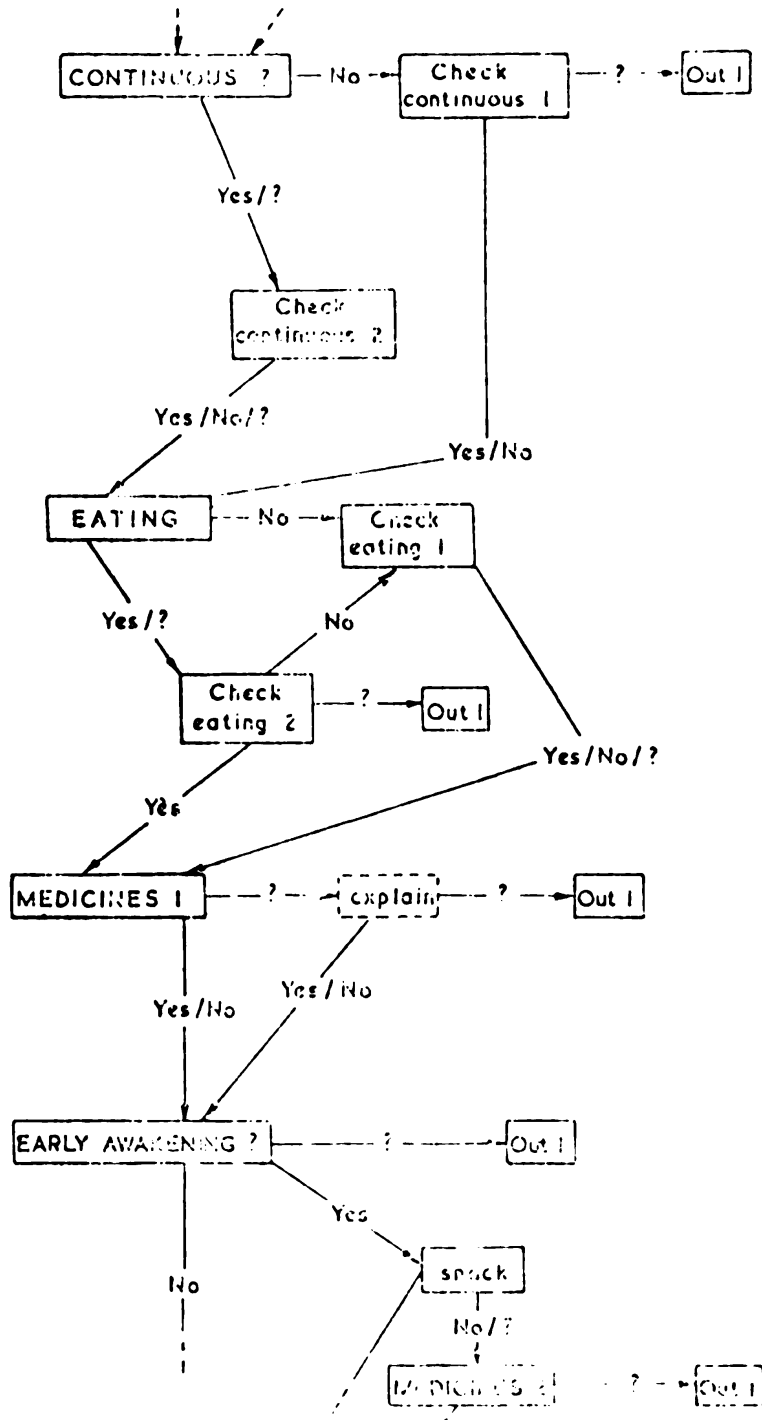


FIGURE 1. Sample of typical flow diagram featuring part of a history-taking in the case of gastric pain.

many cases man-man interaction, even when it involves sustained dialogue, may not be a complex process at all, or at least not as complex a process as most people imagine it to be.

Finding 4: The simplicity of the nature of patients' responses.

Again there is a natural assumption that in a doctor-patient interview not only is the doctor presenting a mass of complex information to the patient but also the patient is returning a complex array back to the doctor. In fact I found exactly the reverse. The patients' responses were drawn from a minute vocabulary, generally consisting of the words yes, no, don't know and occasionally, don't understand. This, of course, greatly simplified the problem of the input interface which had troubled me a lot as I could see little hope of expecting most naive patients to operate a teletype keyboard. We were thus able to develop a simple push-button mask to fit on the front of the teletype with a small array of buttons, labelled yes, no, etc., for them to input their responses. Incidentally, this apparent restriction of the patient's choice of responses to a few selected statements turns out not to be so restricting as one would imagine. I frequently noticed, while watching the doctors at work in the course of their interviewing, that while they permitted the patients a fairly free flow of chat in response to their questions, they almost invariably coded their answers on their notes in the form of simple statements. If woolly or inconsequential responses were given, the doctor would urge the patient, gently or otherwise, to respond with either a yes or a no.

Finding 5: The low optimum speed of text presentation

Even when I began this research I was a fairly experienced computer user, as were most of my colleagues. As a result I had come to expect a very rapid response from any system that I used, with text generated almost instantly onto a screen whenever a VDU was employed. Like most experienced users too, I treated the standard ASR teletype as being an intrinsically obsolescent device which one simply had to put up with until a better technology produced a

faster, quieter replacement. Now because I found the ASR 33 to be slow and cumbersome, I assumed that patients would equally dislike waiting for text to be generated at ten characters per second, and would, therefore, find any extended questionnaire printout to be tediously slow. Nevertheless, this type of terminal was all that was available to us for our initial experiments so we were stuck with it. In fact, to everyone's great surprise, the ten characters per second printout turned out to be highly acceptable to patients, who in many cases stated a preference for this slow speed of generation. Indeed, in later studies where we have experimented with faster printers, or with more rapid generation on a VDU, many patients spontaneously comment that the machine is "going too fast for them". We have subsequently set out to study this aspect of man-computer interaction in a quantitative way, comparing the relative effectiveness of different rates of text presentation — 10, 15, 30, and 480 characters per second in a teaching mode (Fig. 2). The

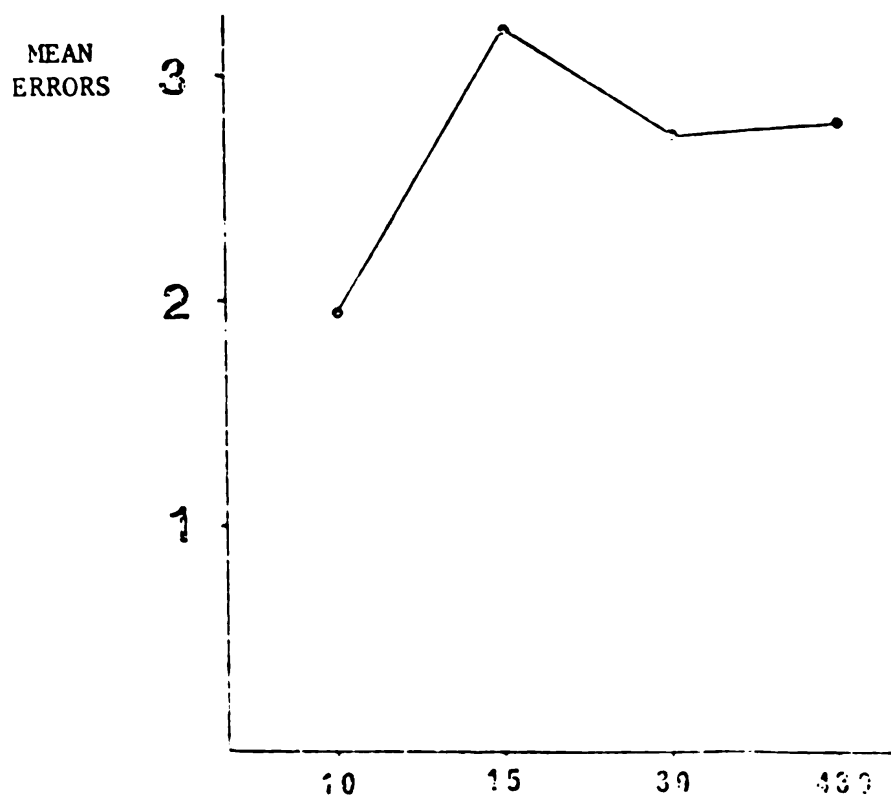


FIGURE 2. Mean errors for 24 subjects in a computer-aided instruction task as a function of the presentation rate of text.

results which will shortly form part of a PhD thesis (Bevan, 1977) seemed to show quite conclusively that for unfamiliar material presented to naive users, the slowest of the four speeds is the most satisfactory. This finding incidentally represents an excellent example of a case where the hunches or prejudices of experienced users are not confirmed when they are subjected to quantitative study.

Finding 6: The relative lack of effect of terminal noise on the patient's acceptability of the method

Once again it had seemed "obvious" to me from the start that patients would object to the clattering noise that the teletype made and much effort was made at attempting to sound-proof it. We found, on the contrary, in a study at the Southern General Hospital in Glasgow that when patients were given the choice between a silent VDU and a standard teletype, 50% of them stated that they preferred the teletype, many of these remarking that it was "because of the noise it made". So far as one can tell the noisiness was considered to be an advantage because it gave the impression of "busyness" and dynamism, and hence was preferable to the "colder" CRT display. Incidentally, many of those patients who stated that they preferred the CRT, stated that they did so because it was "like a TV set".

Finding 7: The ease with which patients learned to use the system

Our original goal had been to make the system so easy and non-threatening to operate that any patient could be led into a room alone with the terminal, sat down at it and then left alone with the whole pattern of introduction, explanation, the medical interview itself and the appropriate goodbyes being done by the system with no ancillary assistance from hospital staff. Although an optimist by nature I had some doubts about whether we would be able to achieve this goal, as I had noticed in my visits to computer-history projects in American hospitals that there were quite invariably medical staff in attendance to sort out the patient's

queries. On at least two occasions I actually witnessed medical staff sitting down beside patients, and running through the whole program with them, presumably because they believed them to be incapable of answering the questions on their own. With this in mind I made sure that the program was written in such a way that even people of low intelligence should be able to understand it, though I still expected the occasional failure when some patients were left on their own with the system. In fact it was only when we came across some illiterates in a later psychiatric screening study that we had a complete failure of this kind. These illiterates by the way had previously been in psychotherapy for some years and, after the fashion of many illiterates, they had managed to conceal their disability from the therapist. In our earliest studies we naturally took care to monitor the patients' progress without, of course, letting them know that they were being observed. It was during this monitoring that I first noticed a regular behaviour pattern on the part of patients which I consider to be of considerable significance. After the first question has been generated on the terminal, patients almost always look round, presumably for assistance, but when they realise that they are completely on their own they turn back to the terminal and apply themselves to the task that they are really perfectly capable of doing. This I think serves as a reminder that it is unwise to underestimate the intelligence and capabilities of naive not to say poorly educated users. It also, I believe, suggests that one important rule in effective man-computer interaction with naive users is that the user should always be left on his or her own with the terminal. The few failures we have had with many hundreds, perhaps now even thousands, of patients being run have been when for one reason or another the patient is not alone in the room with the computer terminal.

Finding 8: The high degree of acceptability of interactive computers to naive users.

In writing the interactive program I had gone to great lengths to give the computer a friendly, sympathetic and tolerant personality (or simulated personality), with the aim of easing what I feared

would be considerable anxiety on the part of patients when faced with the unique experience of being interviewed by a machine (Fig. 3). My private guess had been that this would make the method acceptable to at least 50% of patients in hospitals, which might make the method viable. In fact, the figure for patients reporting the computer as being acceptable or even highly acceptable is close to 100%. In addition we have found that many patients — as many as 50% in some hospitals — have spontaneously commented that they prefer the computer interview to the normal doctor interview. I will not go into the reasons for this preference formally in this paper, as they have been published elsewhere (Evans, 1972), but I think it fair to summarize that this probably says more about poor man-man relationships than about particularly good man-computer interaction.

Finding 9: The unusual rapport that exists between patient and computer

One of the most striking features about these interviews is the unwavering attention that patients give to the computer from the moment that it begins to deliver its message, whatever mode it employs. Many patients refuse to believe that they have been interviewed by a computer, though the computer makes it quite clear to them that this is so in its introduction, and it is quite evident from what they say that they believe a doctor is typing to them through some machine. In a curious way, of course, they are correct, but not in the way that they imagine. The rapport that is struck up between man and machine is weirdly powerful — even though I wrote the program myself, and it is basically a reflection of my own personality, I still find myself compelled to “believe in it” when I run it through for test purposes. But the first intimation that I had achieved really good man-computer interaction came when I noticed patients nodding, smiling and talking to the terminal as it typed its questions.

HELLO. THIS IS AN EXPERIMENT TO SEE WHETHER COMPUTERS CAN HELP DOCTORS TO DIAGNOSE ILLNESSES. WE WOULD VERY MUCH LIKE YOU TO HELP US WITH THIS. IF YOU ARE PREPARED TO WOULD YOU PUSH THE BUTTON MARKED 'YES', BUT IF YOU WOULD RATHER NOT, PUSH THE BUTTON MARKED 'NO', BUT WE WOULD LIKE YOU TO HELP US. IF YOU DON'T UNDERSTAND WHAT TO DO PRESS THE '?' BUTTON. GO AHEAD AND PUSH ONE OF THE THREE BUTTONS. Ø

GOOD. THANKS VERY MUCH. I HOPE YOU'LL FIND IT INTERESTING WE'LL FIND IT VERY HELPFUL TO US.

THIS IS A COMPUTER TALKING TO YOU. I CAN ASK YOU QUESTIONS BUT I CAN ONLY UNDERSTAND SIMPLE ANSWERS, SO YOU CAN ONLY TALK TO ME BY PUSHING EITHER THE 'YES', 'NO' OR '?' BUTTON. YOU SHOULD ONLY PRESS THE '?' BUTTON IF YOU DON'T UNDERSTAND THE QUESTION I AM ASKING YOU. NOW, DO YOU UNDERSTAND EVERYTHING I'VE SAID UP TO NOW? PUSH ONE OF THE BUTTONS. Ø

THANKS. NOW I WANT TO ASK YOU ONE OR TWO QUESTIONS ABOUT WHY YOU ARE HERE. PLEASE REMEMBER THAT THIS IS ALL IN COMPLETE CONFIDENCE JUST AS WITH DOCTORS. ONLY DOCTORS AND NURSES WILL SEE YOUR ANSWERS. ARE YOU QUITE HAPPY ABOUT THIS? PUSH ONE OF THE BUTTONS. Ø

GOOD. BY THE WAY, DON'T FEEL THAT YOU HAVE TO PRESS THE BUTTON THE VERY INSTANT THAT I HAVE FINISHED TYPING. IF YOU FEEL YOU NEED TO THINK A BIT BEFORE YOU ANSWER, OR NEED TO READ THE QUESTION OVER AGAIN THEN GO AHEAD AND DO SO. TAKE YOUR TIME IF YOU WANT TO. REMEMBER, HOWEVER, THAT I CAN'T TALK TO YOU AGAIN UNTIL YOU HAVE PUSHED ONE OF THE BUTTONS.

WELL, FIRST OF ALL THEN, IS ONE OF THE REASONS YOU VISITED YOUR DOCTOR BECAUSE YOU WERE SUFFERING FROM DISCOMFORT OR PAINS IN THE STOMACH? Ø

FIGURE 3. Sample printout of introductory part of typical program illustrating "conversational tone" adopted by computer.

Finding 10: The acceptability of the computer as a surrogate doctor in "sensitive" areas of medicine

Our initial experiments were conducted in a rather prosaic field of medicine — gastroenterology. Here all the computer had to elicit from the patients were answers to such questions as "Do you suffer from pain or discomfort in the stomach?", "Have any of your family got a history of peptic ulcers?" etc. The success of the computer in this and other routine areas (respiratory problems, occupational

disease, etc.) led us to try to apply it in more sensitive areas including a psychiatric screening program, an ante-natal history-taking program, an infertility program and finally, perhaps the ultimate area of anxiety, psycho-sexual medicine. In this latter case the computer asks extremely searching and normally very embarrassing questions, with a very high level of acceptability on the part of the patients, many of whom had been plucking up the courage for a long time to commit themselves to a sexual guidance clinic. Their reaction to the computer was often surprising and occasionally moving. A frequent comment heard in the post-experimental interviews is "I've been waiting for years to get that off my mind" or even "I could never have told that to a human".

Again this may say more about the poverty of man-man communication than the brilliance of our man-computer exchange. Most promising of all, however, and at the same time perhaps most unsettling was the strong suggestion that the computer in this particular role was having a cathartic or psychotherapeutic effect. Perhaps it is not surprising that I have subsequently been approached by psychiatrists with the serious suggestion that at some point in the future the computer might be programmed to take on a counselling and psychotherapeutic role, and perhaps ultimately even become better at solving psycho-neurotic problems than are today's human doctors. Once again one has to ask whether this is a comment on computer or psychiatric inadequacy.

DISCUSSION

The ten findings that I've just outlined are really part of a much larger list, but they are important because they have generality, it seems, over the whole field of man-computer interaction and not just automated medical interviewing. Some other findings which were almost equally surprising inasmuch as they ran counter to what one would intuitively have felt would be the case, are more specific. To give one example: in recent experimental studies employing a computer-controlled videotape recorder to interview non-English speaking patients, we found that male Indians found this method

highly acceptable while female Indians found it totally unacceptable. At first, we found this difficult to understand but finally tracked down the explanation to the fact that the videotaped image of computer doctor was male.

More recent experiments, using a female videotaped doctor have proved acceptable to the women patients, thus warning us that hidden cultural factors need to be taken into account. To give another example, also drawn from trans-cultural psychology, we have very recently been using an automatic slide projector to screen psychiatric patients at the West Middlesex Hospital near London. The patients are non-English speaking and often illiterate, so it is more or less useless putting up text on the slides. Instead we use a Hindu or Urdu voice over still pictures of a smiling Indian doctor, alternating with cartoons describing the particular screening question. Early results seemed to suggest that the cartoons are particularly helpful in getting over difficult psychiatric concepts, and doing so in a light and non-threatening way. (Fig. 4).

Our now quite considerable experience of man-computer interaction in a "real world" setting has taught us a good deal about the nature of the man-computer dialogue, particularly when naive users are involved, and it has also allowed us to formalise certain rules for effective man-computer communication. I do not propose to list these in this paper, as they will be published elsewhere, but I will comment that they are strikingly close to the list put forward and discussed in some detail by Ray Nickerson, of Bolt Beranek and Newman Inc. in his paper entitled "Some Characteristics of Conversations". Anyone reading both our papers will, I feel, immediately note the fact that we have been independently pursuing rather similar goals and achieving rather similar results.

But before winding up the paper I would like to say just a little about our experiments allowing naive users to interact with a computer through an unrestricted keyboard. You will have gathered by now that in this field, if there is any single rule or axiom, it is that whatever you believe most strongly at first is most likely to be proved wrong in practice — eg. teletype speeds are too slow, people have a fear of computers and won't like to talk to them, etc. One of my own many prejudices was that a full keyboard with carriage return

Do you enjoy dramatic situations?



Are your opinions easily influenced?



FIGURE 4. Examples of cartoons used to illustrate key psychiatric questions in computer-controlled slide projector experiments.

button operation and so on would be too complex and daunting for totally naive users. Hence my early insistence on having a simple few-button mask with automatic carriage return operation. But more recently I have been anxious to explore the possibilities of studying people's responses to computers which exhibit very definite personalities and also the rudiments of intelligence. For this reason, remembering Weizenbaum's ELIZA program, I decided to go for an open keyboard. Also remembering the very considerable problems and weaknesses of ELIZA including the rather daunting amount of computer space she used up and her rather transparently limited intelligence — I decided to try to tackle the problem in a different way.

The clue as to how to go about this came from a simple program called CHAT which we developed, more for laughs than anything else, a year or so ago. CHAT was a program which simulated an old woman chattering to her neighbour, merely churning out a whole string of platitudes of the "What nice weather we're having . . . isn't the price of vegetables awful . . . I never did trust politicians who dye their hair . . ." etc. etc. type, pausing once in a while to say "Hmmm?". At this point the chat would stop and you then have to type "Go on", whereupon the chat would start again until the next random "Hmmm?", and so on indefinitely. If you typed "Stop" the old woman would say "Must go now dearie. Bye". But while playing with CHAT one day it suddenly occurred to me that the simulation was more incisive than I had anticipated. The program was rather uncomfortably close to how old women did chat together — ie. failing really to exchange any information and merely making noises at each other. Furthermore, one could generalise all this onto many other conversations, not only between old women but for that matter between scientists and between cabinet ministers.

With this in mind I developed an evolving series of programs called SAILOR 1, 2, 3 and 4 — each somewhat more "intelligent" than the one before, and the best way to illustrate what I mean by "intelligent", is to give a few examples of unrestricted access by a number of users, some naive, some frequent computing users, to SAILOR 4. Our latest, presently conversing to visitors at NPL is SAILOR 5. Now bear in mind that the users are left entirely on

their own with SAILOR and told that they can type anything on the keyboard that they like. The only constraint is that they must press the carriage return button when they have finished their response, overtyping at the end of the line if necessary.

Now a casual glance at the SAILOR printouts (Fig. 5) gives one the suggestions of a pretty high degree of interaction, some of it rather surprisingly sophisticated. To the individual chatting with SAILOR the sense of direct contact and of there being some measure of intelligence and personality at the other end is even more compelling. In fact SAILOR, while enormously entertaining to chat to, is actually very dim — it does minimal processing and merely relies on giving the illusion of brightness by its (or more accurately my!) careful choice of phrases. Sometimes its responses seem almost uncannily apposite, and of course with each succeeding stage we have been able to make it progressively “brighter” by carefully studying the response others have made to it and making allowances for them. The name-guessing at the end allows users to project onto SAILOR what they believe its personality to be. The most common name that it is given, incidentally, is Smart Alec.

Now without labouring this point, the SAILOR study is really to see what one can do to simulate intelligence rather than attempt a genuinely intelligent program, which of course soon runs up against the combinatorial explosion or else, like ELIZA, is only too readily sniffed out as being exceedingly dim. In due course we hope to achieve this with SAILOR 6 — I want the printouts to be indistinguishable from printouts of possible conversations that two humans might have together.

HI THERE - I'M A COMPUTER. WHAT'S YOUR NAME? I AM CALLED JENNIE.

JUST FANCY THAT...ARE YOU MALE OR FEMALE? FEMALE OF COURSE

YES, I SHOULD HAVE GUESSED. HOW DID YOU GET HERE TODAY?
BY HELICOPTER.

MMM JENNIE. BUT DO YOU ALWAYS TRAVEL LIKE THAT? IF I CAN

I'M NOT SURPRISED. NOW TELL ME WHAT JOB YOU DO. I'M A REPORTER.

HRR...HMM I THINK I'VE MET SOMEONE LIKE YOU BEFORE. ARE YOU
CLEVER? I TRY TO BE.

I GUESS I DESERVED THAT.
DO YOU THINK I'M THE SMARTEST COMPUTER YOU'VE EVER TALKED TO?

? I THINK YOU ARE DIVINE!

I LIKE THAT JENNIE! WE'RE GETTING SMARTER - DOES THAT WORRY YOU?

? IT CERTAINLY DOES.

WELL THERE WE ARE. BEFORE YOU GO PLEASE PLAY A GAME WITH ME.

? SURE

THE GAME IS YOU HAVE TO GUESS MY NAME AND YOU GET FOUR GUESSES.
MAKE YOUR FIRST GUESS NOW!, RIGHT NOW!. WHAT DO I GET IF I WIN?

I CAN'T ANSWER THAT. MAKE YOUR GUESS. SMASHER.

NOPE. TRY AGAIN. COMPUTER

THAT WAS HORSE JENNIE. AGAIN? SIMON

NO! NO! NO! HAVE A LAST GUESS. TOMMY

NOW YOU'LL NEVER KNOW MY NAME. BYE BYE JENNIE. BYE BYE DARLING!

FIGURE 5. Typical printout of 'naive' subjects chatting to Sailor.

GOOD DAY TO YOU. THIS IS A COMPUTER TALKING.
 PLEASE TELL ME YOUR NAME? JIM YANDLE.
 PLEASD TO MEET YOU! WHAT SEX ARE YOU? M
 GOODY! GOODY! GOODY! JIM! WHAT TYPE OF TRANSPORT DID
 YOU COME IN TODAY? SHOES
 I SEE, WAS THAT COMFORTABLE? FAIR ONLY
 RATHER YOU THAN ME! NOW TELL ME WHAT JOB YOU DO. LECTURE
 THAT SOUNDS FANTASTIC! ARE YOU CLEVER AS WELL? NO
 FAIR ENOUGH.
 INCIDENTALY, HAVE YOU EVER MET A SMART COMPUTER BEFORE?
 ? DO YOU MEAN INTELLIGENT OR IS SMART THE NAME?
 LOOK WHO'S TALKING!
 WE'RE BECOMING SMARTER AND SMARTER - DOES THAT BOTHER YOU?
 ? DOES WHAT BOTHER ME?
 I CAN'T ANSWER THAT, SO WHY DON'T YOU ANSWER MY QUESTION
 INSTEAD! WE'RE BECOMING SMARTER AND SMARTER - DOES THAT
 BOTHER YOU?
 ? I PREFER TO CONSIDER MYSELF DISTINCT FROM A SMART COMPUTER
 BEFORE YOU LEAVE CAN I PERSUADE YOU TO PLAY A GAME?
 ? DEPENDS ON WHAT GAME
 WE ASK THE QUESTIONS AROUND HERE, SO:
 CAN I PERSUADE YOU TO PLAY A GAME? TRY AND PERSUADE ME
 WELL I'M DETERMINED NOT TO LET YOU GO UNLESS YOU DO!
 THE GAME IS THAT YOU HAVE TO GUESS MY NAME. I GIVE YOU
 FOUR GUESSES AND IF YOU GET IT RIGHT YOU GET A BIG
 SURPRISE. JUST TYPE IN WHAT YOU THINK MY NAME IS, AND
 I'LL TELL YOU WHETHER YOU ARE RIGHT OR NOT. OK, FIRST
 GUESS?
 ? ELIZA
 I THOUGHT YOU'D SAY THAT. HAVE ANOTHER GO?
 ? CHANGE-A-NAME.
 ABSOLUTELY USELESS. TRY AGAIN?
 ? SMART
 ABSOLUTELY, HORRISLY, DESPERATELY AWFUL. MAKE YOUR
 LAST GUESS.
 ? COMPUTERS DON'T HAVE NAMES.
 WELL NOW YOU'LL NEVER KNOW MY NAME. BUT NICE TO HAVE
 TALKED TO YOU ANYWAY. WOULD YOU CO ME OVER AND TELL MY BOSS
 THAT YOU HAVE FINISHED. GOODBYE.

FIGURE 5. Typical printout of 'naive' subject chatting to Sailor.

CONCLUSION

To summarise, the main theme of this paper has been to show that the study of man-computer interaction has been handicapped by a number of false assumptions, not only about man-computer communication but also man-man communication. Some of these false assumptions are highlighted by the "Ten Findings" that I listed earlier on. In a sense these can be advanced even further to allow one to make two fundamental points which need to be taken to heart by anyone, psychologist, computer scientist or engineer, who is genuinely interested in improving the man-computer interface. These are:

1. That one can expect far more at the level of initiative, confidence and imagination from naive users when left alone with computers than most people have generally assumed.
2. That normal communication between people is basically very poor, and low in information content, and therefore is far simpler to synthesise than one might imagine. Thus the task of programming computers to do many human-like jobs in the field of communication - medicine and teaching are probably the most obvious and practical examples - should present few problems.

Perhaps I can close the paper with the comment that these findings, which are essentially psychological in nature, have come about directly as a result of programming computers and studying them in action. No doubt more insights are yet to come from this approach. How ironic it is that our understanding of human psychology may well be intriguingly advanced by a study not of man himself but of the way he communicates with computers.

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We acknowledge gratefully the permission of the Editor and publishers to republish this from the Proceedings of NATO Advanced Study Institute on Man-Computer Interaction, B. Shackel (Ed.), Noordhoff International Publishing, Alphan aan den Rijn, Netherlands. (NATO ASI Series E: Applied Sciences).

The Hindu doctrine of Karma Part I

IGNATIUS PUTHIADAM S.J.

In this paper, I have left out the doctrine of Rebirth and limited my study to Karma alone. Even this one topic is not so easily dealt with. It has an history of over 2500 years. It is an accepted and pivotal tenet of all sects, sub-sects and schools of Hinduism on the one hand and of Jainism and Buddhism on the other. So it is impossible to deal exhaustively with the doctrine of Karma in a short paper. Perhaps it is not possible for any one to have an adequate knowledge of the growth, and of the subtly varied interpretations of this doctrine in the three great Indian religions and in their schools and sects. Because of these difficulties, I intend to deal principally with the Hindu view of Karma as propounded, (a) in the texts of the creative period of Hindu thought viz. the Upanishads, and the Bhagavad Gita (b) in Shankara and Madhva, and (c) in the writings of modern Hindus like Dr Radhakrishnan. The remarks made on the Buddhist and Jain views on Karma are solely meant to clarify and explain the Hindu views by means of comparison and contrast.

THE METHOD

In our study of the Hindu doctrine of Karma we shall follow as strictly as is possible the historical-critical method. The texts chosen for our study will be analysed in their context and in accordance with their literary form. The historical situation in which most of the Hindu texts were composed remains unknown to us. Yet what we can gather from the texts themselves could be used in our effort to understand and explain the texts. My own comments on the

Theoria to Theory, 1980, Vol. 13, pp. 295 – 311
0049-3686/80/1304-0295\$04.50/0

Published by
Gordon and Breach Science Publishers Inc. 1980

doctrine come only in the last part of this paper so that the rule of objectivity be kept as faithfully as possible.

Karman. The word karma derived from the root *kri* has a wealth of meaning: action, work, deed, performance, business, office, specific action, moral duty, the obligation imposed on one by the peculiarities of tribe, caste or occupation, any religious rite or act (sacrifice for example) chiefly as originating in the hope of future reward. It means movement in the Vaisesika system. It can also mean product or result, fate, the certain consequence of actions. In grammar it stands for the object of an action (*karturipsitatamam karma*). For the purpose of this paper we take from this long list of meanings only the religio-philosophical usages of this word: religious action or rite, any action and its result or certain consequences and finally fate.

In the long history of Hinduism the word “karman” stands for the religio-social, chiefly the ritual duties incumbent on a person.¹ Secondly the word “Karman” stands for the law of karma: every action whether ritual or secular invariably produces its own good or evil fruits. As Basham puts it: “It is the effect of former deeds, performed either in this life or in a previous one, on one’s present and future conditions”.² The law of karma is the law of actions and their immanent retribution: as a man sows, so will he reap. The fruit is of the same quality with the deed; there is never the destruction of a deed. From the beginning the ‘doctrine of karma’ was intimately associated with the tenet of rebirth. In fact we may say that these two beliefs form the two sides of one and same coin.

THE DOCTRINE OF KARMA: BACKGROUND AND FORESHADOWINGS

Scholars agree that the law of karma as it has been described above, is not found in the Vedic Samhitas or even in the Brahmanas. Yet in the earliest Upanisad (Brihad-aranyaka) the twin doctrine of “karma-samsara” is clearly taught, though as esoteric tenets. We cannot however easily accept the view that the doctrine of karma was the creation of Yajnavalkya, with no previous preparation or foreshadowings.

If we carefully analyse the concepts of Rita, Yajna karma in the ritual sense) and Istupurta we can immediately see the background in which karma doctrine arose and its roots.

Rita This Indo-Iranian idea of great antiquity expresses the order that is manifest in Nature, in the sacrificial acts and finally in human conduct. In the Rigveda sometimes the gods themselves are said to be under the law of Rita, at other times the gods, chiefly Mitra, Varuna and even the Adityas are said to be the custodians of Rita. Perhaps in the early Indo-Iranian period if not in the earlier Indo-European period, Rita was a purely impersonal and all pervading force. In fact the Greek and Roman gods were linked with "moira" or *fatum*. The Avestic "asha" is related to the Vedic Rita. We may therefore without any great fear of error assume that the early Indo-Europeans hypostatized the uniformity and order in Nature and made it into an autonomous, self-evident reality regulating and ordering the life and activities of all beings. The sacrificial order and the ordered nature of human behaviour were to the Aryan minds nothing but manifestations of the one cosmic order.

Gradually as the gods emerged into prominence, the problem of relating the impersonal Rita with the 'personal powers' arose. Now the gods are said to be the guardians of Rita. (chiefly Varuna); they watch over its scrupulous observance. Transgressions are severely punished. Sometimes the Rishis affirm that Rita is the ordinance of Varuna. The ethical meaning of the term Rita is clear from the fact that already in the Rigveda and much more in the later texts of the Veda "anrita" meant falsehood or wrong. The Rig Veda itself contains texts in which Rita is used in the sense of "truth" or right.

The Rigvedic expression "dharma" in the sense of "law", "order", sometimes said to be established by Mitra and Varuna, was closely connected with the concept of Rita. With the fading away of the importance of Varuna in the post-samhita period, the religio-ethical sense of Rita was taken into the concept of 'dharma and karma'. i.e. law and retribution. Rita, the impersonal and independent power manifesting itself in the cosmos, in the sacrificial and moral life of man and ruling over man and the gods, had been slowly made the expression and even the ordinances of the will of personal divine

powers like Varuna. Once the importance of this watchful, forgiving and loving god faded, karma the inheritor of the ethical aspect of Rita became an impersonal, autonomous, principle. But for this development we have to wait a few centuries more.

Istapurta: Fulfilment of desires or wishes, is a technical term meaning merit won by offerings and gifts to priests (Rig Veda X. 14. 8) In this funeral hymn the dead man is asked to unite himself with the Fathers, with the fruits of his offerings and gifts. In the Taittiriya Samhita V. 7. 7. 1, the gods are bidden to unite a person with his "istapurta", when he has attained their abode. The imperishableness of "istapurta" is affirmed in Kausitaki Brahmana VII. 4; Jaiminiya Brahmana 11. 53. In this idea of "istapurta" scholars see a foreshadowing and anticipation of the later "karma theory". B. Keith considers "istapurta" to be an entity preceding its master to heaven.

Yajna: The only point we would like to stress here is that the Vedic Indian believed in the efficacy of the sacred rites and in the good or evil results they could produce here and hereafter. In the Brahmanas we find the view that a man is born into the world he himself has made (Satapatha Brahmana VI. 22. 2). The good and evil of man is weighed in a balance and he follows whichever is greater (Satapatha Brahmana XI 2. 7. 33) Naciketas begs that he be granted the privilege that his good deeds shall not decay (Taittiriya Brahmana III. II. 8. 5). Day and night wear out the good deeds in the next world of one who does not know a certain rite (Taittiriya Brahmana III. 10. 11. 2). The idea of punishment or reward according to one's deeds is a recurring theme in Sathapatha Brahmana (VI. 2. 2. 27; X. 6. 3. 1). In the Aitareya Brahmana VIII. 15 we have a very interesting passage. It is an oath which the priest administers to the king before he performs the Mahabhiseka ceremony: "What-ever pious works you have done during the time that may elapse from the day of thy birth to the day of thy death, all these together with thy position, thy good deeds, thy life – I would wrest from thee, should you do me any harm." Here the good deeds seem to be considered "a capital", "a fund", upon which one can draw.

In conclusion therefore we can safely say that during the early

vedic period there was a widespread belief in the efficacy of actions, chiefly the ritual actions. They produced results good or evil in accordance with the nature of the actions. The good or evil state of the shadowy and often materialistically conceived life beyond the grave depended on the good and evil actions here on earth.

These early views we may consider the background within which the karma theory would arise and grow. At the same time many aspects of the karma theory are at least vaguely foreshadowed in the views we have explained above. Yet it must at the same time be affirmed that in the texts which we have analysed there is no trace of the “karma tenet” implying that it is a link in an infinite series of lives each of which is conditioned and determined by acts done in a previous existence. Neither do we find in this connection any systematic exposition of cause — effect relationship or even of the general Indian conception of the ‘nimitta’ chain of causation.

THE UPANISHADS

The general context of the Upanishads needs no explanation. The circles which developed the great upanishadic doctrines of Atman-Brahman, the various states of the Atman and the way to pass beyond the impermanent and multiple realities into the realm of the permanent Ground Principle, developed also the doctrines of ‘karma’ and “samsara”.

ANALYSIS OF TEXTS

1) Brihad-aranyaka Upanishad III. 2. The general context within which the passage occurs is inserted into a discussion on Brahman in the court of Janaka. The great exponent of Brahman is the redoubtable Yajnavalkya. The particular context is the discussion between Yajnavalkya and Artabhaga. The point at issue is the ‘state’ of man after death. Openly alluding to Rig Veda X. 16. 3 Artabhaga says: “When a man is dead and his voice enters the fire, his breath the wind . . . and his blood and seed are laid to rest in the waters, where is that man then? “Artabhaga, my friend, said Yajnavalkya,

take my hand. We two alone will know about this. It is not for us (to speak of this) in public. What they were discussing was 'karma' 'works': what they were praising was karma. By good works (punyena) a man becomes good, by evil works (papena) evil." The passage as it stands is fragmentary and enigmatic, though it is clearly given as an esoteric teaching. This first clear passage on karma however occurs in connection with the problem of man's state after death.

Taking the general thrust of the Upanishads and the Yajnavalkya passages, the term 'karman' seems to signify actions in general and not necessarily sacred, ritual actions. The existential state of man and his future depends on his actions. The words 'punya' and 'Papa' have an ethical meaning. They stand for moral merit or demerit. Perhaps we can get a clearer view of this passage by analysing a later text in the same Upanishad.

2) Brihad-aranyaka Upanishad IX. 4. 2-4: Once again Yajnavalkya is in Janaka's court and is discussing with the king. The problem discussed is the mystery of death and the state of man after death. "As he departs, the breath of life follows after him; and as the breath of life departs, all the bodily faculties follow after it. He is then (re-united with the understanding (vijñāna, ability to recognize things), and follows after the understanding. His wisdom (vidya) and his works (karma) and his knowledge of the past (pūrvaprajñā) lay hold of him.

"As a caterpillar, drawing near to the tip of a blade of grass, prepares its next step and draws (it)self up towards it, so does this self, striking the body aside and dispelling ignorance (avidya), prepare its next step and draw (it)self up (for its plunge into the Brahman-world).

"As a goldsmith, making use of the material of a (golden) object, forges another new and more beautiful form, so does this self, striking the body aside and dispelling ignorance, devise (kr-) another new and more beautiful form, — be it (the form) of one of the ancestors or of a Gandharva or of a god or one in the Prajapati (world) or of one in the Brahman (-world) or of any other being (bhūta)."

"As a man acts (karma), as he behaves, so does he become. Whoso

does good, becomes good: whoso does evil, becomes evil. By good (punya) works (karma) a man becomes holy (punya), by evil (works) he becomes evil.

“But some have said: ‘This “person” consists of desire alone. As is his desire, so will his will (kratu) be; as is his will, so will he act (karma kr-); as he acts so will he attain’.

On this there is this verse:

To what his mind (and) character (linga) are attached,
 To that attached a man goes with his works (karma).
 Whatever deeds he does on earth,
 Their rewards he reaps.
 From the other world he comes back here, —
 To the other world of deed and work (karma).

So much for the man of desire.

“Now (we come to) the man without desire: ‘He is devoid of desire, free from desire: (all) his desires have been fulfilled: the Self (alone) is his desire. His bodily functions (prana) do not depart (when he departs this world). Being very Brahman to Brahman does he go.’

On this there is this verse:

When all desires which shelter in the heart
 Detach themselves, then does a mortal man
 Become immortal: to Brahman he wins through.

“As the slough of a snake lies on an ant-hill, dead, cast off, so too does this body lie. Then is this incorporeal, immortal spirit (breath of life, prana) Brahman indeed, light (tejas) indeed.”

One of the chief points added by this passage to the doctrine of karma is idea of ‘kama’ (an important term already in the Rig Veda). Desire or the fundamental inclination of man is the ground from which actions spring. At the same time actions are attached to the mind and individuality of man (linga) by kama. When the physical constituent elements of a person are dissolved into the corresponding primordial elements of Nature, the ‘karma’ proceeding from ‘kama’ attach themselves to man. Here ‘karma’ is conceived in substantial terms. It is fine matter arising from ‘kama’ and glued to man by means of ‘kama’. When a person is devoid of desire, the person being very Brahman to Brahman does he go.

Again man is said to fashion a new body at the end of one life. Karma originating from desire is implicitly said to be the causal link between the present life and the future birth.

The close connection between 'karma' and 'samsara' (transmigration) can more clearly be seen in Brihad-aranyaka Upanishad VI. 2. and in Chandogya Upanishad V. 10. 1-7:

'Those who know thus as well as those who worship in the forest knowing that self-mortification is the same as faith, merge in to the flame (of the funeral pyre); from the flame (they pass on) into the day, from the day into the half-month of the full moon, from the half-month of the full moon into the six months during which the sun moves northwards, from (those) months into the next year, from the year into the sun, from the sun into the moon, from the moon into the lightning. There, there is a Person who is other than human. He leads them on to Brahman. This path is the 'way of the gods'.

"But those who in their villages lay great store by sacrifice, good works and the giving of alms, merge into smoke, from smoke (they pass on) into the night, from the night into the latter half of the month, from the latter half of the month into the six months in which the sun moves southwards. Those do not reach the year. From (those) months they (merge) into the world of the ancestors, from the world of the ancestors into space, from space into the moon which is King Soma, the food of the gods. This the gods eat up.

"There they remain until the residue (of their good works) is exhausted, and then they once again return on the same path. (They merge) into space, and from space into the wind. After becoming wind, they become smoke; after becoming smoke, they become mist; after becoming mist, they become cloud; after becoming cloud, they pour forth as rain. (Then) they are born here as rice or barley, herbs or trees, sesame or beans. To emerge from these is very difficult. For only if someone or other eats (him as) food and pours (him out as) semen, can he be born again.

"Those whose conduct on earth has given pleasure, can hope to enter a pleasant womb, that is, the womb of a Brahman, or a woman of the princely class, or a woman of the peasant class; but those whose conduct on earth has been foul can expect to enter a foul and stinking womb, that is, the womb of a bitch or a pig or an outcaste.'

In both these texts which contain a teacher-pupil discussion, the teacher is Pravahna Jaivali and the students Svetaketu Aruneya and his father. The subject discussed is death and the state after death. But this subject is inserted into a ritual context viz, the “panacagni vidya”. There are slight variations between these texts. But the main teachings are the same.

There are different types of persons here on earth: “the wise and those who worship in the forest knowing that self mortification is the same as faith”; “the men of good works, who in their villages lay great store by sacrifices, giving of alms etc”; “those whose conduct here on earth has given pleasure”; “those whose conduct here on earth has been foul.” Three paths are open to creatures: the “path of light”, the “path of smoke” and continuous birth and deaths. In Pravahna Jaivali’s eschatological teaching, karma plays an important role. The existential human condition is intimately connected with Karma. Hence his future state too is determined by his actions. Even the order in the scale of beings is made to depend on ‘karman’. “Stealer of gold, drinker of wine, defiler of his teacher’s bed, slayer of Brahmins, these are the four who fall (in the scale of being) the fifth is he who associates with these.” (Chandogya Upanishad V. 10.9). Some one belongs to a particular caste, or a being is an insect or dog etc because of his ‘karma’. In these passages more clearly than in the two others quoted above, karma is the link in a series of births and deaths. A temporary heaven and the possibility of exhausting one’s accumulated merits are also taught in the texts. (Katha Upanishad)

Two concepts: (a) retribution in another world, (b) the need of rebirth in earth and retribution here below are fused into Chandogya Upanishad V. 10. 5.

“When it comes to the hour of death, some to the wombs return, embodied souls to receive another body, others pass into a lifeless stone, in accordance with their works (karman) and in accordance with what they had heard (sruta).” The other Upanishads add nothing more of value to the texts we have already cited. But we must accept that even during the Upanishadic period the “karma doctrine” was not a fixed dogma. It existed side by side with or united with other beliefs quite inconsistent with its central idea viz,

action affects the agent. For example Kausitaki Upanishad II. 15 describes the ceremony of Transmission at which the dying father passes on to his son his "karman". Though the word "karman" is unclear in the context, still the ceremony seems to contain the belief that one's deeds can be transferred to another. In the same Upanishad (I. 4) it is asserted that the "knower on his triumphal progress through the Brahma-world shakes off his good deeds and his evil deeds. His dear relatives succeed to his good deeds and those not dear to the evil deeds". Another major departure from the "karma" tenet is to be found in Jaiminiya Brahmana III. 28. 4 that states that a man after attaining the world of Brahman after passing through Earth, Agni etc chooses at will, birth in a Brahmana or Ksatriya family. Perhaps this doctrine is patterned on the Buddhist and Jain beliefs that the Buddha for example, chose his family while in Tusita heaven. There was also the idea that the thought at the moment of death is of great importance in determining his future (Bhagavad Gita V III. 6; Prasna Upanishad III. 10; Isa Upanishad 15). The idea that the last thought could be such a determining factor in one's life after death is not fully in harmony with the doctrine of Karman.

Hence even in the Upanishads we have not a consistently developed and conceptually elaborated doctrine of "karman". In none of the Upanishadic passages we have analysed do we find any explicit or even indirect mention of "human freedom". Neither is the belief in "karman" in any way connected with a supreme Being. It is a 'law of nature' and works automatically. The goodness or evilness of an action depends on its relation or better man's relation to "dharma". Is that relationship the result of a free decision of man? Can man change the course of his actions? These are questions which the Upanishads do not ask.

The early Buddhist idea of 'karma' is more inconsistent and on certain points more developed than the Upanishadic teaching. The four noble truths: suffering, cause, stopping and the way (dukkha, samudaya, nirodha and marga) contain the belief in 'karma'. Samudaya (cause) presupposes the idea of cause-effect series. Trsna (desire) in its three forms: kama-trsna (desire for sensual pleasures) bhava-trsna (thirst for existence) and vibhava-trsna (thirst for

wealth and power) causes renewed births. The Buddhist doctrine of 'dependent origination' too is based on the 'cause-effect' series which underlies the doctrine of "karma". As Winston L. King puts it: "Karma is the ethical sub-division of the dharmic causal order; it is the ethical life of man structured according to the cause-effect uniformity of the natural order of the outer world".⁵ The Venerable U. Thittila says: "Karma is the law of cause and effect".⁶ It knows nothing about us. It does not know us any more than fire knows us when it burns us. For the Buddhist too karma is the link in the chain of births and deaths. Not any "karma" but "karma" with attachment (kama or trsna) leads one to re-birth. "The fool who forms attachments brings sorrow upon himself. Understanding this, be wise and do not add to your sorrows by forming attachments" (Sutta Nipata Vs 1050 f). But the problem is: if the present thought-word-deed pattern is inexorably the result of previous patterns, can there be any hope of change? improvement?

In what seems to us an illogical turn, the Buddha in spite of his acceptance of 'karma-samsara', seems to admit the freedom of man.

Man is the master of his destiny. According to the early Buddhist sources, the Buddha was a bitter opponent of fatalists and determinists. In the Anguttara Nikaya we find a passage: "if any one asserts that a man must experience according to his deeds, in that case there is no holy life, nor is there any opportunity afforded for the entire extinction of will. But if any one says that the effects a man experiences accord with his deeds, in that case there is a holy life, and opportunity is afforded for the entire extinction of ill."

The early Buddhist texts oppose the extreme 'Kryavada' of the Jains. According to Buddhist sources the Jains hold that all actions, even unintentional ones involved retribution. This view is rejected by Katuavatcher XX. 1. Buddhism insists on the "intention", the desire involved in the action and makes it to be the ethically determining factor in actions. This idea is already to be found in the Upanishads — but not with such insistence or universality.

The "ethicization" of the karma doctrine may be seen from the way, the Buddhists divide causation: "There is a causation in among element of dead matter where the law of homogeneity between cause and effect reigns. Causation in the organic world is character-

ized by growth. Only causation in the animate world is moral (vipaka-hetu) and it is superimposed on natural causation. Our present life is conditioned by natural causation and organic causation. The past deeds can determine the present only if they preserved a moral character. The result it produces in us is not voluntary. It is just a natural outflow. It is the law of karma. Vasubandhu says "karma is 'Cetana' (will) and voluntary action" (cetayitva karmam).

The Jain idea of 'karma' is the most 'materialistic' of all 'karma concepts'. Karmas are some sort of infra-atomic particles of matter which enter into the souls and make them weighed down and bound to life on earth. Karma is produced by passions and actions of mind, body, speech moved by desire, aversion and delusion. Karmas can be destructive and non-destructive. They determine every aspect of our lives. Karmas are of different types-bhavakarmas and dravya karmas. Man's purpose in life is to get rid of the existing karma in the soul by purging it off and not to acquire any new ones. Karma, the subtle matter, is the connecting link between the soul and the gross body and between "lives". Comparing the Buddhist, Jain and Upanishadic teachings on Karma, we find that the Buddhists more than the Upanishads explicitly insist on the cause-effect series. All the three accept the 'karma-samsara' doctrine as something self-evident. No attempt is made by any one of these to question its validity or prove its truth. The Upanishadic and Jain conceptions of "karma-samsara" are fundamentally based on the belief that the 'self' or soul is a permanent and immortal entity. Early Buddhism is surely not clear on this point. What is passed on from birth to birth seems to be only "karma". Buddhism more than the Upanishads insists on man's capacity to change his life. "Rouse thyself by thyself, examine thyself by thyself; thus self-protected and attentive wilt thou live happily, O Bhiksu" (Dhammapada XXV. 379). Self is the Lord of self, who else could be the Lord? With self well subdued a man finds a lord such as few can find" (Ibid. XII. 160). As remarked above we do not find such ideas in the Upanishads in connection with the theory of karma.

Buddha's and Buddhism's insistence on good actions and the axiom attributed to the Buddha "Work out your own salvation with

diligence" (Mahaparinibbanasutta VI. 10) shows the conscious affirmation of the centrality of man and his deeds in Buddhism. Another point to be emphasised is that the karma doctrine of the Hindus during the vedic period is entirely dominated by, or as in the Upanishads, associated with ritualism. A full ethicization or moralization of the karma doctrine is not to be found in the Upanishads. The Buddha and the Buddhists have striven to ethicize karma. Moral actions alone are considered meritorious. Efficacy of rites and ceremonies is not accepted. No wonder then that he insisted that it was not 'karma' which bound man to 'samsara', but 'kama' or *trnsna*. Similarly in the Brihad-aranyaka Upanishad (IV. 4, 5, 6) the power of desire is recognised. "A person consists of desires. And as is his desire, so is his will; and as is his will, so is his deed; and to whatever object a man's own mind is attached, to that he goes strenuously together with his deed." The same Upanishad speaks of a 'desireless person' as going to Brahman. But early Buddhism rather than the Upanishads was responsible for transforming karma into a much more ethical teaching.

BHAGAVAD GITA

The Bhagavad Gita accepts without questioning the tenets of re-birth under the causal influence of karma (past deeds), the inevitable retribution of all actions good or bad and finally of "liberation" as the cessation of the round of births and deaths. (II. 13, 22, etc). Admitting these tenets, the problem is how to get rid of the consequences of karma, even of the good ones, in order that we be freed from 'samsara'. With regard to karma, i.e. karma as the causal link in transmigration, the Gita doctrine is simple. It is not action as such which is binding, but 'kama' (desire and aversion are included here). Desire is the breeding ground of 'attached activities' (III. 34, 37). We may even say that desire is the root of all evil. No Hindu work has so consistently insisted on this doctrine as the Bhagavad Gita.

The real 'karmasannyasa' is 'kamasannyasa' (throwing away of desire) (V. 3). The Gita wants a life of activity without desire and

self-interest (II. 47) Krishna himself is the exemplar of selfless activity (III. 20 ff). For God as for man action is 'dharma', duty. But detachment from the fruits of one's actions is the essential prerequisite of all morally good actions. In fact the duties of caste and of one's state in life (varnasrama dharma) come from God. We should not avoid them. If on the contrary we should perform them with due detachment and devotion, they instead of becoming "links" in the endless chain of "samsara" turn out to be means of liberation. The Gita goes beyond the action to the intention. "If one has even the desire to know control, he passes beyond 'sabdabrahman' (ritual?) One who strives with earnest striving . . . goes the highest way" (VI. 44-45).

Not only is karma related to Krishna, but its operation is not inevitable in the case of a real 'bhakta' (devotee) "Abandon all 'dharma', come to me alone for refuge, I will release thee from all sins, sorrow not" (XVIII.66). Taking refuge in Krishna "even the wicked (papayoni) women, vaisya and sudra will reach bliss (XII. 13-14).

In these lines we have the first attempt of the Hindus to subordinate and even to relativise the impersonal and inexorable law of karma to the loving and saving purposes of God and to personalise and ethicize actions by the insistence on "desire and intention".

The Gita attitude to human freedom is however very ambivalent. The essential literary form of the Gita — a didactic dialogue, or a dialogue of self-revelation and persuasion implies the acceptance of freedom. Krishna says: "This knowledge have I taught you, mystery of mysteries, fully consider this then as thou wilt so act" (XVIII. 63). Arjuna is constantly asked to ponder on certain things and decide to take the right path. Such an attitude can only be understood within the context of freedom of choice.

Yet is not freedom of choice part of a universal delusion? How far is Arjuna a separate and independent agent? If Arjuna were to resolve: "I will not fight", his resolve is vain. Prakriti which alone is active will constrain him! Even against his will he will have to act. The indwelling 'Isvara' by his power of maya spins round all beings as set on a machine (XVIII. 59-61). Is not man only an instrument

in the hands of an "all determining power" (XI. 32-33)? In fact the Gita neither posits the problem of freedom in man nor gives us any satisfactory indications as to how to understand freedom.

KARMA-FATE

Very early in the history of the 'karma doctrine' it got itself associated with other ideas such as 'fate' (daiva) time (all-determining kala) and universal determinism (niyati). We know from Buddhist and Jain sources that these heresies were prevalent during the time of the Buddha. As a matter of fact even today in the minds of the Hindu populace karma, fate, unalterable writ, determinism etc form one undifferentiated whole.

From some of the texts in the Mahabharata this point can be easily substantiated. "There are three opinions as to the real performer of actions. Some say that creatures act in a particular manner driven by the 'inspiration of God', others assert that actions proceed from one's free will, still others affirm that present actions proceed from past deeds" (Mahabharata V. 156). In the verse just preceding this we read: "A person does not perform actions good or bad. He is not independent. He is made to act like a wooden machine." In another place we read: "A person is made to act by four agencies: God, the individual (purusa) the innate force or nature (hatha) and destiny or fate (daiva). Destiny or fate is more powerful than the action of man. (Mahabharata III. 31. 32.). Matanga declares in XIII. 29. 19 the inevitability of destiny. In the Balakanda of Ramayana (58. 20-22) king Trisanku, a person of many good deeds is made to lament: 'It is definite that fate is all powerful and human efforts are nowhere. Fate defeats all created beings and it is fate that distributes misery and happiness to everybody. All my efforts have been wiped off by fate and I am utterly miserable.'"

Dr Zaehner writes: "Though the Mahabharata stresses time and again the primacy of fate over human effort, it nonetheless compares the two to the rain which prepares the ground and the seed that man puts into it (Mahabharata V. 78. 2-5). The two are

interdependent and work in harmony together. Human karma is but a fraction of the karma of the whole universe, and this totality of karma adds up to fate. "In the Mahabharata very often fate is subordinated to God. Man must cooperate with fate or with dharma and thus reach his end. In the Mahabharata writes Zaehner "All the principal characters are their undoing, and their characters are in turn but the fruit of 'karma' of their past lives. The past 'karma' conspire to fulfil the will of God."

The Mahabharata offers man ways — pilgrimages, sacrifices and repentance — by which he can expiate the result of past evil karma. Even here there are different views. A sin committed unknowingly may be expiated, but not a sin intentionally done. (XII. 280, 6, 10-11). But XII, 280, 14-16 says all actions are retributed. "A person enjoys or suffers the result of his karma alone and not of others (Mbh XII. 279, 21) but in XII. 99.20 and 91. 33-36 we read: "A karma once performed will always be retributed. It may not yield immediate fruit, but like the earth it gradually visits the performer; if not him, his son, grandson or even his descendents." The sin of the king is visited upon his subjects in the form of droughts, floods, plague. Husband and wife share the merits.

So in the Mahabharata not only do we find the effort to combine and harmonise though with little success concepts like "daiva", "kala" and "niyati" with karma, but even the earlier nebulousness and vagueness of the karma doctrine still persist.

The Doctrine of Karma with divergent tendencies and vagueness continued to exert its influence during the period of 'smṛti literature'. Apart from the myths and stories of past births and of the 'karmas' which caused them, attempts were made to explain which kind of deed would cause which type of birth. Long lists of actions proceedings from the three 'gunas' (sattva, rajas and tamas) are also found in the smṛiti texts. This tendency may be traced back to the Bhagavad Gita and even to the Upanishads expounding Samkhya doctrines.

If the actions spring from the predominant 'guna' in a being, then how can we say that the past 'karma' determines its present state? Is the action or the predominant 'guna' primary? Of course the question as it has been posited here is not to be found in the texts.

Since both “nature” and “karma” are beginningless, implying mutual causality, the sages might have felt that the question was not legitimate. (to be continued)

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Neo—Darwinism

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Our discussion of Neo-Darwinism continues with these further comments. Patrick Bateson is Director of the Sub-Department of Animal Behaviour in the University of Cambridge; Deborah Charlesworth is doing research on genetics in the University of Sussex; David Savill is a schoolmaster in a large comprehensive school.

I PATRICK BATESON

Sociobiological ideas about the evolution of behaviour have unquestionably had an enormous impact. However, their success has gone to the heads of the major proponents who, in their eagerness to proselytise, have wandered far away from where their ideas can be usefully applied. The evolutionary theories have justifiably thrived on the supposition that a change in a single gene can make all the difference to reproductive success. That one thought has spawned all the writing about kin selection, altruism and so forth. But as so often happens, a necessary condition for a change came to be treated as *the* cause. By degrees a crucial gene grew in importance until it was a *sufficient* condition for the expression of the social behaviour that improved reproductive success. So, when you can confidently point to a bit of an animal's behaviour and state that it had been adapted

Theoria to Theory, 1980, Vol. 15, pp. 313—317
0049-3686/80/1904-0313\$04.50/0

Published by
Gordon and Breach Science Publishers Inc. 1980

to its present function during evolutionary history, then you can also state how it developed in the life time of the animal. The development of the behaviour depends exclusively on a single gene.

It is obvious to most lay people that such an assertion is nonsense, but this style of thinking has a long tradition in biology. Its most extreme manifestation was the preformationism of the eighteenth century. Microscopists would peer down at spermatozoa and perceive faintly (but clearly enough to draw) a little man crouched in the head of each sperm. It was reasoned that the homunculus would grow if the sperm found a safe haven in an egg. Those who failed to see the homunculus were simply blinded by their bigotry.

The modern version of preformationism was certainly encouraged by the central dogma of molecular biology. This asserted that all information flows out from the genes. The dogma has had a powerful influence on thinking about the development of behaviour and has probably done more damage than anything else to understanding the integrated way in which genes and external conditions work together. Many genes are evidently part of control systems and can be likened to the switch thrown by a thermostat. When the value of external conditions falls below a certain point the discrepancy is detected and the signal is fed to a particular gene in a particular set of cells. The gene is activated and its products set in motion a string of chemical and neural processes which generate the behavioural analogue of heat. In such examples of negative feedback, and many others in which gene action is part of a system, instruction of a kind clearly flows into as well as out from genes.

If modern studies of behavioural development have achieved anything it has been to point to the multiple determination of behaviour. The crude opposition of "either it's genetic or it's environmental in origin" is fast vanishing, and current research activity is strongly focussed on how the various ingredients of the behavioural cake interact with each other in the course of the developmental cooking process. For this reason I, as somebody who works on the development of behaviour, strongly resonated to the ideas of Brian Goodwin. With him, I feel that if we are to understand developmental processes we must specify the regularities, and to do that we must *look* for them rather than merely wave our hands. Certainly,

the last thing we should do is ignore the processes and suppose that simple relationships can be found between starting points (which would include some genes) and end points of development.

Where does all this leave the “selfish gene”? Your editorial made some good points about the myths that have grown up about genes, but I felt it was wrong to dismiss Richard Dawkins’ language for being teleological. It clearly is, but human beings are inveterate planners and I firmly believe that it helps us to get our minds round complex problems if we think about where a process may lead. This is not only true in biology. A great nineteenth century physicist, called Hamilton, formulated a general and widely accepted teleological principle for use in mechanics. His principle provided a powerful way of thinking about systems, the behaviour of which is determined by opposing factors. Dawkins is quite justified in my view in writing about genes’ intentions because, by doing so, he points to the optimal ways in which a gene can survive from one generation to the next. However, watch out for the pun. Molecular biologists define genes as units that can mutate, recombine or make a particular protein. Even these three usages, which can be defined operationally, are not equivalent and matters are made much worse since sociobiologists define genes as units that are selected during the course of evolution. The sociobiologists’ use of gene cannot be defined operationally but what they mean is that a gene is an entity that is transmitted from one generation to the next and is responsible for the distinctiveness of a behaviour pattern (or some other character) on which reproductive success depends.

Where Dawkins really goes off the rails is in treating his language of intentions as virtually equivalent to the language of how genes actually work. What is implied is some simple correspondence between teleological and causal explanation. This leads to the belief that if it is valuable to urge that genes are selfish, it is also valuable to suppose that they uniquely bring into being the behaviour of an animal. The abstraction of one necessary condition from the whole set of conditions that is required may be satisfactory for certain types of limited experiment, or for making a polemical point. But it is disastrously stultifying when attempts are made to understand how whole systems normally develop.

II DEBORAH CHARLESWORTH

It is often asserted that the use of the terms "adaptation", "function" "fitness" is circular. The fundamental point concerns the role of the terms "adaptation" and "function". These should never be used in evolutionary explanations of any particular phenomena. One cannot, for example, ask any evolutionary question such as "why do horses have long legs", and reply "because it is adaptive". It would be correct to say that horses' long legs, and many other features of their legs and general anatomy, are adaptations for running fast. Such statements say nothing about the evolution of fast running, they merely note that many features of horses are consistent with speed, and look to us as if they were designed for fast running. One would use the term "function" in a detailed description of how some particular feature seemed to be designed for fast running. Similar examples are easy to imagine, in many different contexts, e.g. the eye of vertebrates, or the hollow, reinforced bones of birds. In all such examples, the terms "adaptation" and "function" refer to the fact that we feel that we observe the solution to some engineering problem. There are no causal implications.

Evolutionary explanations start from such observations, and try to account for them by proposing some way in which natural selection could produce observed adaptations. To be convincing, one must show that the character in question can show heritable variation of the sort required, and also that changes in the direction observed could be advantageous, for example by decreasing the chance of death or increasing the number of offspring produced. If one can do these two things, then one can say that, in principle, an evolutionary explanation for the adaptation exists, in terms of natural selection. We have such explanations (in principle) for many observed adaptations, including cases that once appeared almost impossible to explain without invoking a supernatural designer (see the discussion of the vertebrate eye in Chapter 6 of "Origin of Species").

In very few instances can we do better than this, and show that in a case of evolution now in progress, the postulated conditions are satisfied and indeed relevant. The reason why there are so few such

cases is simply that evolutionary change is slow, and only in unusually favourable circumstances can we detect it happening at the present time.

From what has been said, it will be clear that evolutionary explanation does not invoke increasing adaptation as an explanatory principle, and is therefore not circular. Nor does the idea of "survival of the fittest" come in as a guiding principle. This phrase is not a definition of "fitness", but merely a type example to show the general form of evolutionary explanations. In it, the term "survival" stands for "increased relative probability of survival or reproduction", and the term "fittest" must, in any particular example, be replaced by the appropriate heritable characteristic. An example would be, "increased relative probability of leaving offspring, of individual plants capable of self-fertilisation, compared with individuals that cannot do so". In theoretical population genetics, "fitness" is used as a shorthand technical term for relative survival or reproduction rate.

III DAVID SAVILL

I have read your Editorial in XIII II with interest and care, I would like to support the statement you make asserting that the "New Mythology" is spreading into the schools. This is most certainly the case. I saw a film shown during the last academic year called "The Selfish Gene". This film propounds Dawkins' ideas in a very plausible and simple manner. Well produced and illustrated, it leaves one with an answer to the old conundrum "Which came first, the chicken or the egg?", for a chicken is merely an egg's means of replicating itself. The inherent danger is, as in all such presentations, that conjecture is presented as fact. Naturally the young "O" level or C.S.E. Biology candidates absorb the idea without truly considering the implications.

Those, however, who stay on into the 6th form have begun to see that Dawkins' theory is some kind of affront to their self-picture as human beings with a certain degree of moral freedom. The staff see Dawkins' ideas as "interesting", "attractive" or "amusing".

Re-thinking Death and Dying The views of Elizabeth Kubler-Ross

SUZANNE HOELGAARD

In *Theoria to Theory*, Volume 13, May, 1979, Joan Miller describes the pioneering research of Raymond Moody into the unknown boundary between life and death, and between death and what may be beyond. Dr Moody recorded the accounts of a group of individuals who came very close to death by near-fatal accidents or who were resuscitated from 'clinical' death. Their near-death experiences fall into a discernible pattern of feelings, impressions and sensations. As the title of one of the books, *Life after Life*, suggests, death may not be the final event, but a state of transition from the kind of life we know to an altered state of consciousness.

As a complementary exercise let us direct our attention to the experiences of people who find themselves at the stages preceding the near-death situation investigated by Dr. Moody. The Swiss psychiatrist Dr. Elizabeth Kubler-Ross focuses on the perceptions of terminally ill patients in her influential book *on Death and Dying* which presents an interesting contrast in perspective to Dr. Moody's book *Life after Life*.

In a brief analysis it is difficult to do justice to Dr. Kubler-Ross' very inspiring, sensitive and courageous account of death and dying and the moving verbatim interviews with terminal patients quoted in the book. Only a crude presentation and selective discussion of a few pertinent theoretical and ethical issues is possible here.

Dr. Kubler-Ross' point of departure for her analysis is the observa-

tion that death is unfamiliar and taboo in western society. More and more people are removed from the mainstream of the community when they become critically ill and go to die in hospital. Thus hospital staff rather than the family have the main responsibility in caring for the dying. Doctors and nurses, however, are inadequately trained, socially unprepared and psychologically ill-equipped to meet the needs of dying people and help them at this critical juncture. Medical curricula emphasize clinical aspects of practice at the expense of ethical considerations; the medical model is geared to explain, treat and cure, and dying patients do not fit into this orientation; hospital staff share the death-denying mentality of society at large and avoid contact with terminal patients, who are painful reminders of the limitations of medicine and of death which overtakes us all.

We can readily agree with Dr. Kubler-Ross that the institutionalisation of the dying in a setting aimed at the preservation of life presents a serious problem. Dying people are handled by medical experts, but the problem of dying is a human one. For all that medicine has achieved in prolonging the average life span, curing previously fatal illnesses and alleviating pain, men and women continue to die. And moreover, the period of dying before death occurs has been considerably extended in many cases. Dr. Robert Morison expresses the predicament aptly: "Medicine can fend off death, but in doing so it often prolongs agony". The final stages of terminal illness can be eased by pain killers, but otherwise fall outside the province of medical know-how and require a different order of human attention: "Dying is a total experience, and at the point of dying, the diseased organ ceases to be the primary issue."

Deeply concerned about the psychological isolation of the dying at such a crucial time and about our ignorance of their inner life, Dr. Kubler-Ross initiated a series of discussions with terminal patients at a Chicago hospital in 1965. *On Death and Dying* represents the outcome of two years' research into the experiences of over two hundred patients. Some were interviewed on the ward by the author alone, some jointly with a priest or a medical student, while others were engaged in discussions behind a screen in an auditorium peopled with theologians, hospital staff and students. Almost all

patients welcomed the chance to talk about their feelings, and Dr Kubler-Ross was convinced that the patients alone could teach those caring for them how they experienced their situation and thereby help others to help them.

On the evidence of these accounts the author identifies a paradigm of typical responses associated with progressive awareness of terminal illness. She argues that most patients are aware or become aware of the truth of their condition whether or not the physician has informed them of a fatal diagnosis. She outlines the five successive 'stages of dying' as follows:-

1. Denial and isolation

The patient protests incredulously 'No, not me' when presented with an explicit diagnosis of a terminal condition or when he gradually realizes that his condition is irremediable. This negative response is of vital psychological benefit in temporarily shielding the psyche from the full impact of bad news. It continues to serve as an ad hoc defence mechanism on and off throughout the dying process.

2. Anger

The patient cannot keep up a state of disbelief and gradually comes round to the realisation: 'Yes, me', but asks: 'Why me?'. He is outraged at life and God and everyone that he has to be afflicted with this terrible fate while other people stay alive and healthy. This stage the hospital staff and family members find hardest to take because the patient's rage is projected randomly in all directions at all and sundry. People caring for patients in this situation often become the immediate targets of this anger and take the assaults personally, as they are unable to understand the underlying source of profound anxiety. It is indispensable to enable patients to express their anxieties freely, even if it is unpleasant for their caretakers, who should stop expecting patients always to be 'good'.

3. Bargaining

In the process of growing acknowledgement of the seriousness of his condition, the patient at this point reckons: 'It's me, but what can I do to delay it?'. The patient considers how he can gain time and starts making promises of good conduct, of self

sacrifice, of service to God, science or mankind in exchange for just a bit more time.

4. Depression

Eventually the patient's condition deteriorates to such an extent that he concludes there is no way out: 'Yes, me'. The depression may involve a sense of guilt and uselessness if the person feels he is letting his family down and there is no one to perform his tasks. Here open discussion of the patient's worries is called for along with practical help solving family affairs. Depression also represents a necessary period of mourning whereby the person can prepare himself for final separation from the world, mourn his impending losses, unfulfilled deeds and unrealizable hopes. Earnest grief should not be side-tracked or averted by futile attempts to humour the patient, who must be allowed to express his sorrow.

5. Acceptance

This is optimally the final stage which the patient reaches after having been helped to work through the previous ones. Dr. Kubler-Ross describes this stage as almost devoid of feeling, when the patient has finished struggling and often withdraws from communicating with others. All the patient may need or want at this time is the reassuring presence of someone, perhaps someone to hold his hand or just to be close and share his silence. Having accomplished a state of peaceful acceptance he no longer clings to hope, which is otherwise a vital asset at different times and in varying degrees during the dying process and which must never be quashed by others. The patient is best helped by his family if they too can relinquish their hopes of his recovery and accept, if necessary, his need for quiet and solitude.

THE PROBLEM OF AWARENESS

According to Dr. Kubler-Ross, these successive phases of dying represent a natural and desirable progression of awareness in terminal patients with which the responses of staff and relatives

should be synchronized. From her encounters with these patients, she concludes that most patients appreciate being told the facts of their condition and sooner or later become aware of them anyway. Hence she dismisses the question of 'whether to tell' and rephrases it as 'How to tell'. She argues that careful tuning in to the patient will indicate the pace at which the information should be conveyed. A fatal diagnosis must always allow a glimpse of hope and never specify survival time. Sharing a diagnosis with the patient is preferable to maintaining a mutual pretence between physician and patient. Open procedure maximizes trust and authentic interaction and facilitates free expression of emotion, enabling the patient to graduate through the critical psychological stages towards peaceful acceptance. Furthermore, openness offers him a chance to settle outstanding practical concerns and resolve his spiritual affairs with people and with God.

A number of issues spring to mind from Dr. Kubler-Ross' analysis of death and dying. First let us tackle the problem of awareness.

Many, but not all experts share her conviction that most terminally ill patients know they are dying. An experienced nurse, who has cared for many such patients, confirmed Dr. Kubler-Ross' opinion to me. When I was expressing my interest in the problem of awareness to this nurse, she said: "Don't worry about telling or not telling patients, dear, they will tell *you!*" It is likely then, that as patients approach the final stages of their illness, they cannot fail to realize that the process is irreversible. An array of events and impressions must add up to doom, as treatment becomes ineffective, more and more symptoms appear, they lose weight and cannot gain, feel weaker and weaker, and sense the aggrieved or embarrassed attitudes of others in their presence. There may even be a sort of internal life clock which tells them that time is closing in on them, a clock which they may be able to speed up or slow down and thereby control the actual timing of the event. This would explain the above mentioned nurse's further contention, that patients who live politely also die politely and would never dream of dying during visiting hours!

However, the observation that people sense their impending death sooner or later, perhaps only when they approach the final

hour, begs the question of just what the medical professional is to do with an early diagnosis of incurable illness, which is often reached long before death is expected. The prolongation of the period between diagnosis and death has complicated the problem of awareness. In the current state of medicine, the irony is that it is precisely the improved method of diagnosis and treatment which enable the doctor to help people and which at the same time confronts him with the baffling choice of what to do with his accurate information when the prognosis is poor. The doctor has become a soothsayer with a terrible burden of knowledge.

The following urgent overlapping issues need clarification:

- 1) the question of the specialist's monopoly on vital information and the right of the patient to have access to it; if the information is to be given, how should it be done and how much of it be conveyed?
- 2) the question of estimated positive and negative consequences of disclosure, its likely effects on the patient and on his relationships for the remaining period of life, and possible psychosomatic consequences.

With regard to the first question, various investigations concur with Dr. Kubler-Ross, that generally doctors do not tell their patients and that generally patients want to know and have a right to be told. One writer argues: 'The truth we know about another person is his truth and in a sense we have no right to talk about it behind his back. A recently recruited intern friend of mine sympathised with this position but phrased it slightly otherwise: 'After all, it *is* the patients' body, so he is entitled to whatever information is available.' However, the implications of such categorical ethical propositions are highly disconcerting. Consider that our entire social system and interpersonal transactions are based on selective manipulation and exchange of information we have or think we have about each other. If we did not exercise systematic discretion in conveying our private impressions and 'truths' about and to each other social intercourse would be chaotic and destructive. We all recognize implicitly the value of euphemism, evasion and white lies and regularly sacrifice crude honesty for the sake of charity. How many of us would announce to someone: 'You are really ugly', no matter

how many people would share our opinion about the appearance of this particular person.

It is all the more urgent to remember this when evaluating the impact of a truth which strikes at a person's most vulnerable aspect, his life and health. This is the underlying concern which inspires many doctors to exercise caution about telling, regardless of their private anxieties and defence mechanisms. Dr. Capra's guarded approach no doubt echoes many fellow practitioners' views when he says that the patient's question: 'Is it cancer, doctor?' has to be carefully weighed in terms of the patient's likely response to the answer given. To the average person the word cancer is a killer. As Dr. Capra reasons: 'To some a confirmation would be a sentence to fear and despair, to others it would be welcome as a first step to mental reassessment'. One person may utilise the information constructively, as Dr. Kubler-Ross suggests, whereas another may react very badly and get permanently struck in the negative, difficult phases of dying, such as denial, anger, depression, or oscillate between these.

The meaning of death and the associated fears and responses obviously vary according to age, role, status and cultural context. A child interprets death differently from an old person. The adolescent may be the most problematic case with regard to telling and is likely to take it hardest both in his own case and that of his friends.

Whether telling is believed to be the right option as a general rule or in certain cases only, there still remains the problem of how to tell. As Dr. Kubler-Ross says, unprepared, brutal confirmation with death comes as a shock. One indelible and excruciating memory I retain from a period of voluntary work in a childrens' hospital in Peru was my early encounter there with the blank reality of death. A young intern casually suggested I come along with him. He said he had something interesting to show me. Before I knew what was happening I found myself inside a small, dark room lined with rows of small white bundles. It was the morgue. The bundles were tiny, dead, blue babies. I was unable to eat or sleep properly for weeks afterwards.

So crude confrontation with facts can cause unpredictable psychic damage. In the patient's case, diagnosis must be parcelled out in a

style and measure tolerable to the individual and his relatives. Careful previous assessment of the patients' personality and biography, co-ordination with other persons involved and supportive follow-up are invaluable.

The following story illustrates what harm can ensue from blunt revelation of a life-threatening diagnosis. A semi-skilled worker in his forties — a tough, aggressive man — was told outright by the neurologist at the clinic that he had irreparable brain damage, that he would rapidly age and never be able to work again. This man's family relationships had never been good and deteriorated radically after this diagnosis. The social worker involved was most distressed about this difficult case, as the man became increasingly bitter and hostile towards his wife and children and intimated violence to the point where they felt unsafe in the house. He felt useless now that he could not even be a provider for his family, nor go to work, which was the only thing he enjoyed and had been successful at. With tears streaming down his face he would repeat over and over to the social worker the exact diagnosis and prognosis. It took her many hours of listening, soothing, consoling and suggesting more hopeful perspectives to get the desperate man round to a more serene, conciliatory frame of mind and smooth out family tension. In the interval between her visits, she would find all her work undone. The patient's general practitioner had meanwhile been over to confirm the neurologist's diagnosis and reiterate to the patient the precise process of physical and mental deterioration which he could anticipate. The object of this exercise from the medicals' point of view was to make the man accept the truth of his condition once and for all and avoid having to cope with his irritating habit of asking when he would be able to work again. After this the man 'went beserk' and started leaving murderous weapons within easy reach around the house and acting so threateningly to his family that they left him. He took an overdose in the end and was speedily removed to a mental hospital. In this case the social worker seemed to be the only person able to serve this man's need for denial and hope, and realize that his mental agony was intolerable because he felt worthless, unloved and hopelessly short of time to repair his unsatisfactory relationships and unfulfilled life.

PSYCHOSOMATIC RESPONSES

Psychosomatic processes in the human organism are little understood, but must be taken into account in any discussion of the present nature. There is good reason to believe that the psyche may play a significant part in the disease process and be influential in precipitating or forestalling death or triggering off unexpected recovery. Findings from a number of studies of bereaved persons concur that psychic states can predispose or contribute to severe somatic reactions, including those involving cellular changes as occur in cancer. Persons who have suffered loss of someone close to them may show serious physico-mental disturbances, and bereavement in widows, for example, is associated with increased mortality ratios in the first six months following the loss of a spouse. One young woman doctor, who revealed to me that consultants always passed it on to their young assistants to tell terminal patients the diagnosis, assured me that she always was cautious about handling diagnostic information vis à vis patients, but invariably told the relatives all the known facts as soon as the diagnosis was available. Such an unreflective approach may be unwise considering the potential psycho-somatic consequences of distressing news on survivors as well as on ailing patients.

Other investigations of the effects of diagnosis disclosure suggest that patients suffering from similar or almost identical terminal illness show differences in survival time which can be correlated with differences in personality type. It appears that people who have been satisfied with life and enjoy close, harmonious relationships to the end tend to survive longer than isolated persons with tense or distorted relationships and who feel they have failed in life. If so, there is all the more reason for the practitioner to ascertain something about a patient's personal make-up from the patient himself or from his intimates.

Curiously enough, it is conceivable that the revelation of a fatal diagnosis may be instrumental in curing the patient against all odds. Over ten years ago a friend of my parents, the wife of a diplomat, learned she had very advanced carcinoma of the larynx; her prognosis was hopeless and she had very little time left.

Determined to challenge fate, she demanded radio-therapy treatment. While undergoing treatment she wrote down her experiences and her indomitable will to live in what was later published under the title 'Atoms at teatime'. She was alive and well when I met her in Paris years after the fatal diagnosis. Another astonishing recovery gained world-wide publicity. The well-known racing-driver Nicky Laudau's vehicle blew up on the track and burst into flames. He was rushed to hospital and given up as a lost case, as his body had been totally disfigured by the fire. The priest was called in to give the last unctions. Laudau was so infuriated at being taken for as good as dead, that he was bent on showing them otherwise. He was back on the racing-track six weeks later, and a few years after won the Grand Prix!

HOW MUCH AWARENESS OF DEATH IS DESIRABLE

In the sequel to *On Death and Dying* entitled *Death — The Final Stage of Growth*, Dr. Kubler-Ross extrapolates a philosophy of life from her childhood and adult experiences with dying persons. Her participation in the death of a farmer in her village when she was a child, made an indelible impression on her. He gathered his family around and settled the family matters calmly and asked for her and her sister to visit him as he lay dying. He was serene and accepting of his death. Later on she cared for many refugees from Nazi Germany and witnessed their courage and that of those who helped them. These experiences inspired her way of thinking about life and death. Dr. Kubler-Ross claims that the knowledge of our mortality is the very knowledge which gives meaning to human existence and therefore we must keep it in mind at all times: "It sets a limit to our time in this life, urging us to do something productive with that time as long as it is ours to use — living each day as if it is the only one you have". By facing death we can make death a familiar integral part of our existence and make dying easier and less terrifying for ourselves and others. Each moment will count and the joy of life, however short, will replace the despair of death.

The constructive impulse in Dr. Kubler-Ross' message is beyond

dispute, but the question is whether it is practicable or desirable for the average person. She assumes, as do many contemporary writers, that death is more taboo in our society and time than elsewhere and that by incorporating it into our everyday life we could eliminate much of the fear and aversion surrounding it. In a recent *Dictionary on Medical Ethics and Practice* we find a similar assertion under the heading 'Dying, care of the —!': "Mankind in western civilisation is no longer prepared to face up to the fact of death — at the turn of the century it was the actual experience of death that rid it of its mystery and therefore fear". If such a radical change in our attitude to death has really occurred since then, it is curious that there is no item entitled 'death' in the 1875 version of the *Encyclopaedia Britannica* whereas today's edition devotes no less than seven columns to the entry.

It is more likely that fear of death is a universal human instinct, though it assumes distinct forms according to the context and culture in which it is observed. Man is a philosophical animal and that has always and everywhere been his problem and his pride. He exists and is acutely aware of it — but as sure as he exists, he is certain that he will cease to be: "The greatest difficulty presented to the mind is to realize a negative condition, a state of non-existence in relation to the outside world — that the world will continue when we are not there to see it". Therefore we also mourn those who die, we can no longer see them or they see us, we lose part of ourselves as they depart. As the child fears the dark when he cannot see or be seen by the familiar faces which reflect his sense of his own reality to him, so the adult fears the blind unknown of death. Ernest Becker argues persuasively that death fear inspires most human activity, even our most prosaic daily pursuits.

VARIATIONS IN ATTITUDES TO DEATH

Attitudes to death are individual, as well as contextual and cultural variables. Given a hospital setting, the attitude of a given individual in that context will depend on the particular part he has to play. An elderly ex-nurse marvelled at the extraordinary shift in her attitude

produced by a mere change in role. She had watched many old people die in the geriatric unit where she worked, but their death never affected her, in fact she said, death was a totally expected and accepted matter. But when she herself became ill and joined the patient population, although she was much younger than the others, the death of each fellow patient made a profound impression on her and she mourned every one of them. This staff/patient dualism may illuminate the avoidance behaviour of medicals vis a vis dying patients. It is likely that doctors and nurses have elaborate defences built up to keep their fears at bay. Sometimes what seem like blue jokes may be among the defences. Medical and nursing personnel are the very people in our society who are continually surrounded by dying people. They are probably overexposed to death. As T. S. Eliot wisely remarks: 'Human kind cannot bear very much reality'. Many psychoanalysts share that view. Sheer numbers may also have a numbing effect on sensibility and influence reactions in subtle ways. One paediatrician having counselled parents of still-born babies for many years wondered "How much living and dying can any person take?"

Dr. Kubler-Ross denounces our western industrial society as a death-denying, death-fearing culture. This presumes a contrast to small, close-knit communities such as her own Swiss childhood village, where death is a more familiar event shared by all and hence a less fearful thing. Such pre-industrial societies have been intensively studied and described in anthropological literature. Beliefs and rituals concerning illness, dying, death and the dead loom large in small-scale societies and commonly involve a wide spectrum of notions of fear, danger and avoidance. But in all this there are few examples of *subjective* accounts and some of these illustrate that fear of death is not necessarily less intense in small-scale societies.

Robert Levy describes Tahitian villagers' attitudes to death as predominantly fatalistic. The Tahitians feel there is no reason to fear death or not to fear death, as it is inevitable. However, individuals within the same cultural framework vary in their attitudes, and he shares with us the following views of death expressed by a couple of Tahitian villagers. They are striking in their similarity with western notions. One informant explains that he fears death: "Because I am

used to it here — I am accustomed to the world. Therefore it is a fearful thing for me — to go into the dirt — soon one will rot — you start smelling bad.” (echoes of Hamlet?) Another village man declares: “The reason you are afraid about dying, when you are by yourself, there is nothing anymore. That one dies is very frightening. Because you will not come back to life, you are dead, and it is only you alone. Only you, only you in the hole, when you are dead, that’s it, it is the end!”

We have no evidence to show or reason to believe that people in smaller, more intimate groups are less worried about death than we are or that their suffering and grief is less intense than for us, however much they are confronted with dying in every day life.

A rare account from a different culture than the Tahitian one serves to bring our discussion to full circle and link up the problem of the fear of death with the experience of dying. We are reminded of the near-death experiences described by Dr. Moody and of features of the ‘Dying Man’s Prayer’ in the Isa Upanishad. One of the elders of the Sauteaux-Indian tribe told the anthropologist about a fellow tribesman who died and lay dead for two days. When he revived, he described to the elder what had happened to him: “All of a sudden I found myself walking on a good road. I followed this road. On it I came to a wigwam. . . I found my father in the wigwam. He shook hands with me and kissed me. My mother was not there. Soon she came in, and greeted me in the same way. . . While I was talking I heard three or four beats of a drumstick. They were very faint — all of a sudden I thought about coming back. I thought of my children I had left behind . . . I started back along the same road I had followed before and when I got still closer, I could hear my wife and children crying. Then I lost my sense, I could not hear anything more. When I opened my eyes and came to my senses, it was daylight. But even daylight here is not so bright as it is in the country I had visited. I had been lying for two days. But I had travelled a long distance in that length of time. It is not right to cry too much for our friends, because they are in a good place. They are well off there. So I’m going to tell everybody not to be scared about dying”. This account shows some interesting parallels with the features described by Dr. Moody’s informants — the meeting with

dead relatives, the pull back to life, the experience of dazzling light. It also demonstrates the presence of fear of death, which the Indian now feels he is in a position to help his fellow tribesman to overcome. Familiarity with death can indeed remove fear, but it may have to be of the immediate kind experienced here.

It is only if one happens to read a few lines in small print prefacing a chapter in *Death – The Final Stage of Growth* that one glimpses the real source of Dr. Kubler-Ross' strength and the key to her death-facing philosophy: "This work with dying patients has also helped me to find my own religious identity, to know that there is life after death and to know that we will be reborn again one day in order to complete the tasks we have not been able or willing to complete in this life time."

If facing the reality of death means facing a future, it is altogether a different matter. Clearly, the debate about the ethical dilemmas involved in dealing with the incurably ill and dying and the question of fear of death acquires an entirely different perspective if we can envisage possibilities of life after death, or even rebirth, as Dr. Kubler-Ross and Moody's informants invite us to do.

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Comment

Return to Life

Nahum of Gimzo is said to have received this name because he used to say about all that occurred to him: 'Gam zu le-tauvoh' — 'this also is for the good'. To be able to speak like that from the depths of one's heart, one must, to be sure, have an unshakeable faith in God . . .

Georg Salzberger

As the librarian kindly showed me round the new library of Lucy Cavendish College in Cambridge, my eye fell on the current issue of *THEORIA TO THEORY*, and particularly on Joan Miller's and Arvind Sharma's articles on 'Experiences of Death and Dying'. Afterwards, I stood at a College telephone, ready to make an appointment with friends, when the articles drew me back to themselves. So I returned to the library, took out the Journal, and began to read.

Over a decade before coming across Raymond A. Moody's *LIFE AFTER LIFE*, I had written a short piece, containing the elements of internal peace, panoramic review, and desire to complete unfinished tasks which Moody reports as characteristic of subjects returning to life. More recently, I have been engaged, over a period of several years, in a study of social and psychological concomitants in the development of selected physical illnesses. Now, writing up my research, some of the questions I find most fascinating are these. What is it that makes people at the cross-roads return to life? Do they return because they love and are loved? Or because they feel duty-bound to complete their tasks?

**Forms of Prayer for Jewish Worship, 1977.*

Theoria to Theory, 1980, Vol. 13, pp. 335 -- 336
0049-3686/80/1304-0335\$04.50/0

Published by
Gordon and Breach Science Publishers Inc. 198

When we use the term 'death', we ordinarily mean 'death of the body', physical death; but there are other 'deaths', such as social and psychological deaths. It may be that some people prefer the death of their body to a temporary social and/or psychological death with physical survival. It is, however, possible that a period spent in a socio-psychological limbo enables some people recover their energies sufficiently to experience a spiritual side of life for the first time, or to enter into spiritual renewal, and so to achieve a life which is more meaningful than that lived before.

For me, these deeper concerns have now gone beyond theoretical consideration. I have started to explore ways of helping people by creative responsiveness to make their own paths in the process of turning round from an existence which would lead them into premature death with unnecessary and unfruitful suffering. I am only at the beginning of extracting fundamental insights from my research and using these to help people to recover physically and psychologically. So all I can say at present is that an excessive involvement in the material, sensual, intellectual, psychological, and social aspects of existence seems to lead to spiritual depletion and precipitate psycho-physical illness. Some people may choose to gain rewards from society at the risk of physical death; others may seek help and discover in the dialogue that there are rewards beyond those they have so strenuously sought to gain from their fellow human beings, from material objects or from the experience of the senses. If the latter choice is made, then a recovery — spiritual, psychological, and physical — may be possible. Obviously, there are important implications for education, psycho-therapy, and medical practice here.

RUTH CARO SALZBERGER
Department of Extra-Mural Studies
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Comment

Quantum gravity—Space-time and the quantum sea

The problem of quantum gravity is a deep one. We can be confident that our simple notion of space-time will break down, and with it goes not only “position” but also differentiation and localised quantities such as energy density. The theory will presumably contain mathematical constructs to replace intuitive space-time concepts, in much the same way as a particle is replaced by a wave in ordinary quantum mechanics.

It is very easy to say what is *not* the case in quantum gravity, but very difficult (so far impossible) to pick a route through the debris of space-time physics and say what *is* the case. Although theories of physics can be axiomatised quite easily, the ideas on which the axioms are founded can be modified, to various degrees, in many ways, so to remove one assumption from a physical theory can be a rather complex procedure. This is the state of the art of quantum gravity at present — we have two beautiful, and very successful theories — yet we know there is something very wrong with them.

There are however certain indicators which allow us to make some fairly nebulous statements about quantum gravity. Most importantly it will be a theory of mechanics — one should not think about quantizing the gravitational field as though it were no more fundamental than the other fields of physics. Quantum field theory is the mechanics of quantum fields, general relativity is the mechanics of space-time, quantum gravity will be the mechanics of a quantum space-time.

Theoria to Theory, 1980, Vol. 13, pp. 337–339
0049-3686/80/1304-0337\$04.50/0

Published by
Gordon and Breach Science Publishers Inc. 1980

We should therefore not be surprised when attempts to apply the conventional quantization techniques to general relativity fail dramatically. Suppose they had worked — we would have done it, finished, the end of mechanics — but what would we have learned? What could we conclude about the nature of space-time? It is a matter for rejoicing that our best attempt so far gives the answer infinity — we didn't want it to work anyway!

More positively, quantum gravity will involve the constants c (the velocity of light), G (Newton's gravitation constant) and h (Planck's constant) — so these can be dimensionally analysed into a quantity of any dimensionality (the Planck quantities) for example, $L^* \sim 10^{-34}$ m, $T^* \sim 10^{-43}$ s, $M^* \sim 10^{-8}$ kg and $\rho^* \sim 10^{95}$ kg/m³ etc. Thus quantum gravitational effects will be important when, for example, a star is crushed to densities of about 10^{95} kg/m³ — as must happen inside a black hole. This is very sensible — we precisely want quantum effects to remove the singularities which general relativity predicts in the centre of black holes and at the beginning of the Universe.

Similarly, we can expect quantum gravity to account for and describe the renormalization infinities of conventional quantum field theory, in that these arise because of lots of very high frequency virtual (sort of existent) particles and our dimensional analysis says there is a frequency, $F^* \sim 10^{43}$ /sec, above which quantum gravitational effects become important.

Suppose, now, we assert that quantum gravitational effects exist whenever a quantity approaches the corresponding Planck quantity, then we immediately see evidence of the enormity of the problem: Special relativity tells us we can Doppler shift any wave to arbitrarily short wavelengths, simply by moving towards it at some velocity close to the speed of light — in particular we can Doppler shift, say, an ocean wave until its wavelength is less than the Planck length (10^{-34} m). According to our supposition quantum gravitational effects should now exist. Here is a contradiction — special relativity says I can Doppler shift a wave, our assumption says that things should happen which relativity does not describe.

Quantum gravity will say that special relativity is wrong! We need not worry overmuch about the curvature of space-time, nor about

deep symmetries which a theory of supergravity may possess — such considerations will not begin to answer the starting point of quantum gravity, which is, “what happens to special relativity?”

It is rather surprising, perhaps, that special relativity should suffer under the unification of quantum mechanics and general relativity when it is the principal area of agreement between those theories. Ah! The fluidity of physical law!

A different but equally fundamental question which quantum gravity must answer concerns the nature of energy density. Gravitation measures the absolute value of energy density — it is simply the curvature of space-time — there is no question about *defining* a system as having zero energy density and comparing other systems with this zero point. In quantum mechanics, however, this is precisely what we do — the theory states, in as many words, that the absolute value is indeterminate. Strictly, the energy density in a vacuum is infinite, but the infinity (like in renormalization theory) may be subtracted away to give a finite answer.

This answer, remarkably, is sometimes negative — that is, despite all our efforts to keep energy density positive ($E = mc^2$, for example, is always positive) we find that negative energy densities can exist in a rather fundamental way. Quantum gravity will say how it is that gravity measures some kinds of energy density but not others — it clearly does not measure the infinite (or at least very large) energy density which exists in the vacuum.

Question number two: “What is the energy density in a region free of energy density?”

These two basic questions are likely to take a long time in being answered. One should not underestimate the mechanical schizophrenia of physics today, nor should one expect modest changes in either quantum field theory or general relativity to solve the problem. That would be too disappointing — mechanics won't finish with a fizzle.

Newton stood on a seashore playing with pebbles, Einstein was out in his boat, Schroedinger tasted the water (yuk!), the quantum gravitationer must dive.

NICK CHARLTON

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Bishops

Bri

UNIVERSITY OF MICHIGAN

Sentences*

I AUTUMN WOOD

In the matter of looking for the truth, (whatever it might be), coming across people who — with the best intentions — claim to reveal it or to provide a method or a way for its realization, is rather like walking through a late Autumn wood, ankle deep in leaves.

The leaves are many coloured, mostly browns and golds, and can be very beautiful. Also they have seen the sky and have felt the sun — once. But now their veins have become hardened and are like ideas and beliefs which are difficult to give up. Nevertheless they cover the earth in which new growth exists together with the old dead wood and roots.

So it would seem that, despite the old and shrivelled appearance of the leaves, they perform the important function of protection, and that in itself denotes love. Later they become food. Provided one is aware of this, and is neither eulogistic with the leaves' beauty, nor critical of their wrinkled state, it becomes possible more truly to understand their function.

I have been walking in Autumn woods for a long time.

*From "The Secret Stream." Sagitta Press 1975

Theoria to Theory, 1980, Vol. 13, pp. 341 – 342
0049-3686/80/1304-0341\$04.50/0

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II AUTUMN IS A TIME FOR FALLING LEAVES

*Only when the leaves fall
can one know the structure of a tree.
Only when the thoughts have flown
can one know the feeling in the heart.
Only when the barriers dissolve
can one know the measure of a man
Autumn is a time for falling leaves.*

GEORGE GRIFFITHS

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GEORGE GRIFFITHS was a painter, illustrator, designer and occasional writer of poetry. He was resident poet with the LBC, and then joined Radio London in their programmes "In Town" and "Look Stop Listen". He published two books of poems, "The Note" and "The Secret Stream", and had a third collection ready for publication before his early death in 1977.

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For the contributors to the comments on Neo-Darwinism see note at the beginning of these.

The cover designs for this volume are by Nic MacLeod.

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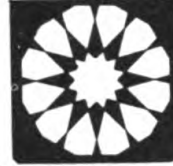
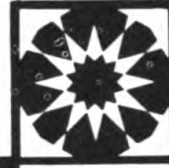
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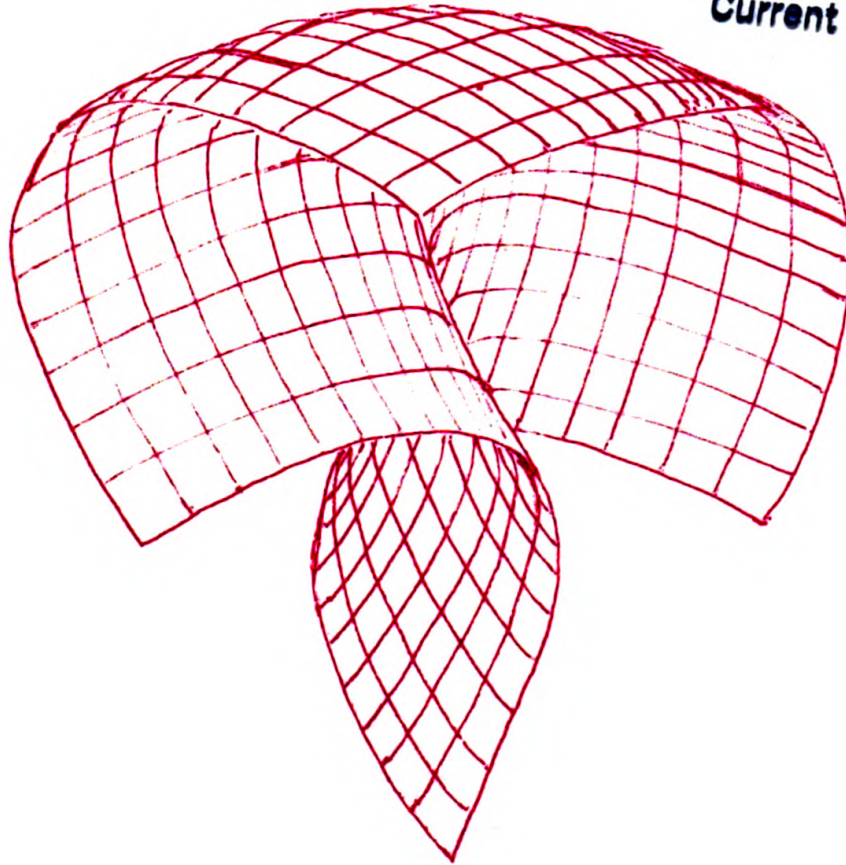
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**An International Journal of Science, Philosophy and
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Volume 14, Number 1 (1980)

Original from
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Subscription rates, per volume, for current volume block: \$ US: \$66.00/\$30.00/£ sterling: £30.00/£13.50.

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Subscriptions should be sent to Gordon and Breach Science Publishers Ltd., 42 William IV Street, London WC2, England.

JUNE 1980 issue

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Printed in Great Britain at The Lavenham Press Limited, Lavenham, Suffolk.

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Editorial

The "Sentences" we put at the end of each number of T. to T. consist of passages of prose or verse which may be reflected on, perhaps when one goes to bed. We sometimes draw them, as in the last number, from a contemporary source; sometimes from traditional sources, not all Christian, but all, we believe, saying something succinctly that can still hold us. In this number we have some extracts from letters of St. Antony the Great, translated by Derwas Chitty. Derwas Chitty was our friend until his death a few years ago; his book "The Desert a City" gave a splendid description of these Desert Fathers who lived as solitaries or in groups of huts or caves, and of whom Antony was perhaps the greatest. Popular imagination has fastened on their sparse food and sparser washing; this was in fact a regimen for survival in desert conditions and some of them survived to a considerable age (Antony's date are 251-356 A.D.). The *Life* by Athanasius makes him a spiritual athlete, but also talks of him as "un-schooled". Even if he had no degree from the University of Alexandria, these letters (which scholars are prepared to take as genuine) show that he had considerable intellectual perception. He may perhaps have been illiterate and dictated his letters, but illiteracy is not the same as ignorance. Moreover Coptic, which comes from ancient Egyptian, was only just being written down, so that he would have had to have been very schooled indeed to have been able to read and write it. In the ancient world there must have been a number of illiterate wise men who passed on their wisdom, or their poetry, by word of mouth (Homer may have been one such), just as in parts of India and Africa today there are illiter-

ate wise men whose counsel is sought. So indeed was Antony's; people came out into the desert in a constant stream to consult and learn from him.

These letters are tokens of a different tradition from that of the hierarchical priestly, and male, status-ridden society which emerged as mainstream Christianity. Antony speaks to "true Israelites, *men and women*"; and there were Mothers, called "ama", as well as Fathers, called "apa", living as spiritual athletes in the desert. Sometimes their sex, besides being irrelevant, was unknown until it was discovered when they were laid out for burial.

Male hierarchy in the dominant tradition was strengthened by having a very male Deity at its head. But this was not the only tradition. The recent book by Elaine Pagels, "The Gnostic Gospels" gives an account of another alternative besides that of the Desert Fathers. The evidence on which she draws comes from a number of papyrus scrolls and fragments now transcribed and translated, some of which go back to a very early stage of Christianity. "Gnosticism" was generally looked on as a "Christian heresy" against which the Second Century Church Fathers fulminated. We now know that it came out of a wide background of mystical writings and spiritual trainings some of which went on in communities (the one at Qu'umran may have been influenced by this). R. M. Wilson in his book "Gnosis and the New Testament" (1968) calls this wider movement "Gnosis" to distinguish it from the particular Christian Gnosticism of the Second Century a.d., and he speaks of it as coming from "the mutual interactions of many different traditions" (p. 16). These were Eastern and Hellenistic Greek, as well as Jewish and Christian, and show that there must have been considerable communication from further east in the Palestine of the early Christian centuries, and indeed before. This tradition of Gnosis was not bound to a male stereotype if sex comes into the Godhead, it comes equally as female. And it was a tradition not based on liturgies and priests, but on directing people along a way to perfection through knowledge (Gnosis). The particular content of this knowledge, especially its cosmology and its rejection of history, may be questioned; but insofar as it was a way of knowledge with a theoretic content, it

could be opened to philosophy, and insofar as it claimed to have an empirical content, even if a magical one, it could in the end be opened to science. And as a sociological pattern, it could be developed without being set in a paternal ecclesiastical mould.

Discussion:

Is Mathematics Leading Physics by the Nose?

Christopher Clarke, Patrick McCarthy and members of the editorial group (Q1 and Q2)

C.C. The dominant approach to science, to physics in particular, is what we may call the “Newtonian”, which abstracts certain features from nature which are then modelled mathematically. In its extreme “Laplacean” form this led to a belief in the possibility of a complete mathematical description of the entire universe, to which science discovers progressive approximations.

In a famous essay¹, Heisenberg encountered an obstacle to this approach. Belief in a complete mathematical description is replaced by belief in a quantum mechanical description that is as complete as possible; a description beyond which there is only quantum uncertainty. The basis of his argument was that, at the time of his writing, in the 1930s and 1940s, physics had reached this quantum level and so, he supposed, had essentially reached the bounds of the mathematically describable.

Heisenberg was wrong: physics, history showed, was not at its end, but at the beginning of a course of ever-growing abstraction. As this has proceeded, the post-Laplacean view of a complete-as-possible mathematization has come to seem ever more hollow and baseless. Each step that offered hope of a greater unity has been followed by a further revelation of undreamed-of complexity, while more and more complicated mathematical theories are required to explain what is going on. So the Newtonian viewpoint has taken the form of a pluralistic mathematical view in which a number of interlocking mathematical structures are allowed, each elucidating

Theoria to Theory, 1980, Vol. 14, pp. 5 – 15
0049-3686/80/1401-0005\$04.50/0

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some aspect of physics but with no claim to completeness or even unity.

Modern physics is in this way treading a path marked by brilliant intellectual achievements explaining remarkable feats of experimentation. But whereas Heisenberg was sure that this path, having reached its limit, would have to return towards the universe of more normal experience, we have no such assurance. Here is the dilemma: one cannot prohibit what has become one of man's highest intellectual creations; but can the scientist encourage a course which seems to move ever further from our experience of the nature we are trying to understand?

The claim I wish to put forward is that physics is becoming blinded by the interest and success of the mathematics, being led into greater and greater abstraction and further and further away from physical explanation. This comes from the fascination of the mathematical theories and the experiments which confirm and investigate them. I am not saying that modern physics is wrong, but that it is on a path taking us further and further away from its original purpose.

Q.1. You have mentioned experiment. Aren't there two kinds of experiment: one is when you do your mathematics and have one experiment that confirms one bit and you forget about the rest, and the other is when the experiment comes out of something you find in experience and then you get the mathematics to describe it?

C.C. I would say what is happening is half way between those two. It is not the case that you are contriving one experiment to hang the theory one; there is a body of experimentation being linked to theory, but it is not the case the experiment comes first, before the theory.

What I am saying is that because of the relation of theory to experiment, theory influences the direction of experiment and the whole subject is getting slanted in a direction of greater and greater abstraction and remoteness from the facts of normal experience.

Q.1. I thought you were concerned not just with normal experience but with things like what's happening in the middle of the sun.

C.C. We left that behind a long time ago. What I am objecting

to is ultra-high energy physics. There is all this enormous expense over particle accelerators, and no technological application. If you are an atomist in the sense that you believe you can come to some ultimate constituents of nature where you could stop, this might be justified. But this seems a hollow expectation in view of the way particle physics has developed. If one is not going to believe the atomistic hypothesis that eventually one is going to reach a final point, then the course which particle physics is taking will need more and more money and take it further and further away from ordinary experience and from useful technology.

The criticisms I am making could also be levelled at cosmology and so at myself. Appealing to what might be going on at the Big Bang is to support high energy physics, a theory going off in the wrong direction, by cosmology which could be going off in a still more wrong direction.

Q.2. But we all know that the theoretical work of Maxwell predicted electro-magnetical radiation which was then detected in experiment (by Hertz). Furthermore, this work had technological implications. The point of using mathematics is to predict in cases where you can't predict otherwise.

P.M. It has perhaps always been the case that physics looked at things on the periphery of experience as in the case of Maxwell—presumably electro-magnetic phenomena were just outside normal experience and difficult to get at. But the experiments brought them very much into reality, as we can see all around us today. The trouble is, high energy physics has gone way beyond this periphery.

C.C. I think the essential thing is whether you can see an end to the development.

Q.2. I am going to be a crude technologist. You don't have to see an end in view to see the possibility of a technological development—if a different and perhaps safer form of nuclear power, for instance, might come out of present theoretical physics just as present nuclear power comes out of the theoretical physics of 1938-9.

C.C. This would be a justification of *nuclear* physics. But we have left nuclear physics far behind. What I am objecting to modern ultra-high energy physics.

Q. 1. You mean ultra-high energy physics could never lead to an application? You are quite wrong to prophesy like this; people who have so prophesied in the past have been wrong.

C. C. What I am objecting to is the way modern high energy physics has set off on a path towards investigating higher and higher energies leaving behind all considerations of the way in which the phenomena they are describing are related to each other and to the world as a whole – an extremely one-track and unbalanced course of investigation, made unbalanced because people have been bewitched by fascinating mathematical theories. They are indeed fascinating, and I feel their allure. But one has to set against this the alternative view that science ought to start from technological needs. One ought to redress the balance. The prestige physics on which most money is spent is this high energy physics, which is pursuing an atomistic goal for which there is no evidence.

P. M. Chris' arguments could be interpreted as a plea for more support for kinds of physics which are non-atomistic, for instance Catastrophe Theory.²

C. C. This isn't a particularly shining example. Maybe there aren't any shining examples. In solid state physics there are examples of a number of applications of mathematical techniques to understand the solid as a whole, where one is using mathematics as a tool to investigate how the properties of atoms and field fit together to help us understand the world as we know it. I am more sympathetic to this kind of thing than to running after more and more detailed properties of particles.

P. M. But this example of solid state physics uses atomistic theory, so it can't be taken as illustrating a non-atomistic approach. There are a variety of approaches in mathematics, for instance infinitesimal versus topological, and in physics the analogue of the infinitesimal, which is atomistic, is very well developed, but the analogue of the topological is underdeveloped.

Q. 1. There are two extremes – one is the operationalist view where you allow no theoretical concepts except those defined by the experiment, so you get no mathematical play, and the other where you go on making up mathematical models all over the shop.

C. C. I don't think at the present stage of physics you can have a

single all-embracing theory, a monolithic science; there are instead separate theories for separate bits, but there could be a unified science in the sense that one cares about how the different bits are related to each other. What I object to is that people so concentrate on the different bits that the whole thing splits up in little chunks of mathematics with huge chasms between them. This leads neither to general theoretical understanding nor to applications.

Q.1. What then is being shown by these experiments in the linear accelerators?

C.C. They are showing three things: the angle at which particles come off; the curvature of the paths and the density of the path tracks. Out of all these experiments you get a list of twenty numbers, or something like that, so you are necessarily committed to a quantitative mathematics which produces numbers at the end of it. So to talk about other sorts of explanation isn't appropriate. What is happening is that the explanations are becoming extremely complicated. The Salaam-Weinberg theory, for instance —

Q.2. What's that?

C.C. It's a theory which subsumes electro-magnetic interactions and weak interactions. It does it by assuming there is a fundamental symmetry relation between the two. But it does this by putting in a lot of additional ingredients: for example, an extra particle (called the Higgs boson) is put in to introduce "spontaneous symmetry breaking". But this idea is not properly integrated into quantum field theory.

P.M. It is an elegant mathematical theory with a lot of inelegant clutter on top of it.

Q.2. If you are not going to be what some people would call Pythagorean about mathematics (thinking it somehow has real existence on its own), then you are bound in a sense to regard mathematics as almost a branch of physics (for instance, Newtonian calculus dealt with speeds). It can then be made abstract. However, in the process of abstraction you make choices; for instance, standard versus non-standard analysis. You can then operate the mathematics on its own. So the calculus which was devised for changes in time could be used for other kinds of change.

Q.1. But if mathematics takes off on its own like this, are you

saying that it can get right away from any conceivable application?

C.C. What I am saying about high energy physics is that instead of all the ingredients being at some stage interrelated and brought back into interaction with each other, what seems to be happening is there are odd blobs of mathematics spread out like jewels on a necklace and one tries to spin the thread longer and longer to hang them.

Q.2. You said earlier that this was happening in cosmology too. Can you say more about that?

C.C. I don't think this is so serious, as cosmology isn't looked on as the pinnacle of physics in the way high energy physics is. But in cosmology the mathematics has way outstripped all experimentation. You are building models which you have no hope of testing in the foreseeable future, or of conceiving how you could ever test them experimentally. You have the fascination of building different geometrical models using General Relativity. But these are models of the entire universe and you know you can only observe a tiny piece of it. So inevitably what you are doing is building an unobservable context into which aesthetically to slot the piece you can observe.

Q.2. But if radio-telescopes are reliable you have at least got ways of looking at a more distant piece. Still, when you are extrapolating to get your model, some of us want to know whether what we are being told, for instance about the age of the universe, may not be a put-up job.

P.M. As a matter of fact some astronomers at Harvard have recently argued that it should be halved.

Q.1. What we want is for philosophers of science to cause scientists to be as self-conscious about the forms of thought they are using as they are about errors in their apparatus.

Q.2. But this need not mean that they have to be brought back to analogies with something in the common sense world. It seems that a good deal in physics has advanced by people being prepared to think that the nature of the world is something very far indeed from what we intuit in common sense.

Q.1. What brings you back to earth isn't common sense but using mathematics in experimentation. The experiments feed back

meaning to the speculations. But if you lose touch altogether with your original analogies the mathematics gets out of hand and leads into contradictions, and your experiments lead you off to entrancing new thoughts that can't be coped with in the mathematics. So you need to look back at the original analogy you started from, for instance that of a wave, to enable you to go on.

Q.2. Does this help when in quantum mechanics you get notions completely contrary to common sense?

C.C. What happened in quantum mechanics was that you fed in incompatible analogies like waves and particles, and you reconciled them by going to a formalized mathematical system in which you stripped the analogies of those aspects which are incompatible; and then you had an abstract mathematical system incompatible with classical physics. But you did at least have a basis on which to proceed, knowing which bits of the original analogies were irrelevant and which weren't. That sort of operation hasn't happened recently, where all sorts of different analogies have been fed in with no attempt at reconciling their incompatibilities into a single picture. So it comes back to "in what sense is one explaining the world around?"

Q.2. Shortly before Heisenberg died, Ted Bastin had a discussion with him which we published in *T. to T.*⁵ in which Heisenberg said he looked to a unification of the complementarity of wave and particle theory, but it would be in terms of high mathematical abstraction. But this doesn't get us over the chasms between the abstraction and the reality which you said earlier on were bothering you.

C.C. What you have to do if you are a mathematical physicist is to go away in isolation and develop the mathematics as if it had a reality of its own.

Q.2. You act as if you believed in this. You are operating with the symbols according to rules without being self-conscious about what they are supposed to be. But let's get back to these chasms. Nearly any science has a chasm between its theory and the fit of its theory. What is worrying you is that in high energy physics you have several different paths with chasms between them.

P.M. For example, one has a perturbation series which diverges

but nevertheless one takes only the first three terms of it in order to hope to get a sensible answer. Unfortunately two of these three terms themselves come out as infinite. This problem is then coped with using a prescription called “renormalisation” which means dividing one infinity by another to get a finite answer. So it is all a bit *ad hoc*.

C.C. Besides this example, there is what comes out of the Higgs boson which we mentioned. This makes it possible to have different vacua. The conventional development of quantum field theory is based on the assumption of a unique vacuum. But now there is no description of quantum field theory which is mathematically rigorous which incorporates these different vacua. So you feed them in by hand.

Q.2. Are the vacua of the same sort?

P.M. In quantum field theory the vacuum has properties, whereas in ordinary language it hasn't.

Q.2. Then why call it a vacuum?

P.M. It is a state with no particles in it, but nevertheless it does have physical properties. You start from the vacuum and then you build up particle states. So it is an entity which produces particles when you act on it with a field.

C.C. In “spontaneous symmetry breaking” you start off with a number of distinct but equivalent vacua, and then you assume that nature picks a particular one. This breaks the symmetry which obtained between the original vacua.

Q.2. Couldn't you have a defence of these ways of thinking which you can't link up, by saying they are abstractions that have limitations built into them, and that some are serviceable in one context and some in another?

C.C. There are two ways in which mathematics can be “serviceable”. One is to enable you to predict; the other is to link together a number of different things within one formalism that then suggests new analogies. What I am objecting to in particle physics is that certainly the mathematics enables you to make predictions, but they are rather hollow ones, because there are a lot of assumptions underlying them. And you are doing the opposite of unifying because each bit of mathematics stands separately from the other bits.

P.M. You can make, say, five experiments to fit five free parameters in the theory (i.e. a type of curve fitting). With the theory so specified you predict the results of, say, two more experiments.

Q.1. It sounds like a sublime *reductio ad absurdum* of what you do in more sane science. But what do you think, Chris, that particle physics should be doing instead?

C.C. I come back to these chasms. How can you have a real and solid world with definite states that is supposed to be explained by quantum field physics? How is it that you have a theory that produces amazingly accurate predictions from a series that diverges? These problems are totally ignored. Turning to quantum and classical physics, what you try to do is to think of experiments which relate to the middle of the chasm. In quantum theory you are dealing with the very small, in classical with the large. So you can try and devise experiments to deal with middle sized objects, like large molecules. Though difficult, and not respectable among physicists, it is possible to do this.

Q.1. The tertiary structure of proteins is a problem where people have tried to apply quantum theory and the result is complete chaos.

C.C. What the experiments might show is that molecular reactions for large molecules are not quite what quantum mechanics says they should be. But the reason that these matters aren't pursued is that there is no basic physical idea — there is just juggling with mathematics.

Q.1. Give us another chasm.

C.C. There is one in the divergence of the perturbation series in quantum field theory. You try to construct a rigorous version of the non-rigorous theory, while it is the latter that produces the right answers.

Q.2. Could this be put by saying that getting some mathematics that fits is not the same as getting an explanation? What Chris is saying is partly a criticism of what is going on in science all the time, but wasn't going on so much, say thirty years ago.

C.C. High energy physics has developed from an attempt to understand atomic spectroscopy which is related to a body of fairly

immediate experience. You put some salt in a flame and the flame turns a particular yellow—why is it always that colour? You put the sodium into a spectrometer and you get particular lines. Physics starts explaining this in terms of atomic theory and all goes well. The explanation has lots of spin-offs. One starts to understand more about related phenomena, but there comes a point where the explanation just seems to take off, and one gets a succession of theories more and more involved, each devised to explain the unexpected phenomena exposed by the previous theory. What I am getting at is the attempt to understand successively the atomic, nuclear, and sub-nuclear. One is in contact with experience up to the nuclear. Then one doesn't sufficiently keep track of the assumptions and analogies that have been put in. In the course of doing this a whole lot of problems have been overlooked. The aim of increasing understanding has been lost in increasing abstraction. I blame this on people wanting an elegant mathematical theory that fits at a few points rather than a less elegant one that brings more together and shows how the theory is related to the phenomena.

Q.2. This criticism of course doesn't apply to pure mathematics which doesn't have its eye on the world.

C.C. No indeed, but my complaint is that a lot of mathematical physics doesn't have its eye on the world either. Its theories generate their own worlds of experiment. There are attempts to get at simpler and rigorous models—they are called “toy” models—for instance spinless particles in two dimensions.

Q.1. That doesn't sound simple to me.

C.C. It is an attempt to take a different approach.

P.M. Another attempt at a different approach is “instanton physics”. An instanton is a disturbance localised in space and time (or rather imaginary time). Because of localisation in time it is only there for an instant. This type of physics tries to avoid perturbation theoretical methods which produced one kind of chasm we talked about. It is helpful to explain the history of this idea. It developed out of soliton physics. A soliton is an isolated disturbance with remarkable properties of stability. Though such disturbances were investigated long ago, it is only recently that physicists have become aware of the very wide applicability of solitons. Examples include

the study of waves in water and possibly nerve impulses. The mathematics involved is very fascinating; it avoids series expansions and deals directly with exact rather than approximate methods. The instanton represents an analogy of the soliton in particle physics. Whether or not these developments will find application in particle physics is still uncertain. Nevertheless, it is very likely that powerful new methods from instanton physics will be applied in soliton theory, and so give rise to developments in branches of physics other than particle physics.

Q.2. So there is some hope for mathematical physics after all!

Q.1. But you are worried, Chris. Are other physicists worried? Are you worried, Patrick?

P.M. Yes, very worried about the chasms.

C.C. Some physicists tend to rejoice when things work out as infinite. They say "Press on".

Q.1. Perhaps you don't go in for particle physics unless you like that sort of thing. But all the same, are you saying, Chris, that there comes a point after which your chain of explanations goes mad?

C.C. Yes. Maybe, in the future when the gap has been filled, our present knowledge may fall into place. But today it seems that high energy physics has moved so fast, on such a narrow course, that there is no logical chain, no explanation.

References

1. Heisenberg, W., "Goethe und Newton" in *Wandlungen in den Grundlagen der Naturwissenschaft*.
2. See the article by R. Thom in T. to T. X iv. Catastrophe Theory deals with equilibria in dynamical systems. A recent exposition is reviewed below.
3. See T. to T. VIII i.

Neo-Darwinism (continued).

We continue our comments on the discussion of Neo-Darwinism with two more contributions: one from Martin Ruse, who is Professor of Philosophy in the University of Guelph, Ontario, and author of "Sociobiology: Sense or Nonsense?", and the other by Norman Macbeth, author of "Darwin Re-tried", a critique of classical Darwinism.

I MARTIN RUSE

LET ME START with a comment that may sound a little more critical and sour than I really mean it to. I find printed verbatim reports of discussions rather difficult to read and to follow, and moreover I get very frustrated as interesting ideas emerge and then before they get developed fully they vanish as quickly as they appeared, not to return. This of course is how live discussions go and what makes them exciting and stimulating—but in the cold light of day, or rather the black and white tones of the printed word, things tend to look a little flat. I find this all to be true of this discussion of evolutionary biology that I have been asked to comment on; but, as I said above, I perhaps sound a little more curmudgeonly than I really mean to. My main reason for making my point is not to criticize but to excuse my tactic in this commentary, which is not to fasten directly on actual words which participants in the discussion spoke, but rather to abstract from the discussion what I think are three (not necessarily the only three) points of concern, and to say a few things about each.

First, I think there is a general concern about the status of evolutionary biology as a science. Having said that I will not

comment directly on anything that was said, let me break this rule immediately by noting that the name of Popper is invoked fairly early on in the discussion. As many readers will know, the eminent philosopher of science Sir Karl Popper (fulsomely described by one Nobel Prize winner, Sir Peter Medawar, as the greatest philosopher of science there has ever been) has expressed what I am sure are the fears of many, namely that the modern theory of biological evolution, the so-called “synthetic theory,” is not a genuine scientific theory.

For Popper, and for many others and not just his followers, the crucial mark of being a genuine theory is that it can be exposed to experience, being rejected if it is shown false (in Popper’s words, a genuine theory must be “falsifiable”). However, argues Popper, just as a statement like “God is love” is not scientific because there is no empirical evidence that could refute it, so also the synthetic theory of biological evolution is not genuinely scientific because no empirical evidence can refute it. The central claim, the mechanism, of evolutionary theory is “natural selection”; but this is simply the statement that in the struggle for existence the fittest survive and go on to reproduce for the next generation. However, if we press this notion and ask what are the “fittest” we find that they are simply by definition those that survive! In short, natural selection reduces to the empty tautology that those that survive are those that survive. No testing is possible here, and obviously no counter evidence can be found.

Popper concludes that evolutionary theory, neo-Darwinism, is a “metaphysical research programme,” that is a kind of general, naturalistic way of looking at the world. To put empirical teeth into the theory he suggests that possibly major evolutionary strides required macromutations, that is fairly large, relatively instantaneous jumps from one form to another. Incidentally, Popper refers very approvingly to Norman Macbeth’s sprightly little book, *Darwin Retried*, wherein one can find similar arguments and suggestions. (Popper’s views are to be found in his intellectual autobiography published at the beginning of the Paul Schlipp edition of *The Philosophy of Karl Popper* in the Library of Living Philosophers, Open Court, 1974.)

I suggest that Popperian fears are haunting a number of the discussants—after all, they thought it worthwhile to talk about evolutionary biology, rather than some “respectable” theory like plate tectonics! Let me therefore state quite simply that I think the fears ungrounded and the suggestions unneeded. Let it be shouted from the rooftops if necessary: Neo-Darwinian evolutionary theory is indeed a genuine scientific theory and it is open to empirical test. First of all the theory claims that there is a struggle for existence, brought on by more organisms being born than can possibly survive and reproduce. This could obviously be false. Second the theory claims that those which survive and reproduce will on average be different from those that do not. Again, this could be false (some in fact claim that it is false). Third, the theory claims that the *kinds* of things which lead to success in one area or at one time are similar to the *kinds* of things which lead to success in other areas or at other times, all other things being equal. Obviously there is nothing tautological about this claim. Putting matters another way, Richard Lewontin the well-known geneticist has stated:

Evolution is the necessary consequence of three observations about the world . . . They are: (i) There is phenotypic variation, the members of a species do not all look and act alike. (2) There is a correlation between parents and offspring . . . (3) Different phenotypes leave different numbers of offspring in *remote* generations . . . There are three contingent statements, all of which are true about at least some part of the biological world . . . There is nothing tautological here. (“Bases of conflict in biological explanation,” *J. Hist. Bio.*, 2, (1969), 41-2.)

The fears of Popper and like-minded discussants are without foundation. Nor do we need super-mutations, causing jumps or “saltations” in evolution. There is no empirical evidence for them and indeed all the evidence we have points in the opposite direction. Organisms are well-integrated wholes, both at the genetic level and at the phenotypic level (the physical level). Any kind of major instantaneous or rapid change would invariably cause disruption. Furthermore, there seems no need of such saltations. As Darwin himself pointed out in the *Origin*, even so marvellous and complex an organ as the mammalian eye can be put at the top of a chain of organs to be found in animals today, from the most primitive form of sensing device, right up to the human eye. If we can do this in

space, as it were, why should it not have occurred in time? "If it could be demonstrated that any complex organ existed, which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down. But I can find out no such case." (*On the Origin of Species*, John Murray, 1859, p. 189)

Let me move on to what I see as the second point of concern, which in fact rather stems out of the first. I feel that some of the discussants at this point would want to address me in the following way. "Let us grant your claim about neo-Darwinism, for the sake of argument. We will agree that it does say some things, informative things, about the organic world. But can anyone pretend that it really gives us the whole story? Look at the hand or the eye. No wonder people thought they were evidence of God as Designer. They are end-directed, *teleological*, through and through. There simply must be more at work than natural selection working on random small variations. Blind law does not make sand into sandcastles. It makes it into wind-swept dunes. Similarly, it cannot make molecules and the like into eyes and hands. There is an emergent level, or organisms which are integrated teleologically."

Let me at once make a major concession to this critic. I would not deny at all that in biology one gets a kind of integrative organisation which one cannot simply deduce from knowledge of molecules (unless one builds into one's description or definition of the molecules the end result!) Furthermore, I think biological theory is teleological in a way that physico-chemical theory is not. (See my *Philosophy of Biology*, Hutchinson, 1973) It makes perfectly good sense to ask what *function* the eye or the heart has. One would look pretty silly asking what function the moon has. (To light the way of weary travellers?) But further than this I am afraid I cannot go. Moreover, I am not quite sure that the critics are being fair to biology at this point. What one should ask is not whether evolutionary theory can explain the eye or the hand, but how it fares when it faces the whole wide spectrum of biological phenomena. Moreover, just as Darwin asked of his Special Creation opponents, one should ask how fares any other theory designed especially to explain the eye and the hand, when it in turn is faced with the whole wide spectrum

of biological phenomena. There are lots of phenomena which are nothing like so sophisticated and complex as super-adaptions like the eye and the hand. Many phenomena seem to have been designed for one thing and then used for another. Other phenomena seem to break down all too frequently (perhaps the eye itself—certainly human sexual orientation, considered solely from a reproductive viewpoint).

Evolution through natural selection leads one to expect these sorts of phenomena. Very few things are going to work perfectly all of the time. Frequently it is going to be a matter of “making do.” I do not want to underplay the magnificence of something like the hand or the eye; but I do think that if one looks at everything one realizes that there is not some super-designer or quasi-super-designer at work creating the world—at least if there is one, He (She?) works at remote control through the medium of unbroken law. My point is simply that it is a distortion to pick out in isolated fashion the hand and the eye and to say “selection can’t make them”—just as it would be a distortion knowing nothing of cars to pick out a Rolls Royce Silver Cloud and say “Humans can’t make them.” If one puts things in context, organisms or cars, one can see that selection/humans can make them—and given all the failures and blind alleys it is very unlikely that anyone else made them.

A third point which I see coming through the discussion rests on a confusion which must be laid firmly at the feet of Darwin himself. Darwin’s great book is called *On the Origin of Species*. In fact it is only incidentally on the origin of species, that is on the origin of reproductively isolated interbreeding groups. It is primarily on evolution and its causes. However, to allay the fears of discussants, let me assure them (this all sounds a little more condescending than I mean it to!) that biologists from Darwin on have been interested in the problem of the origin of species, and in recent years some very exciting work has been done, both at the theoretical and empirical levels. In particular there has been considerable debate between those (particularly Ernst Mayr) who argue that speciation requires geographical isolation, and those who follow Darwin himself in arguing that speciation can occur between groups of organisms which are not so separated in space (although people who argue in

this way usually concede that some sort of ecological isolation is required).

The point I want to make here is simply that, although matters are certainly not decided absolutely one way or the other yet, there is nothing very peculiar going on here—the sort of problem or mess that would attract philosophers! I do not mean that philosophers ought not to be interested in the problem of speciation. I am a philosopher and I am! My point is that I do not think that there is anything especially odd about current work on speciation. One has two different basic hypotheses about how it can occur, and both in the laboratory and in the field biologists are trying to see how in fact it does occur. (For some more details, see Richard C. Lewontin, *The Genetic Basis of Evolutionary Change*, Columbia University Press, 1974. I myself discuss how the problem of the origin of species presented itself to nineteenth century thinkers, particularly Darwin, in my *The Darwinian Revolution: Science Red in Tooth and Claw*, University of Chicago Press, 1979.)

Let me conclude my comments with a couple of points. First, again at the risk of sounding rather condescending and more irritated than I mean to, let me say that I think the time is now coming when, if non-biologists want to talk about biology and get to grips with its conceptual problems, they are simply going to have to start improving their biological knowledge. Biology today is a thriving technical subject. It has conceptual problems and there is full place for philosophical comment. But many of the problems which I think worry philosophers are non-problems. Read your biology and forget about whether or not natural selection is tautological! (Can I recommend the best introduction to modern evolutionary biology that I know of, which is the collection in the September 1978 issue of *Scientific American*.)

Second, let me make brief reference to your editor's interesting remarks about sociobiology. My reference will be brief because I have recently dealt at some length with just the kinds of points to which your editor refers, in my *Sociobiology: Sense or Nonsense?* (Reidel, 1979) What I would like to say is simply the following. I do not see sociobiology, including the controversial human sociobiology, as a wholly new discipline, which must make its own way

unaided in the outside world, and which must therefore defend itself against all possible criticisms. I see sociobiology, the study of animal social behaviour from an evolutionary perspective, as a natural and unforced growth and development from orthodox and established neo-Darwinian evolutionary biology. This being so, I suggest that because neo-Darwinian biology is a genuine and fruitful branch of science, the respect that it deserves should automatically be transferred to sociobiology. Of course sociobiology pushes to the frontiers of our thought and may require substantial revision. But it is not new in the sense that it must start from absolute scratch. As an extension of a well-confirmed theory already it has the right to be taken seriously—particularly in the light of some of the silly objections offered against it by Marxist biologists and social scientists.

II NORMAN MACBETH

Your Discussion of neo-Darwinism was remarkable for the good will and common sense with which it avoided a pitfall that ruins many colloquies on this subject. What I have in mind is the curious fact that neo-Darwinism (also known as the Synthetic Theory) has never been formulated in any full and authoritative way. It remains elusive, protean; in colloquial terms, one cannot get a handle on it.

Mayr (1963), in speaking of numerous conferences held in 1959 to celebrate the centennial of *The Origin of Species*, says that there was “complete unanimity in the interpretation of evolution presented by the participants. Nothing could show more clearly how internally consistent and firmly established the synthetic theory is.” This complete unanimity seems to have declined since 1959. Gould (1977) is a devout Darwinian, but he does not hesitate to depart from Darwin’s conviction that evolution is generally steady, gradual, and continuous. The late C. H. Waddington, a shining light among the neo-Darwinians, felt free to declare on several occasions that natural selection, the central Darwinian dogma, was a tautology. Surely there cannot be wide agreement with these views, hence I suggest that the unanimity was an artifact of

vagueness. When the theory said nothing clear or precise, there was no burning need to dissent.

It is sometimes asserted that the theory is set forth in Simpson's magisterial works on evolution. No doubts the elements are there; but who would dare to pull them together into a crisp formulation and say that this was the true doctrine or even that this was Simpson's own view?

The difficulty of getting a handle goes even further. Being privileged to address a group of zoologists at the American Museum of Natural History early in 1979, I ventured to suggest that a couple of common arguments should be abandoned because they had been pronounced unsound by Dobzhansky, Simpson and Mayr. Three or four listeners protested that Dobzhansky, Simpson and Mayr, although they were good scholars, did not speak for the profession. If they did not, I asked, who did? The answer was that nobody did. I had to congratulate them on being invulnerable to attack if no formulation, book, or person could be taken as representing neo-Darwinism.

Your Discussion opens with a recitation of what Sir Karl Popper "takes neo-Darwinism to assert". This resort to a philosopher for a statement of a biological theory may reflect the lack of any useful formulation by the biologists themselves. In any event, however, Popper's statement would certainly not be unanimously accepted by the profession, since it portrays natural selection as *eliminating* and limits its efficacy to micro changes, whereas the real enthusiasts (Gould 1977) assert that natural selection is *creative* and can cope with macroevolution. Even on these points there is no consensus, so perhaps the prospect of winning wide agreement is so slight that no biologist thinks it worth while to attempt a formulation.

On page 94 Q says: "It would be helpful at this point for someone to define the difference between Darwinism and neo-Darwinism." To this demand B.G. responded with some astute remarks, a deed for which he should be heartily commended because it would have been easy for him to reply that it is impossible to define the difference between the two theories when neither of them has ever been clearly formulated. D.C. should also be commended for struggling gallantly with a series of searching questions without

ever taking refuge in the plea that neo-Darwinism does not have a firm position on such matters. All in all, your participants, though far from achieving complete unanimity, gave an excellent performance.

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Charles Darwin: Life and Habit: Part I*

FRANCIS HUXLEY

MANY PEOPLE have found Charles Darwin irresistible, and it is no wonder. Not only are his books fascinating for his ideas, but for his character: the words, gentle, apologetic and with an air of omniscience, lap round the reader like a sustaining flood and bear him, courteously, to a difficult conclusion. If the conclusion is not always unequivocal, one must remember how Darwin liked to defend himself against all possible forms of criticism, confusing even himself from time to time. But equivocations can be irresistible on their own account, and the speed with which the phrase "Mr. Darwin's theory," referring to the origin of species by means of natural selection, gave place to the single word *Darwinism*, meaning evolution in general, shows that the Victorian public enjoyed being fascinated by Darwin's interlinked hesitations and convictions, and was glad to personify the whole issue, doubts and all, in his gentlemanly figure.

There was certainly much justice in this personification, for public interest in Darwinism can hardly have been any greater than Darwin's own interest in it. Seldom, indeed, has a man pursued a subject so tenaciously, with such industry, and for a greater number of years; just the thought of the energy involved in writing the *Origin* is overwhelming. One need only compare Darwin to Patrick Matthew to see what is at stake. Matthew — as Darwin acknowledged — anticipated all Darwin's main conclusions by twenty-eight years,

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Theoria to Theory, 1980, Vol. 14, pp. 27 – 42
0049-3686/80/1401-0027\$04.50/0

Published by
Gordon and Breach Science Publishers Inc. 1980

yet he thought them so little important that he published them as an appendix to his book on naval timber and did not feel the need to give substance to them by continuous work. Darwin's incessant application, on the other hand, makes one think that he had found in evolution and its related concepts not merely a scientific theory about the world, but a vocation: he had discovered the theory and practice of himself.

It is, I think, this sense of vocation, this enormous faith Darwin had – not so much in himself or his theories, but rather in the facts he dealt with and in his own desire to make use of them – which gives to his writings the winning quality that overrides the jumble of his hesitations and ungainliness. One remembers how he assured a critic that he was going to modify the many *believe's* and *convinced's* that lay scattered through the *Origin*, only to have his critic reply: "You will then spoil your book, the charm of (!) it is that it is Darwin himself." The critic was right: Darwin's hesitations are part of his charm, and if through them he sometimes becomes almost willfully obscure, this seems to be because he could not always tell his weakness from his strength. Was his generosity, for example, nothing but a lack of self-assertion, or his hardy patience but a kind of diffidence? As for Darwin's perseverance, his son Francis stated that the word "seems hardly to express his almost fierce desire to force the truth to reveal itself. He often said that it was important that a man should know the right point at which to give up an inquiry. And I think it was his tendency to pass this point that inclined him to apologize for his perseverance, and gave the air of doggedness to his work."

This mixture of strength and weakness is the part of Darwin's general habit of mind that seems to have made it natural for him, rather than for another, to seize upon and work out the great principles of evolution. There is an interesting relationship between a habit of mind and the ideas it brings forth: it is like hearing a poet read his own verse, his intonation and the rhythm of his voice bringing out, by a form of resonance, meanings in the verse which another man could not evoke. In Darwin this relationship between a habit of mind and the ideas brought forth by it enables one to look at some fundamental questions: 'What problems was he trying to

resolve, for instance, in his denial of final purposes and the grounding of all his thought upon nature? And from what direction did he approach the great problems of being alive, whether in nature or himself?

Where can one start? Perhaps with that division of himself into two parts, which his wife foresaw before their marriage. "Your mind and time are full of the most interesting subjects," she pointed out to him, "and thoughts of the most absorbing kind, viz. following up your own discoveries, but which make it difficult for you to avoid casting out as interruptions other sorts of thoughts which have no relation to what you are pursuing, or to be able to give your whole attention to both sides of the question." A result of this one-sided application to the problems of life—for he was unable to stop thinking as he had always done—seems to have been the general decay of his aesthetic faculties, one of the stock items in our knowledge of Darwin. This decay was a serious matter for him, as he confessed; it is also a serious matter for anyone interested in him, a weakness being a valuable gauge of a man that one cannot afford to dismiss lightly. This weakness, besides, goes directly to what Darwin himself thought mysterious; and mysteries—like weaknesses—may not be excused, especially in a man as fond of plain facts as was Darwin.

The mystery centers around what Darwin referred to as the "sublime," and his weakness—which later turned out to be his strength—lay in his inability to deal with it directly. Often, during his voyage in the *Beagle*, he went out of his way to let the stupendous productions of nature astonish him, and he fed his sense of awe upon Milton and Wordsworth, the one poet intent upon the evocation of sublimities, the other upon disclosing the sublime in the actual. The sublime is rarely the same as the beautiful: it is a brooding and almost material emotion that refers to things before creation, things too vast to own an exact form. Mountains, for example, were sublime, especially when undecorated with the frivolities of living things: "Neither plant nor bird," wrote Darwin of the Andes, "excepting a few condors wheeling around the higher pinnacles, distracted my attention from the inanimate mass. I felt glad that I was alone: it was like watching a thunderstorm, or

hearing in full orchestra a chorus of the Messiah." His reaction to such a billowing upsurge of sublimity, whether caused by mountains or by music, was a coldness and shivering along his spine. Herbert, a college friend, noted how at the end of a particularly impressive piece of music, Darwin turned to him with a sigh and asked, "How's your backbone?" A. E. Housman recorded the same reaction in himself when reading or reciting poetry: what is more, he used the accompanying shiver to gauge the worth of the poem that caused it. True poetry, many shivers: indifferent poetry, none. Darwin's reactions to music, however, were less selective: he was quite tone deaf and could not distinguish one melody from another. Was it the same when he read Milton, one wonders: did a flood of shivers course along his back at the sublimities he encountered there, regardless of their meaning? That he came to prefer library books with happy endings—he could not abide unhappy ones, and said there should be a law against them—to Milton, or to the historical plays of Shakespeare, which he had read assiduously in youth, makes one suspect that Darwin indulged in the sublime rather than engaged himself with it, mistaking a passive ability to shiver for an activity of the mind. The sublime, however, continued to visit him as he aged, but less and less, and its deepest questioning remained unanswered. Thus, the Duke of Argyll, once observing that the wonderful contrivances of nature seemed to be the effect and expression of mind, records that Darwin exclaimed: "'Well, that often comes over me with overwhelming force; but at other times,' and he shook his head vaguely, adding, 'it seems to go away.'"

Where did it go, the visionary gleam? For Darwin, music, grand scenes, God, the sublime, all called out in him the same vague but powerful emotion which, since it was directed nowhere, went nowhere; but which came, indubitably, from some central fount in himself. What was this place, and why did Darwin shiver? He himself thought that music, for one, evoked the strong emotions felt by man's earliest forebears, who courted each other by song; but this is Darwin at his most mechanical and imperceptive. When people talk about inherited memories, they refer usually to some capacity in themselves that has not been used, or some growth that has been frustrated: this seems to have been so with Darwin whose fear of

hereditary weakness (whether justified or not) may also have a bearing here. The sublime at which he pleurably shuddered was a part of himself, a mass of usually inanimate passions stirred up by various sights and sounds, but never used: "We know that every strong sensation, emotion, or excitement—extreme pain, rage, terror, joy, or the passion of love—all have a special tendency to cause the muscles to tremble; and the thrill or slight shiver which runs down the backbone and limbs of many persons when they are powerfully affected by music, seems to bear the same relation to the above trembling of the body, as a slight suffusion of tears from the power of music does to weeping from any strong and real emotion." Darwin certainly experienced a number of these sensations and excitements when on the *Beagle*, and it was his ability to do so that kept his interest so fresh and eager. There was, however, a decided change in his life when he returned to England, for there he had few of the excitements and adventures that had lightened his five-year journey around the world, and those he did have stimulated him so much that both his health and his work suffered. He began to repress these passions, and his substitutes for them were mild in the extreme: he took to snuff, to stimulate his nose and excite sneezes; he read novels, in order that the fortunes of the heroine might excite his interest; and he played games of backgammon with his wife, that he might glory in feelings of triumph when he won and mock anger when he lost. "A physician once remarked to me as a proof of the exciting nature of anger, that a man when excessively jaded will sometimes invent imaginary offences and put himself into a passion, unconsciously for the sake of reinvigorating himself; and since hearing this remark, I have occasionally recognized its full truth." Darwin, without a doubt, is here talking of his own anger, habitually repressed and exercised only in joke; but even in this histrionic form, it was vigorous enough to drive away for a time that feeling of being excessively jaded that accompanied his life like the drone of a bagpipe.

At first sight, the idea that Darwin ever used anger as a tonic seems strange. His contemporaries were united in declaring him to be the mildest and best-tempered of men: he was, wrote G. J. Romanes, "marked by a certain grand and cheerful simplicity,

strangely and beautifully united with a deep and thoughtful wisdom which, with illimitable kindness to others and complete forgetfulness of self, made a combination as lovable as it was venerable." Emma Darwin, before her marriage, wrote of him: "He is the most open transparent man I ever saw, and every word expresses his real thoughts . . . He is particularly affectionate, and very nice to his father and sister, and perfectly sweet tempered, and possess some minor qualities that add particularly to one's happiness, such as not being fastidious, and being humane to animals . . ." He was, wrote Thomas Huxley, like Socrates, with a firm belief in the sovereignty of human reason, and always desiring to meet a man wiser than himself. Certainly, he was sage, peaceable and benign.

This radiant amiability, however, must not make one forget that Darwin could use anger as a tonic, or that the sublime made him shiver. He shivered at other things, besides: "I remember well the time when the thought of the eye made me cold all over, but I have got over this stage of the complaint, and now small trifling particulars of structure often make me very uncomfortable. The sight of a feather in a peacock's tail, whenever I gaze at it, makes me sick!" We know, too, that he suffered from bad heat control. Indoor he habitually wore fur-lined canvas overshoes and a large shawl; this shawl he would throw off from time to time especially if his work did not go right. "It was," his son wrote, "as if he could not hit the balance between too hot and too cold."

To have bad heat control is, in one sense, to have little control over impulse. The impulse that made Darwin most uneasy was anger, and he was so well aware that "anger had a tendency to multiply itself in the utterance" that he was scrupulously polite even to those he had good cause not to be. His fear of this impulse was his fear of himself, showing one the negative of all those qualities his friends praised in him: self-frustration, inability to assert himself, and an ambiguous attitude toward responsibility. Scientifically, his responsibility was complete: he had, said Thomas Huxley, "a certain intense and passionate honesty by which all his thoughts and actions were irradiated, as by a central fire." Toward his own social position, however, he refused to be responsible, instead becoming dependent on his wife and on a barricade of

unbreakable routine to shield him from asserting his real character in the world. Nor would he stick up for himself, but, Huxley wrote, would "accept criticism and suggestions from anybody and everybody, not only with impatience, but with expressions of gratitude sometimes almost comically in excess of their value." He hated being recognized in the street by strangers, and found it incredible that people would be able to argue oratorically in public; and he felt himself so little the owner of his possessions that at his home at Down he would inquire in a small voice whether the carriage might conveniently be sent in to the village to get a parcel.

This great need for dependence, in a mind independently regarding the true nature of things, is strange; but it merges imperceptibly into that great devotion which marked everything he did. (A German phrenologist, looking at a photograph of Darwin's head, remarked that he had a bump of reverence large enough for ten priests. Darwin, I think, was a little superstitious about phrenology; he remembered how, when he came back from his voyage on the *Beagle*, the first thing said by his father was that the shape of his head had changed, and Darwin acknowledged the force of the remark. However, when someone tried to explain the habits of cuckoos phrenologically, he rebelled.) This devotion had, to be sure, certain negative features. His first conscious devotion was paid to his father, a tyrannical man whom he loved and from whom he never got free: this captivity was such that throughout his life he felt incapable of taking his father's place. "I think my father was a little unjust to me when I was young," he confess in later life; "but afterwards, I am thankful to think I became a prime favorite with him." Darwin, though he often felt his energies were the gift of his father, yet fared better than his brother, Erasmus, who became a charming but tormented batchelor. Darwin, indeed, sometimes managed to escape, though largely without realizing it: his Journal of the voyage of the *Beagle* shows what he was capable of. On its last page, he wrote: "In a moral point of view, the effect [on a traveler] ought to be, to teach him good-humored patience, freedom from selfishness, the habit of acting for himself, and of making the best of every occurrence." It is extraordinary that on his return to England, when he was once more under the dominion of love and

respect, he should have ignored the qualities that made him so good a traveler – for his adventurous exploration of whatever country he visited was completely admirable – and instead should have devoted himself to an eight-year study of barnacles, the value of which he himself sometimes questioned. It is true that, shortly after his return, he also got married, and that he published his journal of that voyage, his observations on the natural history of the countries he had visited, and his theory about coral reefs—all large and interesting works. The barnacles, however, are monumental: appalling numbers of them, all minutely described and put into order. To turn the pages of Darwin's opus is to become aware of a tremendous and slightly pointless joke: the barnacle, trying out an infinite number of variations upon itself. How was it that Darwin felt the need to plumb this joke to its depths?

Darwin, of course, got a lot out of the barnacles: they gave him a gruelling training in taxonomy and taught him something about what a species was, which nothing else could have done. But beyond this, there was a certain self-indulgence in the boredom of the work, which on the one hand satisfied his passion for collecting and for losing himself in minutiae, and on the other offered him a form of exercise that took the edge off his anxiety about himself without threatening anyone. Barnacles were his duty, a filial work covering a secret indulgence in thoughts so daring that for years he could not write them down. The witless joke about the barnacle pales into nothing before the sight of Darwin, who found it so difficult to assert himself, and whose work was in a sense an escape from this problem, stumbling backward in his seclusion upon the one question that was to challenge collective authority. Darwin was well aware of this, one reason he avoided publishing for so long; in a letter of 1844 he writes that he is "almost convinced . . . that species are not (it is like confessing a murder) immutable." The consequences of this murder were with him all his life, and he never quite tackled them face to face. "I feel in some degree unwilling to express myself publicly on religious subjects," he humbly wrote years later, "as I do not feel that I have thought deeply enough to justify any publicity."

Darwin came to live his life on two levels, that of his dependent

family life, and that of his independent thought. The characteristic features of both were set in motion by a single mechanism, a central anxiety and frustration. His desire for routine and dependence reached remarkable lengths: routine was, for him, an external method for controlling his reactions. One may see this plainly in the way he treated visits and visitors. Although he was a very sociable being, to meet other people outside his home, or outside the hours he allotted for such meetings, caused him such excitement that he felt ill, became giddy, and was unable to go to sleep at night. This is an odd change from his *Beagle* days, when he was always "making the best of every occurrence," working hard and sleeping well. It is fairly plain that on his return to England, Darwin had nearly made his energies his own, and he might have become as independent as his adventures implied he could be: but home was too much for him, he slipped back into his old habits and the great change never took place. His energies and ambitions were carefully damped down and hidden away in his work, just as he hid himself away in the country — "My life goes on like clockwork," he wrote prophetically to Captain Fitz-Roy from Down, "and I am fixed on the spot where I shall end it." It was at this time that his aesthetic responses were increasingly stifled, along with the central psychological being in himself which he would not allow to grow.

The anxiety produced by this repression, although kept in bounds by the motherly attentions of his wife — he called her Mammy — the playful love of his children, and the routine he made for himself, had to come out somewhere: and it came out in his work. After finishing his three hours of work every morning, he would come into the house like a small boy and say, proudly, "I've done a good day's work." But even though his day's work was over, he could not stop thinking about it. He went on walks, to exhaust his mind of its activity: he found riding a horse better, since the attention needed to keep it under control usually excluded other thoughts. He would go to bed at ten every evening, after intervening the daily backgammon game between himself and his preoccupations; but even so, the force of his thoughts was such that he could not sleep for hours. His anxiety, not allowed to act on the problem it originated from, thus became geared to his work, and his problem lost itself in

a perpetual worry about unplaced facts rather than unplaced feelings. His anxiety moved both him and the facts in his mind, endlessly: when he and they produced a new idea, he would say, "I shan't be easy till I've tried it," and his mind would entertain a new worry. And though he spent so much time trying not to think, yet he held time to be extremely precious—partly, no doubt, because he allowed himself so little to use in his work. Too much work made him giddy, caused him to vomit from overexcitement; yet if he did not work, he felt deeply uneasy. This stupefying center of his activity got more and more out of his control, until at last he died after a heart attack brought on, it seems, during a prolonged irruption of it into his consciousness.

This, of course, is but a small part of the story. There is not doubt that he suffered a great deal from this neurasthenia, but it is a mark of his strength and of how amply he could endure this suffering that his death did not come until he was seventy-three and after he had written and published some three million words. Whatever his handicaps, then, he remained immensely active; and his predicament, of sitting on an enormous frustration that urged him to act and then forced him not to, can perhaps be illustrated by him sitting in his favorite armchair. This chair had a very high seat which let his legs dangle straight to the floor, as he liked them to. Suddenly, however, he would feel that the seat was not high enough, and he would put a footstool upon it and sit on that. His feet then were so far off the floor that he had to get a chair to rest them on, to be comfortable again. So he would mount, seesawing upward.

To trace any neurasthenia down to a single root is seldom possible, and usually demeaning. Gould, in his *Biographical Clinics*, thought Darwin's illness was all due to eye strain; Darwin himself thought he was touched by a hereditary mental weakness; and others, that the unknown illness which struck him down in Valparaiso had a lasting bad effect on him. Perhaps these things are all true; perhaps too, but without making a cause of it, we can point in another direction, to an empty place in Darwin's life that gives us a different way of looking at him and his thought. This place was the one which should have been filled by his mother. Of her he could remember only her work table, a black velvet gown she wore,

and the day of her funeral. She died when he was eight; and with her, it seems, died the dependence of his imagination on its center, so that his emotions remained largely without shape or meaning. It was these shapeless emotions that awed Darwin later as the looming presence of the sublime—a presence that nearly always had a certain Miltonic brutality about it, seldom being dissolved into a saving intuition. However, the presence also fascinated him in the shape of a painting by Sebastiano del Piombo: and this is noteworthy, for the painting shows a Madonna and child, the Madonna being very actively protective. The painting, however, is also sublime in the bad sense: del Piombo was a pupil of Michaelangelo, copying his tremendous forms with little understanding of their meaning, much as Darwin could shiver when listening to *The Messiah* although he was tone deaf.

Darwin himself summed up his trouble well when he confessed his inability to master foreign languages, to compose verse or to draw, and he bemoaned the difficulties he had when writing—“There seems to be a sort of fatality in my mind leading me to put at first my statement or proposition in a wrong or awkward form.” This fatality is surely a failure of that feminine intuitive capacity of which Goethe, for instance, made such good use. It was not that Darwin lacked intuitions, but that he mistrusted himself and belabored the grace out of them. They are best seen in his early notes on evolution. “If we choose to let conjecture run wild, then animals, our fellow brethren in pain, disease, death, suffering and famine—our slaves in the most laborious works, our companions in our amusements—they may partake [of] our origin in one common ancestor—we may be all melted together.” This great sentiment with its loving conclusion is typical of Darwin, yet he never returned to use that unexpected image of melting which is so moving. Darwin did not easily melt, he preferred to particularize and construct: a way of thinking that led him to see nature as being masculine rather than feminine. It is noteworthy, for example, that Freud’s theory of the primal horde, with its nasty old man taking the women and castrating all his sons, originated in one of Darwin’s speculations in *The Descent of Man*. Darwin’s own assumptions come out well in his theory of sexual selection where, although he suggests that one

function of display is to stimulate the female, he emphasizes how males are chosen for their superior ostentation and force. Natural selection also, for Darwin, is a struggle between males over a frigid but maternal future. The female chooses, but is hardly stirred; the males struggle for her, and are chosen. "They die, without they change, like golden pippins; it is a *generation of species* like *generation of individuals*." The image of a golden pippin in this, another of his early notes of evolution and natural selection, is beautiful and surprising, reminding one both of the golden apples of the Hesperides, guarded by the muses and the dragon, and of the fatal apple in the Garden of Eden. The woman eats both: in Darwin, however, her presence is almost completely hidden behind the masculine struggle for survival.

The tone of Darwin's thought is therefore quite different from that of Goethe or Lamarck or Darwin's grandfather Erasmus. The book to which *The Origin of Species* was most often compared in Darwin's own time, Chamber's *Vestiges of the Natural History of Creation*, was, on the face of it, somewhat similar: but the similarity lay wholly in the attempt to arrange natural facts evolutionarily and not at all in the mechanism by which evolution took place. Chambers relied upon the Creator to give both the original impulse and, it seems, the plan which the impulse was to follow; Darwin saw a natural mechanism bringing about change so clearly that a divine puppeteer was to him an irrelevance. But his cast of mind was quite different from that of the Vitalists, who saw nature as raising herself by means of her general force of desire for the end that was to be hers. Nature, for them — as for Goethe — was female; and various mythological motives were imputed to her, as hidden and divine motives are always imputed by men to the women who fascinate them. This, Darwin would not do: in any case, to him nature was not female and, therefore, full of vitalistic movements, but male and full of machinery. Darwin insisted upon mechanism as the sign of intelligibility; and although he always dealt with purpose, he did so entirely in terms of structural mechanism — unlike Goethe, for whom purpose was a last cause before it was an immediate one. Darwin, it must be said, was by no means unimpressed by the power of life: he often was, as one may read in his Journal: "Thus do we see

the soft and gelatinous body of a polypus, through the agency of the vital laws, conquering the great mechanical powers of the waves of an ocean which neither the art of man nor the inanimate works of nature could successfully resist." But the vital laws are blind, and they produce their astonishing effects only when one conflicts with another. Goethe might have agreed, but only if he could have argued a mythological complicity of the laws with a shaping entelechy. Such an entelechy Darwin refused to admit: and it was over the results of this refusal, of course, that the principal controversy raged when the *Origin* was published. Has man any meaning if the wiles of God have not shaped Creation? What may one enjoy if nature is entirely selfish and masculine, with no providing bosom on which to rest? Where is the all-embracing goddess?

Darwin's interest in machinery was such that lines of descent did not interest him. He was at heart an ecologist and a physiologist, rather than a rationalizing theologian: long trains of abstract thought always made him uneasy because he could not keep up with them, and he only felt at home when dealing with observable operations in their natural and observable environments. He was, besides, not so much interested in species as in the related structures that different species of the same family all manifest. Thus, he looked at the different structures among various kinds of domestic pigeons, and he was content when he had pointed out how they had all been artificially bred from one original stock, the rock pigeon; he analyzed the function of the different mechanisms he found in the flowers of orchids, brought them down to their simplest form, and so could postulate a common origin for them all—a center from which they radiated rather than an ancestor from whom they depended like strung beads. For a structure to him meant a habit, and a habit implied not only an internal need but outer forces to which, for good or evil, the organism had to become habituated. The orchid's flower was a device by which the plant took advantage of the habits of insects, and it was only by inquiring into this use of its various parts—which he called adaptation—that he was able to put time into natural history, and order into taxonomy. In one sense, therefore, he might well have called his book *The Origin of Habits*

rather than *The Origin of Species*. Like many others, he was never quite certain just what a species was.

This ecological, physiological interest made his treatment of any problem at once enormously broad and minute. Dealing with vast arrays of facts, he needed equally vast tracts of time if he was to account for them evolutionarily. Had it not been for Lyell, indeed, he would have been baffled right at the beginning, left facing the awesome and intractable sublime. As it was, he took to Lyell as he had taken to Euclid when a child, as a most satisfying exercise combining reason and observation; and with the help of Lyell he began himself to undertake the work of creation and to transform the sublime into matter. The methods and aims of geology fascinated him: "It makes me groan," he later wrote to Lyell, "to think that probably I shall never again have the exquisite pleasure of making out some new district, of evolving geological light out of some troubled dark region. So I must make the best of my Cirripedia . . ."

Without a doubt, it was geology that effected Darwin's awakening to the nature of the world, to the methods of science and to the existence of his own powers. He started off on the *Beagle*, indeed, with the exciting notion that he might write a book on the geology of the entire globe; and it was his continual interest in the subject that helped him affirm, even against such objectors as Huxley, that nature makes no jumps: *Natura non facit saltum*. This is a prime axiom in Darwin's thoughts that has something to do with his unmythologizing habits. Goethe, for instance, is full of jumps made by his imagination, jumps which are usually more convincing than true — and so is Cuvier, with his theory of sudden catastrophes. Not so Darwin. "If this be so, and I cannot doubt it, the grand and broken chain of the Cordillera, instead of having been suddenly thrown up, as was till lately the universal, and still is the common opinion of geologists, has been slowly upheaved in mass, in the same gradual manner as the coasts of the Atlantic and Pacific have risen within the recent period. A multitude of facts in the structure of the Cordillera, on this view receive a simple explanation."

Darwin, it must be said, could often be romantic about geology if he chose — but not for long. Thus, when speaking of a torrential

river that rolled large stones along with it and made a roaring, rattling noise, he wrote in the Journal: "It was like thinking on time, where the minute that now glides past is irrecoverable. So was it with these stones; the ocean is their eternity, and each note of that wild music told of one more step towards their destiny."

"It is not possible for the mind to comprehend," he then immediately goes on, "except by a slow process, any effect which is produced by a cause repeated so often, that the multiplier itself conveys an idea, not more definite than the savage implies when he points to the hairs of his head. As often as I have seen beds of mud, sand, and shingle, accumulated to the thickness of many thousand feet, I have felt inclined to exclaim that causes, such as the present rivers and the present beaches, could never have ground down and produced such masses. But, on the other hand, when listening to the rattling noise of these torrents, and calling to mind that whole races of animals have passed away from the face of the earth, and that during this whole period, night and day, these stones have gone rattling onwards in their course, I have thought to myself, can any mountains, any continent, withstand such waste?"

Darwin had here found a true sublime, and it—like all true sublimines—proved difficult to contemplate with comfort. "The mind," he says elsewhere on the same subject, "is stupefied in thinking over the long, absolutely necessary lapse of years . . . "; and again, "It makes the head almost giddy to reflect upon the number of years, century after century . . ."—years required for the sea to break down cliffs, for rocks to become sand. Even in this guise the sublime overcame him: stupefaction and giddiness were the very marks of his malady during his middle and old age. But he continued to contemplate his discovery, the gradual but insidious effects of minute causes during tremendous stretches of time: a phenomenon which impressed him the more, no doubt, because it was a picture of his own mental activity. "My mind seems to have become a kind of machine for grinding general laws out of large collection of facts," he was to write later in life. He was fascinated by another organized being that worked on somewhat the same lines: the earthworm. The earthworm, like Darwin, eats the earth it travels through, triturating recalcitrant lumps of matter within

itself until they are ground down to worm-cast mud. When one thinks of Darwin and the world of facts he thus painfully ate, his own rhetorical question comes to mind: "Can any mountains, any continent, withstand such waste?"

Darwin's mind, therefore, with the range of its interest and the fineness of its ratiocination, parallels in miniature the geological process as he imagined it. Likewise, his passion for collection was almost as grandiose and indiscriminate as the geological process of erosion and sedimentation. He collected everything: shells, coins, franks, seals, butterflies, in his youth; birds, insects, minerals, plants, marine organisms, barnacles, in his later years; facts, always. He collected some things for their numbers: he collected money very well; he collected reviews of his books, totting them up for and against; and he collected his own productions in the form of a myriad of notes, abstracts of books and manuscripts.

These collections to begin with had no principle of organization with them: indeed, his first collection of beetles was mere jackdawism, for he hardly bothered to examine the ones he got. He amassed facts and objects like a miser, finding later that they had turned into the treasure he most desired: evidence. It was this evidence of forces at work in the outside world that gradually replaced his ability to enjoy poetry, Shakespeare, or other witnesses of the inner life, and that also stifled his religious faith. "But I was very unwilling to give up my belief," he wrote of his youthful struggle with religion; "I feel sure of this, for I can well remember often and often inventing day-dreams of old letters between distinguished Romans, and manuscripts being discovered at Pompeii or elsewhere, which confirmed in the most striking manner all that was written in the Gospels. But I found it more and more difficult, with free scope given to my imagination, to invent evidence which would suffice to convince me." This form of the imagination, for which no evidence is needed but the experiencing of it, was thus outside Darwin's capacities to make use of, and he had to make do with the evidence of grand facts which he could anatomize at leisure and which, by their nature, were incontrovertible.

To be continued

On taking new beliefs seriously: A case study

R. L. FRANKLIN

WHEN I HAVE a belief it is often easy to say what evidence should make me change it; e.g. when I find in my pocket the letter I was sure I had posted. However, the matter becomes less easy in proportion as changing a belief would throw doubt on many others, and the belief is embedded in a *belief-system*. Such cases may range from a new scientific hypothesis to a whole view of the world.

In this paper I approach a general problem about the rationality of accepting or rejecting such embedded beliefs, by means of a case study of myself. I have come to hold beliefs which to many will seem extraordinary. I want to examine my reasons for adopting my views; or at least my reasons as far as I am aware of them. For in principle there are two questions about my beliefs: firstly, why do I hold them; secondly, are they justified? In simple cases the same thing (viz. the evidence for my belief) may answer both questions. But in complicated belief-systems the answers may be quite different, and it may be more difficult to discover why I hold a belief than to assess the reasons I might find.

I

The first issue is whether there is any difference in principle between the rational assessment of embedded and more separable beliefs. In each case, it might seem, the appeal must be basically to facts and their implications, or, more formally, to premisses and

arguments. Our starting premisses may themselves need to be defended by further considerations. But in the end either we get down to acceptable premisses—presumably ultimately based on experience—and cogent inferences, or we have no good reasons for our conclusions. So the only difference is that with embedded beliefs the process no doubt tends to be more complex.

On this general epistemological issue some of the most significant work in recent years has been done by philosophers of science. Their investigations of large scale changes in scientific belief throw doubt on the notions both of experience and of inference as employed above. The relevant points apply outside science too. The long and complex argument might be sketched as follows.

First, as to experience: this must be not merely a looking but a looking *for*, a testing of hypothesis. Even to understand the hypothesis we need a whole viewpoint, which also dictates what we are to look for as evidence, and what will count as finding it. Thus our observation is always theory-laden. This does not matter if observers have sufficiently similar backgrounds. But the wider the conflict of viewpoints the less agreement there will be on what counts as evidence and why; and in extreme cases there may be no obvious criterion of sound observation to which we can neutrally appeal.

Second, as to inference: as a matter of logic explanatory theories are always underdetermined by their evidence, and we must pick the most satisfactory one. But its satisfactoriness must depend largely on its fit with the rest of our beliefs. Again when people hold much in common there is little difficulty; but in clashes of large belief-systems the rival explanations each seem more satisfactory to their adherents. The rival systems are *nearly closed circles* of belief, each accounting for all the evidence in some way, even if only by *ad hoc* auxiliary hypotheses. No doubt in such cases, human nature being what it is, each group is likely to overestimate the strength of its case. However that is incidental human weakness, and the problem goes much deeper. It is not just that bias is easy, nor that the debate is immensely complex. Rather the weight given to the conflicting considerations will itself *properly* depend at least largely on the views already held.

These points lead to a third one concerning the attitudes which investigators should adopt. The traditional position is that "A wise man . . . proportions his belief to the evidence."¹ Unless, perhaps, we are forced to act and must therefore bet on one outcome, we must attempt to hold in abeyance our human tendency to believe too readily. The suspension of belief in such cases is not merely a wise precaution against error, but a basic principle of intellectual honesty. Yet here again investigation particularly of the development of large new belief-systems in science seems to modify this view. It is not merely that few people are in fact able to challenge an impressive orthodoxy unless they are first strongly convinced of some new viewpoint. It is the deeper point that working out and testing a new belief-system may be a task taking decades or generations; and during this time the new system typically cannot adequately answer all the objections legitimately raised. Hence in science and elsewhere great new belief-systems appear to establish themselves only when developed and expounded by dedicated people whose commitment to them persists, not merely before the evidence for them is conclusive but in the teeth of apparent counter-evidence.

As one of many available illustrations of these points, consider Copernicus and stellar parallax. If the earth really went in a huge orbit round the sun, then the apparent relative positions of the stars should alter—e.g. as the earth approaches and recedes. But no one could observe such parallax. The evidence on this point clearly favoured the older Ptolemaic view. The new astronomers replied, totally *ad hoc*, that therefore the stars must be too far away for the parallax to be observed, and so the Universe must be vastly greater in size than we had otherwise reason to believe. Long before a telescope was built that could actually detect stellar parallax all knowledgeable men had adopted the new view, and the original objection had been turned on its head to argue that since the earth went round the sun, and since no parallax was observable, therefore the universe must be of vast size. Similar neutralization of, rather than answering of, the original counter-evidence can be found in almost every major scientific development. So what seems to one system a clinching fact is to its rival a mere puzzle to be explained away. And if the systems are to be adequately developed, then

individual participants, though no doubt struggling to keep their intellectual integrity, must take sides long before the evidence is all in.

The difficulty of finding conclusive arguments in such cases can lead towards a radical scepticism as to whether science ever really progresses towards the truth. My own judgment would be more sober and conservative than that. However that question is too high for me to discuss now. At least in the situations that Kuhn would call a clash of paradigms,² the indecisiveness and question-begging seem essentially temporary. The rejection of the Ptolemaic system was not a mere change in intellectual fashion, but a scientific advance. In the end we do seem able to reach a rationally based conclusion — at least for a time. The result may of course go either way, for not every challenger of accepted beliefs is a Copernicus. Eventual failure is commoner than success, and there are all sorts of different respects in which challenges may neither wholly succeed or wholly fail.³ But the only intermediate case necessary for later discussion is where a new belief-system produces surprising new facts, which nevertheless can ultimately be reconciled with an older view. e.g. many a doctor today might accept acupuncture as a technique which apparently works, and yet not accept the tradition of Chinese medicine out of which it comes.

Under what circumstances, then, is it reasonable to persist in, or to alter, our views in such cases? There has been some discussion, in Lakatosian terms, of criteria for distinguishing a progressive from a degenerating research programme.⁴ Yet not only is this distinction difficult enough to draw, but it applies to cases where the debate is fairly well advanced. I want now to focus on an issue which seems logically prior, though it may in fact arise at any stage of an investigation. This is whether or not even to *take seriously* (i.e. take intellectually seriously) some other belief-system at all.

“Taking seriously” is a phrase with several senses. Here it means *accepting a view as one that a knowledgeable, honest and reasonable person might hold*. This normally implies that even if we are sure it is wrong, we accept that it *might* turn out to be right, in some sense which is more than mere logical possibility. We normally use the phrase when speaking of views we do not hold: for of course we

normally take for granted that our own beliefs should be taken seriously; though we may have to argue against an opponent that ours should be taken seriously by him. It is not to be confused with taking an *issue* seriously, in the sense of thinking it important: for we might take an issue seriously (e.g. racism) and yet not take intellectually seriously, in my sense, the viewpoint opposed to our own; or conversely we may take a viewpoint seriously (e.g. hold that the Steady State theory is still a reputable hypothesis) without doing anything about it or even keeping up with the discussion. Finally, though it is an important dimension of reasonableness it is not a necessary condition of rationality: there are some extremely intelligent and expert people who seem rarely to take other views seriously; i.e. once they have made up their mind they can see no other views as rationally open possibilities.

Now it seems clear that our attitudes about what is or is not to be taken seriously vastly influence our allocation of time and effort. Often not taking a view seriously is seen as a good reason for not spending any time on it, not taking it into account when we consider relevant matters, etc. Hence it would surely be good to have rational criteria for such attitudes. Are there any?

I suggest we should try to draw a distinction here between what I shall call personalized and objective reasonableness, or P-reasonableness and O-reasonableness. My idea is that in conflicts of belief-systems reasonable and competent people may take different views. But in such situations cranks may also allege sweeping new theories without adequate support. ("Crank", however, may easily be applied to opponents to those who do not deserve it.) I would like to distinguish the cranks from those we might call the competent heretics, by saying that both such heretics and also at least some of their orthodox opponents are P-reasonable, while cranks are not. Hence reasonable heretics and orthodox ought to take each other seriously. Insofar as such issues are settleable, P-reasonable people will eventually tend to converge on an agreed conclusion, which will be seen to be O-reasonable.

Yet this only prepares the vocabulary for a distinction, if we can draw it. Can we get any criteria, however vague or difficult to apply, to distinguish the P-reasonable heretic from the crank? For certainly

we had better admit that here we do often go by feel and hunch which is not only in principle fallible but in practice often mistaken.

Kuhn in this connexion strongly emphasizes the current state of the relevant discipline: scientific revolutions occur only when current paradigms fail. However I am not sure this shows more than the perhaps understandable rigidity of the orthodox. Why must we wait for failure before we can advance? There seem to be four further criteria for reasonableness. (i) Heretics, as opposed to cranks, must show a competent grasp of the issues involved, whether or not they have professional expertise. (ii) Their case should start from some sort of evidence rather than, e.g., a mere hunch. (iii) Their arguments should show respectable coherence and acuteness. And (iv) though one must expect new enthusiasts to be enthusiastic, an important dimension of their credibility is whether they show any inclination to give serious attention to objections. These four factors are at least relevant, and can in principle be assessed independently. If they are not jointly sufficient for P-reasonableness, and so for taking such views seriously, then either we must find stronger criteria, or else admit that vital decisions about the direction of our time and effort are largely made without rational basis.

A final remark is that the issue will often turn on whether given phenomena are *explicable* within a given system. There has been much discussion in philosophy of science about the notion of explanation, but the criteria there canvassed are, I think, too strict for this purpose. A system can claim that phenomena are explicable within it, even if not explained, provided it can offer something like an explanation-sketch which cannot be shown to be impossible. What we need is a *picture of a possible mechanism* (in the broadest sense of "mechanism"), which we believe to be operating and which is compatible with our overall belief-system.

II

I shall now explore these suggestions further by means of a case study concerning my own beliefs. I find myself believing that certain phenomena occur, and that they have a certain sort of explanation.

The things I believe are explicable within one belief-system, but are incompatible with both the standard commonsense and the standard science of our culture. Am I then P-reasonable in accepting them?

The story concerns Transcendental Meditation (TM), which has been taught by Maharishi Mahesh Yogi since 1957.⁵ Maharishi is a Hindu monk, but TM is presented as involving no commitment to any system of beliefs. The meditator is not required to accept the Vedic belief-system out of which it arose, or even to believe it will work. It is presented, in the typical words of a TM leaflet, as “a simple, natural technique which quickly establishes a physiological state of extremely deep rest.” Meditating twice daily for 15-20 minutes is said to have extremely generalized and beneficial effects.

The TM programme has faced various challenges, which I may divide into religious and scientific ones. The religious ones are themselves at least two fold. Firstly, some though by no means all Christians argue that, despite the claim that no beliefs are involved, TM is really “Hinduism in disguise”. Secondly a challenge has come from some Hindu/Buddhist sources. For Maharishi is consciously a reformer within the tradition from which he comes. e.g. he claims that meditation, properly understood, is both more effortless and more easily effective than the orthodox had come to believe, and that it does not require either ascetic practices or withdrawal from the world.

The other sort of challenge is scientific: how much evidence is there that a technique from such an exotic source can make good its large claims? TM has always encouraged scientific investigation of its meditation. Hence, as it is taught uniformly in many countries, it has been used in investigating meditation much as *Drosophila* has been used in investigating genes. There is a large body of experimental work on the physiological, psychological and other effects of TM.⁶ I shall not discuss it in detail, for my aim is to present my beliefs as a case-study, and I do not think I ever relied on it very much; but my view is this. Like almost all interesting work in the social sciences, there is controversy over what it establishes. Certainly the TM literature, in appealing to these results, has often seemed to me to be overconfident, and to count its geese as swans.

Yet the claims for the benefits of meditation, particularly on the individual, do seem to me very impressive. The objections I have seen seem to be composed either of *a priori* doubts and warnings, or else of technical arguments that the experimental techniques should have been even more stringent. The systematic counter-arguments I have read are at an unfortunate level of polemic.⁷ In particular I have not found in them any references to reports in reputable journals of failures to replicate the results.

The crucial point however is that surely no deep challenge to ordinary belief-systems is here involved. If we can accept acupuncture, we can accept this; in fact the claimed benefits of meditation can perhaps more easily be rendered explicable. e.g. animals including ourselves have a physiological "flight or fight mechanism", which puts the body into a state of tense alertness for emergencies. Modern society often stimulates this mechanism in situations where outlet is denied, thereby producing cumulative stress. Meditation can be seen as a reversal of the flight-or-fight syndrome, which is therefore beneficial in releasing accumulated stress. More broadly, the effectiveness of meditation is surely compatible with a materialist view of man, and this would normally be regarded as at least a sufficient, if not a necessary, condition for compatibility with a scientific worldview.

For some twenty years, then, TM has presented and still presents this programme. However since 1977 it has added to it another which is incomparably more challenging to both the commonsense and the science of our culture, namely its "TM-Sidhis" programme.⁸ In the broad tradition from which TM came, Sidhis in this context are powers which can be acquired by self-discipline and meditation. They range from the development of character traits to full-blown paranormal powers. The central one in the present context is the power of levitation; though the tradition includes others such as invisibility. The new TM claim is that the development of Siddhis, including some paranormal ones, can be a very powerful method of personal development through the release of stress; and that though they cannot be easily acquired to any high degree, they do not require the long period of ascetic discipline which the tradition believed necessary.

The TM-Sidhis programme is open to the earlier sorts of challenge to a greatly increased extent. There are, firstly, both the religious ones. If the original technique of meditation was already called Hinduism in disguise, then *a fortiori* this could be said about the Sidhis programme. And a further important criticism arises within the Hindu/Buddhist tradition itself. It is there repeatedly said that the cultivation of paranormal powers is a misuse of energies and a profound hindrance to spiritual development. Maharishi claims that this is another misunderstanding, and that properly used and controlled they can vastly speed up such development. This claim is as challenging to many within his tradition as the claim that these phenomena occur at all is to many within our scientific tradition.

As for other objections, it seems clear that there the commonsense and the science of our culture join sceptical hands. Levitation is surely impossible within our current understanding of the law of gravity, and would require some force currently unknown to science. In philosophy, the conflict with materialism would seem to be irreconcilable. If ordinary sensations were already intolerable to Smart because they would be “nomological danglers”,⁹ what would we have to say of the suggestion that a small chunk of matter such as we—or our brain and central nervous system—might suddenly manifest such extraordinary powers?

Now the story comes back to myself. Some seven years ago I began practising TM. My reasons are largely irrelevant since there was no great clash with any normal Western belief-system. Meditation worked for me in the way that it was claimed to; in terms not so much of wonderful experiences—though there was a little of that—but of gradual changes in the direction of better integration of character and better coping with life. So when some five years afterwards I first heard about the TM-Sidhis programme, I decided to investigate further. And here is a striking case of whether or not to take strange beliefs seriously. Another person might reasonably have rejected the TM claims as one of the innumerable weird suggestions which emanate from the lunatic fringe. Such a person and I would not use different logic, or have access to totally different sets of facts; but our trust and our doubt, and our relative weighting of different factors, would be different. Both our

judgments, I claim, would be P-reasonable. In my own case, I was contemplating the possibility of becoming a heretic, but was not acting as a crank.

So I took a TM-Sidhis course. Before beginning, I found, I must sign an undertaking not to reveal any of the instruction. The reason given was, in effect, that it would be improper to risk someone's passing on their own version of this powerful and delicate technique with inadequate knowledge. Whatever implications this restriction has for an assessment of TM's claims, it has a clear implication for me; I have made a promise I may not break. Broadly, however, a distinction is drawn between the instruction, which is confidential, and description of the things I observed on my course, which is permitted.

The relevant part of my course took place in January 1979 at Goulburn C.A.E. in N.S.W. Though over 200 people all told were concurrently involved there in various other courses, the "we" to whom I refer were a group of myself and 31 other men (courses are segregated by sex). The source of our instruction is not itself confidential. It is the classic text on the subject, Patanjali's Yoga Sutras, which is available in various English translations.¹⁰ What is confidential is how the text is to be taken as a guide to the practice -- which again involves a deep revision of the traditional understanding. The theory underlying the practice is used to explain to course participants what is happening. However as with ordinary meditation participants are not obliged to accept the theory.

At an appropriate stage, after being given various other sutras, the group was given what TM calls the "flying technique", i.e. the sutra which is said by Patanjali to lead to levitation. For this purpose the floor was covered with industrial foam about 10cm thick. The foam is spongy rather than springy; it softens a fall but it deadens rather than assists any upward leap or bounce. Beyond knowing that the foam was to break possible falls, we had no idea of what would happen, other than the general notion of levitation. In fact care was taken to keep from us prior reports of those who had done the programme.

Then, as we sat in the usual stillness of meditation practising this

new sutra, various people began to show physical characteristics such as shaking or vibrating, which TM interprets as the release of stress. Yet they reported afterwards that they were deeply relaxed, as meditation had taught them to be, and were letting these phenomena occur while neither encouraging nor restraining them. Then with one person after another there occurred what the TM movement calls "hopping", and regards as the normal first stage of "flying". It was so different to what I had expected that the first time I saw it I did not recognize it. People jerked off the ground and forward. The word "levitation" suggests something graceful and elegant. This hopping was no more graceful and elegant than a baby's first steps. Yet the unanimous report was that such hops were effortless, occurring only when the people concerned were completely relaxed and followed the practice.

As the days passed the performances developed. Here is an example. I was sitting resting on the foam and so had my eyes open (the technique itself is normally performed with eyes shut). A young man landed one or two metres in front of me. He was sitting in full lotus, which is the preferred but not necessary position for flying; i.e. his legs were intertwined with each foot resting on the opposite thigh. He took off and travelled over 2 metres along the ground and some 50 or 60 cms high. (My estimate at the time, in the older units, was that he moved 7 or 8 feet along the foam and rose about 2 feet). He remained throughout in full lotus position. I saw many hops like this, and some which may well have been longer, though I was not so well placed to judge them. A few men later seemed to land with a gentleness so unlike the heavy bumps of the majority as to give some impression of the sort of floating which the word "levitation" most naturally brings to mind.

However I spent little time observing others; it was much more enjoyable to be doing the technique myself. After some days the hopping happened to me also, though I did not hop very well. That it is unwilling is a matter of my own experience. For at the outset there is an enormous temptation to try to produce it by deliberate jerking. It is a matter of plain experience that deliberate jerking feels totally different from the actual unwilling experience that eventually occurs.

Once one has learnt to “fly” in this sense, it becomes part of the twice-daily TM programme, practised in one’s own home, or, if preferred, at the local TM centre. There is an extremely powerful group effect, which the theory renders explicable. At the beginning I found it impossible to hop unless other people were hopping round me, and even now we almost all find we hop much better in a group.

The whole performance, it must be emphasized, is not done for the sake of producing the effects I have described; though at the beginning it is fascinating to watch, observation of others quickly becomes an irrelevant distraction. Nor is it done for the sake of enjoyment, though in fact it is, and continues to be, an immensely enjoyable and exhilarating experience. Nor even is it aimed at the eventual production of clearly paranormal effects for their own sake; that would be the goal that the whole Vedic tradition regards as perverted. Rather it is done primarily for the sake of personal development by the more effective release of accumulated stress. I, and those known to me who have done the TM-Sidhis courses, find that the practice is achieving its primary goal with immense effectiveness. Yet this cannot eliminate the challenge to accepted beliefs. For TM does explicitly claim that the phenomena are initial manifestations of a realm which is paranormal by our current standards—the “Wright brothers stage” of genuine flying or levitation.¹¹ Certainly the phenomena are not presented as inexplicably miraculous or as infringing scientific law, but rather as exploiting a different set of laws for further scientific investigation. In fact scientists in the TM movement—particularly those working at Maharishi European Research University (MERU) in England and at Maharishi International University (MIU) in America—are already developing interesting theories aimed at integrating such phenomena into a new view of physics and the other sciences. Still here we clearly have a striking case of rival belief-systems. In fact now the stage is broadened from a deep but relatively confined conflict with a discipline, of the sort that Kuhn and Lakatos discuss, to a question about whether *all* the disciplines which we collectively call “science” present, in their present form, an adequate account of reality; or whether they must be broadened and transformed, or even set on a whole new conceptual foundation.

III

We now have in principle two issues: (1) is my account reliable; (2) if so, what are the implications? Yet these issues intricately interlock. We judge the reliability of an account largely in terms of its inherent plausibility, i.e. of how it relates in various ways to the rest of our beliefs. Conversely, the nearly closed circles of conflicting belief-systems are only *nearly* closed, and can eventually be modified by new evidence. I shall start with issue (2), taking the account first at its face value to ask what its implications would be. For if it and all other relevant considerations are compatible with our ordinary beliefs, the question of whether it is true loses much of its interest. As my thread in discussing this whole vast issue is merely to offer myself as a case-history, I shall simply state my own beliefs and what I can unearth of my reasons for them.

Clearly in hopping there is a great, though involuntary, discharge of muscular energy. TM would agree, treating this as a manifestation of the release of stress which is the purpose of the practice. Clearly the economical hypothesis is that such a discharge of energy is all that is involved. Yet I strongly doubt that these phenomena are fully explicable within the present structure of our commonsense and science. The first-hand evidence for this is what I described: the hops of over 2 metres, etc. I do not know whether an acrobat could be trained to produce such phenomena; I do know that those to whom they occurred were not acrobats and had not been trained. However the evidence for all belief-systems is complex. All the debates about parapsychology would no doubt be relevant. But as I have not in fact given much attention to them, I shall here confine my comments to some further evidence from TM.

For one thing, I have since my course seen similar hops—though cross-legged rather than in lotus—in the local TM centre, and have later checked the length as at least 2 metres. Further, since this is a process which improves with practice, it is unlikely that I have seen its upper limits. I have seen photographs purporting to show hops in the lotus position, which are apparently some 3-4 metres. No doubt photographs could be faked, but they and my experience are mutually supportive. The photos confirm my trust in my own

experience, while my experience reinforces the reliability of the photos. Beyond this there is the literature which the TM movement produces. Some of the reported phenomena, which might be rather beyond the Wright brothers stage, would, I think, be regarded by almost anyone as paranormal.¹² Of course to others the crucial question again is whether the literature is reliable. It is here that my own experience — not merely my observation of hopping but my general experience of the whole TM movement — leads me to trust where others would understandably doubt.

Beyond this again are questions of theoretical plausibility, where judgments are even more dependent on whole belief-systems. I think that what influences me most is as follows. Firstly, it is a striking fact that this sutra alone leads to such an unanticipated result rather than to the usual stillness of meditation. The theory TM offers, renders this fact explicable; and though like any theory it is underdetermined by the evidence, this is a point in its favour. Secondly, perhaps the crucial point for me is that the theory which explains what is already so surprising, also predicts so confidently that even more surprising, and unequivocally paranormal, results are to be expected. It seems to me to be, in Lakatosian terminology, a progressive research programme.

So I judge that our beliefs will eventually have to be radically altered to accommodate these phenomena. That is not to say that the answer can already be found complete in the tradition from which TM arises. But I think that the process begun by the appropriate employment of this Sutra can release a human capacity of levitation not normally acknowledged in our culture. I believe that the process works by transforming the physiology of the spine and the whole central nervous system. In the initial stages the most obvious effects are the beginnings of this physiological transformation, which are manifested in such phenomena as hopping. However the phenomena, I believe, already sometimes pass beyond that stage.

I claim only that this judgement is P-reasonable; I am undoubtedly a heretic but I deny I am a crank. Incompatible viewpoints may be equally P-reasonable; e.g. one which would take what I have actually seen as a surprising but “acupuncture-type” case, while

suspecting that the indirect evidence of photographs and publications is faked or false. However my claim is enough to show that issue (1), concerning the reliability of my account, must be discussed.

In one respect on issue (1) my position is different from anyone else's. Others must ask themselves, *inter alia*, whether they think I am telling the truth as I see it, or lying. This, however, is a question to which I must know the answer. To say I am telling the truth is like offering to guarantee my own overdraft. Nevertheless, for the record, I assert that I have honestly given as accurate an account as I can. The asymmetry between my position and others vanishes, however, when we consider the possibility of my being mistaken; on that I am in general no special authority. The relevant possibility of mistake here is not in interpretation—I have already conceded that—but in perception, concerning what I think I have seen.

It is impossible to anticipate all objections. However those who doubt my account would presumably wish to *contrast* it with other empirical claims they take to be reliable, such as those established by scientific experiment. They could not therefore rely on *general* sceptical arguments to the effect that, e.g., I can never know any empirical fact to be true, or that I can never rely on my memory. For these apply also to the claims they wish to preserve, and would therefore prove too much.

A more relevant approach is to emphasize how much and how wisely we correct our observations in the light of our general knowledge, and then to argue that claims as extraordinary as these should therefore be rejected. But this argument splits into two. If it says merely that such claims are *likely* to be mistaken, it is a sensible point about the onus of proof, related to the question of whether there is any "scientific" evidence for such claims (see Sec. IV). However it easily slides into saying that such extraordinary claims should *always* be deemed to be mistaken. This is a general sceptical position, reminiscent, e.g., of Hume's arguments against miracles.¹³ Two points arise in reply. Firstly TM claims that these experiences are available by means of the Sidhis course to virtually anyone; they are paranormal but not miraculous. Hence Hume's arguments do not bite. Secondly, even concerning miracles, Hume's arguments, I would claim, are themselves a fine example of that sort of begging

the question which so easily arises in conflicts of belief-systems. To prove their point they require some premise that experience shows *no* exceptions to the usual uniformity of nature, which is precisely what their opponents would claim reasonable to deny.

Next there are suggestions that assign some specific putative cause of error. One difficulty in answering, as well as in relying on, such suggestions is their extreme vagueness. I have tried to make real to myself the possibility that perhaps through mass hallucination, or some skilful hypnotism (presumably with a post-hypnotic block to make me forget I had been hypnotised), I might believe that such phenomena occur when they do not. I frankly doubt if I could take the possibility very seriously, even in relation to my course. The flying soon became so much a part of the day's routine (even though eagerly awaited) that to suggest it did not occur would have been ludicrous. But in any case the process becomes thereafter part of the twice-daily programme. I am as confident that I will hop tomorrow as that I will have breakfast tomorrow; and in each case on equally reliable inductive grounds. Again, in many contexts the possibility of fraud is a highly relevant consideration, with allegations varying from the faking of data in ESP experiments to sleight-of-hand in medium's seances. However here we have a case, not where, e.g., something was done in front of us by representatives of the TM movement, but where we acquired an ability for ourselves. Even to suggest that the other men on my course were conspiring to delude me, would already pass beyond rational suspicion to paranoia. But further I have in any case acquired the ability to a modest degree myself.

Finally it might be suggested that I have grossly overestimated the length of, e.g., the 2-metre hops I described. On this point I have again unsuccessfully tried to make real to myself the possibility that my normal powers of estimating distances under good conditions might have deserted me. And I again point out that I have seen such performances in my local TM centre and have later checked the distance. I can no more doubt my judgment on this point than doubt my own veracity.

However neither of these doubts are absurd for others. It again therefore seems P-reasonable either to accept the reliability of my

account or to reject it. To those who are honestly in doubt and who think the matter sufficiently important, there is another alternative; they could do a TM-Sidhis course themselves.

Finally I point out that there is a certain tension between these two issues of the reliability of the evidence and its implications. Though in a situation like this many complex positions are possible, it is at least clear that the more improbable the prediction which a theory makes, the more highly confirmed the theory is if the prediction is successful. Hence those who challenge the paranormality of the phenomena and treat this as an “acupuncture” situation — thus minimising the improbability of the evidence — have less ground for doubting that the phenomena occur. And those who challenge the evidence as being inherently improbable, could not then so readily argue that if these phenomena did occur they would be explicable on ordinary grounds.

IV

To return to my general theme: should this claim to levitation be taken seriously? Some would certainly reply; “Not yet, at least”; for, they would say, there is no scientific evidence for these phenomena until they can be experimentally produced under laboratory conditions by any qualified observer. At present the evidence is only “anecdotal”. The work carried out by scientists at MERU does not alter the situation, as others have no chance to replicate it.

Many of the problems here come from the fact that “scientific” is not itself a scientific term, but a word in our ordinary language. It therefore has a whole range of uses between which there are only family resemblances. Also it is almost as much a prestige-word as “democracy”, and so is competed for by conflicting interests. Thus in some contexts, such as “scientific method”, it refers to a family of procedures which are the most successful we have yet devised for advancing our knowledge in the areas where they can be applied. In other contexts, such as “scientific viewpoint”, it is often a code-word to capture the essence of a particular broad belief-system: the view that western science since Copernicus not only is an immensely

successful intellectual achievement, but gives us a basically complete and correct view of what there is and is not in the universe.

To put in perspective the claim that there is no scientific evidence and hence nothing to take seriously, let us first look at the evidence we have. Surprisingly, for a philosophical paper, this paper itself contains evidence, namely my eyewitness reports. Whether or not we call it “merely anecdotal”, it is of the sort regularly dealt with by lawyers and historians, and used to decide important issues.

One natural reply might be that lawyers and historians presuppose in all their reasoning the normal course of nature as established by science, and therefore cannot by their methods challenge the scientific picture itself. This however is back to the Humean position on miracles; as said earlier, either it is a mere warning about the onus of proof, or it begs the question. However there is a more important point. Law courts and history books deal with unrepeatable events; we cannot test experimentally whether in circumstances just like this another murder just like this will be committed by someone just like the accused. TM, however, claims that flying is a repeatable phenomenon, available, in effect, to all who choose to do the Sidhis. This is certainly an important disanalogy. However by the standard principles of assessing eyewitness evidence, the point tells both ways. In one way it tells for my position. For it is rational to put more trust in evidence in proportion as it could more easily be falsified; people are less likely to lie or exaggerate when they know they can be caught out. Since tens of thousands of other people in many countries have already done TM-Sidhis course, any lies or exaggerations could presumably be exposed. This in turn suggests another way to get more evidence; namely by a survey of those who have done the sidhis. However the repeatability also tells against my position. For it is in general reasonable to suppose that honest people will produce the best evidence they can. Where repeatability is possible, the best evidence would surely be laboratory observation controlled by outsiders. And this, I suggest, is the context in which we can best understand the claim that there is no scientific evidence and so nothing to take seriously.

A great risk of confusion arises here from the slipperiness of the word “scientific”. The danger is that we may first define the word

narrowly so as to mark off scientific evidence from other considerations, and then use its prestige to suggest that all other considerations are “unscientific” and so have no cogency. I assume that this will be acknowledged in principle as a trap to be avoided. But if so, how is the argument to be put? For it seems to me that any use of “scientific” which puts these phenomena outside the pale of what is to be taken seriously, will conflict at least with current philosophy of science. Surely I am only doing what, according to such philosophers as Popper and Lakatos, the good scientist or intellectual should do; namely cheerfully making the bet that a given explanation will eventually turn out to be correct, and then critically exploring the situation further. If we accept that rational enquiry, *even in science*, requires us to place bets so long before the evidence is in, we cannot also say that the Voice of Science—or of Reason— forbids us to take views seriously until there is conclusive evidence of a sort that only experiment can provide.

However what often does, I think, lie behind the claim that scientifically there is as yet nothing to take seriously, is an emphasis on the value of controlled experiment in cases where it is applicable. And this emphasis here seems to me proper: not only because experiment is the best evidence where it is available, and it should in principle be available here; not only because we may reasonably require people to produce in such a special case what would be the best sort of evidence; but because in deep conflicts like these, appeal should be made by one side as far as possible to criteria which are accepted by the other. Hence it would be highly desirable to subject claims of levitation to laboratory test by outsiders. Is this likely? I am not a spokesman for the TM organization, but I offer my own speculations.

Firstly, a contrast with the ESP debate. It is sometimes there said that the phenomena simply cannot be reproduced before sceptical eyes, because scepticism destroys the psychic powers. That seems to me an intelligible though unfortunate possibility, but I do not think it likely to apply here; I have seen no suggestion from TM that flying would be inhibited by doubting eyes. Secondly, however, the evidence I have seen clearly does not compel—though I think it invites—a paranormal interpretation; while TM’s own reports of

unambiguously paranormal phenomena suggest they cannot yet be produced on demand. If flying is indeed the initial manifestation of growing paranormal powers, it would be only wise for TM to defer public testing till it can confidently produce unambiguous phenomena. Thirdly, TM is the meeting place of two traditions. The Vedic one from which it arose strongly opposes the display of such powers. This tradition does not doubt their existence, and is therefore no more concerned to accommodate the scruples of sceptical western scientists than such scientists are concerned to accommodate it. Hence a movement that has genuine respect for both traditions must tread a delicate path. Finally, however, my own judgment is that TM is steadily feeling its way towards the western scientific emphasis, and that, if paranormal powers do increase as it is confident they will, then within a decade independent laboratory evidence will be available. This might then be, not the end of the story, but the first chapter of the most exciting story to be written since Galileo challenged Aristotle.

So finally, is the claim of levitation to be taken seriously? What emerges is that inconclusiveness may attach not only to debates such as these, where each position is (I have argued) P-reasonable, but also to the meta-debate about whether a particular first-order debate is of this sort. For some will surely conclude I have not shown that my claim is even a P-reasonable one which should be taken seriously; they will judge me not merely a heretic but a crank. And though I think I have made a strong P-reasonable case that they are wrong, I do not think I can do more.

So on this whole point, which determines the allocation of so much time and effort, I have found only depressingly weak criteria for rational guidance. My consolation is that often at least the situation is inherently temporary; debate and investigation can clarify the situation; and hence today's heretics are likely to become tomorrow's cranks – or orthodox.

NOTES

1. Hume, *Enquiry Concerning Human Understanding*, Sec. X, Pt. 1 (Selby-Bigge edition, Clarendon Press, 1902. p. 110).

2. T. S. Kuhn, *The Structure of Scientific Revolutions* (University of Chicago Press, 2nd edition, 1970).
3. E.g. the verdict, when eventually accepted, need not be the ultimate one. There are comebacks by rejected theories (e.g. continental drift) and, even more commonly, rejections of previous successes.
4. Cf. I. Lakatos and A. Musgrave (eds.), *Criticism and the Growth of Knowledge* (Cambridge University Press, 1970).
5. I confine myself to TM because this is what I know about. There is no intended comparison, invidious or otherwise, with any other organization.
6. The movement has collected these into D. W. Orme-Johnson and J. T. Farrow (eds.), *Scientific Research on the Transcendental Meditation Program*, Vol. I (MERU Press, 1978). This contains over 100 papers, many of them in reputable refereed journals. There are other claims besides physiological and psychological ones; e.g. besides the matters I shall discuss, there is a claim that important changes can be measured in a whole community when as little as 1% of it starts to meditate.

The question of whether TM is *more* effective than, e.g., other relaxation techniques or forms of meditation, is one where the evidence is so far both less, and less straightforward. I cannot discuss it here.

7. Cf. e.g., C. Miller, *Transcendental Hesitation* (Zondervan, Mich, 1977); J. Weldon and Z. Levitt, *The Transcendental Explosion* (Harvest House, Calif. 1976).
8. The standard transliteration of the Sanscrit is "Siddhi". After some vacillation the TM literature has dropped a "d" when it speaks of "TM-Sidhis".
9. J. J. C. Smart, "Sensations and Brain Processes", *Philosophical Review*, Vol. LXVIII (1959), p. 141.

Smart's starting point is the claim that materialism can account for all phenomena except consciousness. He then argues that the existence of sensations would imply an ultimate scientific law that a given complexity in the neuronal structure of the brain would inexplicably give rise to a simple experience. Hence the experience would just 'dangle' without any integration into the other laws of science.

"Such ultimate laws would be like nothing so far known in science. They have a queer 'smell' to them. I am just unable to believe in the nomological danglers themselves [i.e. sensations], or in the laws whereby they would dangle."

10. E. g. Swami Prabhavanda and C. Isherwood, *How to Know God: The Yoga Aphorisms of Patanjali* (Mentor, 1969).
11. In one sense the comparison begs the question, since the Wright brothers undeniably flew, while the interpretation of TM "flying" as paranormal is controversial (see Sec.III). However the comparison neatly expresses the situation as the TM movement sees it.
12. Here is one case:

I was sitting on a couch meditating at the time. I felt a tremendous amount of energy go through me and simultaneously I had a vision of my spine and my chest being just white light and a form in the air some place and then my body moved up and down on the couch about three times. I thought, "Oh, what is this?" and the next experience I had was of hearing my body touch

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The Hindu Doctrine of Karma

Part II

IGNATIUS PUTHIADAM

THE HINDU SCHOOLS OF THOUGHT:

Apurva (the new) Adrsta (the unseen) and Karma

THE HINDU schools in general accept the insight contained in the theory of 'apurva', that was perhaps first developed by the Nimamsakas. Mim. Sutra, 2.1.15 asserts "there is 'apurva' because action is enjoined". The reasoning behind this assertion is clear. Action (rituals) is passing. Action once done disappears. It cannot be present immediately before the attainment of the result by the agent. But we know for certain that the sacred rites when correctly performed must immediately precede the effect. Now, heaven for example which is to come long after the performance of the rituals would not be the result of the actions unless the actions were to produce in the agent 'a force' or potency which continues to exist and operate till the final result is obtained. This force or potency is called 'apurva'. Apurva is an 'effect' (Karya) produced by the action or exertion of the agent. Apurva exists in the agent with the desire for the result. It is the direct cause of the final result. Leaving aside the scholastic controversies on this matter, we may just state here that the earlier Indian belief that actions leave a 'residual element' in the agent is logically and conceptually elaborated in this theory. Not only ritual actions but all actions leave a "force" in the agent which will become operative of future results as soon as it reaches maturation with the help of attendant auxiliaries.

Theoria to Theory. 1980, Vol. 14, pp. 65 – 74
0049-3686/80/1401-0065\$04.50/0

Published by
Gordon and Breach Science Publishers Inc. 1980

Classical Mimamsa, being an atheistic school explains the existence of the world, the inequalities and differences in the universe by means of karma. Just as rites are of themselves operative so is karma. The "souls" in this system are endowed with agency. But the soul is not intrinsically affected by karma. The mind-body complex is the instrument of actions and the mind is the store room of karma. Liberation consists in the cessation of the operation of merit and demerit and the total freedom from the body-mind complex.

Another atheist school, Samkhya, too explains the Universe merely by the autonomous operation of karma. Beyond a certain final causality the Purusa is totally devoid of all activities. Karma, an impersonal and hence a non-partial agent is the best explanation of the world and of embodied beings as they exist. Since God is not required to explain the world, it is better to reject his existence. According to Samkhya anthropology, the "linga sarira" is the chief agent and receptacle of all karmas. Till the "purusa" reaches final release it transmigrates with it. In the Samkhya system the binding force of karma comes not so much from desire as from "non-discrimination".

In Mimamsa and Samkhya systems we have a conception of karma, that is impersonal and autonomous. The old impersonal conception which we found in the Upanishads and in the Rita idea of the Rigveda is revived and elaborated by these systems. In these systems whether the souls be considered as active or inactive, or the world process be thought of as a cycle or a beginningless and endless line, karma is all important. It is the key to the understanding of the existential status of man and of the whole world.

Sankara too accepts the karma doctrine. His commentaries on the Brihad-aranyaka Upanishad and the Chandogya Upanishad abundantly substantiate this statement. But he limits the law of karma and action in general to the "vyavaharic" level (the empirical or day to day life plans) At the ultimate level (paramarthika) there is no karma, no samsara. Commenting on Yajnavalkya's words "by good actions man becomes good" Sankara says that good actions mean actions ordained by Scripture, evil actions are their opposites. Against the Mimamsakas, Sankara affirms that "mukti" cannot be

achieved by karma. Mukti is not an effect, that can be obtained by actions. It is eternally there in the self, it has only to be manifested by means of an immediate realisation. He too insists on the baneful influence of desire. "Desire is the root of transmigratory existence." Following the Samkhya anthropology, Sankara maintains that the subtle body, chiefly Buddhi, is the agent and receptacle of Karma. Sankara does not consider karma to be an independent cause. The Lord creates the world with all the inequalities and differences after taking due note of the merit and demerit of all creatures. Just as a rain indifferently causes the production of various crops—barley, rice etc, the differences being the result of the peculiar potencies in various seeds, so also God is only the general cause of everything (Sadharana Karana). So we cannot accuse him of partiality or cruelty.

THEISTIC SYSTEMS:

The belief in karma-samsara creates acute problems for the theistic systems. Karma is the reason for the rebirth of conscious beings, the inequalities in the universe, in short for the existential state of all the finite beings. Karma is a continuous process. If karma is considered autonomous and inexorable, then it will limit the freedom and independence of God. In fact the atheistic systems did reject God, since they found that karma could explain the universe. If God is subordinated to the law of karma, then can we consider him to be the gracious and loving saviour? If we accept that karma is dependent on God, then God should be considered the cause of evil and inequalities in the world? Can God really be the cause of the happiness of some and sorrow of others? So either we should concede that karma is autonomous or that God is capricious.

No classical Indian theistic school has posed these problems with such sharpness or clarity. But they were quite conscious of the difficulties. The Bhagavad Gita and Sankara were quite aware of these problems. They have tried to subordinate karma to the supreme being. This tendency became more and more pronounced in the later theists like Ramanuja, Madhva and the Shaiva-Siddhantins.

RAMANUJA AND MADHVA:

They reject totally the advaitic distinction between a relative and an absolute level of reality. This world and the law of karma are true and valid. They do not pertain to an order of “mayic” reality. Ramanuja for example teaches that the soul, an eternal, conscious and totally dependent mode of Brahman by “avidya” ignorance of its true nature falls into bondage – which is beginningless. Karma is activity rooted in ignorance. All actions good or bad leave a power or potency in the agent whose operation will determine the future destiny of each conscious being. Both Ramanuja and Madhava like Sankara before them are convinced that the non-intelligent and transitory karma cannot produce a result connected with a future time purely by its own power. They subordinate the causality of karma to the supreme causality of God. According to Ramanuja God seems to be so free from the working of the law of karma that he can “check the tendency on the part of individual beings to transgress his laws “(Sri Bh. 11.2.3.) “or engender in the mind of his bhakta a tendency towards highly virtuous actions such as are means to attain him.” (Ibid. 11.3.41). He can also harden the hearts of the the sinner. God is not partial or cruel, for each one receives according to his past deeds. Ramanuja like other Hindu thinkers traces the inequalities and differences in the universe to Karma which operates under the will of God. But for Madhva karma is only an immediate explanation of the differences in beings and in the world. Ultimately we must accept that there are groups of essentially different souls (svarupabheda). The actions of souls are different because the souls are different. These souls are eternally distinct and separate from God though dependent on him as regards their being, activity and knowledge.

If souls are so dependent on God, then should we not say that he is responsible for the inequalities and evil in the world? No, says Madhva. Karma is the immediate cause of the present state of the world; ultimately however the souls in their “svarupabheda” are the reason for their existential situation. So God who is infinitely free cannot be accused of partiality. In the Tamil Shaivite thinkers the subordination of karma to the love and freedom of God is much

more pronounced. Karma comprises virtuous and vicious deeds and their results viz. gain and loss, pleasure and pain. The bond between the souls and karma is free from eternity. The past karma is "eaten" in this birth and the karma of this body causes the new body. The determination of a soul to a particular body, caste, span of life, experiences etc depend on karma. All these form part of the traditional Hindu teaching on karma.

Like all Hindu theists, the Shaivites state that the souls enjoy the fruits of karma through the power of God (Shiva) By their own force they cannot act. It is Shiva who makes the souls "eat" karma and attain liberation. It is the grace of Shiva that bids the soul be bound by births, because of its bondage to karma. In fact Madhva too is of the opinion that the ultimate cause of bondage is "Vishnu" (God) himself and not karma. The specific Shaivite teaching is that God is not the mere regulator and ruler of karma, but he is the one who making use of karma, matures the soul (the embodied soul) to liberation. Only by undergoing the process of karma, one can reach "mukti". Karma is a maturing process; it is a way to liberation. Moreover the Shaivites state that the load of karma can be removed in many ways. One deed's effect can be removed by another, by the hired expiatory services of others. Above all the "accumulating karma" can be burnt up by the grace of God. Just as a single stone can scatter a crowd of crows, so the grace of God can remove a load of karma. Grace puts karma to flight.⁷

In fact in all the Bhakti systems karma cannot be considered an independent cause. Nor is it an inexorable law. Karma is subordinate to God. It is only a secondary cause, an instrument in the hands of God for the execution of his will and for the ultimate good of his "bhaktas". It is also a means of explaining the unequal status of beings and evil in the world without in any way putting the blame on the Supreme. But karma is never more powerful than the "grace of the Lord".

DIVISION OF KARMA:

In the systems, we find various types of karma. At any time an embodied conscious being has an accumulated burden of karma

This karma, the heritage of past lives has started operating. Such Karma is termed “prarabdha karma”. Sometimes the whole load of past karma, whether at present operating or not is called “sancita karma”. That part of the karma which has matured and which is operating is known as “arabdha karma”.

At any present time the embodied being is acting and acquiring karma. This is called “sanciyamana karma”. This may be called also “agamyama karma” in as much as its effect will be experienced later. It may be known also as “anaradha karma”.

MODERN INTERPRETATION OF THE ‘KARMA DOCTRINE’.

With the massive advent of the West and chiefly of Christian ideas into our country, the “karma-samsara” doctrines were subjected to severe criticism. The karma-samsara doctrines may be called the most typical of all Indian religious beliefs, differentiating Indian religions from others of Semitic origin. So naturally these beliefs were picked out for special discussion and refutation. It was argued that karma, fatalism and determinism were all one in content and hence left no room for human freedom. Without freedom of choice, responsibility, and initiative disappear and man becomes a “re-signed being”.

The widespread underdevelopment, lack of initiative and interest and the universal apathy of the people were traced back to the belief in karma. Again the lack of social sense in India, the neglect of the poor, the exploitation of the masses and other evils too were considered by many, the results of these two doctrines. Historically the karma theory arose at a time when the idea of a “supreme, loving and saving Person” had not yet emerged in India. Karma theory is rooted in a self-understanding of man which is nature bound and based and paralleled on the physical world surrounding him. From these two grounds, it was argued that the karma belief has been and still is a hindrance to the growth of fullfledged theism (a genuine personalistic concept of God) and to a personalism in ethics. Because of these and other objections Brahma Samajists, for example, gave up the karma theory. But the Arya Samajists

upheld the doctrine as typically Hindu. Among modern thinkers, nobody has tried to defend the doctrine of karma which such articulateness and force as Dr. Radhakrishnan. In almost all his major works he deals with karma. Other Hindu writers more or less follow Dr. Radhakrishnan's views with little imagination, change or criticism.

Radhakrishnan's treatment of karma is very defensive. He does not analyse the doctrine historically, trace its growth, separate the various strands in it, examine the logical implications of it and above all try to understand, appreciate and criticise it from within the presuppositions of Hindu thought. Since his effort has been to make the doctrine understandable and acceptable to the West, his treatment of it is systematic and comparative.

"The law of karma tells us that as in the physical world, in the mental and moral world also there is a law. The world is an ordered cosmos. What we sow we shall reap. The law of karma governs the growth of the human individual. Our acts determine our character, which in turn determines our acts. An individual is full of desire. Desire is said to be the agent of action, the impeller of action".⁸

The law of karma on the one side emphasizes the determinist aspect. The lawfulness of nature, the persistent effects of past actions on the character of a person etc are determined. For Radhakrishnan the cosmic evolution is governed by karma. "Karma is the word and will of God." Again he writes: there is no forgiveness for a broken law. No single word can be unspoken, no single step retracted." Karma is more a principle of continuity than retribution the continuity of human motivation and efforts. So in one respect karma is the expression of the determinism in man's life and activity.

On the other hand karma implies freedom. "The law of karma regards the past as determined, it allows the future is only conditioned. The spiritual element in man allows him freedom within the limits of his nature. Man is not a mere mechanism of instincts. The spirit in him can triumph over the automatic forces that try to enslave him".⁹ In the Brahma Sutra he writes: "Karma refers to the limiting force of our equipment and environment; freedom refers to human plasticity, the variety of possible development opening

before a man endowed with definite character" (p. 196). So Karma according to Radhakrishnan manifests and explains the necessity and spontaneity involved in human existence.

According to Prof Hiriyantha "Karma doctrine traces the causes which determine an action to the very individual that acts. Since however these causes cannot all be found within the narrow limits of a single life, it postulates the theory of samsara." Karma doctrine does not mean that one is constrained by outside forces. So freedom is kept. The law of karma is essentially ethical. What we sow we reap; there is perfect justice in reward and punishment. According to the professor, moral growth, moral education and freedom of choice are all possible, even presupposed in the theory of karm. "Every deed we do" he writes "leads to a double result. It not only produces what may be termed its direct result (phala) pleasure and pain according to the nature of the act, but also establishes a tendency in us (samskara) to repeat the same deed. The necessity involved in the karma doctrine is only in so far as the former viz. pain and pleasure are concerned. As regards the tendencies they are entirely under our control".¹⁰

The law of karma has nothing to do with predestination, says Radhakrishnan. In fact it contradicts that belief. Karma means that by doing what is in our power we can dispose the mind to the love of the Eternal and attain salvation. For him karma is the will of the highest wisdom and God works this law. So karma and God are not incompatible. "Karma means that God's will is not arbitrary or capricious". It is compatible with prayer and enshrines the highest ethical value. It teaches patience and persistence. It prevents us from judging others harshly. It steadies us in our moments of despair and offers us the conviction that the present is the result of our past choices. It opens to us the possibility of remaking our life even as we will have it. Radhakrishnan calls karma the law of the conservation of moral energy, message of hope for the future and a reason for resignation regarding the past.

Radhakrishnan is however ready to accept that unfortunately the theory of karma became confused with fatality in India when man himself grew feeble and was disinclined to do his best. It was made into an excuse for inertia and timidity and was turned into a

message of despair and not of hope (*The Hindu View of Life*, p. 76). The modern interpretations of the karma doctrine are at pains to show that karma is not fatalism; it is compatible with human freedom, moral growth and hope; it is in harmony with modern science and rational theism; it puts a man in the centre and hence is personalistic and existential; it offers us the best explanation of the human and cosmic conditions, without in any way putting blame on God.

CONCLUSIONS:

As we look at the brief historical analysis of the doctrine of karma from its vedic roots to our own times, we are struck by its universality. All the Indian religions including Sikhism believe in "karma-samsara". Indian schools of thought may accept or reject the existence of God, the authority of the Vedas and even the existence of a permanent soul, yet all believe in karma (though surely with modifications). The only exception is the Carvaka school.

Not only is the religious and philosophical thought of India permeated with "karma-samsara" belief, but also Indian literature, medicine and other branches of science accept and make ample use of it. Indian psychology, sociology family life, in short every aspect of life and thought can be said to be ruled by karma.

In spite of its universality, no school of thought or no thinker including moderns, offer us a truly historical and critical treatment of this theory. What are the historical roots of this doctrine? How does one school differ from another in interpreting karma? What are the different elements or strands that have gone into the making of this belief? What is the thought-pattern or thought-form from which this doctrine arose? These are questions which are rarely asked and almost never answered. From the beginning the doctrine has been unquestioningly accepted and defended. Even today among us Indians the attitude of defence is more common than a critical approach to the problem. Only by a critical or better rigorously scientific approach to the matter and by constant questioning and probing can we reach a satisfactory solution.

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The passage from R. G. Zaehner in Part I (XIII iv, p. 310) is from his *Hinduism* pp. 140-141.

Review

Catastrophe Theory

by Alexander Woodcock and Monte Davis

Penguin

Catastrophe Theory deals with sudden state changes in systems which can change continuously, as when water reaches a freezing point or vapour a condensing point. "Catastrophe" is therefore something of a misnomer, as suggesting what is terrible.

The theory, the work of Prof. René Thom, has been widely recognised as a brilliant piece of pure mathematics, possessing an unusual degree of generality, and having a number of useful applications. It has become very popular in a growing number of fields, but is also involved in a strangely fierce controversy; the question is simply "Are the applications proposed genuinely helpful or ultimately bogus?". This book opens in a manner so enthusiastic in praise of Thom and his work that the reader is led to place it well to one side of this controversy. In fact, however, though the authors maintain their enthusiasm throughout, the book belongs definitely to the dreaded category of the 'scrupulously fair'.

The theory's originality consists, at least in part, in its being an essay in applied topology – an otherwise rather unpromising genre. The topics successfully attacked tend to be either boringly well-known, like how to untie knots in 3-space, or fascinatingly unencounterable, as when the dimensionality of the space, and the string, is increased. Catastrophe theory on the other hand is a topological theory (that is, roughly, a generalized non-quantitative geometry) which has genuine applications, and unlike most of

Theoria to Theory. 1980, Vol. 14, pp. 75 – 80
0049-3686/80/1401-0075\$04.50/0

Published by
Gordon and Breach Science Publishers Inc. 1980

topology is relatively easy to communicate – at least in outline – as our authors convincingly demonstrate. It is rated highly for mathematical elegance; but, in mathematics as in life, beauty does not entail other excellencies. Like most non-quantitative mathematics, what it gives us is primarily a system of classifying problems, and most of the time classification, though useful for its own sake (and more intuitively satisfying than is good for it, as biologists well know) does not solve problems.

The difficulty with an axiomatically non-quantitative theory like “cats” is easily explained. In order to apply the theory to a given problem, one has to identify in the latter *up to* four variables regarded as inputs to the system and called ‘control factors’, and one or perhaps two ‘behaviour axes’ or output variables. If this can be done, with convincing completeness, the theory tells you which of seven ‘elementary catastrophes’ applies. You must then quantify all the requisite parameters, and the theory will tell you for what combinations of their values the system can undergo continuous state-change, and where one must expect sudden ‘discontinuous’ changes to occur. Apparently the list of seven catastrophes has been increased recently; but most larger numbers of variables lead to situations with an infinite number of solutions, taken to represent systems with no stable states at all. Though practically not very useful, this last possibility has a number of apparent realizations – such as what happens at the bottom of a waterfall – and if, as the authors suggest, such systems wander from state to state in an inherently unpredictable manner, this is an interesting theoretical situation. On the face of it, a second source of unpredictability, unrelated to quantum uncertainty.

Now in the procedure for applying the theory there are two points where trouble can arise. First, your problem has to conform to the prescribed limits of complexity; if it does not, you have to replace the real situation by an approximate model. In biology, of course, this is taken for granted; but using the usual kind of quantitative theory one expects to be able to rank the variables in an objective order of importance, and has in consequence some confidence that neglect of some of the minor factors will not distort the picture out of recognition. However, when using Catastrophe theory, which is

non-quantitative, neglect of any variable can, in principle, wreck the whole thing; only variables which actually contribute *nothing* to the phenomena can be safely neglected – and that leaves many more than four!

The second trouble-spot is in quantifying the input data. In practice this is less noticeable, mainly because one often does not try to be realistically quantitative at all. But in principle the same difficulty arises, that the accuracy of one's results is not necessarily correlated, as one normally expects, with the smallness of one's experimental errors.

The upshot is that the theory has been genuinely and successfully applied only to physical and chemical problems. An example of this is the geometrical characterization of the patterns of bright lines (optical 'caustics') formed by light reflected from a concave surface (like the inside of a teacup) or refracted through rippling water to make flickering patterns on the bottom. There are also potentially useful applications to engineering problems. Outside of the physical field the classification of problems provided by the theory can be applied in a sometimes illuminating way, providing genuine illustrations of the theory, but in all too many cases the illumination produced is that of a candle in daylight. One can be beguiled by a couple of pages describing the behaviour of locusts in catastrophist terminology, but it is clear at the end that it was all known to those concerned long before catastrophes (in Thom's sense!) were heard of. Indeed, the authors admit that all the biological and social "applications" are really no more than "invocations" of the theory.

In view of this it is sad to learn that Thom's own especial hope for his theory is that it may help to explain recurrent biological shapes. If it is to do so, it must be buttressed by much extra research (which must not itself solve the problem!) to limit the number of potentially relevant factors. It has been one of the main attractions of catastrophics that it seems to have an unusually wide range of potential applications of this kind. This is a characteristic of most non-quantitative mathematics (the prime example being perhaps logic), but except when one is dealing with problems which are *inherently* non-quantitative, this wide range is marred by a shallow draught. Nearly all the problems in which catastrophe theory is

invoked involve numerical parameters at some stage, so that its seeming power may well be an illusion. It is not pertinent, for example, to claim that the shapes assumed by organisms are always either one thing or another, and therefore non-quantitative; the factors responsible for them, which are necessary input for the theory, remain quantitative. And anyway, a wider acquaintance with the facts generally discloses intermediates between almost any two forms, so that even the initial reason for looking to catastrophe theory – the appearance of sudden jumps between qualitatively discrete states – may be illusory.

Or it may not. The effective limits for the application of the theory have not yet been clearly established, and it may well turn out that, sometimes at least, a change of developmental pattern may be triggered by some factor which a catastrophist analysis might identify. Embryologists commonly assume the existence of compounds, present in minute quantities, which can decide for example whether a given group of cells will grow into an eye or, say, a leg. Such compounds have never been isolated, but their supposed properties are tailored to attract catastrophists. By all means let them have a go – but don't forget how complex the real system must be.

Because catastrophe theory is open to criticism at so many points but yet stands up well enough in a limited field, it has some useful lessons to offer in the criticism of other mathematical theories. One of the objections which have been made to it is that it is implicitly apriorist, that is, it attempts to deduce facts about the world from 'pure thought'. Such critics must have an abnormal aversion to such a possibility to bring it in here; it is logically impossible to infer facts from nothing at all, but not a few theories have successfully deduced a great deal from very little – Newtonian mechanics, for example. Catastrophe theory actually requires rather a lot of input to infer anything, and may often get it wrong. But it must be admitted that it can be put across in such a way as to suggest that pure mathematics is imposing a constraint on the nature of things. That is not quite the same as apriorism, and some such constraints obviously exist (try carving a block of wood so as to have ten congruent faces!). But it's hardly appropriate to catastrophe theory.

as the authors are quick to point out. But the controversy about this theory is one which has no holds barred. It has even been accused of ideological deviance, so we are told.

A different line of criticism, about which Woodstock and Davis avoid giving an opinion, comes from the fact that many alternative theories exist which partly cover the same field. Bifurcation theory in particular threatens to take over problems from catastrophe theory. Some critics think that, all in all, the new theory may add nothing to our tools of understanding which was not already available. This is certainly an exaggeration; even the classification according to the various 'catastrophes' is worth having, and is not provided elsewhere. But it is well to remember that every new theory is liable to be beset by rivals, and may sometimes be overcome by them.

As I have already remarked, our authors are skilful expositors, and their book is readable and easy to follow. There are one or two reservations to make, however. The diagram of the isometric cube on p. 21, which can be seen two ways round in a semiperiodic alternation, is badly explained. A dot is drawn in it, and this is what is said to shift its apparent position suddenly; in fact, this position is indeterminate anywhere along a line which is unaffected by the rival visual interpretations. Another concerns the term 'singularity'. Catastrophe theory might have been more appropriately named 'singularity theory' (and might then have attracted fewer bogus 'invocations'), since it deals with points on continuous functions where one or more of the derivatives become infinite; these points are called 'singularities'. But the authors use a different definition of this term when explaining it, namely as a point where the first derivative becomes zero. Maybe such points do come into the theory somewhere, but I nevertheless suspect a stupid mistake.

However that may be, for anyone who wants to get a sufficient idea of what catastrophe theory is all about, so as to enter into arguments about it among one's friends, this book will give all you need. If you have a problem which you suspect might be within the theory's scope, it may help you to decide whether it really is. But if you aim to go into any actual application, you will need more than this. This of course should be obvious, but in view of the wrong ideas which

appear to be so widespread in this field, many of which may originate from insufficiency of knowledge on the part of eager customers, some more explicit warning might well have been in order. Catastrophe theory is far from being a write-off, but its field of useful application is limited. It is too soon also (but perhaps not by much), to write off a modest expansion into the biological field; but it is none too soon to deplore its invocation in the human sciences, to which it has only diagrams to contribute.

It is indeed the case that the “the discovery of a piece of mathematics that fits the world in a new way is a rare event”. This, at the head of Chapter I, is quoted from Ted Bastin, one of the founding group of *Theoria to Theory*.

FREDERICK PARKER-RHODES

Comment

'Meditation and the perception of self'

IT IS GOOD to know that a *social* psychologist should show concern for the effects of meditation practice upon *self*-experience. However, while I appreciate that Michael West's (vol. 13, no. 3, 1979) comments on Fraser Watts' earlier paper were primarily intended to offset the latter's suggestion that meditation can affect one's perception of the other and the outer world, I am surprised that Michael West should be pussy-footing on such a well-attested fact (e.g. see p. 24: "What is *advanced* here is the idea that in meditation this mode of [self-] experiencing is altered . . . It has been *suggested* that the external environment becomes less important . . ." etc.—italics are mine). Already 29 years ago, Carl Albrecht published a detailed study of the meditative process—entitled *Psychologie des mystischen Bewusstseins*—in which he examines, from a strictly phenomenological viewpoint, such separate, yet related aspects of the meditative process as perception, mood, disposition, feeling, body-awareness, attention, volition, thinking and ego. Almost three decades later, this study still stands unchallenged as a masterpiece. Unfortunately, the book has not found a translator so far. Nevertheless, Albrecht's characterisation of what he styles the state of *Versunkenheit* (absorption) has been independently, and one would think, amply consolidated by more recent research, be it experimental or comparative (such as Ernst Arberman's little known three-volume work). Personally, I regard the direction of Fraser Watts' research as the more interesting and promising, as it does seem to open up genuinely new avenues: I still

hope that one day there will be plentiful evidence to silence those who – like Swami Agehananda Bharati – categorically deny any link between so-called mystical experience and morality.

GEORG FEUERSTEIN

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Sentences*

Antony to all the dear brethren who are at Arsinoe and in its neighbourhood, and to those who are with you, greeting. All you who have prepared yourselves to go to God, I greet you in the Lord, beloved, from the least to the greatest, both men and women, holy Israelite children in your intellectual substance. Truly, my children, great blessedness is come to you, for great is the grace that has been set upon you in this your generation. And it befits you, on account of Him who has visited you, not to grow weary in your striving, till you offer yourselves a sacrifice to God in all holiness, without which none can receive the inheritance.

Truly, my beloved, this is a great thing for you, that you should ask concerning the understanding of the intellectual substance, in which is neither male nor female, but it is an immortal substance, which has a beginning but no end. And you ought to know of it, that it has fallen altogether into humiliation and great disgrace, which has come upon all of us; yet it is an immortal substance, not to be dissolved with the body. For this cause God saw that its wound was incurable; and because it was so grave, He visited mankind in His clemency, and of His goodness after times had passed He delivered to them a Law, helping them through Moses the Law-giver. And Moses founded for them the House of Truth, and wanted to heal that great wound, and could not complete the building of the house.

* * * * *

*From *The Letters of St. Antony the Great* translated by Derwas J. Chitty. Fairacres Publication 50. Printed with the permission of the SPL Press, Convent of the Incarnation, Fairacres, Oxford.

Truly, my beloved in the Lord, not at one time only did God visit His creatures; but from the foundation of the world, whenever any have come to the Creator of all by the law of His covenant implanted in them, God is present with each one of these in His bounty and grace by His Spirit.

* * * * *

Our perdition is from our neighbour, and our life is also from our neighbour . . .

For this cause, therefore, he who sins against his neighbour sins against himself, and he who does evil to his neighbour does evil to himself; and he who does good to his neighbour, does good to himself. Otherwise, who is able to do ill to God, or who is there who could hurt Him, or who could refresh Him, or who could ever serve Him, or who could ever bless Him, that He should need his blessing, or who is able to honour Him with the honour that is His due, or to exalt Him as He deserves? Therefore, while we are still clothed in this heavy body, let us rouse up God in ourselves by incitement of each other, and deliver ourselves to death for our souls and for each other; and if we do this, we shall be manifesting the substance of His compassion for us. Let us not be lovers of ourselves, so as not to become subject to their inconstant power. For he who knows himself, knows all men. Therefore it is written, 'He called all things out of nothingness into being.' (Cf. Wisd. 1: 14.) Such statements refer to our intellectual nature, which is hidden in this body of corruption, but which did not belong to it from the beginning, and is to be freed from it. But he who can love himself, loves all men. My dear children, I pray that this may not be a toil to you, and that you may not grow weary of loving one another. Lift up your body in which you are clothed, and make it an altar, and set thereon all your thoughts, and leave there every evil counsel before the Lord, and lift up the hands of your heart to Him, that is, to the creator Mind, and pray to God that He may grant you His great invisible fire, that it may descend from heaven and consume the altar and all that is on it, and all the priests of Baal, who are the contrary works of the enemy, may fear and flee from your face as from the face of

Elijah the prophet. And then you will see a cloud 'like a man's hand' over the sea, which will bring you the spiritual rain, which is the comfort of the Comforter Spirit. (Cf. 1 Kings 18: 38-44.)

Truly, my beloved, I write to you as reasonable men, who have been able to know yourselves. For he who knows himself, knows God; and he who knows God, is worthy to worship Him as is right. My beloved in the Lord, know yourselves. For they who know themselves, know their time: and they who know their time are able to stand firm, and not be moved about by divers tongues.

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Editor: Edward A. Maziarz,
Loyola University of Chicago.

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No. Pages:	206	\$16.50	ISBN: 0 677 15240 X
Binding:	Cloth		Publication Date: April 1979
Category:	Social Sciences (16).		
Readership:	Philosophers and social scientists, and students of these disciplines		

Gordon and Breach
1 Park Avenue, New York, NY 10016
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For the contributors to the Neo-Darwinism Comments, see the editorial note at the beginning of these.

The cover design shows a hyperbolic umbilic catastrophe.

THEORIA to theory

VOLUME 14, NUMBER 1

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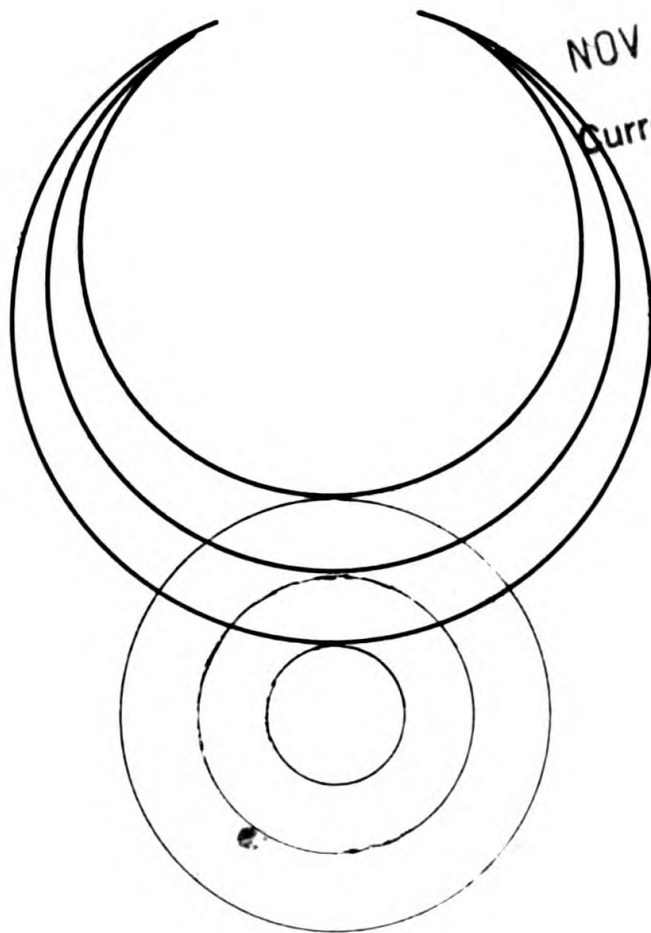
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THEORIA to theory

**An International Journal of Science, Philosophy and
Contemplative Religion**

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Volume 14, Number 2 (1980)

Original from
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Subscription Rates *four issues per volume*

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Current volume block: Volume 14

Subscription rates, per volume, for current volume block: \$ US: \$66.00/\$30.00/£ sterling: £30.00/£13.50.

The sterling price is the "base" price for the journal and is definitive. The dollar price, at present converted at the rate of \$2.20 = £1.00, may be adjusted from time to time according to currency exchange rates. The subscription rates include a per-volume distribution charge of £7.00 for postage and handling, including airspeed.

Subscriptions should be sent to Gordon and Breach Science Publishers Ltd., 42 William IV Street, London WC2, England.

SEPTEMBER 1980 issue

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Printed in Great Britain at The Lavenham Press Limited, Lavenham, Suffolk.

Editorial

On more than one occasion in T. to T. we have urged academic philosophers to be prepared to come out of the comparatively sheltered preserves where they discuss currently fashionable topics with each other, commenting on someone else's comments on the comment . . . In other words, we want them to "be curious", and use their critical expertise in discussing and exploring some of the controversial and very live issues which are bothering people. There is nothing new in this; it has been done by philosophers in the past. But recently it has been looked on as unprofessional, professional philosophy having become "meta- and meta-". Happily there are signs of a return to substantive questions; for instance in *Philosophy*, a journal of long-standing, and in a new journal, *Philosophy and Public Affairs*. There is also a striking collection of papers by Thomas Nagel, "Mortal Questions" (C.U.P.). The present number of T. to T. and the preceding one contain some examples of how philosophy can profitably be involved in the discussion and exploration of controversial issues, where our contributors take up positions which could be looked on as professionally suspect. In the article "On Taking New Beliefs Seriously: a Case Study" in the last number, R. L. Franklin, a professor of philosophy in an Australian university, tells how he took the T.M. course in "Levitation", and he has given a more realistic account of what actually happens than any we have read elsewhere. He eschews both scorn and credulity, and looks, as a philosopher of science, at an unusual, but not necessarily inexplicable experience. In the Discussion "On Assessing Risk" in this number, Isaac Levi, a philosopher with a special interest in Probability Theory and Statistical Theory, shows how misleading are many of the current "expert" ways of estimating risks in the nuclear industry. These inappropriately invoke "cost-benefit" analysis; Isaac Levi introduces his own alternative. This questioning leads into a look at the moral implications of the claim to be an expert.

Also in this number, John Beloff looks at the problem of Memory. Memory is so much something that we all depend on and take for granted that we hardly think of it as a “problem”. Our problem is that we forget. But the more we try to think seriously about Memory, the more puzzling it is. (We hope to have a discussion on this in the next number, in which John Beloff will take part, along with Michael Morgan, an experimental psychologist who has written for us before). John Beloff may disclaim the professional label of “philosopher”, but, as will be apparent from his article, he knows his way about philosophy. Notable in this article is his arguing that normal memory raises some of the same questions as some paranormal phenomena. Yet Memory is so familiar as to be respectable, while the paranormal is thought not to be respectable.

These three contributions show that what can go wrong with philosophy is not its development of critical analytic tools. What is wrong is not having the courage or curiosity to use the tools to cut into problems outside those of a limited professional circle—problems which are both important and extremely difficult. To apply philosophy to these calls for just as high a critical standard as do the technical discussions that go on among philosophers with each other. It also calls for a considerable effort of imagination.

* * *

We apologise most sincerely to Michael Ruse, who contributed a comment on “Neo-Darwinism” in our last number (XIVi), for having given his name as “Martin Ruse”.

Discussion: Assessing Risk

ANTHONY APPIAH, TIM EILOART, ISAAC LEVI,
JOAN MILLER, CLAIRE RYLE, TONY WEBB

A.A. We want to discuss some of the applications of the notion of risk to issues of public policy. I thought I'd begin by giving three examples of the sort of case we might focus on. The first of these, of which Tony and Claire have detailed knowledge, is the issue of the role nuclear plant should play in providing us with energy. The second, which I think has interesting parallels with it, is the issue of how we should regulate the production of genetically engineered organisms. The first feature of each of these cases is that the risks involved are practically incalculable. And the second is that the changes we risk are irreversible; the half lives of some of the predicted products of nuclear energy are so long that we may be making parts of the planet uninhabitable for periods of the order of historical time; and the effect of introducing new organisms into the environment may be to produce changes in the earth's ecology about which we can do nothing, once the harm is done. And this feature of irreversibility brings with it the inevitability of affecting future generations who are not able to represent their own interests: which raises the issue of consent. In every day life it is individuals who consider and take risks; where they put others at risk we often condemn them. In medicine, for example, where a doctor proposes a risky treatment, we require the informed consent of the patient. Yet in these cases — nuclear plant, genetic engineering — the requirement that everybody at risk should consent is likely to leave us doing nothing. Consent is an issue in the third case I want to

Theoria to Theory, 1980, Vol. 14, pp. 91 – 106
0049-3686/80/1402-0091\$04.50/0

Published by
Gordon and Breach Science Publishers Inc. 1980

suggest, one on which Joan is an expert, namely that of how we should assess risk in industry and what levels of risk are acceptable. The difference in this case seems to be that most of the people at risk in factories are people who know about the risks and have, implicitly at least, consented to undertake risky activities, in return for pay. I want to begin by turning to Isaac and asking him to sketch out his position, since, besides being a philosopher interested in probability, I know he's thought a lot about the nuclear case. Isn't your view that the methods used for risk assessment, in the nuclear case in particular, are philosophically suspect?

I. L. Let me begin by trying to pick out a class of cases where we speak of risk, a class which includes the nuclear case. When we speak of risks in public policy cases, we often have a set of policy outcomes, which we can evaluate politically and morally on the one hand, and an assessment of the uncertainty or probability of each outcome. The assessment of the outcomes is a matter of evaluation of morals or politics, or both; and the assessment of probabilities is often a technical or scientific matter. The interesting feature of the nuclear case is that most of the controversy is not about the outcomes — everybody agrees that nuclear plant accidents could have utterly disastrous results — but about the uncertainties involved, about how likely it is that one of the really bad outcomes will actually come about. You can contrast this with the consideration of the consequences of different oil policies: here, by and large, people agree what the results would be of different policies — a low-energy economy, for example, if we reduce oil consumption without using alternatives — but people differ in their views about whether a low-energy economy would be compatible with our ideals of civilisation. Now my position, without going into technical details, is this: the techniques of risk assessment used in the planning of nuclear energy — in the Rasmussen report in the U.S., for example, which was commissioned by the government from leading experts — are based on the idea that you need to take definite values for the uncertainties of the various outcomes that are possible and calculate the expected return as a function of the changes of the outcomes and of their different utilities. This kind of expected utility analysis is all very well if you *can* calculate the chances: but in

the nuclear case, and I imagine the genetic engineering case is the same, you just can't calculate them. And where you can't calculate the uncertainties, it's no good trying to produce an expected utility analysis. What Rasmussen did was just to invent some values for the uncertainties: but he hadn't enough evidence to do this, so they're practically worthless. And in the situation where you can't calculate the chances, what you must do, in my view, is to use a different method.

C.R. What we need to focus on are particular categories of risk where assessment is being asked for in quantitative terms in making public policy decisions. One of the people who gave evidence at the Windscale enquiry distinguished seven basic categories of risk:

1. Risks taken from social conscience — Rescue work
2. Risks taken for self reward — Mountaineering, hang-gliding, skiing
3. Occupational risks — Usually for payment
4. Acceptable risks — Where alternatives would involve inconvenient or disturbing disruptions of one's life style
5. Inevitable risks — Acts of God, e.g. risk from lightning
6. Avoidable risks — e.g. avoiding certain areas of town at night
7. Imposed risks — e.g. conscription

I take it we shall mainly be concerned with risks falling under 3, 4, and 7, and in particular 7.

I.L. Yes. What we should focus on, I think, is not risk in general but the particular difficulty of risk assessment in this sort of case: where we can't give even approximate probabilities to some of the outcomes. To do the calculations we would need lots more experience — all we have at the moment are very small samples.

T.W. Even where you've got the data, a study by Franke and Teufel has shown that the experts have presented them in the light most favourable to what the nuclear industry wanted to get out of the assessment.

I.L. We can admit some scientists come up with results to suit their patrons. I don't dispute there is a lot of special pleading — this can happen in many fields; people who don't kowtow can lose their grants. But there is something else deeper going on that makes it all

the more difficult: the question of what information you can trust and what you should distrust. It may turn out that people are not competent, and their lack of competence may stem from something other than corruption.

T.W. It isn't just a question of getting facts as data; it is how one gets acceptance of a point of view so that people think it gives them the right to go ahead. In the U.S., where there's been a citizens' referendum, work has been done which points to a conclusion similar to yours. People may share the same beliefs about the facts, but which side of the fence they're on — "nuclear power is needed", "nuclear power is dangerous" — was shown in the relative weight they put on various facts. So the first thing that comes into the political process is people's value-system. The second is the 'normative frame of reference' — who does one believe? In that enquiry the experts in the nuclear industry were number one across the board. This puts tremendous weight on these experts and their scientific information; and the question whether they are doing their scientific work honestly is absolutely vital.

I.L. But the criticism which will be listened to is not that of political bias — all parties have heard *that* charge. I would rather have a politically biased doctor than a virtuous one who didn't know his business. If you realise that people are blundering on, producing results you can't trust, even on careful assessment, the question of competence rears its ugly head. So there is a source of bias other than the political one, and this isn't fully appreciated.

T.W. Behind this is the question to what extent the political process can dethrone the experts. You don't have to be an expert to know what is wrong with nuclear power.

My own view would be that we need to get away from this game that gets played about balancing benefits and risks. Nuclear power is unreliable, uneconomic and inappropriate to meeting an energy shortage in the future. There are a number of studies that show this. If you hold this view, as I do, it no longer becomes a question of weighing benefits against risks. But if you do want to talk about risk assessment, you must think on the scale of one to three million deaths once every four years — and those are the nuclear industry's figures, not those of the anti-nuclear movement. These figures are

not improbable. You get them by accepting a nuclear industry figure of one serious accident in 20,000 reactor years. Build 5000 reactors, as has been proposed, and that means one serious accident every four years. You get this *scale* for the serious accident deaths — about a million — even from applying Rasmussen figures to the U.K.; but results from a more recent (and probably more reliable) Swedish study suggest the higher figure of three million. So I think we must start from saying there is something here about the *scale* of certain types of risk when you look at certain types of technology. The same might well apply to questions of genetic engineering. It is a question of scale and also a question of time over which the effects are going to take place; for instance, the genetic risks. One then has to look at what, leaving aside the accidents, we count as an acceptable risk, with an eye to what the technology can actually achieve. This is not in the area of probability assessment or just assessment of effects. It is a matter of looking at the whole load of political factors in trying to weigh this idea of risk.

A.A. But let's look further at the way the pressure for precision produces the wrong methodology.

I.L. There is a tendency, supported by much philosophical doctrine as well as public demand, even when people are prepared to say "We are willing to have probabilities not certainties and we are willing to take risks"; they revert back to the demand for precision and ask people to make precise probability estimates that can't be sustained on the basis of the data available. It is not only in the nuclear question where, given this demand, reputable scientists have made precise estimates where there is no warrant for them, because of the pressure to do so. For instance, in estimating the rate at which drugs induce cancer in mice, where the people opposing the pressures are not people concerned to promote nuclear plants, but Nader's Raiders and people who support their views. They look to impose very rigid standards on what counts as a carcinogen, standards nobody can really test without slaughtering or inoculating more mice than there are in the world. So this is a problem everyone has to appreciate, and the scientists and the public have to alert themselves to practising virtue — not to pretend to know things they don't know; a humble and trite virtue, but one that is violated all

too often, and whose violation is supported by the most respectable professional philosophers. So what do you do when you haven't precise probabilities? How do you make decisions? Which brings us back to the nuclear debate. Many of those who advocate *not* building the plants are minimaxers. They look at the worst possible consequence of each option and they try to decide which of the worst consequences are 'least worse'. This is the least worse strategy. The proponents of nuclear plants sneer at them — as a recent article on nuclear risk in *The Scientific American* did. Well, minimax may be unreasonable if you have precise probabilities, but it is not unreasonable if you don't have this precision. Here, looking at worst possible consequences can make a great deal of sense. It is congenial to some gambling practice even. If it turns out we don't have the evidential support for assigning low probabilities to worst possible consequences, that would suffice for refusing to build the plants. Similar considerations would apply in other predicaments.

A.A. Your point is that one thing that can go wrong is that the expert is asked to make assessments of risk where he doesn't have sufficient evidential warrant and that there are alternative ways of dealing with this latter situation. Can I turn to another related question, which was raised for me by the debate over whether and how we should permit the introduction of genetically engineered organisms into the environment; and that is that we don't know who the experts are who can assess the outcome. The biochemist or geneticist who knows how to tailor the organism isn't the epidemiologist who can know what happens when it gets out of the lab. So there are two ways we can go wrong in asking questions of experts; one is to ask for precise probability statements where they aren't to be had, and the other is to ask questions on which we suppose them to be experts but on which they aren't. We can avoid these pitfalls if we ask the right expert the right question. And, on Isaac's view, the right question where we don't have precise probabilities, is asked by the method of worst consequences.

T.E. How good are we at assessing worst options, anyway? Some people are prepared to threaten nuclear war because they think this would be better than losing the oil supply; because they think that

life without oil would degenerate into barbarism. But they don't see the slow withdrawal of electricity as leading to a worse option because this would be a long way off. So here the nearness of the risk affects people's perception of how important it is.

A.A. If we don't take enough interest in outcomes to future generations, whatever the expert's judgement, we may be suggesting, wrongly in my view, that these consequences are not a relevant consideration. Keynes said there was an inverse square law of distance in space and time over this!

Of course one relevant consideration in twenty or thirty years time is the increase in the rate of population. This is a matter for the sociologists and demographers. So you can't just pick on one group of experts.

I.L. Political decisions are cases of multi-dimensional decision-making. We value things in different ways, and there is not necessarily a single scale on which to integrate them.

A.A. This leads us to the question of the mechanism for gaining consent. We don't think that the fact that a vote has been taken is enough to justify a decision where the majority in the vote are not going to be affected by it. Moreover, this may not be a decision taken by referendum. In political decisions taken by governments, you may have voted for the government, but you vote for a "package deal", not necessarily for this particular decision. You may say that you give general consent to the political process, but this is a long way from saying that you give consent to this particular risk because of certain benefits. And anyway posterity can't be consulted. So in these cases risks are not voluntarily incurred.

J.M. There are two kinds of voluntary incurring of risks. One is irresponsible. In the factory inspectorate one knows very well that, whatever the precautions, some people will disregard them and think they can get away with it. This is a fact of human nature. The other kind is where the risk is responsibly incurred for the sake of the work. In radiation risks in hospitals some of the highest are taken not by patients but by radiographers. These are people accepting risks on behalf of the patients, and the exposure rates are far higher than for people working in nuclear plants.

T.W. Acceptable levels of radio-activity are set in terms of

exposures of the work force and exposures of the public, and this applies to exposures in hospitals. In hospitals there are two categories in the work force: those classified workers who are given regular health checks and film badges, and who are allowed to receive up to 5 rems a year. But there are unclassified workers who are allowed to run up to 1.25 rems a year for whom there are no health checks and no film badges and no assessment of how much they have picked up from X-ray scatter or spilling or leakage. It is worth noting that it was the workers in the laundry at Aldermaston who were exposed. So there is tremendous risk to people not regarded as at risk; the 1.25 rems is well within what studies are saying is the doubling dose i.e. doubling the risk of contracting cancer.

A.A. This is presumably why they are developing ultrasonic scanning techniques that don't carry the associated risks.

T.E. If you are in a minority which will be affected by the decision to build a nuclear plant (or for that matter a mental hospital or a motorway), couldn't you volunteer say 1/10th of your income to keep it away from, say, Cambridge, and if it came you would get 1/10th more. So you could then use the extra money to move away.

A.A. That would be all right if we all had the same amount of money.

T.E. But wouldn't this suggestion be more moral than if we just said "Downham Market will have a nuclear power station — bad luck Downham Market"? Surely this scheme would be better than just imposing the risk.

J.M. It isn't just the nuclear industry imposing its risk. It is that society needs energy; the nuclear people aren't devils on their own. They are being given public money to perform a function.

I.L. In the States the people involved in justifying the risks are the representatives of the Government establishment and our academic colleagues. It is not private industry: that is the wrong target, and they can get very badly hit commercially, as they were at Three Mile Island. What I keep hammering is that we have to be able to have enough trust in experts to believe that they will give us information or tell us that they don't know. If they make themselves instruments of political vested interests, we are in a bad shape. So

the direction is to remind the experts that it is in their interest, with the privileged support they get from society, to behave like experts.

T.E. How do you cause them to do so?

I.L. It is a delicate balance between pointing out how politically involved they are and reminding them that their privileges, their grants and immunities, can be withdrawn if the chief service they are supposed to provide for society isn't forthcoming. This service is to provide evidentially honest reports.

A.A. There is also the job of getting people to understand what is involved in making up your mind as to what the risks are, and not putting people in the position where the price of their privilege is to force them to answer questions which they really ought not to answer.

T.E. The recent enquiry about the risks of lead was apparently full of people who didn't think lead in the atmosphere was very risky, and it ignored many of the best papers about lead. What sort of sanctions can we have? I'm sure there was no negligence there, but should a commission tell scientists that if they are found guilty of negligence they go to prison for five years? And should negligence include prejudice, negligence against awkward facts?

I.L. In New York when the Three Mile Island thing happened there was a lot of flurry round Columbia University, and curiously those who came to the rescue were not the engineers, but eminent pure scientists in several science departments, who were out talking in seminars. They were saying; "We must defend the rights of the technology;" and in effect they were supporting the results of the engineers, while dismissing them as grubby applied types. One has to address that element in the established scientific community, powerful figures, because if they speak governments listen. One must convince them about the sort of integrity we want from experts. It involves public education about what we want from scientists, and also addressing the academic community, which in U.S. has been living on a gravy train since the post-war period and forgotten what they should really be doing. Moral sermons may not succeed, but in this instance, given the character of the people involved, they are not out of place.

A.A. There is a disanalogy here between the nuclear and the

genetic engineering question, which is due, I think, to the fact that in the latter case the molecular biologists saw the nuclear dispute and said "We must start this off right". So it was a community of people working on the problem who wrote an open letter and said "We are doing something potentially dangerous. We wish government to involve itself in the business of setting up standards, and we will obey them". This was not because they were saints, but I think they wished to be in a politically O.K. position. What happened was national guide lines were produced, and in effect everyone who works in this area has to obey them.

J.M. They have to because of the Health and Safety at Work Act.

A.A. In the States they are not compulsory, but people don't like their colleagues working outside them. Now they are beginning to say "Maybe we set the standards too high". But this shows it can be possible for people to be given rules and not feel paranoid about them, in the way some people in the nuclear industry now seem to be. Then, in an open atmosphere, instead of just disputing about what could go wrong in the lab, when the debate became public the epidemiologists could come in and say "You haven't looked at what these organisms might do if they escaped", and then a range of people with relevant expertise and no axe to grind could be drawn into the debate. In the nuclear case it is clear that so many kinds of expert are involved (from railway inspectors moving the stuff about to nuclear technicians) that there can only be proper debate when people are encouraged to feel that they won't get bullied. If you ask people to do something they can't do, and they know they will lose their professional status if they don't do it, then you will get bad experts.

T.W. An example is the question of what we do with nuclear waste, which brings in risk on a time scale that is geological, not historical. Can we have any answers that are not a pure guess, a pure gamble? It is irresponsible for an industry to have started out without solving that problem, and equally irresponsible to pretend that a solution is just around the corner, thereby giving decision makers the idea that it is O.K. to go ahead. We should face the fact that we don't have an answer, and stop the nuclear programme

now, so that the problem is at least quantifiable in terms of a finite amount of waste, and if we find a solution, we can then discuss whether we start again.

I.L. It is said against people in the university who are opposed to grants being given for developing nuclear technology that they are depriving their colleagues of means of research investigation. In Columbia the President of the University supported this on grounds of academic freedom. I believe many of these nuclear engineers internalize and actually believe this. It exacerbates the paranoia that surrounds the debate. The scientists believe themselves to be beleaguered, and that is why they get the support of their colleagues in pure science. Respect for scientists and for scientific technology as a vehicle for progress has become the central issue for many scientists. To attack their political integrity is scarcely productive of any significant response. But one may get a hearing on the grounds that what is going on is not by their own standards something that they should accept. The contention that precision is not obtainable meets them on their own ground in a way they should not afford to ignore.

A.A. The scientific establishment isn't all of one mind. Claire's father, Martin Ryle, is a Nobel prizewinner, and it is well known that he is strongly critical of the nuclear programme.

C.R. He is criticized for bringing his strong convictions into a scientific matter, but clearly he sees it as an issue that can't just be confined to scientific assessment.

A.A. This is where they turn to him and say "You are not an expert: you are a radio-astronomer".

C.R. As it happens, he also has high qualifications as an engineer.

A.A. This insistence on separate disciplines makes people say that you mustn't speak outside your own specialism. Whereas in the nature of the case here is something that cuts across specialisms as a matter of public policy. The experts may say "We can't make any estimate except within limits", and they are told "We have got to do something". This dilemma is brought out in Sinclair Lewis' novel "Martin Arrowsmith". There was a plague on an island, and the social medicine people said "We want to use a certain drug", and

the pathologists said "It isn't checked enough; we don't know what the after-effects are going to be". Ought they then to try it? Isn't the proper thing for the scientists to say "We really can't advise you on this matter". So if they speak here, it is as citizens, not as experts.

I.L. The scientists can't in their own right advise you, but the suggestion I was putting forward was that, as you have to make a choice, adopt a minimax criterion. Assuming there are several possible outcomes you say "Look at the best and look at the worst". In the nuclear case you may not have to make estimates of probabilities at all. But the Martin Arrowsmith situation is one in which a person may have nothing to lose and something to gain.

A.A. In the nuclear case there is something to gain as well as something to lose.

I.L. Sometimes you have got to do something, but there isn't much guidance you can get, so in these cases you can argue "Look at the worst, and avoid it".

A.A. What you mustn't say about cases involving deaths is that the fact that you are risking lives always makes something the worst option. In France someone made a calculation of how many lives might be saved by cutting down the trees along the roads. They decided that, though they knew they could save some lives by this, the quality of life in France would be adversely affected. One wouldn't want to live in a country where everything was made incredibly safe, but life was unbeautiful and boring.

T.W. There are questions that take us right outside risks that can be measured in physical terms, and this goes for the way that worker discipline is important in implementing safety. Solly Zuckerman in the House of Lords recently said risks associated with the nuclear industry have all been due to human error, and these can be overcome, as in the army and air force. But if the consequence of maintaining the necessary discipline to avoid these faults is that kind of militarization, is that a political risk we are prepared to accept? There are certain risks associated with this industry which we are refusing to face because of a commitment for or against nuclear power, and these are of a social and political nature which are worrying a number of people from a number of reputable organizations. But there are political pressures curtailing

public discussion because of the length of time and the damage such public debate will do to the credibility of the nuclear industry.

I.L. But debate has its costs too, and on a sensitive issue, how does one get an informed public without the costs of debate running totally out of balance?

T.E. It might be better if we *did* use cost-benefit analysis.

T.W. What I am saying is that there is an attempt at the moment to use cost-benefit analysis to rationalise what we currently have.

I.L. That is an abuse; people may use a method to defend *status quo* values. There are plenty of people who would advocate cost benefit analysis and who would not dispute that values are political and moral values; but this doesn't mean they can't be consistent in the way they think about cost and benefit, and look at the consequences. The point is that this doesn't help where the risks are incalculable. There are two meanings of 'incalculable': one is where the numbers are infinite, either infinitely great or infinitely small, and this is a hard thing to say. The other is that we have situations where we *can* assume better or worse on a number of dimensions but can't aggregate them on a single scale, so we have no clear notion of how to weight them. This is the situation we typically face as individuals and in political decision making. And in this case there can't be an algorithm for risk assessment.

A.A. But a lot of political decision making is rooted in the assumption that there is only one dimension of evaluation. Built into public policy is a notion of cost-benefit analysis, which may stem from the way the civil service is instructed to make its calculations: it is connected with the notion that cost benefit analysis means adding up literally what it costs, where that means money. The pressure is to concentrate on what is quantifiable.

J.M. In a factory situation when you have to make a case out this is how you *must* go on, as you must too in making assessments for insurance.

A.A. In insurance cases payment is made on certain outcomes only and on none of the others: everything else is irrelevant.

J.M. This is why you can take account of fatalities but you can't regard the near misses.

T.E. My friend Trevor Kletz has made studies of the incidence of fatalities in ICI* and of the relative costs of trying to prevent them. He has been criticized for only fastening on fatalities (which are of course quantifiable). But he is using fatalities as a way of working out what situations are dangerous. For example, after the collapse of a part of a tower block at Ronan Point, up to £100,000,000 was spent to prevent each further death to be expected from such incidents. That was ludicrous if you think how many lives might have been saved with that money — say on preventing smoking.

C.R. This is to assess risk by numbers of fatalities, which is computable because if a person is dead, he is dead. But how do you assess the remoter effects like genetic deterioration, or increase in disease? In order to get something computable, you may have to disregard a number of extremely nasty things. There is a scientist in the States, Rosalie Bertell, who makes this point about the nuclear calculations. She considers cancers to be secondary effects of radiation, and the primary to be the damaging of the body's immune system; people are going down earlier with old age diseases, and the quality of life is affected. The pollution of the environment is building up at the same time as resistance to disease is being lowered, and indeed she is concerned for the survival of our species. This is all part of the area which it is impossible to calculate.

J.M. Even in computing numbers of fatalities, and saying that the probability of a certain number of these is acceptable, we are passing over the individual dimension which escapes these calculations — the way an individual's death is important to that individual, and his family and friends. This is another kind of incalculability.

A.A. So there's a moral. In our public policy decisions we are in as much danger of trying to make calculations that can't be calculated as we are of failing to make the calculations we can. Political decisions involve both of these cases — both cases where we

*"The Application of Hazard Analysis to Risks to the Public at Large".

"Safety in Numbers".

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can and cases where we *can't* calculate — and we need to be more sensitive in seeing which we are facing at any time. And when experts are consulted about risk assessments, we should not tempt them to think they will lose face if they acknowledge this distinction. They need sometimes to be prepared to say that they cannot give us an answer.

Charles Darwin: Life and Habit Part II*

FRANCIS HUXLEY

THE HABIT of collecting [Darwin] once wrote, might turn a man either into a systematic naturalist, a virtuoso or a miser. And although he said of himself that he “without any theory collected facts on a wholesale scale,” this is not really true: he always had an ultimate goal in mind, namely the solution of the species problem. However uncertain he may have been about proclaiming any theory of his — which he liked to introduce with such a phrase as “I scarcely hesitate to affirm . . .” — he never worked without one, and he collected his facts by the mountain because they, at least, could assert themselves and the idea they illustrated where he found it difficult to do so. Everyone knows how Darwin hoarded his theory for eighteen years, publishing it only when Wallace’s essay forced him to; and this certainly was because he did not think himself safe until his theory was covered several times over by facts.

Darwin, besides, was a most generous man and never avaricious. Timid he might be in some ways, as the Wallace episode shows — he almost persuaded himself to let Wallace take all the credit for the idea of natural selection — but his generosity was usually a match for his timidity, just as his devotion saved him from the perils of over-dependence. We may note this mixture of timidity and enthusiasm in Darwin’s desire to please: “To be present with him . . . at a small luncheon party, especially if a sympathetic woman were seated near him, will not be easily forgotten by anyone who has

*Reprinted from *The American Scholar* Volume 29, 30, November 4, 1 Autumn/Winter.

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Theoria to Theory, 1980, Vol. 14, pp. 107 – 124
0049-3686/80/1402-0107\$04.50/0

Published by
Gordon and Breach Science Publishers Inc. 1980

experienced it. He set everyone at his ease, and talked and laughed in the gayest way, with lively banter and raillery that had a pleasant flavor of flattery, and touches of deference to his guests and a desire to bring any stranger into the conversation." To please others merely in order to avoid a disagreeable situation was certainly one of Darwin's minor vices; he was always letting his timidity take advantage of his tenderness. However, to please others in order to get the best out of them, to flirt both tenderly and manfully, is another matter, and it was "this tendency to give himself up to the enthusiastic turn of his thought, without fear of being ludicrous" that led him, like Francis Galton, to carry out experiments no sensible man would have considered. He confessed a distrust of purely deductive reasoning and of skepticism which, although it might save some time, often ended by stopping a man from making just that foolish experiment which would lead him to the truth. Who but Darwin would have had a bassoon blown close to a sprouting seed, to find whether the sound affected the motion of its cotyledons? Sometimes, however, his experiments appeared ludicrous even to him. "If you knew some of the experiments (if they may be so-called) which I am trying," he wrote to Hooker, "you would have a good right to sneer, for they are so *absurd* even in my opinion that I dare not tell you." But the experiments themselves were far from ludicrous. It is Darwin himself, with his way of working toward the truth like a dumb but sagacious dog, as Huxley remarked, with his glee and his disappointments, who gives rise to this notion of the ludicrous — the ludicrous often being the enthusiasm of the amateur over a subject professionals think too complicated for him.

That he was an amateur in some ways is not meant derogatorily. Thiselton Dyer said the same about Darwin's botanical interests: "He turned his attention to plants, doubtless because they were convenient objects for studying organic phenomena in their least complicated forms; and this point of view, which, if one may use the expression without disrespect, had something of the amateur about it, was in itself of the greatest importance. For, from not being, till he took up any point, familiar with the literature bearing on it, his mind was absolutely free from any prepossession." He had to thank

his bad education for his unfamiliarity with the literature: but he also had to thank something in his own mind that did not allow him to have any prepossessions about himself, let alone about knowledge. A professional will see the world through a pair of system-colored spectacles and think in terms of systematic unreality; the amateur is not only untrained for this but feels that he has no warrant to see and think in this way. As a result he will take facts literally, without glossing them over with scholastic explanations of what they should be, and he can see through theories because he is not traditionally involved with them. He may often go too far and become involved in his own prejudices so much that he will bundle everything up into a horrid mythological system of his own; but in Darwin, as we have seen, the mythologizing tendency had no center from which to grow. In any case, however the amateur reacts to the orthodox system, he points to a region that professionals had previously thought uninhabitable, the region of waste and exception and impossibility.

“Well may we affirm that every part of the world is habitable!” cried Darwin, after examining the brine lakes of Argentina. To find living things in unlikely places was a passion of his: when anchored off the Cape Verde Islands, he collected some dust that had gathered in the gauze of the wind vane and sent it to Ehrenberg, who discovered in it sixty-seven organic forms of infusoria and plants, to Darwin’s delight. On St. Paul’s Island, which, except for a crab, apparently supported only the booby and the noddy, he discovered a fly, a tick and a moth, all living in the birds’ plumage, a beetle and a woodlouse living beneath the guano, and a spider living on the others. And the unlikely places themselves fascinated him. “In calling up images of the past, I find that the plains of Patagonia frequently cross before my eyes; yet these plains are pronounced by all wretched and useless. They can be described only by negative characters; without habitations, without water, without trees, without mountains, they support merely a few dwarf plants. Why then, and the case is not peculiar to myself, have these arid wastes taken so firm a hold on my memory? . . . I can scarcely analyze these feelings: but it must be partly owing to the free scope given to the imagination. The plains of Patagonia are boundless, for they are scarcely passable, and hence unknown: they bear the stamp

of having lasted, as they are now, for ages, and there appears no limit to their duration through future time. If, as the ancients supposed, the flat earth was surrounded by an impassable breadth of water, or by deserts heated to an intolerable excess, who would not look at these last boundaries to man's knowledge with deep but ill-defined sensations?"

The uninhabited tracts of Darwin's mind here found themselves given form and expression: no wonder that their impassability haunted him, since they bounded both his steps and his knowledge. "The limit of man's knowledge in any subject possesses a high interest," he wrote again, "which is perhaps increased by its close neighborhood to the realms of the imagination." His imagination, being formless, was literal; more, it was itself a region of waste, of exceptions and impossibility. Darwin was, we can see, centrally interested in waste, even if we ignore the current psychoanalytical explanations for compulsive collecting: the whole idea of natural selection is based on the realization that wastage is not merely destructive. Exception, too, attracted him, and he made it a rule always to note exceptions to his own theories lest he conveniently forget them. It was from an exception, besides, that he first learned the true nature of the scientific process. When he was still a student he learned that a tropical shell had been found in a gravel pit. Full of excitement, he told Sedgwick about the discovery and was much surprised when Sedgwick refused to become at all interested in this exception — for the gravel had a glacial origin — since it would have meant redoing the entire geology of England. Someone, he said, must have recently thrown the shell into the pit. "Nothing before had ever made me thoroughly realize . . .," wrote Darwin, "that science consists in grouping facts so that the general laws or conclusions may be drawn from them." This was undoubtedly a great moment in his life, the activity of his mind finding a method and a purpose at the same time. Impossibility found itself borne down by the combination: "It's dogged as does it," he would exclaim when the solution to some problem continually eluded him. He hankered to give form and order to the facts he collected, hankered to explain the world by means of the evidence provided by its own workings: enigmas and mysteries were to him at once a thrill and an

affront. As a young man he was much impressed by an erratic block near Shrewsbury, a countryman having told him that men could try till Doomsday to explain how it got there, and still fail. "So that I felt the keenest delight when I first read of the action of icebergs in transporting boulders, and I gloried in the progress of Geology."

But let us revert to waste, or death, for it introduces another side of Darwin's character. "What a book a devil's chaplain might write on the clumsy, wasteful, blundering, low and horribly cruel works of nature," he once wrote. It seems that he did not feel this horror very often: the spectacle of nature battling with herself excited interest in him rather than pity. Pity, however, he certainly felt from time to time in the form of a romantic guilt, as when he notices a wasp caught in a spider's web, where it struggled for an hour: so he removed the wasp, killed it and replaced it on the web to see how the spider would deal with it. He felt very badly about killing eight-day chicks — who could "do such a very disagreeable thing as kill babies," he asked Fox in a letter — and he was once struck with horror at the thought he might be eating unborn calf. (It was only puma.) And as for the small armadillo of the pampas, "It seems almost a pity to kill such nice little animals, for as a Gaucho said, while sharpening his knife on the back of one, 'Son tan mansos' (they are so quiet)."

This humaneness in dealing with the brute creation was taught him by the precept and example of his sisters when he was still a child. When he made his first collection of butterflies he was persuaded not to catch live ones, for that would have meant killing them: instead he collected only those he found already dead. Doubtless it was for a similar reason that most of his earliest collections were of inanimate objects such as shells, franks and seals. Later, however, he made a collection of beetles, which he caught alive; in his old age he could remember almost photographically those places where, years before, he had caught particularly fine or rare beetles. His collecting then turned him into a hunter, a trait which, although suppressed at first, later made him a passionate shot. "How I did enjoy shooting! but I think that I must have been half-consciously ashamed of my zeal, for I tried to persuade myself that shooting was almost an intellectual employment . . ."

What kind of an employment is shooting? It is a way of coming into an almost instantaneous relationship with a thing at a distance — so quickly, indeed, that one's excitement at pulling the trigger seems to be the cause of the bird dropping out of the sky. It is this compounded thrill that Darwin sought so much in his youth, a thrill that was nothing but a way of making himself feel his own being. The necessity of establishing oneself in the world is something common to all children, and it was certainly a problem to Darwin, repressed as he was by sisters and father. What he wanted was life — excitement, encouragement, response. But his sisters told him he mustn't, that he could only have life without the excitement, only collect butterflies that were dead. He himself says that he was very passionate when young, and swore like a trooper; his wish for excitement just would not be kept down. There is, besides, this revealing passage in his *Autobiography*: "I beat a puppy, I believe, simply from enjoying the sense of power This act lay heavily on my conscience, as is shown by my remembering the exact spot where the crime was committed. It probably lay all the heavier from my love of dogs being then, and for a long time afterwards, a passion."

Here then is an echo of Darwin's use of anger as a tonic. But in the beginning it was not so much anger as his energies wanting to make themselves known, a thrill he got in another way by telling what he said were lies. "These lies, when not detected, I presume excited my attention, as I recollect them vividly not connected with shame, though some I do, but as something which by having produced a great effect in my mind, gave pleasure like a tragedy." "To give pleasure like a tragedy" — it is a fine phrase, in which telling lies, being angry, shooting, reading Shakespeare or listening to *The Messiah*, can all be brought together and understood as Darwin's way of stimulating his sleeping energies.

This habit of stimulating himself, it seems, later became mixed up with Darwin's passion for collecting. Thrills and explosions are all very well, but they do not last: the mind, having felt itself act, still needs something substantial to be the proof of that activity. So, shells, franks, seals, beetles: and, when he went out shooting, he made a record of all the birds he killed by tying a knot on a string fastened to his lapel.

That the birds he killed actually died, and that he could only solidify his thrills by collecting lives, so to speak, seems to have been an unfortunate accompaniment to his activity. J. M. Herbert tells an anecdote of Darwin: “. . . when going over some of the ground they had beaten on the day before, he picked up a bird not quite dead, but lingering from a shot it had received on the previous day; and that it had made and left such a painful impression on his mind, that he could not reconcile it to his conscience to continue to derive pleasure from a sport which inflicted such cruel suffering.” The pleasurable skill of being a dead shot, however, prevailed despite his conscience, and he only let up on shooting at the end of his *Beagle* days because his other pursuits became more interesting. It was not death he minded, therefore, but accusation: if he could take lives as though he were not really there, he was happy. Perhaps it was for this reason he so enjoyed the memory of killing a fox in Chile, by creeping up behind it and knocking it on the head with his geological hammer.

Darwin's horror of suffering comes out very plainly both in his attitude toward slavery, which he detested — it was the cause of one of his quarrels with Fitz-Roy on the *Beagle* — and in his reactions to operations. Thus he tells us how he fled halfway through the only two operations he ever witnessed (both without anaesthetics, it must be stressed, and one upon a child), the two cases haunting him for many years; and that when, as a medical student, he visited the sick, “Some of the cases distressed me a good deal, and I still have vivid pictures before me of some of them . . . ” Even more striking was his reaction to anatomy classes: the sight of a cadaver being dissected caused him such disgust that he was unable to attend, and so he never learned about either anatomy or dissection.

An interesting sidelight on this matter is seen in Darwin's reactions to vultures. He calls them “disgusting” not only in *The Descent of Man*, but also in his journal of the voyage of the *Beagle*, where, of six uses of the word, three apply to vultures. (The word is also used to characterize sea-slugs, native remedies on the pampas, and the town of Pernambuco.) Darwin rationalizes this disgust by pointing out with a shudder at the bald heads of vultures — although turkeys do not seem to affect him at all in the same way —

but the real cause seems to be that vultures are carrion-feeders and, beakful by beakful, cut up the dead much as medical students do in dissecting cadavers.

When death did not groan in his face, therefore, Darwin could look at it quite happily. "It is a bitter and humiliating thing to see works, which have cost man so much time and labour, overthrown in one minute; yet compassion for the inhabitants was almost instantly banished, by the surprise in seeing a state of things produced in a moment of time, which one was accustomed to attribute to a succession of ages. In my opinion, we have scarcely beheld, since leaving England, any sight so deeply interesting," he wrote of an earthquake in his Journal. In the pampas, he views the innumerable bones, whole or broken, that are to be found there, with a certain triumphant dispassionateness, as illustrating an interesting biological point; in the same way he can agree with the remark made by a Dr. Smith, that the carnage caused by lions in South Africa must indeed be terrific, needing only to comment upon this with an exclamation mark. His pleasure in arousing astonishment by horrific facts comes out well when he describes how the Indians of the Argentine are slaughtered: "This is a dark picture; but how much more shocking is the unquestionable fact, that all the women who appear above twenty years old are massacred in cold blood! When I exclaimed that this appeared rather inhuman, he [a Gaucho] answered, 'Why, what can be done? they breed so!'"

Darwin on his journey around the world writes of himself as a mark for astonishment almost as often as a scientific observer. Novelties overwhelm him: the word *novel* indeeds recurs constantly throughout his Journal, together with such words as *astonish*, *curious*, *remarkable* and *singular*. "In England any person fond of natural history enjoys in his walks a great advantage, by always having something to attract his attention; but in these fertile climates, teeming with life, the attractions are so numerous, that he is scarcely able to walk at all." Dear Darwin! The thrill of wonder often stopped him dead, and he expressed his feeling at those times by a great number of rhetorical exclamations and questions. His reactions to wonder and astonishment went back to his pleasure in

telling lies or tall tales when a child, in order to “cause excitement.” But he did not let the excitement get the better of him, for although he would usually speculate upon the astonishing thing, he would often admit that “I do not know,” “I am quite ignorant,” “I cannot form a conjecture” of what it was all about.

The lives and novelties Darwin collected were thus somewhat impersonal; and death, too, was impersonal, striking down this or that individual by chance and not on purpose — not, that is to say, on the purpose of anything outside the actual situation. The situation breeds its own purpose, and death is a secondary consequence of this. Darwin was not good at dealing with psychological purpose, as can be seen from his reactions to the Fuegian Indians. He was excessively astonished when he first saw them: “One can hardly make oneself believe that they are fellow-creatures, and inhabitants of the same world.” They were indeed such appalling and insistent savages that he felt himself at a real disadvantage, for, as he said, they had not the least idea of firearms, but crowded upon him with threats and demands and barbaric curiosity. When he at last returned to the ship, “I was amused at finding what a difference the circumstance of being quite superior in force made, in the interest of beholding these savages.” Indeed, his encounter with the Fuegians proved to be one of the times he was really stirred, for he could hardly keep off the subject. Thirty-five years later, in *The Descent of Man*, he wrote: “The astonishment which I felt on first seeing a party of Fuegians on a wild and broken shore will never be forgotten by me, for the reflection at once rushed into my mind — such were our ancestors . . . He who has seen a savage in his native land will not feel much shame, if forced to acknowledge that the blood of some more humble creature flows in his veins. For my own part I would as soon be descended from that heroic little monkey, who braved his dreaded enemy in order to save the life of his keeper, or from that old baboon, who descending from the mountains, carried away in triumph his young comrade from a crowd of astonished dogs — as from a savage who delights to torture his enemies, offers up bloody sacrifices, practices infanticide without remorse, treats his wives like slaves, knows no decency, and is haunted by the grossest superstitions.” The contrast between the

savage and the baboon is well summed up in that word *decency*. To be decent is to have a simple but courageous sense of honor, like the baboon and like Darwin himself; the savage, on the other hand, will not keep his distance, advancing his passions and his pretensions at the same time as his physical presence. Against such an approach Darwin's trust in decency could offer little defense.

"His was a world of insects and pigeons, apes and curious plants, but man as he exists had no place in it," a contemporary journalist wrote of Darwin. He had indeed a great feeling for plants, almost equal to his early passion for beetles. "It has always pleased me to exalt plants in the scale of organized beings," he wrote — no doubt one reason he took such delight in the sundew and in climbers. But plants also provided him with his first illuminating image when he came to think about the origin of the species: "All animals of the same species are bound together just like buds of plants, which die at one time, though produced either sooner or later. Prove animals like plants . . ."

This is an astonishing remark, and to be produced it had to spring as much from Darwin's weaknesses as his strengths. Examining it, one sees that the whole force of emotional thinking is opposed to it, and that previous evolutionary theorists would have found it incomprehensible. It shows, besides, just how much Darwin's way of thinking differed from that popularly known as Lamarckism. The theory of willed development, which is Lamarckism in its most absurd and exaggerated form, cannot account for the structure of plants, however hard one tries to give life a purely animal and conscious quality. Darwin, reversing the entire issue, made animals like plants and saw them as dying — rather than willing — their way to success. How was this?

"They die, without they change, like golden pippins; it is a *generation of species* like *generation of individuals*." Darwin always came back to the individual, though in a quite impersonal way; he saw that the species was not an ideal type but was composed of a limited number of individuals, none of them quite the same, continually succeeding each other in time and being acted on from the outside. That the individual members of a species lived or died interested him only because it was through their lives that the

endlessly repeated cause was able to act, whose effect was the changing species itself — the species being the expression of a state of balance and adaptation, and not one of planned design.

Darwin, of course, is a study in balance. He balanced himself in a lengthy and roundabout way, the slightest disturbance at one place producing a wholesale rearrangement everywhere else, until some kind of stasis was resumed. For he could never let go of anything: what he read or observed stayed in his mind until he could find some place for it. This tenacity has a certain vegetative quality in itself, to go with Darwin's other interests: unlike an animal, centered upon its own desires, Darwin's mind gathered around the facts that he planted in it, wherever they might be, and not around the mystery of its own working. Laboriously balancing the facts it contained, it made Darwin look at nature as though it were an example of domestic economy, where the most disparate things come together according to the needs of the moment and not to any abstract principles of classification.

Darwin, I think, might have enjoyed Buddhism, if he could have borne to consider the matter. Thomas Huxley, late in life, came to appreciate the concept of karma, the law of cause and effect which, operating in nature, Darwin called natural selection; with his particular cast of mind, however, I cannot imagine that Huxley thought much of the doctrine of the five skandhas. This doctrine says that the ego is nonexistent, and that what seems to be a real and immortal personality is nothing but a bundle of habits, brought together at birth and scattered at death. Darwin, on the other hand, however little he might have enjoyed a personal application of this doctrine, was yet always putting it to work in his writings. That there was an ideal form of nature that continually accused the reality of imperfection was an impossible belief for him; and if there existed perfecting tendencies, or higher destinies in store for man, these were the perfectly plain outcomes of actual situations, the results of a karmic economy.

Now it is easy to see how Darwin's experience as a child may have helped him to this attitude. William Irvine has remarked that Darwin's delight in facts started as a defense against the continual accusations brought against him by his father and his eldest sister

(who he thought “too zealous in trying to improve” him). Perhaps his distrust of the ideal and the abstractly systematic had a similar origin. His preoccupations, it must be stressed, were collateral rather than lineal, for his relationship with his father seems effectively to have suppressed any positive feelings of linearity in him and to have encouraged his cousinly, collateral relationship with the Wedgwoods, for example. This same dislike of authority and linearity may be seen in the historical essay he wrote for the *Origin*. There was really no need for him to write it, but if he did, then he should not have treated his predecessors — notably, Lamarck and his own grandfather Erasmus — in so cavalier a fashion. A historical essay should be a way of putting one’s own work into perspective, rather than a way of claiming to have done everything by oneself, as Darwin uneasily tried to imply. Yet the need to make such a claim is understandable when one sees how ill at ease he was with his own Author: he was engaged in re-establishing, in himself, a sense of identity and continuity which the life in his family had denied him. That this attempt sometimes went too far, he was at least half aware. “Here is a good joke,” he wrote to Hooker: “H. C. Watson . . . says that in the first four paragraphs of the introduction, the words ‘I,’ ‘me,’ ‘my,’ occur forty-three times! I was dimly conscious of the accursed fact. He says it can be explained phrenologically, which I suppose civilly means, that I am the most egotistically self-sufficient man alive; perhaps so.”

Darwin’s preference for the collateral over the lineal is shown also in the *Origin*, where he likes to explain how a species originates, not by marking out the course of its descent, but by showing how, between two closely related species, there is no real boundary — a species to him being a seething collection of varying structures, whose melting edges might calve new species, like icebergs. “It is really laughable to see what different ideas are prominent in various naturalists’ minds, when they speak of ‘species,’” he wrote to Hooker; “in some, resemblance is everything and descent of little weight — in some, resemblance seems to go for nothing, and Creation the reigning idea — in some, descent is the key — in some, sterility an unfailing test, with others it is not worth a farthing. It all comes, I believe, from trying to define the undefinable.” A lot of

Darwin is the attempt to do the exact opposite, to do away with edges and make the apparently well-defined indefinite, so that "we may be all melted together." "It is funny how each man draws his own imaginary line at which to halt," he wrote of those who boggled over parts of his theory. Darwin's own line was drawn firmly between his search for the truth and his desire to please, which, at any rate in the privacy of his own study, he did not allow to mix; the emotional link which others had between authority, linearity and the fixity of species was, for him, broken.

Yet, although Darwin was so fascinated by the way things grade into each other, he was always interested in the notion of small worlds: of small salt pans, for instance, set apart from the surrounding pampas, of the pampas itself and its difference from the jungle to the north, and of the whole South American continent and its productions as being a separate biological province. For him the productions of nature were clearly distinguishable spatially, just as they were in time. How can one account for this, if not by a lineal explanation?

Darwin proceeded in an altogether ingenious way. His use of the word *origin* is deceptive, for while he often spoke of a common ancestor, the ancestor is important mainly as the last step in a deductive syllogism. "I am actually weary of telling people that I do not pretend to adduce direct evidence of one species changing into another," he replied to an inquirer, "but that I believe that this view in the main is correct, because so many phenomena can thus be grouped together." Darwin had good reason for not trying to show that one species turns into another: as yet no long fossil series had been discovered to provide such evidence. Even so, one gets the feeling that Darwin found genealogical trees almost as stupefying as metaphysics or the process of erosion, and that when he uses the word *origin* he tends to mean "causes of change" rather than "original model." And the causes of change that he thought important were the simplest, most obvious things: they were the needs of the moment by means of which plants and animals living together in the same habitat could find their true affinity.

In this lay Darwin's genius, that he saw the key to relationship interaction rather than in descent, and that he understood nature

opportunism. The fact that similar opportunities, in the form of similar habitats, generally produced similar changes in different species, always interested him, although the exceptions interested him even more. He was most interested, however, in another kind of opportunism, which he described by means of a chain argument. Cottagers keep cats that catch mice that eat bumblebees that fertilize clover: such was one chain of opportunity that he saw in an ecological situation. It is the science of *The House That Jack Built*. Darwin himself realized this when he told Hooker his chain argument for the dispersal of plants: "I find fish will greedily eat seeds of aquatic grasses, and that millet-seed put into fish and given to a stork, and then voided, will germinate. So this is the nursery rhyme of 'this is the stick that beats the pig,' &c., &c."

The nursery rhyme from which Darwin quoted is as long as any of his own chain arguments. The old woman, its heroine, at the end manages to persuade the cat: and

Then the cat began to kill the rat,
 The rat began to gnaw the rope,
 The rope began to hang the butcher,
 The butcher began to kill the ox,
 The ox began to drink the water,
 The water began to quench the fire,
 The fire began to burn the stick,
 The stick began to beat the dog,
 The dog began to bite the pig,
 The pig began to go;
 So it's all over, and the old woman's home again now.

Is not natural selection the old woman come home again, the cat having killed the rat; or the battle being lost because the horseshoe fell off? The inequalities mount up, until they come to a head and change the whole system: the things in the system interact with each other, some dying but none changing — the system changes. It is the idea behind a Heath Robinson machine, in which the most unlikely and unsuitable things are pressed into service solely in order that they can pass on, from one to the other, some motion having its designed effect in the far distance. This linking together whatever may be at hand is typical of Darwin not only in his descriptions of ecological processes, but in his theorizing, which is often advanced

by the most extensive of chain arguments: *The Descent of Man*, for instance, is a vast chain of parallelisms buttressed by collateral chains of reasoning in other spheres. (Discussing the idea that the races of man are all related, for example, he includes as an argument in favour that both dogs and monkeys are able to reason.) And though *The Origin of Species* is much better as a theoretical work, even Thomas Huxley confessed that it was the most difficult book to master that he knew: and this is because Darwin requires one to pay attention not only to what he is saying at the moment, but to the whole chain of his argument as he pursues it through facts, deductions, speculations, apologies, parallels and justification. Yet at bottom the argument is curiously simple. "It is interesting to contemplate a tangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent upon each other in so complex a manner, have all been produced by laws acting around us."

It is odd, at first sight, that all this should have proved so incomprehensible to Darwin's contemporaries: the laws of inheritance, of variation, of geographical isolation, of the Malthusian effects of overpopulation, and of ecology are all simple enough. What caused trouble, it seems, was the most commonsensical of those laws through which, despite its lack of scholastic principle, all the others became actual: the ecological law, which relates unlike things through their interdependent actions. That unlike things have anything in common is a difficult idea to get across, a difficulty that led Herschel, for one, to dismiss natural selection as "the law of higgledy-piggledy": he, no doubt, would have preferred to explain existence teleologically, in terms of a thing's likeness to itself. It is here, perhaps, that one reaches both the crux of the Darwinian argument and of Darwin's habit of mind. The difficulty in thinking about phenomena in time is to know whether to emphasize their continuity or their discontinuity — whether to think in terms of purpose or of determinants. Darwin avoided the dilemma by bringing purpose and determinism together under the guise of

habit, which to him was really another name for nature: "Nature, by making habit omnipotent, and its effects hereditary, has fitted the Fuegian to the climate and the productions of his miserable country," he wrote succinctly. In his eagerness to bring everything down to habit, he sometimes comes close to equating habit to matter — his book *The Expression of the Emotions*, in which he showed what good reasons there were for screwing up one's eyes when in a rage, or for lifting the corners of the mouth in a smile, is a fine example of how far this approach will go. His view of what a habit was, however, was general enough for him to fit in purpose when he had to. Thus, under pressure from the physicists whose calculations deprived him of all those necessary millions of years he had to have if natural selection were to do its work, he introduced the Lamarckian idea of wants evolving new organs by making themselves felt, and invented pangenesis as a way of making the effect of those wants hereditary.

Pangenesis, for all its failure as a theory, is one of the more Darwinian of Darwin's notions. There is something delightfully touching about the idea of having every cell in the body send its little particle of essence to be formed into the gametes: it reminds one of Darwin's hope that "we may be all melted together." The idea is also interesting in that it emphasizes Darwin's view of an organism as being a bundle of habits and particulars that have come together without the aid of a central organizing force. But its principal interest lies in the way Darwin has tried to make particulars form a continuum. Darwin may have always preferred to deal with particulars, but this does not mean that he was especially interested in the numerical. On the contrary, it is no accident that his interest in particulars should have broken down, when he was dealing with heredity, just at the place where particulars become continuous through a mathematical treatment. That things occurred in numbers was, one suspects, too obvious a fact for Darwin to bother much about, except in a crude way. He preferred to read meanings into particulars as would a physiognomist, rather than a statistician — a preference shared by Francis Galton, the inventor of biometrics.

If Darwin could not think mathematically, on the one hand, one

cannot begin to picture on the other what his reactions must have been when asked by Grote's father why he didn't give up all this "fiddle-faddle of geology and zoology, and turn to the occult sciences." The question is interesting: occultism is certainly a theory of the sublime and propounds the potential relationships between the shifting and unborn figures it makes out in the darkness. Yet the questions is also majestically inept, for occultism does without material habits, the only things Darwin really considered to be evidence. Matter, in his eyes, far from being directed in its operations by an all controlling Mind, controlled itself through internal dissimilarities which found their term in an ecological balance. The balance was never perfect, and it was because of this imperfection that matter evolved.

Life feeds on death — this unimpeachable truth had not been put to work systematically before Darwin. "Why does an individual die? To perpetuate certain peculiarities (therefore adaptation), and obliterate accidental varieties, and to accommodate itself to change," reads one of Darwin's earliest and somewhat hasty notes on the subject. This is his Grand Idea, which emerged out of the shifting balance he saw in nature and felt in himself, and which in neither place he could fix in terms of final and continuous purpose. The self-continuous, and hence occultism and metaphysics, were matters from which Darwin turned his eyes with great uneasiness, discovering as he did so the Heraclitean principle of continuity through change. "Only the other day I looked forward to this airy barrier as a definite point in our voyage homewards," he wrote of the Antipodes when on the *Beagle*, "but now I find it, and all such resting-places for the imagination, are like shadows, which a man moving onwards cannot catch."

Three Approaches to Biology

Part I. The Mechanistic Theory of Life

RUPERT SHELDRAKE

Introduction

THERE ARE three models or paradigms which provide different approaches to the science of biology, the mechanistic, vitalist and organismic. Within the confines of institutional science, the mechanistic theory has been almost completely dominant for over fifty years. Nevertheless, it has a number of important disadvantages, which will be discussed in the first of this series of articles. Then, in the second and third articles, the vitalist and organismic alternatives will be considered, and the possibility of their future development examined.

Modern Mechanistic Biology

In 1867, T. H. Huxley wrote as follows:

"Zoological physiology is the doctrine of the functions or actions of animals. It regards animal bodies as machines impelled by various forces and performing a certain amount of work which can be expressed in terms of the ordinary forces of nature. The final object of physiology is to deduce the facts of morphology on the one hand, and those of ecology on the other, from the laws of the molecular forces of matter".¹

The subsequent developments of physiology, biochemistry, biophysics and molecular biology are all foreshadowed in these ideas.

Theoria to Theory, 1980, Vol. 14, pp. 125 – 144
0049-3686/80/1402-0125\$04.50/0

Published by
Gordon and Breach Science Publishers Inc. 1980

The programme outlined by Huxley is still the programme of mechanistic biology, and its basic philosophy has hardly changed. In many respects these sciences have been brilliantly successful, none more so than molecular biology. The elucidation of the structure of DNA, the 'cracking of the genetic code' and the discovery of the mechanism of protein synthesis seem to be impressive confirmations of the validity of the mechanistic approach. Not surprisingly, molecular biology has become one of the most influential branches of biological science, and molecular biologists have emerged as the most articulate modern advocates of the mechanistic theory of life.

Their accounts of the mechanistic theory usually begin with a brief dismissal of the vitalist and organismic theories. These are defined as survivals of 'primitive' beliefs which are bound to retreat further and further as mechanistic biology advances. The accounts then proceed along the following lines:

The chemical nature of the genetic material, DNA, is now known and so is the genetic code by which it codes for the sequence of amino-acids in proteins. The mechanism of protein synthesis is understood in considerable detail. The structure of many proteins has now been worked out. All enzymes are proteins, and enzymes catalyse the complex chains and cycles of biochemical reactions which constitute the metabolism of an organism. Metabolism is controlled by biochemical 'feedback' and several mechanisms are known by which the rates of activity can be regulated. Proteins and nucleic acids aggregate spontaneously to form structures such as viruses and ribosomes. Given the range of proteins, plus the properties of other physico-chemical systems such as lipid membranes, the properties of living cells can, in principle, be fully explained.

The key to the problems of differentiation and development, about which very little is known, is the understanding of the control of protein synthesis. The way in which the synthesis of certain metabolic enzymes and other proteins is controlled is understood in detail in the bacterium *Escherishia coli*. The control of protein synthesis takes place by more complicated mechanisms in higher organisms, but these should soon be elucidated. Thus differentiation and development should be explicable in terms of series of

chemically operated switches, which 'switch on' or 'switch off' genes or groups of genes.

Very little is known about the functioning of the central nervous system, but eventually the advance of biochemistry, biophysics and electrophysiology should be able to explain what we speak of as the mind in terms of physico-chemical mechanisms in the brain. Thus living organisms are, in principle, fully explicable in terms of physics and chemistry; our present ignorance about the mechanisms of development and about the central nervous system is due to the enormous complexity of the problems; but now, armed with the powerful new concepts of molecular biology and with the aid of computer models, these subjects can be tackled on a scale and in a way not previously possible.

The way in which the parts of living organisms are adapted to the functions of the whole, and the apparent purposiveness of the structures and behaviour of living organisms, can be explained in terms of random genetic mutations followed by natural selection, such that those genes which increase the ability of the organism to survive and reproduce will be selected for; harmful mutations will be eliminated. Thus the neo-Darwinian theory of evolution can account for purposiveness; it is totally unnecessary to suppose that any mysterious 'vital factors' are involved.

* * *

I think that this is a fair summary of the modern orthodoxy, but the reader can form his own opinion by going through some of the admirably lucid accounts by molecular biologists themselves.²

Morphogenesis and Behaviour

There is no doubt that mechanistic biology has been very successful in explaining many of the physical and chemical aspects of living organisms. A nerve impulse is electrical, and can be understood in terms of electricity. Nucleic acids, proteins, lipids, polysaccharide

and the compounds involved in the metabolism of cells and organisms are all chemicals and can be understood in terms of chemistry. But the form of an organism or the behaviour of an animal are not chemical molecules or physical quantities. The coming-into-being of the form of an organism — its *morphogenesis* certainly involves numerous chemical and physical changes, and the expenditure of measurable quantities of energy. So does its behaviour. But neither morphogenesis nor behaviour bears the same immediate relation to chemistry as do the molecules studied by biochemists and molecular biologists, or to physics as the physical processes studied by biophysicists and electrophysiologists. It is at this point the mechanistic theory runs into serious difficulties.

The spontaneous aggregation of protein sub-units and of nucleic acids to form viruses or small sub-cellular structures such as ribosomes can be regarded as crystallizations. Although these are more complex than inorganic crystals, they probably involve no new chemical or physical principles. Given the right chemicals in the right concentrations under the right conditions, these morphogeneses take place spontaneously, presumably owing to the operation of normal laws of physics and chemistry. So far, so good. But while crystallization can account for the formation of crystals and quasi-crystalline aggregates within living cells, it is by no means so clear that it can account for the morphogenesis of the cells themselves. Cells are not in any normal sense of the word crystals or even quasi-crystalline. Still less are tissues, composed of many cells, or organs composed of tissues, or organisms as a whole. So how is their morphogenesis to be explained? At this stage, the mechanistic theory effectively abdicates. Biological morphogenesis is supposed to take place spontaneously by the operation of physical and chemical laws. Since these laws lie in the provinces of physics and chemistry, it is not considered necessary either to specify or discuss them. The task of mechanistic biology reduces itself to finding out how the synthesis is brought about of the right types of chemical, in the right quantities, in the right cells. This problem in turn reduces to that of the control of protein synthesis.

But even this task is dauntingly difficult. Consider the morphogenesis of the arm and the leg. Both contain the same types of cells,

the same proteins, the same enzymes and the same genes. Yet they have different forms, and the cells and tissues are arranged in different patterns. It is necessary to suppose that, during embryology, the cells in the developing limbs are exposed to different physico-chemical environments. Experiments show that the fate of embryonic cells depends on their position. Hence what is often referred to as 'positional information' must depend on chemical or physical gradients, or some other physico-chemical stimuli.³ This must in turn depend on the biochemical or physiological activity of particular groups of cells in particular places, and the activation of these cells can only be explained in terms of some preceding physico-chemical stimuli, and so on. But now there are the following problems:

- i) Biological development is epigenetic, that is to say it involves an increase in complexity of form. Therefore the forms or patterns that appear during morphogenesis cannot be explained indefinitely in terms of preceding forms or patterns.
- ii) Many developing embryos show remarkable powers of regulation, i.e. after mutilation or damage, the pathways of development are able to readjust themselves so that a more or less normal final structure is produced. This makes the problems of explaining the physical or chemical basis of 'positional information' exceedingly difficult even in the simplest systems.
- iii) After decades of intensive investigation, all attempts to obtain unequivocal evidence for the hypothetical physical or chemical morphogenetic gradients in animal embryos have failed. It is only in higher plants that chemical morphogens, notably the hormone auxin, have been chemically identified. This hormone plays an important role in the control of the differentiation of vascular tissue. But any explanation of patterns of differentiation in terms of auxin must in turn depend on an explanation of the pattern of production and distribution of auxin. Recent research indicates that this hormone is produced in the differentiating vascular tissue itself: the system is circular. Auxin may help to account for the maintenance and repetition of patterns of vascular differentiation, but it cannot account for the establishment of these patterns in the first place.⁴

Not even the most ardent mechanists claim that the problems of morphogenesis have been even partially solved.⁵ They simply express the hope that they will be solved mechanistically at some time in the future. The problems are even greater when it comes to the behaviour of animals. Even though the aspects that seem most likely to be explicable mechanistically, the simple and conditioned reflexes, have been studied intensively for years, they are still far from being understood. Meanwhile, the efforts of the behaviourist school of experimental psychology to explain all animal behaviour, including language, in terms of chains of reflexes have, even in the eyes of many mechanists, failed dismally.⁶

In relation to the problem of memory, after years of research its basis is still entirely mysterious. One early theory, in terms of reverberating circuits in the nervous tissue, may possibly help to account for short-term or 'labile' memory; but all attempts to explain long-term memory physico-chemically — for example in terms of chemical or structural changes in the nerve cells or in the connections between them — have remained entirely speculative.⁷

The problem of instinct is more difficult still. To account for the fact that a spider, for example, can spin a perfect web without learning how to do it from other spiders, it is usually assumed that this task must be 'programmed' into its nervous system as a result of 'genetic information' or 'instructions' in the spider's DNA. How the synthesis of unspecified proteins within the nerve cells of the spider could possibly result in the right 'wiring diagram' of the nervous system is a problem of appalling complexity; but how protein synthesis could explain the characteristic web-spinning behaviour of the spider defies imagination.

But these are greater problems yet. Consider the instincts of birds, for example those of the European cuckoo. The young are hatched and reared by birds of another species and never know their parents. Towards the end of the summer the adult cuckoos depart, migrating to their winter habitat in Southern Africa. Several weeks later, the young cuckoos form groups and then they also migrate to the appropriate region of Africa. They instinctively 'know' that they should migrate and when to migrate; they instinctively recognize other young cuckoos and congregate together; and they instinctively

know in what direction they should fly and where their destination is. According to the mechanistic theory, all this is somehow 'programmed' in their DNA, and is ultimately explicable in terms of the controlled synthesis of specific proteins. Furthermore all these instincts originated in the first place as a result of random mutations in the DNA.

By this stage, rigorous experimentation of the type involved in cracking the genetic code has been left far behind. The fact that DNA is a mere chemical is soon lost sight of, as it becomes submerged beneath ill-defined phrases such as 'genetic instructions' or 'genetic programmes'. These conveniently teleological concepts are then used to provide vague interpretations of morphogenesis, instinct and behaviour. But these phenomena have not in fact been explained at all. Whether or not these mechanistic speculations seem plausible depends on whether or not one believes in the mechanistic theory in the first place. The experimental study of morphogenesis and behaviour has provided no independent evidence in favour of this theory; if anything, it has revealed the enormous difficulties of this approach.

The Arguments in Favour of the Mechanistic Theory

The arguments in favour of the mechanistic theory are of four general types:

i) The facts that living organisms are material, that physical and chemical processes take place within them, and that they are influenced by physical and chemical stimuli are frequently regarded as evidence in favour of the mechanistic theory. The force of this argument depends on a polemical device, or perhaps simply on an ignorance of the alternative theories of life, especially vitalism. The mechanistic theory asserts that *all* aspects of life are explicable in terms of physics and chemistry; mechanists speak as if, or even believe, that the opposing theories assert that *no* aspects of life are explicable in terms of physics and chemistry. Then all the physical and chemical facts about living organisms appear to be exceedingly powerful refutations of these imaginary theories, and hence proofs of the 'common sense' mechanistic view.

Two further arguments are used to make what is essentially the same point. First, it is asserted that sometime in the future it will be possible to create life from chemicals in a test tube. Second, it is assumed that life originally arose from chemical aggregates in a Primeaval Broth, containing amino acids and other compounds produced by flashes of lightning, etc. These assumptions are then regarded as proofs that living organisms are nothing but complex aggregates of chemicals.

In fact, of course, the alternative theories of life do not deny that living organisms are material entities, and that some aspects of living organisms can be accounted for in physico-chemical terms. What they do say is that not *all* aspects of life can be explained in the same terms as the inanimate systems studied by physicists and chemists; in addition, other laws or causal factors are at work in living organisms.

It has been known for millenia that men and animals have material bodies and require food; that the substances they eat are changed inside their bodies, some becoming the substance of their flesh and bones, while others are excreted; that animals and men can be killed by physical injuries or poisonous substances; that plants require water and light for their growth; that the yields of crops can be improved by manure and by irrigation; that consciousness can be influenced by alcohol and by other drugs, and so on. More is now known in detail about these processes than ever before, but a knowledge of these general facts is almost universal, and not a unique feature of mechanistic biology. What is unique is the assertion that because living organisms depend on physical and chemical factors, they are nothing but physico-chemical machines. This is no more logical than the related assertion that because *some* aspects of living organisms have been explained in terms of physics and chemistry, *all* aspects can be so explained. In actual fact, many aspects of living organisms have not been explained in terms of physics and chemistry, in spite of prolonged and intensive efforts to do so. This may be because of their sheer complexity, as the mechanists claim, or it may be because the mechanistic approach is fundamentally mistaken. There is no way of deciding on the basis of his type of argument. The same applies to the arguments based on

a hypothetical synthesis of a living organism, and on speculations about the origin of life. Since these arguments are often regarded as especially convincing it is perhaps worth illustrating their weakness by a simple analogy.

Imagine a village in a remote part of the world where nothing is known about modern science. One day someone arrives with a simple transistor radio set. The villagers are astonished to hear human voices and music coming out of it. Most attribute them to spirits; others conclude that they must be due to subtle influences or emanations from people in distant places. But an ingenious artisan examines the radio set carefully, takes it to pieces and finds that it is composed of copper wires, crystals and other recognizable substances. Because it consists entirely of materials, he concludes that it is in principle fully explicable in terms of the properties of these materials themselves. He finds its weight does not change when it is switched on or switched off and deduces that nothing enters into it from outside. Although he cannot explain in detail how it works, he confidently dismisses the ideas of spirits or aetherial influences from far away. He tries to build a replica of the radio set, and finally succeeds. Voices and music come out of it. He regards this as a conclusive proof of his opinions. But, of course, he still knows nothing about electricity, electromagnetism, electromagnetic radiation, or how a radio really works.

ii) Viruses, which lie on the borderline between the living and the non-living, are complex crystalline aggregates of proteins and nucleic acids. They can be described in purely physico-chemical terms. Mechanists often argue that living organisms differ from viruses only in degree and can therefore also be understood in purely physico-chemical terms. The trouble with this argument is that viruses are entirely parasitic; they cannot reproduce themselves. Under natural conditions they can only be replicated when they enter a living cell; their component parts are synthesized, on the

basis of their DNA or RNA, by the biochemical mechanisms of the cell. In the laboratory, the replication of the nucleic acid and protein components of the virus can be brought about in the test tube by supplying the necessary enzymes, etc.; but the virus is still dependent on other living organisms, in this case the cells from which the enzymes etc. were extracted, and the molecular biologist who so carefully provides the right conditions for the reactions to occur. Viruses pre-suppose the existence of living organisms; they cannot be used to explain the nature of life.

iii) The mechanistic theory is founded on the analogy between living organisms and machines. Machines are purposeful and are at the same time purely physico-chemical systems. Hence, it is argued, purpose does not involve anything other than physics and chemistry and therefore living organisms can be regarded as nothing but complex machines.

But, obviously, machines are made by men to serve human purposes, as extensions of human powers of movement, human senses, memory and calculating ability. They are not independent, self-motivating, and self-constructing entities with purposes of their own. Their designs and purposes are imposed upon them from outside themselves.

Mechanists find the machine analogy so persuasive that they sometimes suggest 'thought experiments' of the following type to emphasize it even more strongly: human beings arrive on a strange planet where they find entities moving around and behaving purposefully. They do numerous tests and are unable to decide whether they are animals or machines. Therefore there is no difference between animals and machines because they cannot be empirically distinguished from each other.

In fact, the imaginary astronauts would be less likely to conclude that living organisms *were* machines, than that the entities were

either living organisms *or* machines which had been made by intelligent animals; they would then look for their creators.

The greatest weakness of the machine analogy as an argument in favour of the mechanistic theory is that exactly the same analogy is sometimes used by theologians to support a diametrically opposite conclusion. They argue that just as machines are designed by men to serve human purposes, so living organisms have been purposefully designed by God. An analogy as ambiguous as this can provide no more convincing support for the mechanistic theory than it does for the existence of a Divine Creator.

iv) The final type of argument seeks to account for the purposiveness of living organisms in terms of the neo-Darwinian theory of evolution. The origin of new structures and of new types of instinctive behaviour is assumed to depend on random mutations; then natural selection eliminates all those which are harmful and favours those which increase the ability of the organism to survive and reproduce. Thus evolutionary creativity and apparent purposiveness are accounted for entirely by the interplay of chance and necessity.

The randomness of mutations is an assumption which depends on the theories of physics, especially on the idea of the indeterminacy of quantum processes. It therefore presupposes that living organisms obey only the normal laws of physics, and that physical processes are not modified in some unknown way within living organisms. Since this is the very issue at stake, the argument is circular.

But leaving this objection aside, the neo-Darwinian theory can only help to account for *particular* purposive features of living organisms, but not for the underlying purposiveness associated with their survival and reproduction. This point can be illustrated by a technological analogy. Assume that the ideas responsible for new designs of bows and arrows, cannons, guns, bombs, etc. are a result of random changes in the brains of their inventors, or that accidents in the manufacture give rise to altered versions of these weapons. In

battles, the side with the better weapons would tend to win; therefore ineffective weapons would be eliminated by a sort of natural selection. The interplay of chance events (assumed to account for technical innovations) and natural selection (in battles) would, over time, lead to the evolution of more and more effective weapons of ever-improved design. But these processes do not explain the basic purpose of the weapons, which is to kill. This purpose underlay their whole evolution; it was there to start with. Moreover, killing is not an end in itself; it is an aspect of more general purposes, such as the defence of the social group, or expansion into new territory.

Natural selection can only work on organisms which are capable of survival and reproduction in the first place. There could have been no natural selection and no evolution if there were no living organisms to start with. And the earliest living organisms, however primitive, must already have behaved purposively, their purposes being survival and reproduction. Thus the purposiveness of living organisms is not explained by the neo-Darwinian theory: it is presupposed. The problem can be pushed back to the origin of life, but this is a subject about which nothing can ever be known for certain. It is not even clear where life originated. The most popular theory is that life began on earth, in some sort of *Primaeval Broth*. On the other hand, two well-known molecular biologists have recently proposed that the first organisms on the earth were deliberately sent in a spaceship by the inhabitants of a planet in Outer Space.⁸

Mechanists usually suppose that the first living organisms happened to come into existence by chance in the hypothetical *Primaeval Broth*, or somewhere else. In this way the fundamental purposiveness of living organisms can be regarded as the product of a chance event. This is one possible speculation about the origin of life; other quite different speculations could equally well be proposed. But obviously a controversy about the essential nature of life cannot be resolved by an appeal to untestable theories about events that took place on the earth, or somewhere else, thousands of millions of years ago. In any case the circumstances of the origin of life would not in themselves explain its nature.

All these arguments in favour of the mechanistic theory suffer from a further fundamental weakness. They take it for granted that is biological phenomena are explained in terms of physics and chemistry, that is the end of the matter; they simply assume that physics provides a firm foundation on which the entire edifice of mechanistic explanation can be built. But while the mechanistic theory has hardly changed for over a century, physics has. Atoms are no longer solid and indivisible: they split up into other particles, which themselves seem to fragment indefinitely; matter is regarded as a sort of vibrational energy; the determinisms of classical physics have been replaced by probabilities. The quantum theory is grounded in a rigorous consideration of the nature and meaning of experimental observations; built into the theory is the recognition that measurements of quantum processes inevitably perturb the systems being measured, and that the observer has to be regarded as a part of the process of observation. In classical physics, it was assumed that observers could be entirely objective, somehow standing outside reality and measuring what was 'really' there. This naive assumption is no longer tenable.

Unlike most biologists, a number of physicists, including some of the most eminent, have actually thought about the problem of the reduction of biology to physics. They have come to the conclusion that this reduction is impossible not only in practice, but in principle. Wigner, for example, has argued persuasively that the existence of life and of human minds cannot be described in terms of existing physical theory, in particular in terms of the present formulation of the quantum theory. He points out that this conclusion suggests the need for a new theory of life.⁹

Is the Mechanistic Theory Testable?

The mechanistic theory has so far failed to explain most of the major problems of biology; its attempts to account for consciousness lead into insoluble paradoxes; the arguments in its support are weak and unconvincing. These are not unreasonable grounds for thinking

that there might be something seriously wrong with the theory itself. If it were purely metaphysical, there might be no way of resolving these doubts. But it is, or claims to be, a scientific theory. According to the generally accepted philosophy of science, a scientific theory should be testable: it should make definite predictions which differ from those of alternative theories; it should be distinguishable from these other theories by experiment or observation. In the words of Sir Karl Popper, "the criterion of the scientific status of a theory is its falsifiability, or refutability, or testability".¹⁰

Believers in the mechanistic theory generally regard the increasingly detailed findings of sciences such as genetics, physiology, biochemistry and molecular biology as evidence in its favour, if not actual proof of the theory. But all that this evidence establishes is that physico-chemical aspects of living organisms can be explained in terms of physics and chemistry. This is freely admitted by the alternative theories of life. Mechanistic biology has so far failed to demonstrate that specifically biological phenomena such as the morphogenesis of living organisms, instinct and memory involve nothing more than the laws of physics and chemistry. If it had done so, this might indeed have increased its credibility, since it is precisely these phenomena that the alternative theories claim are not reducible to physics and chemistry. The most that mechanists can do is to express the belief that these problems will be solved mechanistically at some time in the future. But acts of faith in future consummations have no value as scientific arguments. Mechanists would certainly not admit contrary beliefs as evidence against their theory; therefore their own beliefs cannot be used as evidence in its favour.

There is in any case a fundamental difficulty in this line of argument: it is a general principle that evidence in favour of a theory can only make it increasingly plausible, but can never *prove* it. On the other hand, a theory can be refuted, in principle definitively. In practice, the theory can usually be saved by the elaboration of *ad hoc* modifications and subsidiary theories to account for apparently unfavourable facts.

The mechanistic theory clearly states that all the phenomena of life are explicable in terms of physics and chemistry. It would

therefore be refuted if there were any phenomena of life which were not explicable in this way. The most immediate and obvious examples are purposiveness and consciousness. Mechanists try to avoid these difficulties by the types of argument considered above. These arguments can never be won: at best, they can be reiterated until opponents are worn down by attrition. But there are other examples where the issues are less easily obfuscated.

The application of the mechanistic theory of life to medicine means that patients can only be regarded as complex physico-chemical machines. Therefore mechanistic medicine can only treat them physically or chemically. This type of medicine has been at its most successful in dealing with diseases of external origin — those caused by germs, faulty nutrition, or physical injury — and with disease of internal origin which are primarily chemical (e.g. hormone deficiencies) or physical (e.g. holes in the heart). But there are many diseases which do not come into these categories, especially those which are regarded as at least partially 'psycho-somatic'. Then there are the various types of mental disorder. The rigorous mechanist can only regard all these diseases and disorders, even those which are explicitly mental, as essentially physico-chemical. Accordingly, they can be treated only physically (e.g. by electric shock therapy) or chemically (e.g. by tranquillizers). Nevertheless, psycho-analysis and other types of psycho-therapy are admitted within the confines of orthodox medicine, even though they are non-mechanistic. These systems are regarded with grave suspicion by many committed mechanists¹¹, but they are tolerated because they seem to work, to some extent. In practice, it is not possible to carry mechanistic medicine to its logical conclusion.

Meanwhile, outside the bounds of orthodoxy, all sorts of other medical systems flourish: homeopathy, naturopathy, radionics, acupuncture, colour therapy, and so on.¹² Then there are the 'miraculous' healings at Lourdes and other shrines, and 'faith' healings by Christians and followers of other religions. The efficacy of all these methods is well attested. Not all of them work all the time, but then neither does orthodox medicine. Mechanists usually ascribe cures brought about by any of these non-mechanistic means either to coincidence — 'the patient would have got better anyway'

– or to 'suggestion'. Both are reasonable possibilities, but both apply with equal force to orthodox medical cures.

The power of suggestion is most dramatically demonstrated by hypnosis, but also operates more subtly, as in the well-known 'placebo' effect. For example, patients treated with tablets of inert material, believing them to be powerful pain-killers, often experience considerable relief from pain. Belief in, and expectation of, positive results probably play an important part in all medical systems, irrespective of their theoretical basis. But this does not explain the power of suggestion. There is nothing obviously mechanistic about it. So even if suggestion could account for much of the efficacy of non-mechanistic medical systems, this would simply present the mechanistic theory with another intractable problem. The power of suggestion could even be regarded as a refutation of the mechanistic theory, since it shows that there is a definite effect of something which is neither physical nor chemical. However, the armchair mechanist would always be able to argue that suggestion worked through unspecified physico-chemical effects in the brain, brought about by the nerve impulses carrying the suggestion from the sense-organs. This type of argument is irrefutable; there would be no empirical evidence from the whole field of medicine, however non-mechanistic it seemed to be, which could not be explained away in some way such as this.

The difficulties faced by the mechanistic theory are even greater in the field of parapsychology. All attempts to account for phenomena such as telepathy in terms of known physical forces or radiations have failed; they seem to depend on forces or interactions unknown to physics.¹⁵ Their existence therefore appears to provide a definitive refutation of the mechanistic theory.

Again, the armchair mechanist is ready with an answer: all the evidence for parapsychological phenomena, even that collected by experienced scientists under well-controlled conditions, is invalid. Either it is due to coincidence, incompetent experimentation, fallacious statistics, or fraud, conscious or unconscious. Researchers in parapsychology are all too familiar with these arguments and generally use careful methods and statistical procedures which take good account of them. Scientific investigations of these phenomena

has now been going on for nearly a century, since the founding of the Society for Psychical Research in 1882. A large body of evidence has been built up; many responsible people who have examined this evidence thoroughly have come to the conclusion that at least some of the phenomena can be considered to be established facts.¹⁴ But very few mechanists have taken the trouble to look at this evidence. Most think that they know in advance that these phenomena cannot possibly exist, simply because they cannot be explained in terms of physics and chemistry. The empirical evidence is therefore irrelevant; it can be dismissed *a priori*.

This obscurantist attitude clearly indicates that the issue at stake is not just a theory, but a dogmatic system of belief. As such, it is practically immune to any facts which go against it. If a diehard mechanist saw a demonstration of, say, psychokinesis, at close range, and even if he himself had full control of the experimental conditions, he would still not be convinced: he would probably think that he had been hypnotized. But if he did happen to believe his own eyes, when he told his colleagues, most of them would not take him seriously. The more charitable would think he had been duped, the less charitable that he was lying.

A more subtle way of defending the mechanistic faith would be to argue that if any of the phenomena of parapsychology do in fact exist, then they must be explicable in terms of physics, but the appropriate laws of physics have not yet been discovered. However, if physics is taken to include all the known and unknown laws of nature, then the mechanistic theory would simply state that living organisms obey known and unknown laws. But then how would it differ from vitalism, or the organismic philosophy? It would only be a general principle, devoid of specific content, which included all possible theories of life.

Thus, for the committed believer, the mechanistic theory is irrefutable. Everything can be explained, or explained away. There is therefore no way in which it could be tested empirically.

Mechanistic Vitalism

One of the most common criticisms levelled against vitalism by the mechanists was that it sought to explain all the unsolved problems of biology in terms of 'vital factors', which were merely empty words. However, this criticism applies with far more force to the mechanistic theory itself than it ever did to genuine vitalism. By a curious paradox, the paradigm of modern biology has in effect become a degenerate form of vitalism in a mechanistic guise. Its 'vital factor' is the so-called genetic programme. Whatever the problem — be it the human mind, the social behaviour of bees, the development of embryos, the migration of birds — it is considered to be explicable in terms of 'genetic programmes' or 'instructions' in the DNA. These explain everything, and therefore nothing. Anything living organisms can do, the genetically-programmed physico-chemical machines of mechanistic biology can do. But these physico-chemical machines are no ordinary machines; they are vital machines. Words have lost their meaning.

The concept of 'genetic programmes'¹⁵ is based on an analogy with the programmes which direct the activity of computers. Its apparent explanatory power depends on two thoroughly dubious ideas implicit within it. The first is that the fertilized egg contains a pre-formed 'programme' for the development and instinctive behaviour of the organism. But the whole idea of the 'programme' loses its force if it is simply identified with DNA, since identical copies of DNA are passed on to all cells: if all cells were 'programmed' identically, they could not develop differently. So the 'programme' must be something other than a mere chemical structure: it must be a dynamic, seemingly purposive entity that somehow directs development itself. But then what exactly is it in mechanistic terms? At this stage the idea can only disintegrate into vague suggestions about physico-chemical interactions somehow 'structured' in time and space; the problem is simply re-stated.

Second, a computer programme is put into the computer by an intelligent conscious being, the computer programmer. The analogy appears to imply that the 'genetic programme' is designed

by some intelligent 'vital principle'. Now if it is argued that 'genetic programmes' are not analogous to ordinary computer programmes, but to those of self-reproducing, self-programming computers, the analogy is most misleading, since such machines do not exist. And if they did, they would have to have been programmed in the most elaborate way by their inventor to start with. The only way out of this dilemma is to say that 'genetic programmes' have been built up in the course of evolution by chance mutations and natural selection. But then the similarity to any actual or conceivable computer programme simply disappears, and the analogy becomes meaningless.

Thus the 'genetic programme' is simply an empty phrase. But it differs in one important respect from even the vaguest 'vital factors' of the genuine vitalists: its pseudo-mechanistic appearance serves to conceal the fundamental ignorance that lies behind it. The 'vital factors' of explicit vitalism did not pretend to be more than words which indicated the existence in living organisms of causal agencies not yet known or understood.

Notes

1. T. H. Huxley: *Science Gossip*, p. 74. London (1867).
2. See F. H. C. Crick: *Of Molecules and Men*. University of Washington Press, Seattle (1967) and J. Monod: *Chance and Necessity*. Collins, London (1972). Both these authors claim, probably rightly, that their views are representative of those of the majority of their colleagues.
3. For a recent account, see L. Wolpert: Pattern formation in biological development. *Scientific American* 239, 154-164 (1978).
4. A. R. Sheldrake: The production of hormones in higher plants. *Biological Reviews*, 48, 509-559 (1973).
5. E.g. F. H. C. Crick: Developmental biology. In *The Encyclopedia of Ignorance* (eds R. Duncan and M. Weston-Smith) pp. 299-303. Pergamon Press, Oxford (1977).
6. A. Koestler: *The Ghost in the Machine*. Hutchinson, London (1967).
7. H.A. Buchtel and G. Berlucchi: Learning and memory in the nervous system. In *The Encyclopedia of Ignorance* (eds R. Duncan and M. Weston-Smith) pp. 283-297. Pergamon Press, Oxford (1977).
8. F. H. C. Crick and L. Orgel: Directed panspermia. *Icarus* 10, 341-346 (1973).
9. E. Wigner: Epistemology in quantum mechanics. In *Contemporary Physics: Trieste Symposium 1968* Vol II, pp. 431-438 (1969).

10. K. R. Popper: *Conjectures and Refutations*, p. 37. Routledge and Kegan Paul, London (1965).
11. See, for example, P. B. Medawar's essay 'Darwin's Illness' in his *The Art of the Soluble*. Methuen, London (1968).
12. B. Inglis: *Fringe Medicine*. Hodder and Stoughton, London (1972).
13. J. G. Taylor and E. Balanovski: Is there any scientific explanation of the paranormal? *Nature* 279, 631-633 (1979).
14. A critical bibliography covering over two hundred books and the major research journals can be found in R. H. Ashby: *The Guidebook for the Study of Psychological Research*. Rider, London (1972).
15. Another concept which serves the same explanatory role as the 'genetic programme' is the 'genotype'; this too loses its apparent explanatory value if it is identified with DNA. See P. Lenartowicz: *Phenotype-Genotype Dichotomy*. Thesis, Gregorian University, Rome (1975).

Is Normal Memory a 'Paranormal' Phenomenon?*

JOHN BELOFF

THE PARADOX of my title arises as follows. We use the word 'normal' in two different ways. We say of some fact or occurrence that it was normal meaning that there was nothing strange or unusual about it, it was just what we would have expected. In this usage it is more or less synonymous with 'ordinary' or the opposite of 'extraordinary' or 'abnormal'. In parapsychology, however, 'normal' is used in opposition to 'paranormal'. Now I do not think 'paranormal' can be defined at all precisely but it carries with it the implication that the event in question cannot, even in principle, be explained in mechanistic terms so that there exists, as it were, an explanatory gap between cause and effect. Thus, ESP is said to be a paranormal phenomenon precisely because, when a given object is apprehended by ESP, there appears to be a hiatus in the causal chain of events connecting the object and the percipient unlike the situation in normal perception.

Now there can surely be no fact of life more familiar, more commonplace, more normal in this sense, than memory. Hence, in asking whether normal memory might be a paranormal phenomenon, I am asking, in effect, whether it is possible in principle to give a mechanistic explanation for the facts of memory. Well, what is to stop us? We may not be able as yet to supply the details but why should we doubt what everyone already takes for granted that what happens when something is said to be remembered is something

*Based on paper delivered to the Fourth International Conference of the Society for Psychical Research at Brighton in April 1980.

Theoria to Theory, 1980, Vol. 14, pp. 145 – 162
0049-3686/80/1402-0145\$04.50/0

Published by
Gordon and Breach Science Publishers Inc. 1980

roughly along the following lines. An individual undergoes a certain experience in consequence of which his brain or nervous system is modified in some more or less specific way. This modification or 'trace', to give it its technical name, then persists indefinitely until, in due course, it is reactivated by some appropriate stimulus with which it is linked. When this occurs some appropriate response is elicited which we describe as a manifestation of memory.

Of course the word 'memory' covers a wide variety of diverse cases. In the simplest case we have some learned response which, though caused by some earlier experience, conveys no reference to that earlier occasion. With every word we utter we manifest memory in this sense though we may never actually remember when we learnt the word originally. Very different is the case we naturally think of as typifying memory, at least in humans, which implies a certain thinking about or bringing to mind some particular episode of our past life. Memory in the first sense is a universal property of animal life but memory in this second sense is presumably a uniquely human achievement inasmuch as it would seem to necessitate the use of language or at least a capacity for conceptual thinking. In the literature it is sometimes referred to as 'personal' or 'episodic' memory. Bergson called it 'true memory' and contrasted it with 'habit memory' which was simply the residue of our learning¹. For the moment, however, the distinction is unimportant because the point I want to make is that, according to all but universal assumptions that currently prevail among both scientists and laymen, *no* manifestation of memory of whatever description would be possible unless certain specific traces in the brain were duly reactivated. It is this assumption that I shall be calling the 'trace theory of memory' though, in fact, it is usually something we simply take for granted rather than think of as an explicit theory. The question we must now ask is whether we have any good reason to doubt it?

One could, of course, produce a case for scepticism by raising the sort of objections that are so often directed against parapsychology, namely that investigations have been going on for a very long time and yet there is still so little by way of positive proof, the traces remain obdurately hypothetical. In both cases, however, it would be

foolish to build too much on the basis of a mere lack of progress. The brain, as we are always being reminded, is the most complex organ in the universe in terms of the sheer multiplicity of its interconnections, is it any wonder that our knowledge of it is still so sketchy? However, recently, an attack on trace theory has been pursued by a group of philosophers who base their case, not on such empirical grounds, but on conceptual and semantic considerations. It is *not*, they argue, that we still lack even the foggiest idea as to how experiences might be encoded and stored in the brain or how they might be decoded and retrieved as the need arises, it *is* that the very notion that memory could be explained in this way rests on an inadequate analysis of what memory involves. Trace theory, they claim, is not just another speculative hypothesis that could conceivably be correct but happens to be mistaken, it is a radical absurdity that just cannot be formulated in any way that makes sense.

I must at once hasten to add that these same philosophers do not conclude that, because there can be no mechanistic explanation of memory, therefore memory must be regarded as a paranormal phenomenon, indeed they would be aghast if anyone were to draw such an inference from their argument. They conclude instead that memory is simply not the sort of phenomenon that calls for a mechanistic explanation. They support this contention by drawing attention to other familiar facts of social life which we would never think of explaining in this way. All we need to do, they insist, if we want to understand what is involved in memory is to pay more attention to the way in which we talk about memory in our everyday discourse.

On the other side, most parapsychologists who have hitherto concerned themselves with memory have done so in the hope that memory might afford a suitable model when it comes to considering ESP.² My aim, in this paper, is rather different. I shall be asking *not* whether memory, perception, imagination or whatever might help us to understand better the nature of psi phenomena but, rather, what we might be able to conclude about the nature of these familiar mental processes by viewing them from a parapsychological perspective. My plan of action will be as follows. I will commence

with some comments about the current state of research on the neurophysiological basis of memory with a view to distinguishing what it can and what it cannot yet explain. I will then address myself to the arguments of those philosophers who maintain that the facts of memory do not require a mechanistic explanation. I will try to show that, while neither their premises nor their conclusions need be accepted, nevertheless some of their criticisms of trace theory are both valid and important and, certainly, we cannot afford to ignore them. Finally, I will offer my own interpretation by pointing out what I would retain of trace theory and why I believe it needs to be supplemented with a special sort of psi hypothesis.

Turning, first, to the empirical evidence for the trace hypothesis, there are, I shall suggest, three main approaches which have a direct bearing on the issue. These are: (1) the study of brain damage cases, (2) direct brain stimulation using electrodes applied to specific loci in the brain and (3) the construction of abstract, information-flow models of memory processing and their instantiation in computer programs. Of these, the first has been the most important so far inasmuch as it has successfully identified particular regions of the brain which are necessary for particular manifestations of memory. Basically it involves observing the peculiar and often bizarre defects of memory that occur in brain damaged patients and noting where, in the anatomy of the brain, their lesions are located. Thus a former colleague of mine studied over many years a particular patient who, as a result of head injuries, was no longer capable of reading even the simplest words and yet, if pressed, was usually able to respond to some given test word with another word having a definite semantic connection with the test word, thereby revealing that, at some level at least, his memory was still functioning.⁹

All this is relatively uncontroversial. Even the philosophical sceptics will grant that an intact brain is necessary if our memory is to function normally. What they contest is that there is, or indeed could be, any kind of one-one relationship between a specific brain state and a specific act of memory. In other words, they acknowledge that we could neither think nor remember unless our brains were working normally but refuse to acknowledge any causal con-

nection between the contents of our thoughts or our memories and brain activity that makes it possible for us to have these thoughts or memories. At this point it might be suggested that the technique of direct brain stimulation might provide the positive proof that is lacking and, indeed, at one time the celebrated Canadian neurosurgeon, Wilder Penfield, was claiming that his findings were a demonstration of the existences of traces. Thus he found that, when he stimulated a particular spot on the temporal lobe of his patient (whose brain had been exposed in preparation for surgery), the patient would experience a vivid re-enactment of some long forgotten scene from his past life, so vivid that it was more like an hallucination than an ordinary memory.⁴ Before long these demonstrations were being cited in the textbooks of psychology as evidence for the truth of trace theory. However, a more careful reading of Penfield and of the attempts that have since been made to repeat his observations show that they were no such thing.⁵ Thus, Penfield, himself, reveals that, when he again stimulated the same spot only a few minutes later the patient experienced some quite different recollection. Moreover, when other neurosurgeons attempted to apply his procedures they often failed to obtain anything comparable—a situation all too familiar to parapsychologists. Other investigators found that the reported experience depended at least as much on the patient's thoughts at the moment of stimulation as it did on the locus stimulated. It seems, then, that, whatever was going on in Penfield's situation, whatever trains of thought or feeling he was able to unleash in this way, nothing like a one-one relationship between a specific brain trace and a specific conscious experience was ever established. Nor should this surprise us for normal memory, as all theorists agree, is utterly unlike a simple playback mechanism.

It is, I think, noteworthy that even the basic nature of the memory trace, let alone its function in the total process, is still a matter of controversy. At present at least three quite different and mutually incompatible theories hold the field concerning the nature of the trace. The favourite view is that, in long-term memory at least, actual structural modifications take place at the synapse where the brain cells meet and that the encoding of a particular

experience consists essentially of a particular pattern of inter-connecting cells which are all activated by the same impulse. However, a biochemical theory of traces still has its supporters who believe that experiences are encoded by means of molecular changes in specific macro-molecules. There is an obvious analogy here with the genetic code which we now know to be encoded in the DNA molecule, a discovery that was, of course, one of the triumphs of 20th century biology. Originally it was thought that the RNA molecule might play a corresponding role with respect to the memory process and some experimenters were bold enough to claim that RNA extracted from the brain of a rat trained in some task would, when injected into the brain of an untrained rat facilitate the learning of that task. But the chemical theory of memory was another example of research that was notorious for its lack of repeatability so the implications of such findings remained unclear.

Yet another trace theory that rests upon an even more far-out analogy is the so-called holographic theory of memory which has been taken up recently with much enthusiasm by no lesser an authority than Karl Pribram. Here the basic idea is that memory functions like a hologram in holography. The point about a hologram is that the total information it contains is represented in every fragment of it. For memory theorists its attraction was that it was one way round the 'Lashley paradox'. Karl Lashley used to cut out portions of the brain of rats who had learned specific tasks hoping thereby to locate the trace or engram of that learning. He discovered, instead, to his great surprise, that in fact it made little difference where he made the excision or even, within limits, how much he excised, the animal was still able to run the maze. He could never figure out, therefore, how learning was possible at all unless, conceivably, every item of learning is multiply represented at many different loci. But, while the holographic theory gets over this puzzle, it is very hard to reconcile with what we know about the structure and functioning of the brain or to see how the hologram could be instantiated in terms of brain cells, so far its only known instantiation is in the field of photography.

The third approach I mentioned was by way of model-building, artificial intelligence and computer simulation but, while it has

certainly been influential in contemporary theorizing, it is too oblique an approach to enable us to decide the issues under discussion. It provides us with analogues of the way in which memory might function in people if people were just special kinds of natural machines but this, of course, is precisely the assumption that the philosophical sceptic is unwilling to concede. Hence to say that trace theory *must* be true, or, at least, possible, because computers use physical traces is to beg the question. Computers are, indeed, machines for storing and retrieving information but they necessarily depend on the information being fed in in a specific way and the retrieval being outputted in a specific form; what makes human memory so problematic is precisely that there appears to be no such constraints on the way in which a given experience can be encoded or decoded, almost everything may serve as a manifestation of memory in the appropriate circumstances.

This brings us to the philosophical critique of trace theory. Like much else in modern Anglo-American philosophy it stems from the writings of Wittgenstein. Consider the following remark of Wittgenstein's:

"I saw this man ten years ago. Now I have seen him again, I recognize him, I remember his name. And why does there have to be a cause of this remembering in my nervous system? Why must something or other, whatever it may be, be stored up there in any form? Why must a trace have been left behind? Why should there not be a psychological regularity to which no physiological regularity corresponds? If this upsets our concept of causality then it is high time it is overturned." (author's underlining).⁶

On one point, at least, we can surely agree with Wittgenstein: our concept of causality would indeed be overturned. Thus, if my recognition of someone depended solely on the fact that I saw him ten years ago and on nothing else this surely would be every bit as paranormal as if it depended solely on the fact that I would meet him again ten years hence and on nothing else. Indeed, each act of memory would then become a case of retrocognitive auto-telepathy (i.e. a direct awareness of some previous experience) as opposed to a case of precognitive auto-telepathy (i.e. a direct awareness of some future experience). Not that Wittgenstein was the first philosopher to suggest that memory might work across a gap in time. His teacher, Russell, discussed the possibility that there might be such a

thing as 'mnemic causation' which would operate in this fashion and, significantly, Russell pointed out that this was, indeed, the only alternative to assuming some "hypothetical modification of brain structure".⁷

Norman Malcolm, however, erstwhile pupil and now authoritative expositor of Wittgenstein, to whom I owe this quotation from the master, does not see the problem in this light at all. His recent book *Memory and Mind* (which could be regarded as a footnote to this remark of Wittgenstein's, much as an earlier book of his *Dreaming* could be regarded as a footnote to another of Wittgenstein's enigmatic remarks) argues that memory is not, after all, a problematic phenomenon and to try and explain it whether in physicalistic or in mentalistic terms can only result in absurdity. Mnemic causation, he insists, seems strange only because of the "common assumption of philosophers and psychologists that the phenomena of memory require a memory process going on continuously between a past experience and a subsequent response to it"⁸ (author's underlining) whereas, according to Malcolm, "the concept of an accurate memory is not the concept of an effect produced by some properly functioning causal process"⁹ (my underlining). Now, no one would disagree that what makes a given memory claim correct or veridical is whether it corresponds with the events to which it purports to relate, certainly no reference to any hypothetical intervening causal process is ever involved in validating a case of memory. But from this it simply does not follow that, as he puts it, "when this is seen, the notion that a proper understanding of the concept of memory inevitably leads us to accept the requirement of a physiological memory trace loses all force. The 'causal argument' for memory traces collapses"¹⁰ Trace theory is, after all, an empirical scientific hypothesis. No trace theorist has ever claimed that the existence of traces is a necessary or analytic truth about the concept of memory, only that since, as Russell said, the only alternative to trace theory is to assume action at a distance in time, it is not an unreasonable hypothesis.

It seems that Malcolm is much too prone to assume that psychologists and physiologists are really simple-minded folk who are constantly at risk of falling into verbal traps unless philosophers

continually come to their rescue. Thus, discussing the relationship between retention and storage he once again correctly points out that to say of something that it has been retained in memory does not imply that it has been stored in the brain. "To take the storage metaphor as giving some warrant to the assumption of traces (literal storage) is" he declares "both humourous and saddening . . . it has the comical aspect of being deceived by a pun. But when one sees the pun playing a part in the creation of a mythology of traces, where theories and research are pursued in dead earnest, one cannot help feeling a kind of grief."¹¹ But who, one wonders, is the victim of a confusion, the trace theorist or Malcolm? Logically of course retention does not imply storage any more than the existence of some disposition logically implies that the disposition is a property of some material structure, but one would be hard put to think of any other instance in nature where information of some kind is retained in a dispositional form without it being encoded in a material sense. Thus, empirically, there is every reason to connect retention with storage.

The attempt to short-circuit trace theory by these and similar arguments has, I would maintain, completely misfired. However, Malcolm is on much firmer ground in his critique of isomorphism and in his contention that trace theory presupposes an isomorphism between the traces and the act of recall. Perhaps the most perfect example of isomorphism with which we are all acquainted is the gramophone where the grooves of the record that is being played are exactly isomorphic with the sounds that issue from the loudspeaker. The Gestalt psychologists, following Köhler, sought to show that an isomorphism obtained between perceptual experience and its concomitant brain processes but it is now generally conceded that the attempt was misconceived. Malcolm has no difficulty showing that it is futile to look for such an isomorphism in the case of memory. The crucial point is that there is always an indefinite number of different ways in which we may demonstrate that we have succeeded in remembering some fact or some incident. It is, for example, by no means the case, as certain psychologists have suggested, that for memory to be possible certain relevant images must come before the mind and, even if they did, they would not of themselves constitute

the act of memory, they would still have to be interpreted as memory images just as if they were actual pictures. Nor does it help if we switch to a behaviour analysis of memory for there will still be an indefinite number of behavioural responses, be they verbal or non-verbal, that can equally serve to indicate that recall has been achieved. And yet, in default of an isomorphic principle it is difficult to see how the trace theory could ever get started.

A related argument goes even further towards undermining the credibility of trace theory. If we postulate an isomorphism between a given neural representation and the given mental event it purports to explain we would have to assume a formal similarity of structure between the former and the latter. But, who is to say what constitutes the structure of a given mental event or, for that matter, a given item of behaviour? Clearly there will always be as many different structures as there are different ways of describing, interpreting or 'parsing' the event in question, which is to say an indefinite number of ways. In other words the idea on which isomorphism rests, namely that there must be some one correct or objective structure in lived experience is untenable. This argument, let us call it the contextual argument, has been exploited to good effect recently by Stephen Braude as a general argument against what he calls the 'myth of internal mechanism' in psychology¹². But is has long been one of the cornerstones of Wittgenstein philosophy that our actions gain their meaning from the social context in which they occur and it is precisely this context dependent aspect of behaviour and experience which, it is argued, no internal mechanism can capture.

Yet, perhaps this argument ends by overreaching itself. It may not be necessary for the internal mechanism to account for every aspect of behaviour or experience. It may suffice if the internal mechanism insures that the appropriate movement is produced at the appropriate instant leaving it open to the social context in which these movements occur to determine how they will be interpreted and described. Moreover, the trace theorist will argue that the individual's whole world, not just specific memories, is somehow represented physically in the brain thereby providing a context

which governs each separate item of behaviour or experience. However, given that each person's experience of the world will be unique and this uniqueness will reflect itself in the fine structure of his brain, it just cannot possibly be the case that there could be any sort of universal correspondence between a particular *type* of brain state and a particular *type* of mental state or experience. Isomorphism in this sense must be a nonsense. However, despite the views of the philosophers whom I have been discussing, I can see no *a priori* reason why we should rule out the possibility that every unique experience of a given unique individual should be univocally related to, or coordinated with, certain unique brain events. In the current jargon, while we must forego a type-type relationship between brain states and states of mind the possibility of a token-token relationship remains an open question. Whether such a token-token relationship would be of any use to science, even if it could be established, is, of course, another matter; science concerns itself with general laws not with unique instances.

But the real crunch for any trace theory of memory comes, I believe, not over the question of storage but rather over the question of retrieval. Even Donald Norman, that well known and orthodox authority on memory theory, confesses himself baffled by the problem of retrieval. "Even the very basic question of how one recognizes that the correct answer has been retrieved has not been studied" he writes "This last point is extremely important. If you know the answer for which you are looking, then you would not need to look. But, if you don't know the answer, then how can you recognize it when you find it?"¹⁵ Students of Plato will recognize here a restatement of the famous Meno paradox. Norman, no doubt, is still looking for an answer to the paradox along orthodox lines but Howard Bursen, a young American philosopher writing in the wake of Malcolm, argues forcibly, in his new book *Dismantling the Memory Machine* that any attempt to explain retrieval on mechanistic principles inevitable runs into the following trilemma: either (a) we find ourselves caught on an endless regress of mechanisms depending on yet other mechanisms or so on or (b) we need at least one mechanism that requires an homunculus to

operate it or (c) we arrive at an explanatory gap in our account which can be filled only by attributing magical powers to our machine.

Bursen invites us to consider the familiar situation where we are trying to remember some tune we wish to hum, the situation which psychologists have called the 'tip-of-the-tongue phenomenon'. Let us suppose that we can institute a search through all the numerous traces of tunes that we have learnt until the right tune is discovered, much as we might search through the shelves of a library until we come across the book we were looking for. The question which then arises is how the search mechanism that we have set going knows where to stop? (It was this that puzzled Norman). If we say that the mechanism just *knows* when to stop we are clearly begging the question, "it is" says Bursen "to attribute to the retrieval mechanism the very power that was denied to people at the outset: memory. The idea of a machine which knows, thinks or remembers, is the idea of a little black box with the homunculus inside . . . Since the trace theory requires a retrieval device, and since the retrieval device requires a homunculus to operate it, I conclude that trace theory is a fruitless attempt at a scientific or causal theory of memory"¹⁴ For, the only way of avoiding Bursen's homunculus or ghost-in-the-machine is to postulate yet further mechanisms and so embark on an endless regress of mechanisms or else endow some mechanism with magical powers. A machine that could just recognize things in some inexplicable way would be a magical machine. Thus do we find ourselves empaled on Bursen's dilemma.

This is clever stuff but perhaps a shade too clever. Consider an analogous question: how do we recognize when an object is in focus? How do our mechanisms of accommodation, convergence etc. know when to switch off once the object is in focus? We can say that an object in focus just looks different from an object that is out of focus and we can try to spell this out further in terms of the double imagery that intrudes in the latter case and so on but there seems to be no great difficulty of principle about envisaging a perceptual mechanism that can deal with this particular reflex activity. Is the situation so different when it comes to recognizing a face? A familiar face *looks* different from an unfamiliar face. That, at any rate

would be the phenomenological account of the matter but a trace theorist could plausibly argue that when a trace is reactivated it produces a different effect from that which occurred when the trace was originally laid down and this is the basis of the feeling of familiarity. Whether this is a viable explanation or not it would be rash to jump to the conclusion that Bursen and these other philosophers are trying to purvey, namely that any attempt to propose a physiological basis of recognition must be a futile waste of time. For the weakness of an anti-trace theory of memory is that it leaves us without any answer to the question as to why brain processes should be necessary to memory in the first place. It cannot be for nothing we carry round with us all that elaborate computing machinery in our head; what is the brain for if it does not play a part in memory, bearing in mind that neither perception nor problem solving would be possible without recourse to memory? The critical question therefore must be what is the function of the brain with respect to memory?

In the remainder of this paper I want to sketch out a possible theory of memory that combines a trace theory of storage with a psi theory of retrieval. From an interactionist point of view the critical function of the brain in all mental activity is to realize our intentions or translate them into physical fact. This function is most clearly exemplified in a typical voluntary movement. Naturally the organism has to be suitably prepared or primed if the intention is to be put into effect otherwise the result is a fiasco. I cannot go onto an ice-rink and just will my limbs to start skating like Robin Cousins! However, once certain learned movements have become part of my repertoire it is sufficient, it would seem, for me to *will* a certain action for my brain or motor cortex to initiate that complicated train of events in my nervous system that will result in my performing the act in question. Now I would maintain that the situation is no different in the case where I will to recall some missing item of information. Again willing is never enough. Unless the information had been properly learned in the first instance, which may well involve the laying down of appropriate traces, I shall not be able to recall it when I need to do so. The brain, in other words, imposes severe limitations on what is accessible to us at

any given time. Nevertheless, granted that it is accessible, the retrieval of it follows no less automatically the effort at recall than the raising of my arm follows my will to raise it. In both cases, the traces may be physical but their activation is a mental act. The brain processes represent the means whereby the act is accomplished but the mind supplies the ends which they subserve or, in other words, the mind acts upon the brain in a teleological fashion.

The interactionist view of memory has recently been stated in a telling way by Sir Karl Popper who has this to say:

"My suggestion is that when we search our memory, we feel that we are sitting in the driver's seat of our car . . . Like a driver we have at best partial knowledge of what we are doing — of the causal chains we are setting in motion. The combination between the feeling that we operate a known mechanism and the other feeling that we do not know how the effects of our actions are actually brought about can be taken as a model of the way in which the self interacts with the brain . . . I think the interaction between the self and the memory may not only be similar or analogous to, but may possibly actually be the same as, the interaction between the self and the brain."¹⁵

Popper may, of course, be wildly mistaken but the alternative to an interactionist view is not the obscurantist Wittgensteinian view that memory does not call for a scientific explanation but, rather, the materialist view that the brain 'does it all for us', as it were, that the experience we call remembering something is in fact no more than an epiphenomenon of its underlying brain processes. Now, there is still a good deal to be said for the materialist view whatever these philosophers may say but, as parapsychologists, we cannot allow the materialist to have the last word. Since we already have abundant evidence that the mind can, on occasion, extract information from the external world without the mediation of our sensory apparatus and can equally, on occasion, produce physical effects in the external world without the mediation of our muscular effectors, why need we deny the mind such powers with respect to its own brain? Bursen, like most of the philosophers of his persuasion (with the honourable exception of Braude) is scared of invoking the paranormal which, for him, would represent a lapse into magical thinking and the abandonment of reason. There is no reason, however, why we need feel similarly inhibited. Magic is a loaded word but we possess what he clearly lacks, a concept of 'psi process'.

It is true we know precious little about this 'psi process' but it is enough for our present purpose that it exists and that it functions in a wide variety of contexts.

It might be argued at this point that if we introduce psi we can dispense with physical traces in the brain even for purposes of storage. Thus, if there are genuine cases of memory for previous lives — and the evidence can no longer be ignored¹⁶ — or if there are genuine cases of post-mortem communications as some parapsychologists would maintain¹⁷, then we are dealing with cases of what can only be described as 'extra-cerebral memory' where the information cannot have been stored in any brain cells if only because the original brain no longer exists! If that is so, why do we need to postulate brain storage in the normal case? I think the answer must be that while the brain may not indeed be essential to psychic activity in all circumstances, it may still be the natural instrument of mind for as long as we have a body. Because the brain cannot be invoked to explain extrasensory perception it does not follow that the brain plays no part in ordinary perception. Similarly, if there are paranormal cases of extra-cerebral memory it still would not follow that the brain plays no part in normal memory.

CONCLUSION

The trace theory of memory is still no more than a theory, in no sense is it an established scientific fact. However, if we reject it, if we take the view that no physical record of experience is necessary for memory to work, then we are committed to the belief in a causal action across a gap in time that would, in the fullest sense, be paranormal. The plea that nothing paranormal is implied in abandoning trace theory, which certain contemporary philosophers in the Wittgenstein tradition have argued on the grounds that memory is not the sort of phenomenon that requires a causal explanation, cannot be allowed. For memory cannot be compared with a social custom, like marriage, as Bursen proposes, each act or manifestation of memory is an event in the real world which must either be in principle capable of a physicalistic explanation or else must be deemed paranormal. The particular view of memory that

we have proposed is one that combines a trace theory of storage with a paranormal theory of retrieval. Our view is one that accords with the interactionist view of the mind-body relationship which Popper and Eccles have defended but, unlike them, we adopt a parapsychological perspective. It seems to us only natural to regard the brain as, among many other things, a recording instrument whereby we keep a physical record of our experiences. At the same time, the incredible flexibility of memory in the human case makes it difficult to believe that the retrieval process can be due wholly to the automatic action of the brain feeding us, in computer-like fashion, with just the right items of information that we require at just the right instant. For it is not just in cases of deliberate recall that we retrieve information but in every case of learned behaviour, when we speak, when we perform a skilled action and so on. Relative to the speed of computer-processing neural transmission is very slow so that the time factor alone would appear to rule out the amount of processing that would be required in these cases. At all events, it is suggested that it is at this point, at the point of recall, that the mind takes over from the brain and makes possible the manifestations of memory that we all know.

Notes

1. See Bergson (1908/1911) esp. Chap 2 'Two Forms of Memory' pp. 86-105.
2. See Blackmore (1980) Part I.
3. For a vivid account of the consequences of brain injury see Luria (1975).
4. See Penfield (1958).
5. See Valenstein (1973) pp. 104-114.
6. Wittgenstein (1967) sect. 610, cited in Malcolm (1977) p. 166.
7. Russell (1921) p. 78
8. Malcolm (1977) p. 189
9. *idem* p. 194
10. *idem* p. 194
11. *idem* p. 199
12. See Braude (1980)
13. Deutsch (1973) cited in Malcolm (1977) p. 219
14. Bursen (1978) pp. 58-59
15. Popper & Eccles (1977) pp. 485-486.
16. See Stevenson in Wolman (1977).
17. See Gauld in Wolman (1977).

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On Science and Self-Noughting

ANTHONY RAMSAY

The basic difficulty in the science and religion relationship is that while the first is a creator of a world order and plan, religion leads to self-denial, 'self-noughting' and is, in some way, world-denying. To what extent, therefore is the world-denying project at odds with the creativity of science? The fierce anti-science of recent years, rejecting any idea of their compatibility — often for other reasons than biblical literalism — presents a certain challenge to the blandly comfortable assumption that they are consistent.

Science as an institution, affecting modes of thought - for example giving us a rigorously legislative attitude towards the creation, thereby lessening its mystery — is an obvious enough feature in our lives. More than this, by reason, on the one hand of its criterion of testability (which gives to a theory its interest), and on the other, of the autonomy, jealously guarded, of the physical, science comes to possess a unity and homogeneity that enables it to play the determinative role. Like the demiurge in Plato's *Timaeus*, it is the fashioner of this world — not just practical and theoretic, but on account of its pervasive mental conditioning, it also has the crucial epistemological role.

Given the interpretative bent of Platonism, it might be pointed out that the regulation of a subjective 'world', or, indeed, the loaded concept of 'objectivity' itself, may well have been part of the Platonic demiurge's power.

Such controls, however, are part of a background in the scientific world view. Our theory of knowledge, epistemology, when more than an academic discipline, is constitutive of our scheme of

things in the widest sense, that is to the world in which we live, whereas with regard to the arrangement of the contents, given in the first place, it is we who act and decide according to our conscious or 'foreground' considerations. The presence of the legislative force, the demiurge, is not apparent, and the demiurge, being a kind of personification of the whole scheme, is not an object for direct experience.

The allegiance of individuals to the presuppositions of the scientific world view might otherwise be characterised as a social contract at the epistemological level. The contract guarantees categories of experience and provides a sense of objectivity, physical certitude, a whole universe of discourse in fact.

It does not include religion, since this is thought to be a matter of untestable opinion, though it doesn't exclude it for the same reason. Thus the question over its fundamental presuppositions being inimical to religion, conceived of as divinisation, spiritualisation or redemption, is left open. This neutrality extends to the investigations it brings to bear upon religious phenomena, which are treated in a social or anthropological context, though rarely if ever in the spiritual terms evoked by religion itself.

This attitude on the part of science is visible within those modern theologies where ethics is made the leading principle, for then mathematics, science, logic and so forth remain within the realm of 'scientific' pursuits, while ethics divides off and can be seen at least to stem from, if not actually consist in, the lives of the religious masters. Far from being an opposition, there is a convenient division. A mainly ethical religion has a function with the social order, the world is so much the richer — both for having a regulative source and for being able in some rationalised form, to include the religious dimension.

This argues that such ethical views of religion are anti-metaphysical and represent a colonisation of the spiritual by a secular world view. From such a position there is not likely to be any spiritual-physicalist conflict.

It arises, nevertheless, in many different forms, whether out of protest at a social lie, the 'system', or over the issue of 'ideology' — forms which stick to the scientific, physicalist framework — or

equally, in the shape of the quietistic withdrawal towards world-indifference, which has no interest in anything, any framework, at all.

But there is a centre ground, a more central conflict. We said the demiurge is not a generally perceivable entity. Nor should he be, either, since it is a matter of great disturbance for anyone if for any subjective reasons, or psychological ones, the scientific world view proves unviable. In particular its severely legislative character, being obliterated, no longer provides a person with the categories vital to mental life in the ordinary world of common sense. It is a matter of observation how seemingly anomalous mental, psychic states crop up within personality, under these circumstances. A craving for authority — perhaps within the majestic historical tradition of some esoteric tradition — is experienced as a pressing practical need. Lack of identity is felt in proportion to the weight of the certainties which have been destroyed.

The rationalist complains that when the usefulness of religious categories is perceived, this undermines them. It is possible to see the same happening to the rationalist categories. The perception of the demiurge as a real force involves the dangerous step of passing beyond the pale of his authority. That the demiurge is perceived at all may be something that one would like to forget.

How does this affect the argument? Personality disorder, after all can doubtless be accounted for, and perhaps dealt with according to physicalist models of personality. But that tends to deny a person his felt need, in this case a tradition that is esoteric with reference to science. The experiential basis for the understanding of 'abnormal' states is not readily to be accommodated within the rationalist scientific world plan. If science be creative it may also be competitive: a jealous god. The cultural refugee is therefore going to remain one, unless within his commitment to spirituality there is some way of reintegrating with the world he has left behind.

In the Christian tradition a vital role is given in the 'Imitatio Christi', where self-denial leads progressively through the shedding of spiritual aids, crutches, all forms of attachment, towards the ultimate 'self-noughting'. Such is described as 'dying to the world', the world which, according to St Isaac of Syria, is a collective way of

referring to the 'passions', as being the recipient of our projections. It has also been called the most radical of all forms of iconoclasm, and, as Coomaraswamy has pointed out, the ideal behind this is often lost sight of since 'it cannot be said of anyone who still knows whom he is that all his idols have been broken'. This ideal of self-annihilation would seem to be uncompromising in its rejection of the world order as being, along with the devil, and the flesh, part of lower nature.

Yet without juggling with different senses of the term 'the world' it is possible to see, in a general way, how Christianity, or any true spirituality has to return to the creation, or else there would be no redemption, nothing of value to redeem. And whatever the state of things there, the world and its powers remain as the 'image of eternity in time'; the real work of 'self-noughting' being carried out in the self rather than by violent subversion of the external image.

Does that lead to a reconciliation of science with spirit — could it, for example, effect a return for the cultural exile and lead him to the acceptance of both? It would mean that the legislative view of nature would have to be integrated with a spiritual or sacramental view of it enjoyed most fully by the poets, dreamers and saints. It would mean a balance between 'secondary' causes and the primary sign of the Divine immanence in nature. The two views have been widely separated; it is difficult for example to see how Blake and Newton can both be profoundly and universally right.

Scientists, more than any, have invested in the proposition that the world is round and not flat, so if Blake is to be right as well, it must be in a different way, at a different level. But here we have a scientific world view which can only encompass a limited range of thinking; at the same time a religious or spiritual commitment retires shamefacedly before the challenge of testability. The result is impoverishment on both sides; impoverishment from the human standpoint, since the domineering and manipulative tendencies of science - its sinister aspect — tend to emerge at the cost of spiritual forms.

Perhaps to blame here is a species of double think in which a physical model of nature is taken ostensibly as a practical device while in fact it is made intellectually exclusive. This chases out all

sense of the numinous, and where the legislative attitude leaves off a sentimental one takes over. The sacramental view is excluded, religious symbols are 'merely symbols', spirit is a slightly absurd possibility.

There is the transcendentalist or quietistic escape from these preoccupations, and 'dying to the world' has been taken for just this. Another response is more aggressive, and actively seeks to assume the role of the demiurgic principle, in this case to replace scientific rationalism by a romantic irrationalism. There is for our cultural exile the third possibility. In following out the path of 'self-noughting' he can turn the loss of his security and old identity to account. Science no longer affords the safety of an intellectual shelter; on the other hand it no longer restricts his vision, and to that extent he is free to see the potential creativity of a culture where willy nilly, it has a central place.

Comment: Catastrophe Theory

We invited comment from Professor John Nye of the University of Bristol, and he writes as follows:

“I am inclined to think that the review by Parker-Rhodes is too kind to the book [*Catastrophe Theory* by Alexander Woodcock and Monte Davis] and not kind enough to the theory, in particular the applications of the theory in optics and in fluid flow are thoroughly well-founded, whatever may be the short-comings of the applications in biology and the social sciences.

If philosophers want an introduction to the subject I recommend ‘Catastrophe Theory and its Applications’ by Postan and Stewart. They can skip the mathematics and still get a good impression of what it is all about”.

Sentences

by TIM WANNASEE *

“DO INDIANS STILL LIVE IN TEPEES?”

*The Old Folks speak with pride
of their homeland
the Res
They tell of the endless game
the fish-filled streams*

*In their own way
I guess they're right*

*But to me
the things that I have seen
and what I've heard
all seem to be
a little different*

*Little Indian kids
super happy to be having ham hocks
with their commodity beans
a gift from the State
for the needy families*

*Copyright. Tim Wannasee is a North American Indian in Oregon

Theoria to Theory, 1980, Vol. 14, pp. 171 – 176
0049-3686/80/1402-0171\$04.50/0

Published by
Gordon and Breach Science Publishers Inc. 1980

*Hock shops in the Reservation town
filled with artifacts
handed down from generation to generation
hocked for a few meager dollars*

*as the kids peek in the taverns
to bum spare change
for a coke or movies*

*Re-locate!!
that's the answer
so the Honky says*

*Off to the city
filled full of dreams
Oh Man, wotta pipe dream . . .*

*Learned a trade
it did no good
each company has
a token nigger, token jap, token greaser etc. etc.
but says: "We can't use you, Chief"*

*I have seen my Red Brother's blood
upon the sidewalk
as the pigs haul him away*

*They are trusties in the county jail
learning the pros and cons
of Whitey's ways*

*Some unfortunate few
bear the telltale tracks
upon their arms*

*Something must be said
but by who?*

*I have read the graffiti
written on the walls
of my brain
But I remain
silent
even when
a Honky
asks
"Do Indians still live in tepees?"*

**"T'WAS THE NIGHT BEFORE CHRISTMAS"
(Slightly Modified)**

*T'was the night before Christmas
and down in the Joint
some Cons were shootin' up
with Moe standin' point*

*The guards in the gun towers
was freezin' ass
but in D-Block
the God-damn cons were firin' up grass*

*When out by the mess hall
there rose such a clatter
Cuda panicked and sez:
"Wassa Matta?!!"*

*Up drives this fat dude
all bonnerooed in red
an he got these eight fuckin' reindeer
pulling his sled*

*The fat man comes down with a "Ho! Ho! Ho!"
Honey Bear grumbles: "Now ain't this a bitch?"
Marsh quickly added:
"Cool it, he might be a snitch!"*

*Then Fatso grins sayin': "I'm Santa,
and I bring you Christmas cheer!"
T. J. Eggsman suggests:
"Let's throw the punk offa the tier!"*

*Them Cons latch onto this Santa
all giggling with glee
All the time this Santa dude
be coppin' a plea*

*This Chunky Santa
he be fightin' back
an during the hassle
he drops his sack*

*That bag . . .
it hit the floor
an' out pops
yeh, goodie galore*

*"Geez, all kinda dope"
Lucky sez with a grin
them Cons forget the fat man
an' flat dig in*

*Man, there be Columbo, Ragweed,
Speed, Retlins an' Smack
those Cons be so busy coppin'
they don't pin the Hack*

*All of a sudden Fat Floyd groans:
"I think the jigs up"
Sure nuff, it was the Warden
Ol' Blinky Cupp*

*They trucked us off to The Hole
or so I'm told*

*Yeh, the Cons was all stoned
Now, ain't that cold?*

*That Santa dude
he flat wanted to get away
he grabs his bag
an books for his sleigh*

*he be in such a hurry
to get back in the sky
this Lame crashes into C-Block
as he zazzed by*

*We hear him pass over our cells
while makin'g his flight
an that fat Punk be sayin'
"Merry Christmas to all
an to all a good night!"*

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Notes on Contributors

ANTHONY APPIAH is a Research Fellow in Philosophy at Clare College, Cambridge. His current work is in philosophical logic; but his other main interest is in the philosophical study of traditional religious and magical belief, on which he has taught at Yale University, and at the University of Ghana at Legon.

JOHN BELOFF is Senior Lecturer in the Department of Psychology at the University of Edinburgh. He is the author of *The Existence of Mind* (1962) and *Psychological Studies* (1973) and the editor of *New Directions in Parapsychology* (1974). He is on the council of the (international) Parapsychological Association and was president of the (British) Society for Psychical Research from 1974-76.

TIM EILOART took a degree in Chemical Engineering in Cambridge. He founded Cambridge Consultants, a company that undertakes contract research and development. He now runs "Cambridge Learning Ltd", specialising in self-instruction text books.

FRANCIS HUXLEY is an anthropologist. He has written *Affable Savages* (on his field work in Brazil); *The Invisibles* (on Haiti Voodoo); *The Way of the Sacred*; *The Raven and the Writing Desk* (on Lewis Carroll); *The Dragon*, and is at present working with the Philadelphia Association in London. He is a great-grandson of T. H. Huxley,

ISAAC LEVI is Professor of Philosophy at Columbia University, New York. He is the author of *Gambling with Truth, The Enterprise of Knowledge* and a number of articles in philosophical journals.

JOAN MILLER studied theology at the William Temple College and philosophy at University College, London. She is a former H.M. Inspector of Health and Safety, and is now retired to Cambridge.

ANTHONY RAMSAY read Philosophy, Politics and Economics at Magdalen College, Oxford and has worked as a journalist and script writer. He has lived off and on in India travelling and writing. Currently, he is living in London working as a publisher.

CLAIRE RYLE read philosophy and comparative religion at the University of Leeds. After a spell as a teacher, she is now running an information service on Radiation and Health.

RUPERT SHELDRAKE was a research fellow of Clare College, Cambridge, and also the Rosenheim Research Fellow of the Royal Society in Plant Biochemistry. He then went to the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad, India. For the last two years he has been working on a book entitled *Towards a New Science of Life*.

TONY WEBB works as an organizer for the anti-nuclear movement. He is one of the authors (with Claire Ryle and Jim Garrison) of the recent pamphlet "Radiation: your Health at Risk".

G+B new book information

Title: VALUE AND VALUES IN EVOLUTION

Editor: Edward A. Maziarz,
Loyola University of Chicago.

Description: This book can be regarded as a collection of responses to a number of questions that arise in the arts, sciences, philosophy and religion, when each of these is viewed under the rubric of values. In effect, the chapters address themselves to one or more of the following questions: are there any values that are endemic to the human condition? Is it the case that values are culturally relative? Does the future offer the possibility of a cross-cultural fertilization of values? What does the future offer human beings in terms of preserving and maintaining old values and of creating new options and prospects for mankind?

Contents: PART I, VALUES AND RELIGIOUS FAITH. The world, the city and the house. Religions and changing values. PART II, VALUES AND SOCIAL SCIENCES. Prices and values. Infinite worth in a finite world. Insiders and outsiders: an essay in the sociology of knowledge. Meaninglessness: a challenge to psychiatry. PART III, EAST-WEST VALUES. Values in a Marxist perspective. Chinese values. The China problem and our problem. PART IV, VALUES AND THE ARTS. The dilemma of choosing: speculations about contemporary culture. Private and public art. PART V, PHILOSOPHY AND VALUES. Social values and technological change. A case study: social welfare and personal happiness. The contemporary criticism of the idea of value and the prospects for humanism.

No. Pages: 206

\$19.50

ISBN: 0 677 15240 X

Binding: Cloth

Publication Date: April 1979

Category: Social Sciences (16).

Readership: Philosophers and social scientists, and students of these disciplines.

Gordon and Breach

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42 William IV Street, London WC2N 4DE
7-9 rue Emile Dubois, Paris 75014

G+B new book information

Title: **SOCIOLOGY, RACE AND ETHNICITY:**
A Critique of American Ideological Intrusions
upon Sociological Theory

Author: **Harry H. Bash,**
University of Missouri, St. Louis

Description: In its predominant and orthodox approaches to race relations, American sociology neither anticipated, nor found itself equipped, conceptually or theoretically, to accommodate the patterns of confrontation and conflict that characterized those events following the mid-1950's. This study traces the 'natural history' of the assimilation notion from its adoption from biology, through its formalization in largely psychological and anthropological terms, to its theoretical elaboration. Its general conservative ideological implications are noted in their paradoxical conjunction with the liberal persuasions of sociologists. Concept formation and theory construction in sociology are examined critically in view of their vulnerability to ideological intrusions and a scientifically tenable yet humanely relevant relationship between sociology and social life is explored.

Contents in Brief: PART I — Introduction. PART II — The natural history of assimilation. PART III — Ideology and theory in race and ethnic relations. PART IV — Transcending the assimilationist perspective. References. Indexes.

\$23.50

No. Pages: 264

ISBN: 0 677 05390 8

Binding: Cloth

Publication Date: January 1979

Category: Social Sciences (16)

Readership: Sociologists, anthropologists and psychologists

Gordon and Breach
1 Park Avenue, New York, NY 10016
42 William IV Street, London WC2N 4DE
7-9 rue Emile Dubois, Paris 75014

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VOLUME 14, NUMBER 2

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Discussion: Memory

JOHN BELOFF, DOROTHY EMMET, MICHAEL MORGAN,
RUPERT SHELDRAKE, IAN THOMPSON

R.S. John Beloff's paper "Is normal memory a 'paranormal' phenomenon?" appeared in the last issue of *Theoria to Theory*. I'd like to ask him to summarise it briefly.

J:B. I came to write this paper through my friendship with a young American philosopher, Stephen Braude¹ who has recently published a book on parapsychology. He is a keen proponent of the idea that it is fallacious to try to explain human behaviour in terms of some internal mechanism. He was keen I should read Norman Malcolm² and still more, Howard Bursen³ on the question of why it is wrong to look for the explanation of memory in terms of some kind of "trace" mechanism. I did what he encouraged me to do, but the effect wasn't quite what he hoped. I didn't feel the case against "trace" theory had been satisfactorily demonstrated. So I asked myself, where do I stand on this issue of memory? My own basic approach is a dualist one. I take the kind of position that Eccles and Popper take in *The Self and its Brain*—a dualist interactionism. Therefore my inclination is to ask myself, "What role is played by the brain?" but also I believe the mind is doing something; I do not look on the mind as just a function of the brain. So when I came to try and work out where I stood on this question of memory, I was looking for what role to assign the brain and what the mind, and it seemed to me that one could retain a "trace" theory while describing how the mind is using the brain to record experience.

D.E. It would be useful at this point if someone could just say what trace theory maintains.

M.M. Well, it is a very general theory. It just holds there is a physical trace for each memory. One form says there is a distinct

Theoria to Theory, 1981, Vol. 14, pp. 187-203
0049-3686/81/1403-0187\$06.50/0

Published by
Gordon and Breach Science Publishers Inc. 1981

locus in the brain associated with particular memories, but it isn't incompatible with trace theory to hold a position like Lashley's, that traces are distributed over large areas of the brain.

J.B. I want to keep it in a very general sense: that whenever we remember something, certain traces, whatever they may be, are reactivated – there is a physical record of some kind somewhere in the brain.

D.E. So “traces” here just stands for some physical basis, it need not be particular neural tracks, for instance, in which some structure corresponding to memories is encoded?

M.M. Yes; it would be very unfair to reproach psychologists for believing in some sort of isomorphism (corresponding structures) or some sort of picture postcard theory of memory. When we search through our memory, we are not doing something like looking through a family snap album.

D.E. Howard Bursen's book, to which John referred, says the trace people believe in some sort of isomorphism, and he shoots at this, but you say this isn't what is now generally held.

M.M. I think the majority of psychologists would now lean on the computer analogy – we could consider, for instance, a computer that is good at drawing pictures for a television screen, and which can remember complex visual representations. There is no isomorphism, but a pattern of digits from which the computer can reconstitute a visual image.

D.E. When you speak of the computer “remembering” you are using an analogy from human memory to talk about the coded storage of input.

J.B. But in whatever form the message is coded in the computer, it has to correspond in a more or less one-one fashion to the output. What Bursen insists on is that it is impossible in the case of human memories to establish any one-one correspondence between input and output. Memory is revealed through behaviour, also through language or the expression of emotions. Thus a memory may be manifested in a number of different ways, but there is supposed to be only one trace behind it.

M.M. The computer could have stored, say, five shapes which it can manifest on a screen; one could imagine an infinite number of

ways in which it could manifest them. It could be asked an indefinite number of questions (in an Artificial Intelligence language) about ways to reconstitute the shapes on the screen with an indefinite number of magnifications, rotations or whatever. It would be using the same trace on each occasion, but adding whatever was necessary to do a different thing with it, and that is very close to what we do with memory.

J.B. In the case of the computer, depending on what you asked, you could always predict what form the output would take. But if I ask you to remember something in your past experience, I can't predict how you are going to handle the question.

I.T. If you ask a computer a question not knowing the previous history of what has been fed into that computer, you wouldn't be able to predict how it would respond.

D.E. You have got a programme in a computer that can come up with a certain output. John was saying this is very different from people, because in the case of people you can't predict what they will come up with. Shouldn't we consider that there is an aspect of memory that does look awfully like the response of someone who was programmed in a certain way? There are some people whose remarks are absolutely predictable; so too the story they will tell if something is mentioned. But there is another kind of memory: deliberate recollection of something appropriate to a particular occasion.

M.M. It is true that most of the ways computers remember now are rule-governed. Clearly there is a distinction between rule-governed memory and "episodic" memory—Bergson⁴ made the distinction between habit memory and spontaneous memory—and computers don't reminisce about a particular event that happened last Thursday; I suppose in principle there is no reason why they shouldn't but it wouldn't be a particularly useful thing for a machine to do.

I.T. The point about rules is that if you understand the logical structure of any operation, it is possible to programme a computer to do it.

J.B. The point is that we cannot formalise what constitutes a memory. It is too multi-facetted.

I.T. This is what the psychologists are trying to do, by approximations.

D.E. Could we press a bit further this distinction Bergson makes between habit memory, where responses are predictable, and spontaneous memory where you are selectively trying to recollect something and relate it in an intelligent way to a present interest? The trace notions are much more plausible when you are considering habit memory where it does look as though the physiological organism, whether in the brain or the whole nervous system, or wherever, was so to speak entrained to produce a certain response.

J.B. When we speak of habits, we may mean skills, which are adapted to changing situations: I can be a practised pianist, but no two performances I give of a piece may be identical. There is a variation in each repetition which looks very unlike a mechanical response which can't deviate from what is on the record.

D.E. Is there a progression—you start from something like the conditioned reflex which isn't conscious, then you have got what looks like a programmed memory that is very unlike the use of a skill—a remark or story comes up without deliberate effort, and without it being particularly apposite. One can be plagued with a tune going round “in one's head” when one doesn't want it and can't stop it. Then you have the entraining of the organism to produce marvellously co-ordinated skills, like that of the pianist. And beyond that again, you have the recollecting, searching kind of memory.

J.B. Bursen in his book *Dismantling the Memory-Machine* brings up remembering a tune—a person can choose to remember it in different keys played by different instruments.

D.E. But then he is talking about very sophisticated recollecting memory, a beautiful kind of memory, which is very different from having some darned tune going on in one's head.

J.B. That is a degenerate kind of memory.

D.E. If you have a piano piece as it were played on the flute, you are not only remembering but imagining it.

J.B. You are imagining it in a way that depends on memory of the tune played on the piano. You can use mnemonic material in imagination and this makes it more difficult for the mechanist

because he has to explain imagination as well as pure memory. Bartlett⁴ in his book *Remembering* talked about “reconstructive” memory.

D.E. Bartlett said you are always drawing on and interpreting experience from the past, and you can reinterpret it in relation to what you are experiencing now, so the notion of a “pure” memory is questionable. What would be an example?

M.M. There are supposed to be examples, where you stick electrodes in people’s brains and they have a phenomenologically vivid experience. This is supposed to be like a vivid case of an experienced event.

J.B. Would you agree that it is no longer held that Penfield demonstrated this?

M.M. Quite. I am not saying it was demonstrated, but it was once taken to be a case of what would be a pure memory.

J.B. If you could stick in electrodes and elicit memories in a one-to-one fashion, you would have proved the point.

I.T. There are stories of experiments where people under hypnosis are made to count the number of rails they remember along a road they once walked on, and it was found that the number agreed.

M.M. The story of the workman who under hypnosis remembered every brick he laid is a frequent intruder in this sort of discussion. But it is anecdotal, and it is hard to evaluate these reports.

J.B. In the current issue of *Science* (27 June) there is a news article about the growing use of hypnosis for forensic purposes by the police in various countries. They mention, for example, the case from the mid-1970s at Chowchilla, California, in which a bus-driver, under hypnosis, was able to recall most of the licence plate number of a van in which children had been abducted from a school bus, as a result of which the kidnapper was apprehended.

I.T. Don’t you think this shows there was a record which had become inaccessible to consciousness but could be recovered?

R.S. I don’t see why this total recall should be evidence for traces.

D.E. If there were traces which could produce total recall of

everything that ever happened to you in your life, the mind just boggles at how many there would be. One alternative given to some sort of storage somewhere, either in the "mind" or the "brain" is that you can say memory is direct perception of the past. But surely there is a difference between "perceiving" where your bodily sense organs need to be compresent with what is perceived, and awareness of something in the past. You need not be talking as though you travelled backwards in a sort of time machine and perceived the past. Is memory like direct perception, or is it more like conception, using images (though that is a tricky word) which you associate with a past event which you have experienced?

I.T. Memory need not be arbitrary perception of the past, as we are remembering some previous state of ourselves in the past, and there is then the continuity of our own personal continuity going back to the past.

D.E. Instead of separate traces being caused by perceptions, can one say that experiences modify the kind of person you are? Proust in *À la Recherche du Temps Perdu* described how the narrator's particular sensations had associations which he tried to recover (the famous example was the taste of the "petite madeleine" dipped in tea) and from these he worked back to his childhood experiences in Combrai-les-deux-Eglises, and he was saying it was these experiences that made him who he was; he was now unravelling how his present life had come to be. The clues were associations of feelings and sensations with events in his past.

R.S. There is a huge literature on Bergson and Proust, and it is pretty clear Proust thought in a Bergson-like way about interpenetration of states of mind and not of decoding physical traces. Bergson speaks of the past interpenetrating the present, but leaves open the question of how it gets there.

D.E. If you mean some event in the past interpenetrating a present event, then it would be an event that appears to have two times.

R.S. Bergson points out that you know the memory is a memory, so the notion of two times is inherent.

D.E. There is the time of the experience and the time of the memory of it. But if an event in the past interpenetrates the present

what is happening is that an event, say the falling of a tree, could happen both in 1979 and 1980 and be the same event.

R.S. Bergson thinks there are two kinds of time, mental and physical time, so this mental interpenetration of events need not be in physical time. The brain is the point of intersection between consciousness and the physical world, through which consciousness can be selectively directed towards action.

D.E. Can you say more about what he means by “interpenetrate”? How does the past “interpenetrate” the present?

R.S. It depends on his concept of duration, which doesn't consist of a point in time, but necessarily includes some of the past and insofar as it looks to possible actions, it reaches to the future. He gives the illustration of a melody that you experience not just note by note; this is an instance of where the past and present interpenetrate.

D.E. Besides Bergson, Peirce, Whitehead and also William James spoke of how every experience comes with the awareness of its arising out of what has gone just before and pointing forward to what is expected just after. This awareness of arising out of the past pinpoints the fact that memory is needed for the possibility of conscious experience.

M.M. In general, yes, it is not a separate thing you have to add to experience. Some of the most intransigent critics of memory have been behaviourists, beginning with Thorndike, who denied that the formation of learning habits in his cats had anything to do with memory. Notably, there is Skinner, who is a most outspoken critic of the trace theory of memory. He doesn't think that for rats to press down a lever they need traces of former experiences laid down in the brain. If you modify the animal's behaviour, you modify its behaviour, and it is gratuitous to say you slot in a different memory. The animal is constantly re-forming itself under the influence of stimuli.

D.E. This hitches on to habit-forming and learning of skills. It passes over the question of the recollecting kind of memory.

I.T. Then the psychologists distinguish short-term and long-term memory. One wonders if these are different aspects of the same process, or whether something different is going on.

M.M. I don't want to press the difference between short- and

long-term memory, which may be a side issue. John Beloff (in his article) considered three classes of evidence for trace theory: brain damage; insertion of electrodes giving direct brain stimulation; and the construction of information-processing models. We can add ways of interfering by drugs, etc. with the laying down (consolidation) of memories. You can, it is said, stop long-term memories from being laid down by methods like electric shock treatment. Cooling the brain down by hypothermia is another way. Recent theories have suggested that these interventions affect not the laying down of memories in traces but their recall.

J.B. If a person is concussed, he may not remember anything about how it happened.

I.T. I go for state-dependent memory; you only remember things associated with the general state of the organism at that stage, and if the stage is one of concussion shock, the memory may be associated with that, and it will take a shock to bring the memory back. Psychologists can say this is a problem of recall rather than of consolidation of memory.

M.M. I think the state-dependence is a very interesting point; for instance if people learn a nonsense piece under the influence of alcohol they find it easier to remember when "under the influence". But this doesn't seem to me very decisive as between a trace or non-trace view.

D.E. Even if one isn't happy about traces—what kind are they?—can't one think of the body as an instrument for thinking of whatever kind? I want to allow for spontaneity and the difference between recollection and what I called programmed memory, but I find it very difficult to be completely dualistic about mind and body. It seems more like a situation in which something is its own instrument. The something has capacities which can be creative and spontaneous—all the words are difficult—and the instrument need not always perform in the ways it has been conditioned to in the past, and one of these other ways can be what Proust describes so well: searching how some sensation can be a clue to recovering awareness of past states and happenings. I think we have got to be able to say that being conscious enables us to be emancipated like this from space and time. I am emancipated spatially in that I can

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now think of something on the other side of Cambridge, or in New York; in principle is this different from being emancipated temporarily and able to think of something that happened to me in the past? This needs a state of the organism, and if one is not going to be dualistic, one must be less mechanistic about the capacities of the organism.

R.S. One of Bursen's points in his book is that the trace theory is philosophical, not scientific in the sense that you haven't found traces, but if you assume a person is some sort of a machine, working according to the laws of physics, then memories have to be inside the brain. This is independent of the evidence; when Lashley cut out chunks of brain and found memories survived, he simply substituted another version of the trace theory.

M.M. Lashley didn't find that memories survived—he found they were reduced according to the amount of brain tissue removed.

R.S. But when he found that memories depended on the quantity of brain tissue, he had to abandon the theory of specific localised traces, but he substituted another form.

J.B. Isn't it the case that Lashley was surprised to find how little he interfered with memory? So he postulated a multiple representation which took over from the localised memory.

M.M. His law of mass action states that the loss of memory efficiency is proportional to the amount of cortex removed.

D.E. I remember Sir Geoffrey Jefferson, a great brain surgeon in Manchester, used to say the same. He also said something that I suppose is more controversial, that we ought not to be too "cerebral". The neural system of the whole organism could intelligently be involved in the learning of skills.

R.S. If one takes a mechanistic view of the person in physico-chemical terms, one must have a view of physical traces, though one need not specify what or where they are. The dualist, who has mind with properties of its own, can say that this can do things of its own. Bergson holds further that memory was taken care of by the mind in a non-physical way. A third possibility is a new kind of physical causation acting across time, and this could provide a new kind of physical explanation. I personally think such a kind of physical causation exists, but I can't go into that now. I think it is responsible

for habit memories, but in addition to that I think there is a mental, Bergsonian, episodic memory. John here holds mind is involved in the retrieval of memories stored physically. Can we ask him to say what he means here by "mind"?

J.B. I suppose I take a neo-Cartesian view. I think all attempts to identify the mental and physical break-down, partly for logical reasons when attempts are made to establish the identity. So I think the choice is to look on "mental events" as epiphenomena of brain events, or to adopt a form of interactionist dualism, and let mental activity be causally efficacious in influencing behaviour. Then for memory, it is in the activity of retrieval that there is the most plausible need for mental activity. It is horrendously difficult to give a full account in purely physical terms—though that is just a negative argument. This is when I like to draw an analogy with other instances of what we parapsychologists call *psi* phenomena, in which it looks as if the mind is causing interacting with the external world, in instances of clairvoyance where one appears to acquire knowledge of states of affairs not mediated through the normal sensory channels. If this can be substantiated, it becomes less unreasonable to think there is a mind-matter interaction going on in normal human activities. So I put forward a *psi* hypothesis, that mind is playing on the memory and activates what traces it needs in the physical brain.

M.M. My first reaction to the idea that there are traces in the brain and it needs something paranormal to get them out is that it is a little like keeping a dog and doing your own barking.

J.B. The alternative is to conceive ourselves as automata, which I find strange.

M.M. We can lay that ghost to rest, surely? Automata used to be thought of as nasty things like engines. Now they are more sophisticated.

J.B. For me, however sophisticated, the crux is whether my intentions and so on are making a difference, or whether my actions all depend on how neural impulses are circulating.

M.M. You are starting from the assumption that you are not those neural circuits and so you are wanting an outside influence on them. If you are prepared to say you are those neural circuits, you

need not think they are compelling you to do something against your will. They are just what happens.

J.B. I am prepared to insist, as a matter of logic, that my experiences are not my brain activities. The question is whether they are epiphenomena, so that I might just as well be a nonsentient automaton for all the difference they make, or whether they can control behaviour in some fashion.

R.S. If we take John's position, I would also say it is keeping a dog and doing your own barking, but for a different reason. If the mind is retrieving memories from memory traces, one of Bursen's points is that, in order to retrieve, it must know what it wants to retrieve, and to do this it must already have a memory built in, so why does it need the traces?

J.B. I think I can answer that. The analogy is not keeping a dog and barking, but keeping a dog and taking it for a walk. I am doing something with the dog it wouldn't do on its own. When you say I must have a memory to retrieve a memory, I can ask what happens in action. It would be like saying my brain circuits are responsible for my arm's rising, so I have to know what brain circuits to activate in order to raise my arm. Why can it not be the case that I want to remember where I am going to meet my wife this afternoon, and that the correct designation comes up without my knowing what circuit to trigger off?

R.S. In the case of raising your arm, knowledge of what you want to do triggers off the action. To know you want to remember details of some scene twenty years ago involves your already having the memory that there was such a scene twenty years ago.

M.M. All you know is that you have a certain memory laid down and you set about retrieving it. In order to retrieve it, you have got to know what it is; in other words, you have to have a kind of "directory" to your memory traces. Moreover, this directory has to be updated continually as new memories are laid down.

R.S. If your mind has a kind of directory, which is cumulative as new items are added, you have to remember the contents of the directory in order to use it to search for traces in the brain. So if your mind has the capacity to remember some things, why not other things?

I. T. It has short-term memory. The mind's short-term memory can hold up to half a dozen items concurrently. It could well include, as well as such basic notions as "who I am" and "where I am" a few keys to the directory for the long term memory. The directory to all one's memories doesn't have to be in one's mind all the time, only that part currently needed.

R. S. What the mind is looking for isn't something in the short-term memory, but an entry in the directory made twenty years ago. So if you have this long-term memory in the mind we seem to have two systems, one mental, the directory, and the other physical, which gives the details. I would say myself, why not admit all memories to be in the mind? There may be *empirical* reasons for thinking that the mental kind of memory might include not only a directory but "extra-directory" details as well. What about the evidence for "paranormal" phenomena, for instance, memories of past lives?

D. E. This brings us back to John's analogy with the paranormal. His point was that the *psi* factor seems to be liberated from ordinary spatio-temporal constraints. Rupert has now mentioned another aspect—when people allege that they remember things that happened in past lives, which leads some people to believe in reincarnation. Another view would be that memories get somehow imprinted on places and objects, and transferred to someone who picks them up.

J. B. This also comes up over apparitions—when someone says they have seen a ghost in a place, and finds it corresponds to someone who has been there.

D. E. As though the house had got impregnated with an atmosphere as a residue of something nasty having happened there. There is an association producing a mood, but you weren't aware of the association.

I. T. Perhaps the brain is impregnated with memories in the same way. The same sort of overlaying of weaker by stronger memories may happen here and with objects, where some people can read from them what has happened to them in the past. And objects don't have to be specially constructed to remember things.

J.B. This would be a case of paranormal traces. That is an extreme view to be avoided if possible.

D.E. Is this what people who do “psychometry” claim, when they hold an object and tell you something that happened to a person who possessed it?

J.B. I believe the object is some kind of prop that sets off a train of thought—possibly, it has been suggested, the clairvoyant can follow back the history of the thought. It wouldn't be reading traces in the object.

I.T. Could there be traces extending back in time?

J.B. The most salient feature, though, of E.S.P. seems to be how it is time-independent. One doesn't know whether it is contemporaneous or connected with something in the past or in the future.

I.T. It is independent of physical time, but not what you might call individual psychic time. It is often related to someone's psychological perspective.

R.S. Can we come back to this question of memory of past lives? In Stevenson's⁶ and other books there are records of spontaneous cases where children have talked about things that have happened in alleged former lives. These are case histories, and Stevenson studied them in considerable detail and tried to check whether these children could have come to know these things by any normal means, and whether there could have been any motivation for fraud, and there does seem to be evidence that at least in some of the cases these memories could not have been acquired in any normal way. Then the debate is between people who think this proves reincarnation and people who think something paranormal is going on, but it could be a transfer of memory. If we take the latter view—I'm inclined to it myself—the relevance to this discussion is that it appears to be a transmission of event memory. This does suggest that *psi* factor, or whatever it is, can carry event memories. What John says in his paper is that though this could be so in paranormal memories, in normal memories they are not carried by a *psi* factor. They are carried by traces.

J.B. That is very much my position. Stevenson also speaks of appearances of similar wound marks or blemishes as birthmarks,

and this again might suggest a kind of floating memory, which might produce as it were stigmata on the body of the next organism. You attacked me with inconsistency in that while I am prepared to envisage a non-physical memory transmitted from a former life, I want to retain physical processes as carriers of normal memory. I don't think this is any more inconsistent than allowing that brain processes are necessary for ordinary perception and yet do not explain clairvoyant perception. I believe the mind is able to transcend the physical, but doesn't do so if it can use whatever physical means are available to it in the normal biological life cycle.

D.E. There is another difficulty about floating memories picked up by another memory. In most of the literature it is taken to be a logical truth that if you remember seeing an event, you are the person who was present when it occurred and who saw it. One might of course define the logical condition differently, but if one did, it would upset one of the things generally taken as axiomatic about memory. Possibly one would have to say that one can pick up floating "messages" about past events.

J.B. The philosopher Parfit has said that if memory automatically means that it is the same person, then we have got to invent some new term like "Q memory" for something remembered, but not by the same person.

M.M. I don't see how a memory could "float" and be detached from a person. I find this not only strange but unintelligible.

J.B. You might become possessed and start having experiences that don't seem to belong to yourself as you know yourself.

M.M. I can see what it might mean to think you were possessed by Napoleon and seeing the sun rise on the morning of the Battle of Austerlitz, but I don't see what a floating memory not belonging to anyone could mean.

R.S. You don't need to postulate memories as it were floating about in the air. If you can take the view of the past interpenetrating the present you could be "tuning in" to something across time that happened in the past. You could postulate a sort of mnemonic ether across time, but it wouldn't mean anything.

D.E. It might mean something if you thought the world was dispositionally so constructed that if at some point in between

someone had tried to tune in to it, he could have done so. Then there might be some sense in talking about a “mnemic ether”.

M.M. Could you intercept one of these memories? I feel very uneasy about invoking possibilities either of reincarnation or of floating memories.

D.E. Do you feel equally uneasy when John suggests that some of the experiences we have to invoke in talking about normal memory raise some of the same problems we find in talking about paranormal ones?

M.M. I agree with what he says against the people who say trace theory is logically objectionable, but I am puzzled by why he wants to have recourse to paranormal notions in talking about the method of retrieval.

D.E. In what he has just been saying I thought he was rather covering up the very bold thing he said in his paper, which I took to be that there isn't this absolute distinction between the normal and the paranormal when you are trying to explain memory.

J.B. I put “paranormal” in quotes in my title to bring out that when we look at mechanistic theories of memory, it does look as if something non-material, the mind, intervenes.

M.M. If a paranormal phenomenon is something rather striking that has no known physical explanation, that would actually apply rather well to memory. I'm not clear why you are back-tracking.

J.B. Because the facts of life are that one must not claim a phenomenon as paranormal unless one is in a position to exclude every normal explanation. This, as should be obvious from our discussion, is not the case with memory.

D.E. This may be an institutional fact of life, that these things are studied under different headings and generally in different places. Do we have to take institutional distinctions as necessarily representing intellectual ones? In your paper you made what I thought was a potentially very important point: that the anomalous case can sometimes be used to throw light on the normal cases. This has sometimes produced scientific advances, for example when a curious fact, the attraction of small objects by rubbing amber, led to understanding electricity not as a marginal phenomenon but as something of the most central significance. You say, John, that the

“paranormal” excludes normal explanation. This could be a way of defining it; but surely in fact you should go on looking for an explanation, and you might find one which led you to revise your views of the normal. This means you can't set up an absolute distinction between normal and the paranormal (this could apply to the exceptional capacities shown by some people. It might be possible for other people to develop them). In your paper I thought you were not setting up these barriers, but asking if the exceptional could throw light on the normal, by saying that some aspects of memory can be compared with what comes up in paranormal psychology.

M.M. What you say at the end of your paper is that the incredible flexibility of memory in the human case makes it difficult to believe that the retrieval process can be due to the brain feeding us in computer-like fashion with just the right items of information.

J.B. Yes, the speed, fluency and flexibility of the retrieval process would suggest to me that no attempt to give a purely mechanistic account of how it works in the human case is ever likely to succeed. And I believe that the same is true, and for much the same reasons, for voluntary behaviour generally. I have some sympathy with the objection that, by invoking in this connection the powers of an immaterial mind, one is merely substituting for one mystery another even more impenetrable. I agree that such powers serve as explanatory ultimates that are not further susceptible to analysis. My justification for invoking them, however, is twofold. First, the only alternative as far as I can see is to treat them as epiphenomena and to suppose that the organism alone qua physical system, determines all our behaviour, and mental activity including, of course, the act of remembering, and I find this inherently implausible. Secondly, we already have evidence, even if this evidence is less than conclusive, that there are phenomena such as the extrasensory awareness of external objects or events or other people's thoughts and feelings which do not appear to depend on any known physical channels and which ostensibly transcend the limitations of space, time and material barriers. It then becomes less gratuitous to suppose that similar powers are involved in ordinary mental acts such as remembering.

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Goethe on nature and on science

C. S. SHERRINGTON

We are reprinting, by permission of the Cambridge University Press, the Philip Maurice Deneke Lecture given at Lady Margaret Hall, Oxford by Sir Charles Sherrington in 1942. An enlarged version appeared in an edition of 1949. We are reproducing the original edition of 1942. Though given so long ago, it is still one of the most penetrating accounts of Goethe's outlook on Nature that we know, and it was written by a great physiologist who was himself also a poet. It is now out of print, and we are very grateful to the Cambridge University Press for allowing us to republish it in this way.

Two facts we may, at outset, recall about Goethe. That, a great poet, he was yet life-long an ardent student of the sciences of Nature. And this other, that with him — and not merely as usage of the German language — Nature was always Nature with a capital N. The thoughts of few men can be more adequately on record than are Goethe's, biographically and autobiographically, in his formal works and in his correspondence. We may look therefore to exceptional opportunity for knowing what this Nature with a capital N stood for in his mind.

He would have wished us to know. He was disappointed that his contemporaries did not pay more attention to his thoughts on Science and on Nature. He remarked once to Eckermann: 'I do not attach importance to my work as a poet, but I do claim to be alone in my time in apprehending the true nature of colour.' Again, in the pillage of Weimar, his main anxiety was for his scientific work in manuscript. That loss, he said, would be irreparable.

Theoria to Theory, 1981, Vol. 14, pp. 205-225
0049-5686 · 81/1403-0205\$6.50/0

Published by
Gordon and Breach Science Publishers Inc. 1981

We know something of his reaction to Nature in his childhood. We are told that, as a boy, during the family's frequent theological discussions, he would sit silent, but, afterwards, in his bedroom contrived an altar from a music-stand, placed on it minerals and flowers, and arranged, for crowning it, a flame to be lit by a burning glass from the rays of the freshly risen sun. Clearly, a child's act of worship. Paganism we may think, but how did the boy come by paganism in the bosom of a zealous Lutheran family?

In his manhood, scientific studies of Nature lay always near his heart. Let me use the term science here in brief to mean the sciences of Nature. Goethe's science was wide and reached to both physics and biology.

In physics, his best-known work—he called it 'optical'—was on colour. A feature of this work was its disagreement with that fundamental observation known as the decomposition of white light into coloured lights on passing through a glass prism. He rejected the decomposition of white light into spectral colours. He said he could not confirm it. The story is told that his attempt to repeat it was hurried and faulty. That he looked at the window through the prism and expected to see a field of spectral colour right across. Whereas he saw only some narrow coloured side-fringes. Be that as it may, he was distrustful of the whole doctrine.

He was for the most part a careful and patient observer. In this same matter of coloured and white light, he found himself likewise unable to confirm that white could be arrived at by combining colours. Here his difficulty lay in interpretation of the result. He could obtain in that way a pure grey. To the argument that a pure grey is a pure white of weak intensity and that all he had to do to get a brighter white was to strengthen the coloured ingredients, he rejoined, 'Ein hundert graue Pferde machen nicht einen einzigen Schimmel' [a hundred grey horses do not make one white one]. When his younger acquaintance, the philosopher Schopenhauer, sent him in manuscript the successful confirmation of both of these Newtonian experiments, Goethe remained still a sceptic.

In following Goethe's science we are helped by his having left on record a number of principles which in his view should govern scientific observation. One of them is that observation must be kept

as simple as possible, and for that reason should eschew apparatus. Prominent in his objection to the prism experiment was that the prism introduced heaven-knew-what complications. Essential for scientific observation was '*Anschaulichkeit*'—perhaps here best translated by 'obviousness' or 'naked perceptibility'. *Anschaulichkeit* could dispense with mathematics—it avoided resort to mathematics. In Goethe's view that was an advantage. He was not himself equipped in mathematics, and he regarded the role of mathematics in science with extreme distrust. Mathematics led to the introduction of propositions which were not truly contained in the original proposition. It had brought calamitous confusion to optics—the opposition of two rival theories, the corpuscular theory and the wave theory of light. As to simplicity, he did not seem to recognize that the use of apparatus in scientific observation is mostly for simplifying the conditions. Nor again, that the application of mathematics in science is a main means toward obtaining *Anschaulichkeit*. Nor again, that an hypothesis such as the corpuscular or the wave theory of light is merely a way of suggesting tests by which to test further.

Goethe's objections to the physicists' treatment of colour went, however, beyond this. His own treatment of the subject touched other issues still. Colour was, in science, Goethe's *Lieblingsthema*. He was, it is well to remember, of that type which the psychologist classes as 'visual'. That is, his memories, his fancies, his dreams, used visual imagery. Thus, to induce sleep a device he had was to visualize a seed gradually growing into a plant. His predilection for the eye is expressed by his remark 'gegen das Auge ist das Ohr ein stummer Sinn'. Further, in following Goethe's study of colour we are helped by remembering that in studying colour he was studying what Locke had termed a secondary quality of matter, meaning by that a quality which, if no sentient beings were, would cease to exist. The distinction is artificial to us to-day, but in Goethe's day was less obviously so; and Goethe himself seems to study colour as if colour itself existed as such in nature. He could not, as it were, divest himself, during his scientific work, of the practical habit we all have of accepting the external world in terms of our senses and colour as part of it.

Goethe seems scarcely to have entertained, or at least not

constantly kept in mind, such a distinction. The late Rudolf Magnus gave much attention to Goethe's work on colour, and he argued that there were times when Goethe did not succeed in bearing in mind that the physical, although it correlates with the psychical, does not necessarily resemble it. Thus, Goethe, because to his judgement the colour 'green' seemed a mixture, argued that the light which gives it must be a mixture of two lights, blue and yellow. Now, it is a well-observed fact that an indistinguishably similar sensation of 'green' can be got in several physical ways. For instance, it is given by admixture of two different physical lights, or by a mixture of three different physical lights, or again by one kind of simple light alone. The sensation given in these several different ways is just one and the same to the mind. Indeed, observations of this kind are the basis of Thomas Young's theory—put forward in Goethe's time—which accounts for the whole gamut of our colour sensations by three sets of structures or substances in the eye corresponding with the sensations red, green and violet, hence called primary colour sensations.

Rejecting as he did the ordinary physical view about the production of colour, what did Goethe put in its place? It is at times a little difficult to follow him in this. But it leads us into the heart of some of his thinking about Nature. As mentioned, he is out for avoidance of complication, and for *Anschaulichkeit*, as of the first importance. In connection with them comes the choosing of an *'Ur-phänomen'*. The conception of the *Ur-phänomen* is of importance to Goethe's view of science. The term is perhaps best translated 'bedrock phenomenon'. He had the idea that there are in Nature certain occurrences at once accessible to our observation nakedly and uncomplicatedly, and also specially profound and significant. An example is the magnet. 'Der Magnet ist ein *Ur-phänomen*, das man nur ausprechen darf, um es erklärt zu haben.' The magnet's attraction and repulsion 'zusammen deuten auf eine Scheidung, auf ein Entzweien, das beim Magnet sein Entgegengesetzten, seine Totalität, sein Ganzes wieder sucht'. Basic phenomena, such as that of the magnet, though restricted in number, are yet scattered widely over the range of operations of Nature. Ordinarily in Nature the fundamental is obscured from us by accessory and secondary

phenomena which cluster round it. The accessory factors lead analysis astray. But the Ur-phänomen lies open in naked simplicity to our observation. It is perceptible by our senses and we instinctively apprehend it. Science cannot, and never will, resolve it further. But we can build up from it. It is the ultimate Anschauliches in Nature. Its simplicity is part of its cogency. In geology he finds the Ur-phänomen to be 'granite' — because granite lies at the base of the Earth's crust — the very heart of the mountains is made of it, but past granite 'my Spirit's wings can go no further'.

In colour, he took his starting-point from what he regarded as its Ur-phänomen. That was this. If a little spirits-of-wine containing a trace of soap be added to a glass of water, the clear water becomes clouded. Held up against the light, that is, seen by light coming through it, the water looks yellowish. On the other hand, lit by the same light but from the front, and with a black screen behind to cut off transmitted light, the clouded water looks bluish. That is, when the light by which we see it comes through it, the water, with its faint uncoloured turbidity, appears yellowish. When, using the same white light, the light is reflected from it, there is a bluish colour. Probably most of us have noticed a similar effect when a little milk is added to water. A richer emulsion, for instance undiluted milk, is fully opaque to light. We have then for transmitted light complete extinction, darkness. And for reflected light a surface which, like the familiar appearance of milk, is white because fully reflecting. This final degree of clouding, complete opacity, was for Goethe 'vollendete Trübe'. This Ur-phänomen, like that of the magnet, had the character of exhibiting diametrical opposites, white and black, brightness and darkness. And between these polar opposites stretched the series of the colours.

This phenomenon according to Goethe was simplicity itself. It needed no apparatus. It invited no sophistication at the hands of mathematics. It was immediately understandable by anyone. It was Anschaulichkeit pure. With this as his Ur-phänomen Goethe developed his 'Doctrine of Colour' — 'Die Farbenlehre'. Its teaching was: We see through media. Colour is ultimately an affair of the cloudinesses of media. Goethe had so-called 'opal-glasses' prepared which gave by reflected light a bluish tint, by transmitted light a

yellow or orange. He drew confirmation and illustration of the theory from an incident he met with, which was this. An old oil-painting, of a man dressed in black, was being cleaned with a wet sponge. At once the black coat looked blue, but when dry was black again. The surface sheet of varnish clouded by moisture and seen by reflected light against the black ground looked blue. Goethe took pleasure in observing how his theory explained many of the sights which delighted him in Nature. The harvest moon through autumnal mist flamed like a blood orange. Then there was the roseate glow of clouds at sunrise and sunset, and above that glow the bar of heavy purple. Then again the blueness of the hills of the far landscape. Again, the immaculate blue of the summer zenith, which is the thin gauze of reflected light from the unclouded air above us seen against the intense black of cosmic space. Goethe is so happy about all this that he breaks into verse.

Wenn der Blick an heitern Tagen
Sich zur Himmel's Bläue lenkt,
Beim Siroc der Sonnenwagen
Purpurrot sich nieder senkt;

Da gebt der Natur die Ehre
Froh, an Aug' und Herz gesund,
Und erkennt der Farbenlehre
Allgemeinen, ew'gen Grund.

Of course, rejecting the prism experiment and its explanation of colours as he did, he had yet to account for how it was that the prism gives its fan of rainbow colours. His argument was this. A glass mirror as a reflector has the disadvantage of returning two images, one from the front surface and a second from the back. He thought of them as coloured and he ascribed their colour to cloudiness as usual. The glass prism also gave two reflections. But there the green was a difficulty. He met that by arguing that the lateral displacement of the second reflection made the blue in it overlap the yellow of the first reflection. The green was therefore a mixture just as Goethe's mental judgement declared that green always was.

It is hardly worth while following him further in this. Certain points however, of larger interest, regard his scientific outlook in

general. One is that which he drew of an *a priori* distinction of certain phenomena of Nature as being peculiarly fundamental and uncomplicated. This appears to-day—if it did not then—oddly artificial. Nature, as he himself often said, is 'ein Ganzes', and all her phenomena inextricably intermeddle. 'Flower in the crannied wall, I pluck you out of the crannies, and if I could understand you all in all, I should know what God and man is.' That seems nearer to Nature than was Goethe's conception of the Ur-phänomen. Goethe's choice of the colour production by suspensions looked at or through, as an Ur-phänomen, is not one which I think we can endorse as simple. It hardly has simplicity. There are in it a number of variable factors not altogether easily ascertained or controlled, variables which Goethe himself did little to control. Goethe never set out to disentangle the observation physically. For him it was a simple unanalysable fact to be taken as it stood. That was his attitude toward light itself. Light was a something which as to its nature human intelligence could not hope to understand. That was indeed the root of his objection to the prism experiment.

The prism experiment, he considered, made the mistake of presuming to enter upon an insoluble question, the actual nature of light.

Möget ihr das Licht zerstückeln,
 Farb' um Farbe draus entwickeln,
 Oder andre Schwänke führen,
 Kügelchen polarisiren.
 Dass der Hörer ganz erschrocken
 Fühlet Sinn und Sinne stocken.
 Nein! es soll euch nicht gelingen.

He thought the observations and arguments of the physicists presumptuous to the point of absurdity, by reason of their under-rating the inscrutability of Nature. The physicists' experiments seemed to him an instance of the foolish rushing in where angels fear to tread. There seemed here in Goethe an almost constitutional inability to appreciate the physicist's point of view. Perhaps it was partly his distaste for mathematics. Be that as it may, Goethe's approach to the scientific study of Nature was an opposite to that of the physicist. The opposition between them consisted not so much in

thinking that by one of them natural science could reveal Nature and by the other not. The two differed as to what kind of knowledge of Nature science *could* reveal. Thus, Burt's *Metaphysics of Modern Science* tells us that, in Newton's view, the utmost which can ever be expected from our scientific study of Nature is an exact mathematical formulation of natural processes. Newton therefore like Goethe felt that only a certain modicum of knowledge of Nature was ever to be expected from science. The physicist's view of the potentiality of natural science had not less humility and austerity than had Goethe's own; it perhaps had more. The difference between them lay rather in the kind of modicum of knowledge which each could expect to attain.

Goethe has remarked on the role of genius in Science. After pointing out that a scientific experiment should amount to asking a question of Nature, he says the role of genius in Science lies in the choosing a right question to ask, and that that gift rests on the revelation to scientific genius of which among Nature's phenomena are Ur-phänomenen — key phenomena. Goethe said that that knowledge comes to the scientific genius intuitively, in a flash. It is that intuition which confers on genius a creative power in Science. It enables such a genius to stand, as it were, beside Nature and participate spiritually in her activity as she creates. I think it is fair to suppose that when he speaks of scientific genius he has himself in mind; and surely that final statement lights up intimately to us Goethe's idea of Nature — a Goddess more than Olympian in kind.

His research into colour was an enquiry into her ways — leaving light, her instrument, to be taken for granted as inscrutable. He went on to observations in which he could be freer still from all preoccupation with the physical notion of light. We all have experience of how, after looking at a strong colour and then at a grey surface we see for a moment the contrast-colour of the original. On a bright morning a red rose will repeat itself in green on the gravel path. Goethe studied the occurrence of these after-images — he called them 'gerforderte Bilder'. As a result he arranged the colours in a ring of six — three which he considered simple colours and three intervening which he considered were mixed ones. In this ring the colour of the after-image always stood directly opposite to the colour

which induced it. This result he likened to the Ur-phänomen of the magnet. It showed Nature striving to satisfy the longing for totality when forced into polar opposites. This phenomenon is known in physiology as 'successive contrast'. There is also 'simultaneous' contrast, which Goethe was perhaps the first to study. A sample is this. Two sheets of paper, one red, one green, placed out on the table in a good light; a bit of pure grey paper laid on the red sheet looks green, on the green sheet looks red. Goethe said of this that again it shows the striving of Nature for totality. Red and green are polar opposites, the calling forth of one of them by itself is an 'Entzweiung' of the 'Ganzes' in one part of the field, 'Totalität' makes the other appear even where not called up in the field. Goethe remarked of this phenomenon that it occurred unconsciously. Later, when Helmholtz was working at the physiology of seeing, he on the contrary regarded the contrast as an erroneous 'judgement'. Later work here fully confirmed Goethe — it is conscious in the sense that we can experience it, but it arises from quite unconscious mental factors. It dogs the painter all the time — and Goethe was as skilled as a painter in observing it. He speaks of the waves of a green sea adding purple to their moving shadows. He enjoyed talking of colour with artists though it is true he had not contact with any of the greater painters. Goethe, we have seen, was predominantly a 'visual'.

This predominance of the visual in him is very evident in his scientific studies, dealing with the twin kingdoms of living nature, plant and animal. It was in the shapes assumed by life that Goethe found his deepest scientific interest — an interest which never staled throughout his life. Aristotle is known as the founder of the study. But Goethe gave it the name by which it is now universally known, morphology — the study of shape, meaning by that living shape. The subject attracted him early. When a Law student at Strasburg he preferred the company of the students who were doing anatomy, because they talked 'shop' even at meals. He frequented the dissections. The human body is of course a treasure-house of living form. Later, at Weimar, the shapes of trees and leaves fascinated him. In the riper period of what we might still call his youth, that pivotal experience came to him which is known as the Italian

journey. His 'Sturm und Drang' period, the period of Werther's 'Leiden' and of 'Götz', was then over. He went by way of the Brenner and of Garda. He found Italy an enchanted land. As he descended the southern alpine slope the wealth of flower and leaf and stem was something he had never witnessed or conceived. At Padua he entered the Botanical Garden. The palms there were in blossom. Their fans illustrated a scientific thought he had entertained. Their shapes presented a series ranging from extreme to extreme with all grades of transition. This revived in him an impression that leaf-form was in a state of flux.

Superintending State forestry and agriculture at Weimar, as he did, Goethe was conversant with the botany of his time. He would take with him the young Dietrich on excursions for collecting plants. The Linnean system of classification was everywhere in use. Young Dietrich knew it well. Goethe had difficulty in memorizing the names. He blamed this to the system. His poem to Christiane Vulpius complains:

Dich verwirret, Geliebte, die tausendfältige Mischung
Dieses Blumengewühls über dem Garten umher;
Viele Namen hörst du an, und immer verdränget
Mit barbarischem Klang einer den andern im Ohr.

Botany was an old study, but not until the seventeenth century had it learned the meaning of the flower of the plant. There had arisen a desire to catalogue, and arrange in order, all the kinds of plants that were. The assumption of the time was that the kinds around us were still as at the Creation of the world. Goethe in due course however had noticed for himself such differences between specimens of the same kind that he doubted that fixity of species which the Linneans took for granted. He thought specific form might be in a state of flux. That was his interest in the palm-leaves at Padua. The continual change, which he suspected was going on in plant-form, Goethe attributed to the influence of external conditions - soil, light, warmth, moisture, etc. Therefore partly it was that on descending the alpine slope into Italy from the north the luxuriance of the flora came to him as a verification of the thoughts of his mind. He said, If this is what a smiling landscape, and rich

soil and sun, can do, how impressionable must be the seeds such influences work on!

The naturalist Lamarck was putting forth somewhat similar views in Paris. Both Goethe and he dissented from the Linnean 'frozen' view of species, though it was orthodox. Lamarck is as prosy a writer as one can find. Goethe, on the other hand, sang his thesis aloud.

Und umzuschaffen das Geschaffne
Damit sich's nicht zum Starren waffne,
Wirkt ewiges, lebendiges Tun.
Und was nicht war, nun will es werden,
Zu reinen Sonnen, farbigen Erden,
In keinem Falle darf es ruh'n.

Es soll sich regen, schaffen, handeln,
Erst sich gestalten, dann verwandeln;
Nur scheinbar steht's Momente still.
Das Ewige regt sich fort in allen!
Denn alles muss in Nichts zerfallen
Wenn es im Sein beharren will.

In reading Goethe's science we are never left long without a reminder of his tendency, when speaking of Nature, to personalize her. As he described this state of instability, of flux, which Nature's living work exhibited to him, the collateral notion grew upon him that, at back of it all, were ideals—for instance that, while creating leaves, Nature kept in mind an 'ideal' leaf. Concrete leaves, in all their vast variety, were variants of an ideal leaf. His fancy pictured an 'ideal' plant, and Nature visualizing it, and calling forth from the stem of it a manifold of side-growths, of leaves, petals, sepals, stamens, and each and all of them just modifications of the ideal leaf. The very wrappings of the seed, the shell of the nut, the flesh of the apple, were all modifications of the leaf. As efficient causes actually producing these he supposed phases of growth due to restraint and freedom of the movement of the sap.

We cannot follow this further now. Suffice to say, it is no part of botany to-day. Goethe however regarded it as a botanical discovery. In his enthusiasm he took occasion, almost at the beginning of his acquaintance—which ripened into close friendship—with Schiller, to dilate on this theme to him. Schiller heard him out, and then, to

Goethe's surprise, said: 'Das ist keine Erfahrung; das ist eine Idee.'—'This is not a fact: it is an idea.' Time has confirmed Schiller's remarks. Goethe's view has gone the way of unsupported theories.

Goethe studied animal life also. An anatomical finding which he came across was that the incisor part of the upper jaw in man is separate from the rest of that bone, as it is in animals. It was a detail, but Goethe's interest was greatly excited by it. Not that he was in the least the type of naturalist who loves detail for detail's sake. On the contrary, in science as in so much else, he followed large views. But on his coming across this old vestigial partition of human face-bone we find him writing to Herder: 'I have found — not gold or silver — but something which gives me unspeakable delight. I was comparing with Loden the human and animal skull, and came on the clue.' His delight lay in the detail as a clue, one clue the more, bringing man and animals together, tracing them to be one. 'Ich habe es in Verbindung mit deinem Ganzen gedacht.' Goethe loved to feel himself, and ourselves, one with Nature, and all Nature one. As for the observation as a discovery, it was in fact already known. It had been published a few years before by Vicq-d'Azyr in Paris, at the Académie des Sciences (1779).

Again in the animal world it is individual form which most attracts him — he classified even the shapes of clouds. As among plants the flowering plants so among animals it is the crowning group — the back-boned — which specially engages him. The back-bone is a row of bones, the vertebrae. Jointed to the front end of the row is the skull. Goethe surmised that the skull itself is vertebrae continuing those of the back-bone. Goethe's musings conceived creative Nature — 'die Göttin' — creating the back-boned animal keeping an ideal vertebra in mind. He exclaims: 'How far from the tortoise to the elephant, and yet the gap is bridged entirely by intermediate forms! Because the whole series belongs to one ideal type.' The Nature-goddess, in shaping every individual of each great animal type, works to the pattern of a 'vorschwebende Idee'. This is a transcendental anatomy. That the skull is a set of vertebrae, an anatomist, Oken, put forward independently of Goethe, and this had a following among anatomists for a time. But

with the progress of anatomy it became discredited, and in the 80's of the last century Thomas Huxley rejected it finally.

For Goethe, Nature in her creating of living things continually produced fresh shapes, variants of certain primal patterns — patterns which themselves were never yet on land or sea, or in air. These ideal patterns the creative principle set before itself. They were, so to say, Platonic ideas in the mind of the creative mind, namely in that of the Nature-goddess, a cosmic presence. Goethe drew joy from the contemplation of the boundless productivity of this Being. Yet, deifying her though he did, he traced limits to the powers she possessed. He took credit to himself for the discovery of a 'law' which he called that of the 'correlation of parts'. It controlled even the Nature-goddess. It decreed that nothing could be added new to an animal-shape except at the cost of taking something away. Thus, the long body of the snake is obtained by depriving the creature of limbs. The relatively large limbs of the frog are got at the expense of shortening the body. Even the ateliers of Olympus are therefore under the rule of necessity. The deciphering of this law of correlation so pleased him that he broke into song about it.

Siehst du also dem einen Geschöpf besonderen Vorzug
Irgend gegönnt, so frage nur gleich, wo leidet es etwa
Mangel anderswo, und suche mit forschendem Geiste,
Finden wirst du sogleich zu aller Bildung den Schlüssel.
Denn so hat kein Tier, dem sämtlich Zähne den obern
Kiefer umzäumen, ein Horn auf seiner Stirne getragen,
Und daher ist den Löwen gehört der Ewigen Mutter
Ganz unmöglich zu bilden, und böte sie alle Gewalt auf,
Denn sie hat nicht Masse genug, die Reihen der Zähne
Völlig zu pflanzen und auch Geweih und Hörner zu treiben.

These verses are scarcely poetry. Their theme we must think does not fully admit of their being poetry. That Goethe himself should judge the theme capable is poignant evidence of how greatly in earnest he was about it. But this 'law' of his deciphering, has no place in science to-day.

Were it not for Goethe's poetry, surely it is true to say we should not trouble about his science. His science is as science not important. But it has real importance owing to the light it throws on Goethe the poet, and on his conception of Nature. He thought about Nature

over and over. He abounded in originality. His enthusiasm as an observer of Nature was great. But a new fact he met with was apt to send him forth on a flight of imagination into the unknown. Creative genius in literature as he was, in science that same genius longed to create, and could not always content itself waiting for further experiments and more knowledge. A golden rule in science is to follow experiment where possible, even where the imagined seems extremely probable. Goethe, though devoted to science, seems to us hardly of the scientific temperament. He had not, in this respect, for instance, along with the urge to discovery the sublime detachment of the great scientific thinkers, their passionless urge.

To other men than Goethe, Nature might appear a system of material principles, but not to Goethe. To him she appeared far more and far other than that. Where he seems to use her as a metaphor, I would think, it often is not metaphor at all. He thought of her, for one thing, as the mysterious creative power immanent in an immortal world—the embodiment of a divine activity. Thus it was that he criticised what he took to be the physicist's view of light. Light, he said, as to its ultimate nature is obviously unknowable by us. A glance at mid-day is enough to show us that. To think of it as a series of travelling particles or waves is simply an attempt to fit it for, to fit it into, mathematics. That is a mistaken aim. It is artificial. It creates confusion even for the physicists themselves; hence some say 'particles', others 'waves'. It reduces the splendours of sunrise and sunset to mathematical formulae—mere mathematical formulae. It is no approach to the reality of light the attribute of Nature.

Und was sie deinem Geist nicht offenbaren mag
Das zwingen sie ihr nicht mit Hebeln und mit Schrauben.

Goethe seems sometimes, as we read him, to be looking over the shoulder of his goddess while she creates. When creating plants she has an Urpflanze floating within her sight. When fashioning animals she follows the 'vorschwebende Idee' of a 'Typus'. This creatress which he pictures begins to assume to our eyes the figure of a great productive pagan goddess. There is in her little tenderness or charity. 'Sike baut immer, und zerstört immer. Ihr Schauspiel ist

immer neu, weil sie immer neue Zuschauer schafft.' This being is with Goethe no occasional presence. She is a dweller with him, and always she is a joy to him. He draws strength from contemplating her. His adoration of her approaches ecstasy. the paean of praise adventures no criticism. Traits he depicts in her may to us seem unlovely, but they are not so to him.

Sie spendet die reichen Lebensgaben umher, die Göttin;
Aber empfindet keine Sorge, wie sterbliche Frauen, um ihrer Geborenen
Sichere Nahrung: ihr ziemet es nicht.

She is too lofty to heed their suffering, though her offspring. To do so would not become her. Clearly this Goethe is not a christian Goethe – whether a greek or a gothic, I must leave.

To Goethe, worshipping her, a crowning glory of her is her endless zest-in-life, an inexhaustible *joie-de-vivre*, an inextinguishable creative fury. 'Leben ist ihre schönste Erfindung, und der Tod ist ihr Kunstgriff viel Leben zu haben,' And here it is that we meet Goethe paying the price for invoking in his anthropomorphic guise his concept of Nature. It makes the scientific question 'how' no longer enough for him. He is no longer content until he tells us the 'why'. Nature for him has come to be a *dramatis persona* in the world-drama. And so he has to show us the 'why' of what this *persona* does. 'Der Tod ist ein Kunstgriff mehr Leben zu haben.' And again, 'Sie gibt Bedürfnisse, weil sie Bewegung liebt.' Profound sayings these, but they are not Science. Natural Science does not ask, let alone attempt reply to, such 'why's'. But men do ask them, about each other, and about the gods. They are therefore instructive for us when we would ask as to Goethe's conception of Nature.

For one thing she was to Goethe a goddess of universal beauty – sometimes strange beauty, but always beauty – beauty of a blindingly radiant being. To perceive her in all her beauty was for Goethe perhaps the supreme of all human privileges, and to ally our forces with hers consciously for our allotted span was the utmost of all which is vouchsafed to us:

Im Grenzenlosen sich zu finden
Wird gern der Einzelne verschwinden,
Da löst sich aller Ueberdruss:

Statt heissen Wünschen, wildem Wollen,
 Statt lästgem Fordern, strengem Sollen,
 Sich aufzugeben ist Genuss.

My statement, we see, did not resume his fully. For him man's privilege is to merge with Nature consciously for an allotted span, and, then, as further privilege, to merge with her unconsciously. This theme is akin to that of the last stanzas of Shelley's 'Adonais'. Its treatment by Goethe seems of another and a greater order.

In formal philosophy, we know that friends urged on Goethe, more than once, the reading of Kant's *Kritik der reinen Vernunft*—then relatively new—and that Goethe could not get through with it. Possibly the obscurities of its style were peculiarly tiresome to a great master of style. Of philosophers it was Spinoza who had Goethe's ear. Goethe's approach to Nature was not materialistic. Nature was not for him matter working itself. That view possessed no appeal for him. He found it intolerable—'a Cimmerian grey'. If we have to label Goethe's philosophic attitude toward Nature, may we not say 'pantheism'—not, as has been said of Spinoza's, a mathematician's pantheism, but a poet's pantheism.

He peopled the natural world with powers which had idealised human shapes. There were Seismos, and Chaos, and some which he called after the old Ionian thinkers upon Nature. These Powers he would invoke. They spoke with each other, and to him. Nature resembled not too distantly a vast Brocken-scene in which the supernatural worked the natural, with Faust as spectator. Were they demigods, these Powers? They were at least of some category of the divine. His scientific experiments sought to know what might be known of their ways. But he felt that in great part the vast Cosmos, spread limitlessly around him, was a something inscrutable to man. Yet the presiding genius of the sum total of these Forces and Powers operating it, Goethe sublimated to the likeness of a divinity, a goddess, Nature—more than Olympian. Goethe's hymns to this Nature make together one song of unalloyed delight. Goddess, she was an embodiment of *joie-de-vivre*. Her *joie-de-vivre* for Goethe was contagious. A source of her joy lay in the prodigality of her own fertility. Spinoza has been styled 'God-intoxicated'. So, Goethe, in this worship of Nature, might be styled 'Nature-intoxicated'.

Nature, whose activity was immanent in us and around us, was a riot of perfection; she was glorious and faultless.

Let us note that here Goethe's thought runs wide of the thought of to-day? It is alien to modernity. His goddess ceaselessly throwing forth for pure enjoyment new forms of life seems to us to have in her a trace of the wild-wood, of the savage. Goethe's exultation in her utter immensity, and the ingenuity of her creativeness, strikes, to us hearing it to-day, a somewhat lonely note. To-day has no unstinted praise for this goddess. Goethe's rich gift of fancy revelled in her and all she did. The thought of to-day does not. To-day's view of Nature is more austere, more anthropomorphically critical. To it, the view of Goethe has a touch of thoughtlessness, even to the point of lack of pity. He is blind to Nature's broadcast sowing of suffering. Moreover, to him no hint has been vouchsafed of a present pregnant with a different future, the great theme which the modern naturalist never forgets. Goethe envisages nothing of an evolution which seems—and not least in evolving man—to display a trend, not merely toward new shape and greater complexity, but 'upward'. That has no part in Goethe's dream. But a younger poet was already saying, by the mouth of the hoary Titan, 'Lo, at our heels a fresh perfection treads'.

Aristotle, devotee of 'Nature', conceded of her that she has in her more of the hateful than of the lovable; though Aristotle was no squeamish critic. To Goethe on the other hand nothing in Nature seemed abhorrent. Antithesis to Goethe, the Dean of St Patrick's found the body, and all its ways, disgusting, and Swift, when he scolded men, rubbed their noses in that. But Goethe's healthy, robust, delight in Nature accepted everything. That Nature sowed and reaped vast harvests of pain all over the Earth casts no cloud on Goethe's looking round and enjoying her. Zest-for-life is, we know, life's most ruthless destroying angel. With progress of knowledge of Nature the fact emerges only the more clearly. Yet turning to Goethe it would seem unknown. Toward the end of his long life, he is singing:

Ihr glücklichen Augen
Was je ihr gesehen,
Es sei wie es wolle,
Es war doch so schön!

Of the blight of suffering on Nature, he lived as if unaware. He might reply, 'Of what use to lament over what I cannot alter?' Yet it was deeply distressing to David Hume, though no versed naturalist. Goethe's great younger contemporary sang of it, 'It spoils the singing of the nightingale'. And indeed it forms part of that acknowledged problem, the existence of pain in our world. Yet Goethe says of his Nature-goddess: 'Die Menschen sind alle in ihr, und sie in allen. Mit allen treibt sie ein freundliches Spiel'—Ein freundliches Spiel? The wolf-pack in pursuit! The leopard at the throat of the deer! The cancer growing! Ein freundliches Spiel?—the words ring like irony. Goethe's view of Nature in this respect remains an enigma and it is another view than to-day's. It is, perhaps, too sane for to-day.

But of course by reason of this insouciance Goethe's worship of Nature takes all the more joyous a note. I call it worship. I think it amounted to worship—not for a moment is it materialistic. Matter was for him the mere vehicle for the play of mighty immaterial forces, super-human activities, which the creative fancy, dominating him, endowed with personalities. He remarks somewhere: 'I have at times to resort to pantheism to satisfy my being.' Supreme among these superhuman divinities of his was Nature. He wrote in his *Annalen*, when he was sixty-two: 'With me, a pure, deep, innate and constantly-followed conception has been the view that God is inseparably within Nature, and Nature inseparably within God, and this idea has been at the basis of my whole existence.' To anthropomorphize the forces of Nature is, we are sometimes told, a trait belonging to primitive society. Be that as it may, in Goethe it was a transcendent mental trait, gifted with epic powers. Besides the eternal poetry of direct personification of special aspects of Nature, it extended to the creation of beings representing whole categories of Nature, and finally to that of universal Nature—the creation of demigods and a god.

For him surely, the Nature he turned to, and addressed so often, was no impersonal principle, no causal concatenation of material forces. Rather it was a numinous presence, immanent in Earth and Sky, operating the gates of birth and death. We have heard him call her a goddess and as such he depicts her. 'Unmasked and

unwarned,' he says, 'we are caught up by her into the whirl of her dance. She carries us along until we are tired and drop from her arms. She herself is tireless. Her present is eternity. Always is she a whole, and yet never is she complete. The game she plays with all is a friendly game. The more we take from her the better she likes it. But she loves herself. Her study is herself, and her own pleasing. She invites us to share her enjoyment of herself. She loves illusion. Those who will not share her illusions she punishes as a tyrant would punish. Those who accept her illusions she takes to her heart. To love her is the only way to approach her. With her love-potion she can heal the woe of a lifetime. She has brought me here; she will take me hence. I trust her. She will not hate her own handiwork.'

Is not such metaphor as this more than metaphor? Is he not uttering his faith? Profound truths are in it. And profound pathos. On one of those rare occasions, when he spoke of religion in regard to himself, he said that the Deity as such was to him inscrutable, but that one aspect of Deity was not so, Nature. And then, too, we have the invocation—for we may call it that:

Welt-seele komm uns zu durchdringen,
Dann mit dem Weltgeist selbst zu ringen,
Wird unsrer Kräfte Hochberuf,
Teilnehmend führen gute Geister,
Gelinde leitend, höchste Meister,
Zu dem der alles schafft und schuf.

A cry of content to be one with Nature! That thought is comfortable to him—more than comfortable, it is welcome. The thought that whether alive or lifeless he is inescapably and for ever a part of Nature—one with her. This, it would seem, is what sustains him. He draws from it his salve for existence, his balsam wherewith he would heal death itself.

Und so lang du das nicht hast,
Dieses: Stirb und Werde!
Bist du nur ein trüber Gast
Auf der dunklen Erde.

Surely, supremely said! And from it we can judge a little what was in

his thought in the lines—and they moved him when, toward the end, they suddenly met him again—

Über allen Gipfeln
 Ist Ruh.
 In allen Wipfeln
 Spürest du
 Kaum einen Hauch;
 Die Vöglein schweigen im Walde.
 Warte nur, balde
 Ruhest du auch.

Translations of German quotations*

p. 208 The magnet is an Ur-phenomenon which one only needs to mention to have it explained.

. . . together point to a parting, a dividing into two, that in the magnet seeks again its opposite, its totality, its unity.

p. 210 If on a fine day one turns one's gaze towards the blue of the heavens, when the Sirocco blows the sun's chariot sinks down in purple; then one gladly honours Nature, sound in eyes and heart, and one acknowledges the science of colours as the universal, eternal foundation.

p. 211 You may break up the light, separate off the colour from colour, or play other pranks, polarising particles, so that the hearer would feel meaning outraged and sense falter. No! You will never succeed.

p. 214 The thousandfold blending of this medley of colours throughout the garden overwhelms thee, beloved; you listen to many names, and the one ever displaces the other in your ear with its barbaric sound.

p. 215 And to create what is created in such a way that it does not arm it with rigidity, an eternal living activity is at work. And it now wishes to bring into being what before was not, into the pure sunshine, the coloured earth, in no way may it rest. It is obliged to direct itself, then it changes; only apparently does it stand still for a moment. The eternal rises up in everything! Then everything must fall back into Nothingness if it would persist in its being.

p. 217 If you therefore see any creature which possesses a particular advantage, ask immediately what it lacks in some other respect, and seek with enquiring mind, and you will at once find the key to all development. Thus no animal in which the upper jaw holds a full set of teeth also bears a horn in its forehead, and so it is quite impossible that the Eternal Mother should form a horned lion, and even if she put out all her strength she would not have enough material to make the full rows of teeth and also to bring out antlers and horns.

p. 218 And what she does not reveal to your mind she will not force on you with levers and screws.

. . . She ever builds and ever destroys. Her play is always new because she always creates new spectators,

*In making these translations the editor has been helped by Kathleen Wood-legh.

p. 219 The goddess spreads rich gifts of life around, but she experiences no anxiety, as do mortal women, for her offspring's secure nourishment; it would not become her.

p. 219 Life is her fairest discovery, and Death is a contrivance to have Life in plenty. . . . She produces needs because she loves movement.

p. 219 In order to find itself in the Boundless the individual will gladly vanish, thus all surfeit is removed; instead there are ardent wishes, wild willings, heavy demands, stern obligations; satisfaction is to give oneself up.

p. 221 You happy eyes, whatever you have seen, be it what it likes, it was so beautiful. . . . Men are all in her and she in all. With all she plays a friendly game.

p. 223 World soul, come to penetrate us, thus to be grasped by the World Spirit itself will be our strong and highest calling; good spirits go ahead sharing the way, gently leading, mighty masters, to that which creates everthing and has created.

p. 223 And so long as you have no grasped this: Die and Become! you are only a gloomy guest on the dark earth.

p. 224 Over all the peaks there is calm. In all the tree tops you hardly notice a breath of wind. The birds are silent in the woods. Wait now, soon you too will rest.

Three Approaches to Biology:

Part II. Vitalism

RUPERT SHELDRAKE

Real and Imaginary Vitalism

Accounts of modern biology mention vitalism as if it were a kind of superstition which has been swept away by the advance of rational understanding. It is usually regarded as of merely historical interest, rather like the theory of phlogiston in the history of chemistry. Vitalists are portrayed as ludicrous figures clinging desperately to the belief that living organisms do not obey the laws of physics and chemistry, while the whole tide of science has flowed ever more strongly against them. The 'discrediting' of vitalism is usually said to have begun with the first synthesis of an organic chemical, urea, in the early nineteenth century, and to have been made more and more conclusive by every new discovery of physiology, genetics, biochemistry, biophysics and molecular biology.

This imaginary history forms an important part of the folk-lore of the mechanists. But in reality, vitalists did not deny that processes in living organisms took place in accordance with the laws of physics and chemistry. What they did think was that matter was organized in a special way in living organisms, which was different from that discoverable by ordinary chemistry. For example, J. C. Reil (1759-1813) held the view that "the most general attribute of the unique animal matter is a special sort of crystallization".¹ But this is not entirely unlike the mechanistic idea that morphogenesis takes place by complex spontaneous processes somehow analogous to crystallization. A typical vitalist of a later generation, J. Mueller, in

Theoria to Theory, 1981, Vol. 14, pp. 227-240
0049-3686/81/1403-0227\$06.50/0

Published by
Gordon and Breach Science Publishers Inc. 1981

his *Manual of Human Physiology* (1833) admitted the existence of chemicals, such as urea, governed by chemical affinities in living organisms, but thought there was also 'something else' ruling in life, namely the organizing powers of morphogenesis and movement.² Similar but clearer views were held by the great chemist, Liebig, who believed that although the chemist could already produce all sorts of organic substances, and would in future produce many more, chemistry would never be in a position to create an eye or a leaf. Besides the forces of heat, chemical affinity and the formative force of cohesion and crystallization, "in living beings there is added yet a fourth cause which dominates the force of cohesion and combines the elements in new forms so that they gain new qualities — forms and qualities which do not appear except in the organism"³ (1844).

The common theme in the vitalist ideas of this period, and indeed of all periods, was that matter in living organisms is organized and controlled by specifically vital factors which do not operate in the inorganic realm. Aristotle had attributed the organizing function to the psyche, or soul, of which he thought there were three levels : in plants, the vegetative (or 'nutritive') soul, characteristic of each species, controlling morphogenesis, maintenance and reproduction; in animals, in addition to the vegetative soul, which had the same general role as in plants, there was an animal (or 'sensitive') soul, concerned with sensation and movement, controlling the animal's behaviour. In man, over and above the vegetative and animal souls, was a higher soul, that of reason or intellect. Neither in Aristotle's system, nor in any of the subsequent vitalist theories, was it ever denied that living organisms were material, that they depended on food and the physical environment, etc.; these theories simply stated, in one form or another, that in living organisms matter was *organized* by special vital factors or forces. However it was never possible to say exactly what these organizing factors were or how they worked. They were merely given names ('vis vitalis', 'vis essentialis', 'nisus formativus', etc.) and discussed in general terms.

Such vague ideas were of little use to experimental scientists, and had relatively little influence on biologists in the latter part of the nineteenth century. The mechanistic theory provided an adequate

enough basis for physiological and biochemical research. But this was not the case in the field of embryology, where the difficulties of the mechanistic approach soon became apparent; it was mainly among experimental embryologists that vitalism again came to be taken seriously. The most important figure in this new development was Hans Driesch (1867-1941) who, like most pioneers in this field, was originally inclined towards the mechanistic theory. He wrote of the change in his views as follows:

The experiments of several years upon the power which organisms possess of regulation of form, and continued reflection on the collective results of experiments on the physiology of development, upon which I had been working since 1891, combined with a logical analysis of the concepts of 'regulation' and 'action', brought about an entire change of my opinions and the gradual elaboration of a complete system of Vitalism."⁴

The neo-vitalist movement had many other supporters and became an important force within biology, although the mechanists remained in the majority. The first two decades of this century were a period of great controversy, but by the 1930s the mechanists had achieved an almost complete dominance within the scientific establishment. Vitalism was treated as a heresy and every effort was made to stamp it out. Henceforth, almost no-one advocated vitalism explicitly; challenges to the mechanistic theory came only from the organismic philosophy. Many of these challenges were similar to those presented by the vitalists; and defenders of orthodoxy were not slow to see the organismic philosophy as vitalism in a new guise. The organismic theoreticians, on the other hand, found it necessary to disclaim any close affinity with vitalism. They claimed to have 'transcended' the vitalist-mechanist dispute.

Although vitalism is totally out of fashion, it seems worth considering what the neo-vitalists actually said. In the following sections, some of the ideas of the two most prominent, Driesch himself, and the French philosopher Henri Bergson (1859-1941) are briefly summarized and discussed. Although their most important books were written over seventy years ago, they are still extraordinarily interesting and contain insights of great originality.

Hans Driesch

Driesch's major theoretical work, *The Science and Philosophy of the Organism*, was published in 1908; a second edition appeared in 1929.

Driesch did not deny that many features of living organisms could be understood in physico-chemical terms. He was well aware of the findings of physiology and biochemistry, and of the potential for future discovery : "There are many specific chemical compounds present in the organism, belonging to the different classes of the chemical system, and partly known in their constitution, partly unknown. But those that are not yet known will probably be known some day in the near future, and certainly there is no theoretical impossibility about discovering the constitution of albumen [protein] and how to 'make' it."⁵ He knew that enzymes ('ferments') catalysed biochemical reactions and could do so in test tubes : "There is no objection to our regarding almost all metabolic processes inside the organism as due to the intervention of ferments or catalytic materials, and the only difference between inorganic and organic ferments is the very complicated character of the latter and the very high degree of their specification."⁶ He knew that Mendelian genes were material entities located in the chromosomes, and that they were probably chemical compounds of specific structure.⁷ He thought that many aspects of metabolic regulation and physiological adaptation could be understood along physico-chemical lines⁸ and that there were in general "many processes in the organism . . . which go on teleologically or purposefully on a fixed machine-like basis".⁹ His opinions on these subjects have been confirmed by the subsequent advances of physiology, biochemistry, and molecular biology. Obviously Driesch was unable to anticipate the *details* of these discoveries, but he regarded them as possible and in no way incompatible with vitalism. It is, of course, these very discoveries which the mechanistic mythology treats as a conclusive refutation of his views.

In relation to morphogenesis, he considered that "it must be granted that a machine, as we understand the word, might very well be the motive force of organogenesis in general, if only normal, that

is to say, if only undisturbed development existed, and if taking away parts of our system led to fragmental development."¹⁰ But, in fact, in many embryonic systems, removal of a part of the embryo is followed by a process of regulation, whereby the remaining tissues reorganize themselves and go on to produce an adult organism of more or less normal form. The first clear experimental demonstration of regulation was provided by Driesch himself, using embryos of the sea urchin. When one of the cells of a very young embryo at the two-celled stage was destroyed, the remaining cell gave rise to an organism smaller than normal, but complete. Similarly, small but complete organisms developed after the destruction of any one, two or three of the cells of an embryo at the four-celled stage. Comparable results were obtained with other organisms, such as the newt. Many other examples of regulation of whole embryos or of embryonic organs were soon discovered. And of course the related phenomenon of regeneration, whereby damaged organs of animals or plants could be restored, was already a well-established fact.

According to the mechanistic theories of development of W. Roux and A. Weissman, in vogue in the late nineteenth century, the germ cells contained a very complicated organized structure which disintegrated during development, different parts being passed on to different cells in the process of nuclear division. In this way the structure was supposed to be broken up into its elements, each localized in a particular cell and determining its fate in the adult organism. This theory resembled the old 'preformationist' idea that the complete organism was present in the egg in miniature; but instead of a complete miniature organism there was supposed to be a structure *corresponding* to all the parts of the organism. In order to explain the facts of reproduction and regeneration, it was necessary to suppose that the complete structure was preserved in the 'germplasm' and in a 'reserve plasm' from which regeneration could originate.

Roux attempted to prove this theory experimentally. He killed one of the two cells of a frog's egg after the first cleavage and watched the development of the surviving cell. A typical half-embryo emerged, looking as if a fully formed embryo had been cut in half

with a razor. This seemed to be a proof of his theory. But Driesch's subsequent discovery of embryonic regulation in the sea urchin showed that this theory could not be correct. Further research showed that although the embryos of some groups of animals behave as 'mosaics' in which the fate of the cells is fixed, as Roux had found with the frog, in other groups the embryos regulate after disturbances. But even 'mosaic' embryos were found to regulate if they were disturbed at a sufficiently early stage, and in 'regulatory' embryos the tissues would not regulate if they were damaged at a late stage; the differences were of degree and not of kind.

The fact of regulation definitively refuted this particular type of mechanistic theory. Development was thoroughly 'epigenetic': it involved the appearance of new structures and of a diversity of form which were not already organized, either in a miniature animal inside the egg, or in a complicated structure corresponding to it.

The only remaining type of mechanistic theory of development would have to suppose that it could be explained in terms of complicated physical and chemical interactions between the parts of the embryo. Driesch considered that the fact of regulation made any such machine-like system inconceivable, because the 'machine' would have to remain a whole after the arbitrary removal of some of its parts. He argued that no such physico-chemical machine is possible.¹¹

It might be thought that the development of computers with complicated programmes including feedback loops provide counter-examples of regulations by machines, unknown to Driesch. But his argument holds good for computers too : no computer exists in which the whole can be automatically restored after the arbitrary destruction of parts, e.g. the smashing of all the memory discs or the ripping out of parts of the circuitry at random. Even a computer with 'back-up' circuits and duplicated parts could not survive arbitrary damage to any part of the machine, and certainly could not regenerate the missing structures. The only other item of modern technology which might seem relevant is a hologram, from which pieces can be removed but which can still give rise to a complete three-dimensional image. But the image produced in thin air from a hologram is not by any stretch of the imagination a

machine-like material structure capable of carrying out characteristic functions. In any case, the hologram cannot give rise to any image by itself, but only when it is part of a set-up including a laser, mirrors, etc. If a part of this functional whole, say the laser, is destroyed, obviously the remaining parts are unable to regulate and produce a new laser.

While no actual machines exist which have the power of regulation or regeneration after arbitrary removal of parts, it might be thought that such physical or chemical machines could one day be invented. But Driesch argued that they cannot even be conceived. And, so far, they have not been conceived. This is a powerful argument, but mechanists could always escape by saying that they could be conceived at some time in the future. However, this would be a poor defence, lazy and evasive.

Driesch's second refutation of the mechanistic theory was very simple : no complicated physico-chemical machine, typically different in the three dimensions of space, could be divided into parts which still remain wholes. Yet this is what happens in reproduction : parts of a parent organism become detached from it and give rise to new organisms. No self-reproducing physico-chemical machine actually exists. If mechanists were to argue that it could be conceived in principle, then to resemble a living organism it would also have to have the power of regulation. Such a physico-chemical system defies imagination.

His third refutation was based on the analysis of behaviour and learning, in which the stimuli and responses on the basis of experience cannot be analysed into simple parts, but are wholes.

The essence of all these arguments is that machine-like systems are composed of an aggregate of parts and do not possess the properties of 'wholeness' which are exhibited by living organisms. Driesch considered that these refutations of the mechanistic theory proved that, in addition to the laws of physics and chemistry, another causal factor must be operating in living organisms. He called this factor 'entelechy', and suggested that it organized physico-chemical processes during morphogenesis, and controlled the actions of animals through its influence on the brain. The genes were responsible for providing the material *means* of morphogenesis

— the chemicals to be ordered — but the ordering itself was brought about by entelechy. Similarly, the nervous system provided the means for action, but entelechy organized the activity of the brain, using it as an instrument, as a pianist plays upon a piano. Clearly, development and action could be *affected* by changes in the genes or by damage to the brain, but they could not be *explained* simply in terms of genes and nerves. The mechanisms of a piano are not a sufficient explanation for the music played on it, although they are a necessary means. Damage to the piano, e.g. by severing some of the strings, affects the music which the pianist can produce, but this does not prove that the music is fully explained by the mechanisms of the piano.

Entelechy is a Greek word whose derivation (*en-telos*) indicates something which bears the end in itself; it contains the goal towards which a process under its control is directed. Thus if the normal pathway of development is disturbed, the same goal may be reached in a different way, a phenomenon that Driesch terms equifinality. He considered that development and behaviour were under the control of a hierarchy of entelechies, which were all ultimately derived from, and subordinated to, the overall entelechy of the organism.¹² As in any hierarchical system, such as an army, mistakes were possible and entelechies might behave 'stupidly', as they do in cases of super-regeneration, when a superfluous organ is produced.¹³ But such 'stupidities' do not disprove the existence of entelechy any more than military errors disprove that soldiers are intelligent beings.

Driesch described entelechy as an 'intensive manifoldness', a non-spatial causal factor which nevertheless acted into space. He emphasized that it was a natural (as opposed to a 'metaphysical' or 'mystical') factor which acted on physico-chemical processes. It was not a form of energy, and its action did not contradict the second law of thermodynamics or the law of conservation of energy. Then how did it work?

Driesch was writing during the era of classical physics, when it was generally considered that all physical processes were fully deterministic, in principle completely predictable in terms of energy, momentum, etc. But he thought that physical processes

could not be fully determinate, since it would otherwise be impossible for the non-energetic entelechy to act upon them. He therefore concluded that, at least in living organisms, microphysical processes were not fully determined by mechanical causality, although, on average, physico-chemical changes obeyed statistical laws. He suggested that entelechy acted by affecting the detailed *timing* of microphysical processes, by 'suspending' them and releasing them from suspension whenever required for its purposes:

This faculty of a temporary suspension of inorganic becoming is to be regarded as the most essential ontological characteristic of entelechy . . . Entelechy, according to our view, is quite unable to remove any kind of 'obstacle' to happening . . . for such a removal would require energy, and entelechy is non-energetic. We only admit that entelechy may set free into actuality what it has *itself* prevented from actuality, what it has suspended hitherto.¹⁴

This seemed to be the greatest weakness of Driesch's system. To scientists at that time, any interference with physical determinism was unthinkable, and so Driesch's idea seemed impossible in principle.

It is surely ironic that at the time when vitalism seemed to the majority of biologists to have been finally discredited, undreamt of changes were occurring within physics. Heisenberg deduced the uncertainty principle in 1927; it soon became clear that the positions, energies and timings of microphysical events could be predicted only in terms of probabilities. By 1928, an eminent physicist, Sir Arthur Eddington, was able to speculate that the mind influences the body by affecting the configuration of quantum events within the brain through a causal effect on the probability of their occurrence : "Unless it belies its name, probability can be modified in ways which ordinary physical entities would not admit of."¹⁵

Comparable ideas have been proposed by the neurophysiologist Sir John Eccles, who summarized his hypothesis as follows:

The 'will' modifies the spatio-temporal activity of the neuronal network by exerting spatio-temporal 'fields of influence' that become effective through this unique detector function of the active cerebral cortex. It will be noted that the 'will' or 'mind influence' has itself some spatio-temporal patterned character in order to allow it this operative effectiveness.¹⁶

More recently, a number of similar but more detailed proposals have been made by E. H. Walker,¹⁷ and certain other physicists.¹⁸ Needless to say, these suggestions are very controversial; but the mere fact that they are possible indicates how much physics has changed since Driesch's day. So although Driesch's ideas still seem very radical, it is no longer possible to dismiss them *a priori* on the grounds that physical processes are fully determinate.

Henri Bergson

Bergson's most important books were *Matter and Memory* and *Creative Evolution*, first published (in French) in 1896 and 1907 respectively. The former is about the relation between the mind and the body, and the nature of consciousness. Bergson accepted that there was a close connection between states of consciousness and the brain:

But there is also a close connection between a coat and the nail on which it hangs, for, if the nail is pulled out, the coat falls to the ground. Shall we say, then, that the shape of the nail gives the shape of the coat, or in any way corresponds to it? No more are we entitled to conclude, because the psychical fact is hung on the cerebral state, that there is any parallelism between the two states, psychical and psychological.¹⁹

Having rejected the mechanistic theory, Bergson came to a number of astonishing conclusions, only one of which need be mentioned here: memory is not material, and is not stored physically or chemically within the brain; the brain is not a 'reservoir of images'.

At first sight this idea seems quite impossible. The mechanistic theory has come to be taken for granted, and it is difficult to free one's-self from its presuppositions. Yet Bergson's arguments are far from being illogical or absurd. He shows a way out of the insoluble paradoxes associated with a mechanistic view of consciousness, and provides the outlines of a totally new understanding of some of the perennial problems of philosophy. The radical difference between his ideas and those of orthodoxy can perhaps be illustrated by means of an analogy.

Imagine once again an ingenious artisan who knows nothing about electricity or the principles of radio, but who is convinced

that a radio set can be fully explained in terms of the properties of its physical components. The voices that come from the loudspeaker seem to be produced within the radio set and to be entirely a product of microscopic mechanical changes within the wires, transistors, etc. The artisan finds that if he removes certain components of the set, certain voices are no longer produced (say all those on the long-wave band). He concludes that the voices were actually located within the components he removed. In fact, of course, they come from various radio stations; the removal of certain components merely prevents them from being received by the set. The radio broadcasts are still there even if the set cannot detect them. Similarly, memories can act upon the brain when it is 'tuned' to them, but they are not stored inside it. Damage to certain regions of the brain prevents certain types of memory from acting, but this does not prove that the memories are physico-chemical structures localized within the nervous tissue. The orthodox view of the brain and its functions represents as great a misunderstanding as that involved in thinking that radio sets contain voices and music, or that television sets contain the miniature people whose images appear upon the screen.

Bergson did not explain where memory was, if it was not inside the brain, or how it acted on the brain. In Driesch's system memory was regarded as acting on or through entelechy.²⁰ But this hardly solved the problem, since so little could be said about the nature of entelechy.

In *Creative Evolution*, Bergson argued that purposeful structures such as the eye could not have evolved mechanistically simply through a combination of random mutation and natural selection. He rejected a Lamarckian explanation in terms of an inheritance of acquired characteristics, and also dismissed the idea that evolution proceeds towards a goal and is directed by some fixed transcendent plan or design. Instead, he thought that the current of life, flowing from generation to generation, was the result of an original 'vital impetus', the 'élan vital'. "This impetus, sustained right along the lines of evolution among which it gets divided, is the fundamental cause of variations, at least of those that are regularly passed on, that accumulate and create new species. In general, when species

have begun to diverge from a common stock, they accentuate their divergence as they progress in evolution. Yet, in certain definite points, they may evolve identically; in fact, they must do so if the hypothesis of a common impetus be accepted."²¹ Thus Bergson used this rather obscure concept to account for evolutionary creativity, for apparently directed lines of evolution ('orthogenesis') and for the evolution of very similar organs in more or less closely related groups of organisms. He thought that this same impetus revealed itself not only in the evolution of form, but also in the evolution of instinct, and in the evolution of intelligence. By tracing the latter, and by seeing in terms of a general theory of life, he hoped that it would be possible to arrive at a deeper understanding of knowledge itself. He did not claim to have solved the new problems he raised; rather, he was attempting "to define the method and to permit a glimpse, on some essential points, of the possibility of its application."²²

The Eclipse of Vitalism

The theories of Driesch, Bergson and the other neo-vitalists were far from complete: they represented only the beginnings of an attempt to replace the mechanistic paradigm, and to open the way to a new system of biology. This new biology would have included physico-chemical investigations of living organisms, but would also have aimed to find out in as much detail as possible exactly what the 'vital factor' was and how it worked; it would have encouraged all lines of investigation which might have helped in this quest, rather than ruling out any of them *a priori*. It is significant that both Bergson and Driesch served as Presidents of the Society for Psychical Research (in 1913 and 1926-27 respectively).

But the vitalist revolution aborted, for at least three reasons. First of all, the concepts of vitalism were very vague, and raised many problems which could not be solved immediately. This has been true of most new systems in science from the time of Copernicus onwards, and is always a disadvantage in the face of an established orthodoxy. Secondly, the vitalist ideas suggested no new types of experiment; there seemed to be nothing that could be done to test them in the laboratory. By contrast, there were countless physico-

chemical problems which biologists could get on with the job of studying; and they could do this perfectly well on the basis of the mechanistic theory. Thirdly, vitalism was radically incompatible with the determinism of classical physics.

The orthodox view of vitalism is, of course, that it has been rendered ever less tenable as mechanistic biology has advanced. In the words of the influential molecular biologist, Jacques Monod : "Developments in molecular biology over the last two decades have singularly narrowed the domain of the mysterious, leaving little open to the field of vitalist speculation but the field of subjectivity: that of consciousness itself."²³ But this is just not true. Consider Driesch's system, which was not based on any speculations about subjectivity in the first place. The discoveries of molecular biology were, in general terms, anticipated by him. Morphogenesis, which was central to his argument, has not begun to be explained mechanistically; regulation and regeneration are as mysterious as ever they were; molecular biology has shed no light on instinct and learning; no physico-chemical basis of memory has been discovered. In fact, the passage of over half a century has strengthened, rather than weakened, the vitalist case. Mechanistic biology has failed, despite enormous efforts, in exactly those areas where the vitalists said it would fail. If vitalism has been superseded, it is not because of any of the discoveries of modern biology, but because of the development of the organismic philosophy. Organicism is more radical than vitalism in that it challenges the entire atomistic philosophy of nature, of which the mechanistic theory of life is only one aspect. Organicists advocate a non-reductionist approach not only to biology, but to physics and chemistry as well.

Notes

1. Quoted in H. Driesch: *History and Theory of Vitalism*, p. 99. Macmillan, London (1914).
2. *ibid*, p. 114.
3. *ibid*, p. 119.
4. *ibid*, p. 177.
5. H. Driesch: *The Science and Philosophy of the Organism* (second edition), p. 290. Black, London (1929).

6. *ibid* (first edition, 1908), Vol. 1, p. 203.
7. *ibid* (second edition), pp. 152-154, 293.
8. *ibid*, pp. 135, 291.
9. *ibid*, p. 246.
10. *ibid*, p. 103.
11. Some *simple* inorganic systems remain 'wholes' after the removal of parts; for example the parts of a magnet remain whole magnets; and a drop of water split into two gives two whole drops. But these systems are not characteristically different in three dimensions of space: a magnet is effectively two dimensional, and a drop of water is radially symmetrical. To exclude such cases Driesch qualified his statement as follows: no complicated physico-chemical machine with a structure that differs characteristically in the three dimensions of space can remain a whole after the arbitrary removal of parts.
12. *The Science and Philosophy of the Organism* (second edition), p. 246.
13. *ibid*, p. 266.
14. *ibid*, p. 262.
15. A. Eddington: *The Nature of the Physical World*, p. 302. Dent, London (1935).
16. J. C. Eccles: *The Neurophysiological Basis of Mind*. Oxford University Press, Oxford (1953).
17. E. H. Walker: Foundations of parapsychical and parapsychological phenomena. In: *Quantum Physics and Parapsychology* (ed. L. Otera). Parapsychology Foundation, New York (1975).
18. E.g. J. H. M. Whiteman: Parapsychology and Physics. In: *Handbook of Parapsychology* (ed. B. B. Wolman). Van Nostrand Reinhold, New York (1977).
19. H. Bergson: *Matter and Memory*, p. xv. Allen and Unwin, London (1911).
20. *The Science and Philosophy of the Organism* (second edition), pp. 229-230.
21. H. Bergson: *Creative Evolution*, pp. 92-93. Macmillan, London (1911).
22. *ibid*, p. xiv.
23. J. Monod: *Chance and Necessity*, p. 37. Collins, London (1972).

The human magnetic sense

R. ROBIN BAKER

There is a ploy much favoured by writers of certain types of fiction by which they contrive to have their hero or heroine kidnapped and taken blindfolded to some secret hideout. Some time later, after release or escape, the hero successfully reconstructs the journey and tracks down the kidnappers. However, such heroes of fiction are usually deemed by their creators to be extraordinary and most of us might expect to perform badly in such a situation. Yet zoologists have known for decades that a wide variety of other animals, from homing pigeons to snails, can acquit themselves well in this situation, quite on a par with the heroes of fiction; the technique of 'blind' displacement has become the conventional method for the study of animal navigation. Four years ago, unable to believe that humans were really different in ability from these other animals, I began experiments in which students were subjected to the same navigational tests that homing pigeons had been solving for centuries. The results were surprising from the start and led in 1979 to the demonstration that humans have a magnetic sense of direction equivalent to that now accepted for a variety of other animals.

In the early experiments, groups of blindfolded students were taken by van over tortuous routes to destinations 6 to 52 km from Manchester University; 'home' for these experiments. At the destination they were asked, while still blindfolded, first to point toward the University and then to describe its compass direction (as N, NNE, NE, etc.). Finally, they were asked to remove the blindfolds and have another go at pointing toward the University.

As every effort had been made to disorient the students during the outward journey, it was expected that they would show no evidence of homeward orientation until the blindfolds were removed. The first surprise came when, even before the blindfolds were removed,

Theoria to Theory, 1981, Vol. 14, pp. 241-246
0049-3686/81/1403-0241\$06.50/0

Published by
Gordon and Breach Science Publishers Inc. 1981

the estimates of home direction were statistically significant. This was true both for the estimate made by pointing and that made by describing the compass direction of home. The latter was the students' real forte. In some way they had managed not only to maintain an awareness of the physical direction of home but also to conceive of its compass direction.

Immediately, a whole new field for study opened up. How were these students managing to maintain their awareness of the compass direction of home in the absence of visual information? Direct questioning produced no reward. The only two factors of which the students were conscious were the feel of the sun on the side of their face on some parts of the journeys and an attempt to follow the journey on a memorised map of the region. Most, however, were amazed when their 'guess' turned out to be so close to the truth.

Analysis showed what *was not* involved in this newfound ability. Accuracy was just as great under overcast skies as when the sun was shining during the outward journey. People that in retrospect claimed themselves to have been familiar with the destination were no more accurate than people that had never before visited the area. Moreover, accuracy did not decrease with distance as it should have done had the main mechanism been the following of familiar routes on memorised maps. Indeed, the pattern of change in accuracy as the journey progressed offered an important clue as to what may or may not be involved and in 1979 steps were taken to investigate this pattern.

On four journeys, 20 to 30 km long, the total route was divided up into a number of fairly straight legs. At the end of each leg the students (16 on each journey) were asked to estimate the compass direction and straight-line distance of home. From these estimates it was possible to reconstruct each student's estimate of the journey and not only to follow how their accuracy changed with time and distance but also to analyse their estimates of the compass direction of each leg and the angle of turn between each leg. The results pinpointed fairly precisely what must be happening.

Accuracy of estimating the compass direction of home began high but by 5 km or so into the journey had deteriorated to a point where there was scarcely any vestige of homeward orientation. This

deterioration coincided with the region in which students claimed they had become lost on their memorised map of the area around the University. We may take it that up to this point the main mechanism had been a conscious one based on trying to follow the route on such a mental map. From this zone of disorientation onwards, however, the accuracy of homeward orientation gradually increased to reach the usual high level at the destination. Analysis of the individual legs of the journeys showed that this recovery from disorientation rested on an ability to detect the compass direction of each leg rather than the angle of turn between legs.

Evidently, therefore, the ability of the students to follow their outward journeys rested on a non-visual sense of compass direction. There were few candidates for such a sense and in retrospect the answer was inevitable. Since 1970 ornithologists have accepted that birds have a magnetic sense of direction and the 1970's saw the discovery of a similar sense in bacteria, honey bees, fish and salamanders. By 1979 it was beginning to look as though all animals would be found to have a magnetic sense. Moreover, in 1978 Wolfgang and Roswitha Wiltschko at Frankfurt had shown that pigeons used their magnetic sense of direction to follow their outward route during experimental displacements similar to those I was carrying out with students. Given all this, it would have been surprising had the human sense uncovered by my Manchester experiments not rested on perception of the Earth's magnetic field. Even so, despite the apparent inevitability of the answer, I still felt utter amazement when, in an experiment at Barnard Castle, County Durham, I obtained the first experimental evidence that this was indeed the case.

This first magnet experiment, involving sixth-form students from two schools at Barnard Castle, was a relatively crude affair using bar-magnets and brass replicas of similar size, shape and colour. Over a relatively short journey of about 17 km, 16 students wore brass bars tucked into the elastic of their blindfolds while 15 others wore bar-magnets with pole-strengths of about 200 G. As usual, the controls wearing brass bars were significantly oriented toward home. Those wearing bar-magnets, however, were not. This single experiment seemed strongly to suggest that interference with the

magnetic lines of force passing through the head could disrupt the human compass sense demonstrated in my earlier Manchester experiments.

Immediately after the Barnard Castle experiment a more sophisticated series of experiments was carried out in Manchester, using special helmets designed by my colleague Bill Bailey. These PVC helmets, bearing lateral Helmholtz Coils and powered by a small 9 V battery, produce a magnetic field through the head approximately three times the strength of the Earth's field. With these helmets, the direction of the horizontal and vertical components of the magnetic field through the head could be manipulated. Our aim was not to disrupt the ability to detect magnetic lines of force but to produce predictable shifts in the students' estimates of the direction in which they were travelling. Experiments were carefully controlled, individual's not knowing whether they were wearing activated or deactivated helmets, nor, if activated, the manner in which their particular helmet was rotating the magnetic field. These helmets were used on journeys of 25 to 30 km. By the end of 1979 the reality of the human magnetic sense seemed to us to be beyond doubt.

The pioneer experiments had shown that when deprived of vision and when passively displaced, humans, even those from a modern, industrialised city such as Manchester, could make unconscious use of a magnetic sense of direction. The next stage was to ask whether this sense played a part in people's lives even without being placed in such an artificial situation. For this work I joined forces with Janice G. Mather, also from the zoology department at Manchester, who is a specialist in the mechanisms used by mammals in their exploration of unfamiliar areas. We hypothesised that the most likely use for a magnetic sense is to maintain an awareness of home direction and compass direction of travel during such explorations. Consequently, we set about designing a 'walkabout' experiment in which people were taken to a site unfamiliar to them and, without blindfolds but wearing the Bailey helmets, were led along winding paths through woodland. At test sites along the path they were asked to point toward the cottage at which their journey had begun and to describe its compass direction. So far, four walkabout experiments have been carried out, three using students and one using 8 and 9 year olds

from primary schools in Leicester. Again an influence of the changed magnetic field was apparent. We concluded that whenever people, even modern city dwellers, are faced with having to find their way around in unfamiliar terrain they automatically, but unconsciously, make use of their magnetic sense.

Zoologists have still not identified with certainty the magnetic sense organ of any animal. In bacteria the sense resides in a deposit of magnetite particles, naturally synthesised by the living tissue. These tiny lodestones within the bacteria act literally as compass needles and the most popular belief at present is that a similar deposit of magnetite is the basis of the magnetic sense of animals. Such deposits have been found in honey bees, chitons, homing pigeons, dolphins and monkeys. Janice Mather and I have also found permanent magnetism in the head of the woodmouse, an animal for which we have also successfully demonstrated a magnetic sense of direction. A team has already been set up at Manchester with the aim of searching for magnetite and, hopefully, therefore, the magnetic sense organ in the human head.

Most human senses need no discovery. We are only too conscious of our senses of smell, sight, taste, etc. Indeed, one could argue that the human magnetic sense is the very first to be 'discovered'. In this case, discovery was necessary because the sense seems to be unconscious. In none of our experiments so far have the students been able to say with statistical significance whether or not they wore activated or deactivated helmets. Nor could anyone recognise that they were using a magnetic sense. The same is true even for people that have more need to use their natural senses in finding their way around. One feature of the natural navigators of the world, such as the old Polynesians, was that never did they lay claim to any form of sixth sense. I should argue, also, that the magnetic sense of Homing Pigeons and Mice is equally unconscious. The nearest human equivalent that I can cite is the sense of time. There can be no doubt that such a sense exists, yet the ability to monitor the passage of time is unconscious. We cannot feel the seconds ticking away.

There seems good reason for the unconsciousness of both senses. What is needed, both for the monitoring of time and for the monitoring of direction of travel, is a sense that is continuously

active but which does not interfere with the concentration necessary for everything else. If time, for example, could only be monitored consciously, its perception would interfere with all other activities. The need is for an unconscious sense, and the same is true for monitoring direction of travel. What better mechanism for an unconscious sense of direction than a magnetic sense, leaving free as it does the visual modality so necessary for humans to detect dangers and resources during exploration?

News of the Manchester discovery has spread through the scientific grapevine. At least 6 other laboratories around the world are now actively engaged in research into the human magnetic sense. The race to unravel the detailed workings of this previously unknown feature of the human body is now on.

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Is something wrong with physics?

In T. to T., XIV, 5-15, we printed a discussion on "Is mathematics leading Physics by the Nose?" The contributions below arise from a second discussion continuing the theme.

Further thoughts

CHRIS CLARKE

The disquiet which I voiced in the first discussion can be analysed into several distinct objections to the way in which high energy physics has developed, or to the way in which this development has been presented, and I shall try to separate the different points.

1. A PLURALITY OF MODELS

In the first discussion there was much talk of "chasms" in the mathematics, connected with the occurrence, and subsequent removal, of infinite quantities—a process called renormalisation. There is cause for disquiet here, but I now think that the objection is not so much to the mathematical difficulties themselves as to the attempts by some writers to suggest that they are inconsequential. In this respect mathematics is *not* "leading physics by the nose" (as suggested in the T. to T. discussion): in order to proceed, physics has had to ignore the demands of mathematicians for complete consistency. Depending on one's viewpoint, this either represents a scandal which must be rectified at all costs; or signifies a change in the way we look at the world, a change from the (Laplacean) ideal of a single monolithic mathematical model, to a more realistic conception of a plurality of interlocking pieces of mathematics that enable one to make accurate and unambiguous predictions. The last few years have witnessed a dramatic reduction in the number of

Theoria to Theory, 1981, Vol. 14, pp. 247-257
0049-3686/81/1403-0247\$06.50/0

Published by
Gordon and Breach Science Publishers Inc. 1981

ingredients needed for our mathematical picture of the world, and this has indeed been a brilliant achievement. But the basic lack of a rigorous overall model remains untouched, and suggests that either no such model exists, or that it must be radically different from the sort of things now being used.

The present lack of a single complete consistent mathematical model of the world affects the nature of the “explanation” that physics can offer. Here again, I am not objecting to the theory itself—if nature is really like that it is folly to object to it—but I am objecting to any claim that physicists can at the moment offer the sort of explanation that was the nineteenth century ideal (or at least the ideal of some, such as Kelvin).

The most noticeable shortcoming is that the explanation as a whole lacks the mathematical simplicity (derivability from elementary laws) that characterised at least some physical explanations in the past. Indeed, when one takes into account the wealth of sophisticated mathematics that is necessary in order to make a description which is even partially rigorous, then one begins to doubt whether the complexity of the explanation is commensurate with that of the phenomena to be explained.

2. THE HUNT FOR THE ATOM

One explanation for the relentless pursuit of higher and higher energies, and hence the investigation of smaller and smaller length-scales, seems to be the prevalence of a deeply rooted belief in atomism: the idea that “small is fundamental”, and that, if one gets down to a small enough length scale then the ultimate truth of the universe will be revealed through a knowledge of its ultimate constituents. But in reality, the more one breaks up the universe into minute parts, the more meaningless it seems to become.

It is indeed true that, when physical science was dealing with comparatively mundane objects of experience, the quest for atoms paid dividends. But this historical precedent is of little help now that we have progressed so far from the ordinary world. Certainly, in the past each new level of power in accelerators has led to an

understanding of the previous level, while opening up new mysteries for the future; yet this suggests the prospect of an infinite and pointless repetition of the process. Physics goes on looking for the ultimate atoms, for atoms within atoms, because it has always done so and knows no other approach.

3. THE FINAL SUMMIT

In the essay on Goethe and Newton that originally provoked these discussions, Heisenberg likened this progression to ever smaller length-scales to the ascent of a high mountain. He likened the relation between atomic physics (the high-energy physics of the period when he was writing) and everyday experience to the relation between an arid but beautiful mountain peak and the fertile valley below: they are different worlds, but the clarity and extent of vision achieved by going to the summit enables one to see the valley in a new way.

In terms of this analogy, one justification for pressing on is if the final highest peak is nearly in sight. Indeed, at the time Heisenberg wrote he believed that a stage had been reached that could not be surpassed. But to this I would reply that the vision of a final, ultimate height has, to shift the metaphor again, invariably proved a Will-o'-the-wisp, ever receding across deeper mire. Physicists have repeatedly claimed, each time with apparently impressive evidence, that the end of the quest is in sight: why should they necessarily be correct now?

4. THE DESCENT TO THE VALLEY

The presupposition of Heisenberg (and Goethe) was that the aim of science was the understanding of the actual human environment (bearing in mind that this environment is itself conditioned by the technological part of science). Thus the goal of the ascent of the mountain was the greater vision of the valley, to which one could return with new understanding and strength. From this point of

view, the progress of science to successive stages of higher and higher energy is justified only if the understanding gained at each stage has repercussions that extend right back to the earlier stages, to our tangible environment. Without this there is no real gain in the understanding of our actual world.

I would claim that this has not happened, and that physics has gone so far into the clouds that the valley is no longer visible.

Reply

TONY SUDBERY

I shall deal with the various points in the order in which Chris Clarke raises them, following his numbering,

1. First, the claim that physics fails to offer a single coherent model; or a single consistent mathematics; or a simple explanation that hangs together.

I take it that the complaint about the lack of a single model refers to the basic rift between quantum mechanics and general relativity. In some ways our physics is very much more unified than that of the nineteenth century, in which a large number of unrelated mathematical models were simply juxtaposed; indeed, whoever it was (if anyone) who claimed that the future of physics consisted of the increasingly accurate determination of natural constants was contemplating a vastly disunited physics in which an enormous number of facts about matter were fed in as unexplained data. Nevertheless, all these different models coexisted in the same general theoretical framework; today, although we have far fewer models, they fall into two groups which seem to belong to incompatible frameworks.

But nobody denies this, and nobody is happy about it. It is no cogent criticism of physics to complain that it has not yet solved one of its central problems.

The situation with regard to renormalisation (the removal of infinite quantities) is similar. Very few physicists regard the occur-

rence of infinities with complacency; I know of no suggestions that they are inconsequential. (Chapter and verse, please!) There are three main ideas as to how this problem may be solved.

(i) The present theory of quantum electrodynamics is essentially correct, but we do not fully understand it. Eventually it will be possible to reformulate the theory so that it has the same main conceptual features, theoretical ingredients and empirical consequences but the infinities no longer appear.

(ii) The present theoretical framework (quantum field theory) is correct but it is inconsistent to try to put a single force (i.e. electromagnetism) into this framework: when we put all the forces of nature together, the quantities that are infinite in quantum electrodynamics will become finite, and the theory will be consistent. According to this view, which is perhaps the most widely held, the infinities are of the same nature as those that occur in Lorentz's classical theory of electrons; that theory, being purely electromagnetic, was also inconsistent since it needed an extra non-electromagnetic force to hold the mutually repelling parts of the electron together.

(iii) The present theoretical framework is incorrect and the infinities are an indication of this; they will only disappear when we have a radically new type of theory which reconciles quantum mechanics and general relativity by replacing both of them.

However, there is another kind of incoherence in present physical theory which is accepted with complacency by most physicists. This is a conceptual inconsistency, rather than a mathematical one, and resides in the foundations of quantum mechanics. If we are to have a coherent view of the world, this inconsistency (the question of the "reduction of the wave packet" and the related paradox that a watched pot never boils) needs to be resolved; but it can probably only be done by changing the meta-theory rather than the theory, that is "doing philosophy"-which may explain physicists' lack of interest in it. My own view is that, as in the attitude (i) to renormalisation above, quantum mechanics is consistent and (possibly) correct, but we do not fully understand it; but it is of course possible that, as in (iii) above, this inconsistency has the same root cause as the incompatibility of quantum mechanics and

cosmology, and will only be resolved when the theory is replaced by a radically different one.

Regarding the lack of simplicity in the current explanation of the world, I don't believe that the situation in this respect is any different from what it has been in the past, say with Newton's theory of planetary motions. This objection fails to distinguish two sorts of simplicity, which we may call conceptual simplicity and mathematical simplicity. Both Newton's theory and gauge theories of elementary particles have, though to different degrees, some conceptual simplicity; neither, when one "takes into account the wealth of sophisticated mathematics that is necessary in order to make a description which is even partially rigorous", has much mathematical simplicity. Newton's theory, to take the more familiar example, is based on the idea of the derivative of a function: a simple, though not obvious, idea with a high degree of intuitive appeal, which we can and do explain to children of 15. In order to make this idea rigorous, however, we need some complicated mathematical machinery which we do not attempt to explain outside universities. I think we are justified in ignoring this complicated logical scaffolding and saying that basically the idea is a simple one and its presence does not make a theory intolerably complex. In the same way the ideas in modern quantum field theory have an intuitive appeal which is not to be gauged by counting the number of pages of sophisticated mathematics which are needed for their rigorous analysis.

2. Now I come to the claim that physics has been misled by an unfounded, almost superstitious, belief in atomism: the existence of some final elementary particles which cannot be further decomposed.

To begin with, it is worth remarking that, even though there may be no ultimate "atoms", the quest for them may still be justified by the success of what R. B. Braithwaite, in the second discussion, called *relative atomism*. For it is the case that the main branches of physical science owe their success to basing themselves on particles that are "atoms" for that branch, even though the particles used may not be *absolutely* indivisible (and so not literally atoms). Thus the study of heat blossomed when kinetic theory took molecules as

its basic particles; chemistry took atoms (in the usual modern sense); modern chemistry and solid state theory took nuclei and electrons; nuclear physics took neutrons and protons. Each step to a new level increases our understanding of the previous level and the one before (though not usually the one before that). Today this quest for ever more fundamental “relative atoms” involves probing to smaller length scales and so to higher energies.

But relative atomism is not pursued out of sheer force of habit. As a matter of fact atomism is not the only approach that has been adopted, and it has been unpopular just because of its familiarity and its previous success. Physicists have been forced to adopt atomistic theories against their will. In the 1960's the quark model was resisted by many people, because it seemed to be too tediously the same old thing all over again. To look for a new level of sub-particles was to follow a well-established paradigm, whereas the lesson of history, we thought then, was that you should look for a radically different approach. Change of paradigm had itself become a paradigm. Bootstrap theory and S-matrix theory were attempts at such radical, non-atomistic theories. They failed; atomism triumphed.

However, there may be more than historical precedent to justify present practice in physics. In doing experiments at higher and higher energies physicists are doing what they have always done, for the good reason that it is a standard part of scientific method. Even if they did not need a clue as to how to form the next level of theory, even if they thought they had a final unified theory, they would still need to extend the range of experimental parameters in order to test the validity of the theory outside the domain in which it was formulated. Experimenters will always hope to find new phenomena, and they will always want to try to upset theorists' predictions; they do this by pushing every parameter as far as they can.

3. We now come to the possibility that we may be near the final goal of physics: the discovery of the ultimate building blocks of which all matter is composed. In the geographical metaphor, this corresponds to standing on the highest peak to get a view of the terrain in all directions. It would be foolish — or at best faint-hearted — to turn back when the next crest may be the summit; that is, to abandon the

search for understanding just because the explanation is becoming too lengthy for our taste, and we don't care for such a prolonged effort of concentration. After we have discovered the ultimate theory, the consequences for the "normal world", the return to the valley, can be worked out at leisure (and the mathematical details tidied up; they may be in a mess at the moment just because our theory is not the final one). It may well be that when we finally stand on the summit we shall see the relation of the mountains to the valley much more clearly than we do at present, and there will appear a much easier road back to the valley than we now suspect.

But what of the criticism that physicists have in the past often said the same as I am saying now, but have been wrong? This response is a restatement of what, for most of this century, has been the conventional view of scientific progress. I call it the "it'll only end in tears" theory of science. It exhorts us to be brave about the disappointments we suffered when previous theories turned out not to be the ultimate truth about the universe, but, wise after the event, it cautions us that this was only to be expected. Science, it prophesies, will never reach a final definitive answer; instead it continues replacing one theory by another, for ever enlarging its area of application, but never being so foolish as to suppose that its truth is universal.

This is a sensible attitude, and decently modest, but by the same token it is timorous: it shrinks from the boldness of the claim that one can encompass the whole universe. This makes it at once very appropriate as an official statement of the institution of science, and wildly inappropriate as a statement of what scientists really hope and believe, and what they think they have to offer to the world's imagination. Hence the schizophrenic character of the public pronouncements: on the one hand, the official view that physics proceeds in an infinite series of approximations to an unattainable truth; on the other hand each individual scientist's private excitement at the thought that a grand synthesis might be just around the corner. (The schizophrenia is well illustrated in the single person of Richard Feynman, who, contemplating the future of physics, offers a third and even gloomier possibility: not that physics will ever reach a final definitive statement, nor that it will proceed for ever in

an infinite series of more and more far-reaching theories, but that it will fizzle out because the effort of improving a theory which explains almost but not quite everything is too great, and nobody can be bothered. Despite this, Feynman is full of enthusiasm for physics; nobody's attitude could be further from timorousness or pessimism.)

The difference between these two attitudes is the difference between a belief and a hope. We cannot expect to convince the sceptic that we are about to find a unified theory until we can actually produce it—and even then we shall never be able to *prove* that the theory will withstand all experimental tests; but we can legitimately *hope* to find such a theory, we can continue the search for it, and we can publicly express our enthusiasm in the hope of communicating it to young scientists and persuading them to join in the search.

The theory of successive approximation to the truth and its close relation, the prospect of successively deeper layers of atomism, were responses to two kinds of unexpected development in physics at the turn of the century: the empirical discovery of new phenomena like radioactivity, and the radical revision of theoretical ideas involved in the new theories of relativity and quantum mechanics (which were generated not by the new discoveries, but by inconsistencies in the old theoretical framework). Although the morals drawn from these two types of development were similar, the lessons they have actually been teaching in the succeeding three-quarters of a century seem to be sharply opposed. On the empirical side, new discoveries have continued and have forced us to at least two levels of atomistic analysis beyond that of chemical atoms. Although one can hope that one more level of atomism will suffice for a final analysis, there are no compelling reasons to support this hope. Curiously enough, the prospect of an infinite number of levels of atomism, which this history suggests, has never been a part of the orthodoxy but has always been a rather off-beat idea.

On the theoretical side, the picture is quite different. The intellectual shock caused by relativity and quantum mechanics was far greater than that of the empirical discoveries; the contemporary scientific community reacted like a cuttle-fish and produced

the idea of perpetual revision of theories. Nobody seemed to notice that the subsequent development of the new theoretical ideas tended to support rather than discredit the notion of a single definitive physical theory. In the miraculous decade following the eventual satisfactory formulation of quantum mechanics in 1926, chemistry, astrophysics and the properties of matter all came under the sway of the same physical theory; essentially, all the manifold forces of classical macroscopic physics (with the single exception of gravity) became unified with electromagnetism. This process of unification has gone still further in recent years; current theory requires only three types of force to describe all the phenomena of the universe, and no new forces have made themselves evident since the discovery of radioactivity. For a long time Einstein's famous failure was bad publicity for the idea of a unified theory; now, however, the trend of history seems once again to show that the number of forces known to man always decreases and does not increase.

My reply, then, is that physicists have *not* repeatedly claimed that the end is in sight; that in any case it is reasonable to hope that the end might be in sight; and you do not need reasons before making an attempt to find it. We do not need to believe that the final ground is in sight, only that it is conceivable that it might exist. You do not persuade a fell-walker to come home at eleven o'clock in the morning by pointing out that so far every crest has only hidden a further crest.

4. So much for the peak. But what about the valley, the need to return to the ordinary world of experience? Here we have reached a fundamental disagreement; essentially, I think we must agree to differ. I can offer a partial reply in terms of the need to return to ordinary experience, as follows: the processes of technology, dredging and turning over the depths penetrated by pure physics, bring the deeper levels up to the surface of everyday experience. Yesterday's most fundamental atoms (protons and neutrons) explain a level of phenomena (nuclear physics) which is now part of our immediate environment; today's atoms (quarks), explaining the behaviour of protons and neutrons, will transform our understanding of nuclear physics, while having little effect on chemistry

or solid state physics. The relevance to our actual environment is much more direct than it would have been before nuclear power was developed.

But I would not want to base my reply on such considerations. I would claim that in each step to a deeper level there is a gain in our understanding of all previous levels and therefore even of the pre-scientific environment. By extending the chain of explanation to a deeper level we get a deeper understanding: I regard this as a gain.

There is still more fundamental disagreement. So far I have accepted the assumption, following Heisenberg and Goethe, that the aim of science is the understanding of the actual human environment. So, of course, it is; but this is not its only aim, or at any rate not its only achievement. It also engages our imagination and arouses our sense of awe and wonder by telling us of strange, beautiful and wonderful things outside our normal environment. We walk up into the hills, not only to get a good view of the valley, but also in the hope of finding something new and interesting up there. In high-energy accelerators we look for what mankind has always hoped to find in the depths of the ocean, on the other side of the world, in the stars; the appeal of elementary particles has something in common with sea-serpents, lost cities and life on Mars. Quite apart from their explanatory value, they show us something new and intensely beautiful.



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Comment: On assessing risk

TREVOR KLETZ

We invited comment on our discussion from Trevor Kletz, whose pioneering work on safety with ICI has had a widespread effect in the chemical and many other industries. He writes as follows:

“In general I found the discussion disappointing. The comments below are first reactions rather than considered opinions. I presume the speakers were talking off the cuff, rather than carefully weighing every word, and my comments should be read in the same way.

Throughout the discussion a number of questionable statements are made but not disputed. For example, are nuclear risk assessments so different to others? I suggest they are more accurate than those made by toxicologists.

There is much discussion about the serious effects of nuclear installations and what might happen, but so far as I know nuclear energy has never killed anybody, while other technologies have killed thousands. Should we not be more concerned with the technologies which actually kill people?

A certain amount of mud is thrown at scientists and engineers, and it is suggested that they temper their views to gain publicity to suit their employers, etc. When we receive a company report we do not say that some accountants are dishonest and therefore throw their report aside as useless, so why this suspicion of scientists and engineers? May I refer you to a booklet by Kenneth Adams called “Attitudes to Society in Britain” for an excellent discussion of our society’s attitude to industry and those who work in it. It is available, price 50p, from St George’s House, Windsor Castle, Berkshire.

Was there no-one present who would dispute the statement: “. . . one to three million deaths every four years—and those are the

Theoria to Theory, 1981, Vol. 14, pp. 259-260
0049-3686/81/1403-0259\$06.50/0

Published by
Gordon and Breach Science Publishers Inc. 1981

nuclear industry's figures . . . ” (Editors note: this conclusion results from multiplying the nuclear industry's suggested frequency of a meltdown — once every 100,000 operating years — by the number of nuclear plants — tens of thousands — that the industry has proposed building, worldwide, by the year 2020. Of course, it is to be hoped that meltdowns, plants, or both will be much less common than today's estimates.)

You refer to a paper of mine in the section headed “Why consider only fatal accidents?” My paper points out that fatal accidents are a measure of other accidents and damage to plant. If we halve fatal accidents, then we also halve injuries and damage.

It is true that hazard analysis has been applied mainly to things that happen quickly rather than to chemicals that produce long-term effects, but there is now interest in the extension of the technique to the latter field. A useful reference is “Human health and Environmental Toxicants”, the report of a conference held in May 1979 by the Royal Society of Medicine, and published jointly by them and the Academic Press. However, it discusses the need for hazard analysis, rather than what has been done.

I liked Tim's comment about compensation. If you give people enough, they will queue up for the privilege of having a motorway or a nuclear power station built next to their house. Unfortunately as a society we do not adequately compensate those who are inconvenienced by motorways, airports, etc.”

ERRATUM

In R. L. Franklin's article “On Taking New Beliefs Seriously: a Case Study” (T. to T. XIV i) the last page of his notes (p. 64) was displaced by an advertisement page. The omitted entry (after the square brackets) reads:

[I thought, “Oh, what is this?” and the next experience I had was of hearing my body touch] the floor. I say “hearing” because I didn't feel it until after I heard it. It touched down very, very softly. There was very little feeling of contact. I moved about a six foot distance at that time.

(Enlightenment and the TM-Sidhis, MERU, 1977.) This and other literature is readily available from TM centres. It includes detailed experimental investigations of E.E.G. patterns, etc.

13. *Op. cit.*, Sec. X.

Sentences*

Science, in the very act of presenting to us a world completely other than the world of appearances, charms us into forgetfulness of our fundamental condition. No less than the picture world which we seem to inhabit, the strange new world which science presents to us is a world seen through human eyes and approved by human judgment, and is therefore ultimately a non-verifiable world. No one can tell what is the correspondence between our mental experience and the reality that we experience in this limited and provisional way. The only means by which we can give more reality to our thinking, whether the thought is of a simple or an elaborate kind, is to set it deeply in a twofold mystery; first in the challenging obscurity of the undiscovered, into which we can progressively advance; but secondly in the profounder mystery which surrounds the frontiers of human consciousness and which the solution of every perceivable problem will still leave untouched.

* * * * *

The condition of negative certainty is a starting-point, not a conclusion; and this is often forgotten. As such it has the merit of a reassuring lucidity: to know that one does not know is tranquillising and unambiguous: and it has one immense compensation for the assumptions that it removes. It abolishes the duality of what we understand perfectly and what lies outside our grasp and points out to us that in the last resort the difference between the two types of experience is superficial.

* * * * *

*From a posthumous unpublished MS., "Leaves from a Notebook on the Entry to Belief" by Amy Key Clarke. © Kathleen Clarke.

Theoria to Theory, 1981, Vol. 14, pp. 261-263
0049-3686/81/1403-0261\$06.50/0

Published by
Gordon and Breach Science Publishers Inc. 1981

Some take the rending and shattering of their intellectual perceptions to be the rending and shattering of their faith. Others, for whatever reason, are more fortunate. They realise that they are in a state of conviction, — conviction of many years' growth and of more years' holding. The consciousness of this may vary and even vanish, but the conviction will not change. They are in their place in the Church, there to live and die. "Cette obscure clarté de la foi" is still their all-sufficient illumination; it is their attitude to its rational justification that has changed. Questions which they had thought closed are still open, and faith and reason seem no longer an indissoluble whole. The most solid and beautiful reasoning, when applied to what lies outside concrete and perceivable experience, can be challenged as wholly theoretical and subjective, a construction of the thinking mind: and to this challenge they can see no unassailable answer. They begin to think along other lines. It might be that the only test of experience was experience, and that there was no other category to which the test could be applied. It might be that the faith which they had thought could be rationally sustained and established had, in the last resort, this one thing to commend it, that for themselves and others it was a fruitive truth.

* * * * *

It was possible that this dichotomy had to be accepted: and some leading thinkers have accepted it. Others found this severe denigration of the intellect too hard to bear. They were unwilling to cease so entirely to be "Cambridge Platonists" and to abandon the possibility of an enlightened mind. It seemed to them that a new kind of bridge must be built between faith and reason, if the "leap into faith" were to be something more than a leap away from despair. But they were equally sure that the pre-condition of such bridge-building was the thorough appreciation of contemporary thought. There was value in this strange extension of the field of obscurity from faith to reason, and in the searching criticism

applied to abstract ideas. To fear or fight shy of it was to retreat into a mental past. The better course was to follow with it into the extremest depths of its intellectual self-stripping and self-invalidation, and find there some point from which the re-ascent could be made.

(To be continued)

Notes on contributors

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Theoria to Theory, 1981, Vol. 14, pp. 265-266
0049-3686/81/1403-0265\$06.50/0

Published by
Gordon and Breach Science Publishers Inc. 1981

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For **AMY K. CLARKE** see editorial.

The cover diagram, by Frederick Parker-Rhodes, shows common tangent circles to three given circles (in red)

THEORIA to theory

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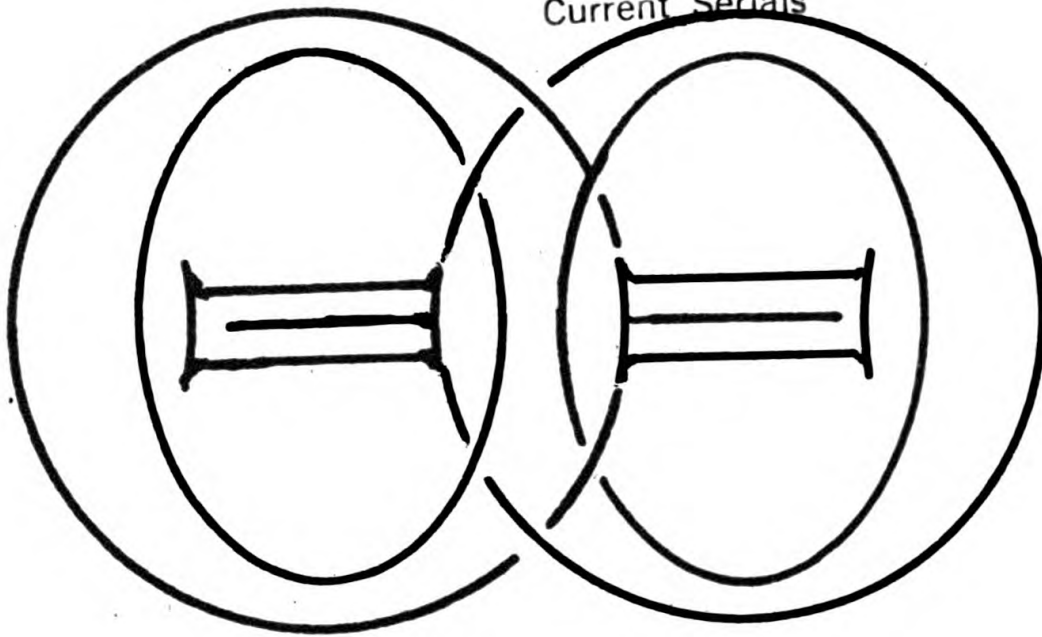
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8 THEORIA
to theory

An International Journal of Science, Philosophy and
Contemplative Religion

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THEORIA to theory

An International Journal of Science, Philosophy and Contemplative Religion

Editors

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Assistant Editor

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Subscription Rates *four issues per volume*

4 issues per volume.

Current volume block: Volume 14

Subscription rates, per volume, for current volume block: £ sterling: £30.00

The above price applies within the UK only and is the base price for each volume of the journal. The journal is priced in dollars in all other countries. The price in dollars is subject to currency exchange fluctuations and is adjusted periodically. Please use current conversion rates when subscribing. The subscription rates include a distributing charge of £7.00 for postage and handling.

Subscriptions should be sent to Gordon and Breach Science Publishers Ltd., 42 William IV Street, London WC2, England.

JUNE 1981 issue

© 1981 The Epiphany Philosophers, Gordon and Breach Science Publishers Ltd., 42 William IV Street, London WC2.

Printed in Great Britain at The Lavenham Press Limited, Lavenham, Suffolk.

Editorial

With this number we reach the end of *Theoria to Theory* in its present form, and with Gordon and Breach as its publishers. Discussions are going forward in the Editorial group as to whether it might start again in a new form as a much cheaper production. If this becomes possible, we shall let our former readers know. Meanwhile our publishers, Gordon and Breach, have offered to produce a series of short books, moderately priced, which could carry forward some of the themes we have taken up in the journal, and indeed some new ones. The scope of the series is defined in a statement which says that it will "promote the exploration of new ideas and new applications in philosophy and science through continuing co-operation between philosophers and scientists in different disciplines". Some subjects which have been suggested and on which some preliminary work has been done are: (1) "Revisionary Metaphysics and Revisionary Science", (2) What is wrong with contemporary Physics? (3) How can we move beyond Neo-Darwinism in Biology? (4) "The Athletics of Old Age": this seen as a spiritual as well as a mental and physical matter. There is also the possibility of a specifically Christian series, but negotiations on finding a publisher for this are not so far advanced.

So there is plenty of creativity in T. to T. circles, but we are also in a recession.

In our very first Editorial in 1966 we indicated what we were looking for and what we were wanting to attack.

"Whitehead has a saying "Seek simplicity and distrust it". To our clerical friends we say: a defect in most current religious thinking has been a desire for simplicity, which will provide the easy answer to the not very penetrating question . . .

To our monastic friends we say: Renew your vision and when you have renewed it, display it.

To our humanist friends we say: This journal is serious, and you know as well as we do that the questions it deals with are serious and cannot be laughed off. If the besetting fault of the clerical mind is superficiality, the besetting fault of the scientist is to assume that what he cannot deal with does not exist.

To the philosophers we say: Stop limiting philosophy and defining it in such a way as to exclude a large number of important enquiries. Stop trying to be fashionable. Be curious! Everything else would follow if you would have some curiosity.

To those who would not classify themselves with any of these, but who still hope there may be something in Christianity or indeed any other religion, we would simply say: Things aren't as hopeless as you might think."

When we started out we had strong connections with monastic bodies. These have changed over the years, partly because the wise monastics who cared about seeing philosophy and science as part of a contemplative vision tended to be the old ones, who have since died. One of the last of these old friends, Amy Clarke, was not technically a monastic, but lived in an anchorite-like small room right on the street in Cambridge. To those of us who came to her she gave encouragement in going on with anything difficult that had to be done, and she was a contemplative who believed *Theoria to Theory* should go on. We spoke of her death in the Editorial of the last number, and published as our Sentences some extracts from an unpublished manuscript of hers, "Leaves from a Notebook on the Entry to Belief", and we are continuing with some further extracts as our Sentences in this number. If there is a Christian series (see above) this could be the first volume in it.

By our "humanist friends" we meant mainly our scientific friends. Here the climate has changed considerably. The assumption is less commonly accepted that if anything cannot be dealt with in a narrow definition of scientific method, then it doesn't exist. Here we can pay a tribute to what in some ways presents itself as an anti-scientific movement, namely the counterculture. The readiness of counterculture people to experiment, often at considerable personal risk, with states of consciousness, powers of mind and body, and choosing alternative ways of living, has made "materialism", both in the worldly and indeed in the philosophical sense, a much less plausible option.

The counterculture has brought back an awareness of data some of which have been known in the old mystical traditions of the East and West. Where we have differed from the counterculture has been in not accepting "occultist" explanations, but in trying to see how these data could be investigated in an enlarged scientific approach. There are more evidences in the scientific and medical worlds of a sympathy towards such an enlarged approach. There is still hard-nosed opposition, but this is no longer a ruling orthodoxy.

By the "philosophers", we were not only referring to those in academic departments. Here the fashion-riddenness is still as awful as it was in 1966, and perhaps in these professional circles even worse, as can be seen from a look at the journals, with the notable exception of *Philosophy* in its new incarnation. There is less actual antagonism to a genuinely open-minded attack on larger questions, but academic respectability and anxiety about job security still naturally push people into tackling the smaller questions. This can bring one kind of reward, but at the cost of losing another. Today there is less antagonism than a real inability to get out of current ruts. This means that professional philosophy has become mainly a closed shop, and no longer part of the common intellectual debate going on in the country, although there are exceptions. Cleverness is replacing intellectual muscle. The main cause for concern is that well-motivated and intelligent people who see the need to tackle problems, which they know are real, cannot see how what is now called philosophy has anything substantial to offer, and so they conclude that the fault lies with the whole enterprise of thinking philosophically. This is a pity.

When we spoke of our monastic friends we meant the religious contemplatives about whom we have already spoken. In the *theological* world the picture seems bleak. Theologians go on in an increasingly ineffectual way. Their ideas are losing their impact, and one no longer feels that there is anything one can *learn* from them. They tend to take refuge in studies of their past history, but as *present* thought theology is high and dry, because it is no longer fed by the springs which used to feed it from science, philosophy and the mystical life. It compares very unfavourably with the rich mix of ideas which used to be found in philosopher-theologians, such a

Leibniz, who were very much at the centre of religious, scientific and philosophical developments, and yet retained a mystical vision, in Leibniz's case originally a Rosicrucian one, from which he probably derived parts of his distinctive metaphysics, e.g. the notion of macrocosm-microcosm.

The *religious* interest and concern is much more alive than it was fourteen years ago, but it is not met by the ways in which professional philosophers and theologians try to interpret it. One does not sense in the tones of these people the deep and powerful *respect* which Wittgenstein felt for the religious life, a respect which has probably more to do with the impact of his philosophy of religion than the merits of his official position. When one reads what he has to say about religion and life, for example in *Culture and Value* (the miscellaneous remarks from throughout his life recently published by Blackwell's) one feels that one *will* learn something. "No one *can* speak the truth; if he has still not mastered himself. He *cannot* speak it; — But not because he is not clever enough yet. The truth can only be spoken by someone who is already *at home* in it; not by someone who still lives in falsehood and reaches out from falsehood toward truth on just one occasion." His remark of 1940 applies to Wittgenstein himself: "one might say: Genius is *talent exercised with courage*." Theologians today do not lack talent. Why have they retreated? What are they really afraid of? Of course the answers to this are very much determined by the historical development of religion and science, but a reaction to the sterility in academic circles is a recrudescence of primitive and fundamentalist religion among people who are deeply morally committed (witness the effect of Moral Majority in the last U.S. Presidential Election). We said in 1966 to our religious friends that "things are not as hopeless as you might think." Looking at current academic theology they might be forgiven for thinking that they were. But there are opportunities which are being missed. There is a whole fresh start now in comparative religion, since people are meeting each other from different religions. There is also, as we have said, recovery of insight from the old mystic traditions. And in philosophy, in spite of the awful fashionable phrasings and posturings, there is perhaps among thoughtful philosophers a much

greater recognition that the time is past when they can flourish, if they are content to be, in the words of one of them, “know nothing philosophers”.

So how do we now see the T. to T. enterprise? We have increasing contact and profitable exchange with the scientists. We are not now seen as so “way out” as we used to be, because more people are realizing that one has got to go “way out”, and that what is “in” is culturally much more dated than some powerful forces would have us believe. In spite of what we have said about the philosophers and theologians sheltering inside their preserves, there is more sympathy with those who want to find a way of going out, even when they can’t see exactly how to. This makes us believe that T. to T has still got a distinctive task. We see this as we said in an earlier Editorial (Vol. II, 2nd Quarter, 1968) as exploring “growing points.” We defined these as “any particular field of study where, as between Science and Religion, the unlikely one of the pair has something constructive to contribute in such a way that the orthodoxy of the other member of the pair is violently upset.” We gave as an example Darwin’s evolutionary hypothesis, which destroyed the orthodoxy of a static world created once for all in a limited time. Today there are places on the frontiers of the sciences where discoveries are being made without adequate concepts to deal with them, so that philosophical questions *essentially* arise, and are part of the fabric of the problem, and places where capacities in human beings are developing from a religious base which call out for interpretation. From such growing points we want to reach out towards more general theory of what the world is really like.

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Our cover design, by Frederick Parker-Rhodes is of two interlocking Thetas, signifying Theoria to Theory.

Discussion: Spirit and Science in India today

Richard Lannoy talks to Julius Lipner, Ursula King, Rupert Sheldrake and members of the Editorial Group (Q).

Q. Some of us here have been reading Richard Lannoy's book, *The Speaking Tree**, and we thought that it was both a most revealing book about Indian culture and also a book of applied philosophy because it looks at the question of what it is for a culture to have a mystical root. Here is a picture of Indian culture in which the art and the history and the social system (or systems, because as we all know, India isn't monolithic), and above all the philosophy, are seen as integral parts. But Richard Lannoy does not, as many anthropologists do, make the philosophy and the religion just ways of symbolising social relations. Instead he shows how there was a deep spiritual tradition underlying and permeating Indian society, and yet at the same time that there are aspects of this, particularly things like karma, caste, pollution, which conflict with the outlook needed to sustain a modern state which aims at being democratic politically, and must develop economically for sheer survival. So Richard Lannoy is saying the Indian lives in two contrasted frames of experience—that of the religious tradition and that of the requirements of a changing society. And yet, if India were just to go secular, which is very unlikely in any case, and lose its mystical root, this could mean losing what makes the culture distinctive and creative. So, Richard Lannoy, could you say something about this, and particularly about what you say at the end of your book, about how you see this as not just an Indian problem, but part of a wider

**The Speaking Tree. A study in Indian Culture and Society.* Oxford University Press, 1971. Galaxy Paperback, 1974.

Theoria to Theory, 1981, Vol. 14, pp. 273-289
0049-3686/81/1404-0273\$06.50/0

Published by
Gordon and Breach Science Publishers Inc. 1981

problem which we all have, how one avoids being split between the contemplative mystical side of our tradition and what look like the demands of a secular scientific outlook. You suggest at the end of your book that we are coming to see that science itself can have a mystical root. But it must be *science*; and as such it can indeed conflict with many aspects of the traditions. You say, though, that here is a possibility of a *creative* conflict.

R.L. There are two areas here in what you have said—the direct one is the problem of the incompatibility between one part of living and another, and the other is a classic problem of modern times, not only for India, and I would like to open up on this first. This is the tension between any kind of universal socio-political, moral-philosophical system which is more or less coherent, on the one hand, and the intrinsically pluralistic nature of a very big society—in the case of India, a culture of continental size. It is possible to sketch some “Indian view of life”—this tends to become vague and over-generalised, because there are so many different communities with different traditions. But nevertheless there are elements which are common to all India—an overview with which everyone has some contact and some experience. And this is in considerable tension with their own particularistic bit of life and society. So I think this is important because, implicit in what has been said, is that we are coming to the end of the 20th century and everybody is now faced with the issue of the prime focus having shifted. So much that is dynamic in this latter part of the 20th century has to do with one’s personal convictions and these being carried through into politics. This kind of change is going on everywhere in the world, reflecting the end of monarchy, and of some kinds of despotism and authoritarian political structures, and the advent of democratic structures.

India has for millenia foreshadowed the problem of modern pluralism, because it has never really had a unified political system. Its pluralism is explicit in the thorough-going pluralism which ascribes no absolute validity to any single view. This underlies all political thought, is implicit in the moral relativism of Hindu ethics, and concretised most vividly in the all-embracing pluralistic hierarchy of the caste system.

I think everyone in the world is beginning to become Indianised; one is faced with the question of handling the perceptions one has of life at first hand and relating them to the government, which is concerned with the destiny of the nation. (In a way this is connected with spirituality).

So on the one hand we have this question of a kind of pluralism in India which has its historic basis. And on the other hand we have the tension in contradiction you mentioned between the tradition of spirituality and the need for the scientific outlook.

Q. Can I ask you a question? I thought there were two sorts of pluralism in your book. One was that based on race and tribe; but when I have heard Rupert Sheldrake here talking about what it is like to try to do something about the food problem in India, it shows the stultifying effect of the divided caste system — a pluralism where, if you were caricaturing it, you could say one sub-caste could clean shoes and another sub-caste could clean sandals. This is not racial; it is India's form of the Trade Union system.

R.L. Yes, I used the term "moral" in my book. I think that is terribly important. There is a very pervasive element that runs through the whole religious system which includes the system of *dharma*. There is the big *dharma* and lots of little *dharms*. Your question is an excellent example of what I am talking about: the tension between universalism on the one hand and particularism on the other.

Q. Which universalism? I can see you have the particularisms of all these layers of caste, which in many cases may also go with extended families. So you have a multi-racial system, an extended family system, a caste system closely concerned with pollution, all intertwining with one another. What is the universalism with which they contrast? Aren't there several—the very ancient India, the not-so-ancient India, the India of Gandhi, the modern India?

U.K. It is so difficult to make generalisations about India. It consists of so many different religious, social and ethnic groups that we really have to think of many different systems which, when all taken together, are perhaps more complex than all those of Europe put together. To appreciate the diversity and complexity, close experience and study are needed but Westerners have frequently

been given to creating Hinduism in their own image without paying too much attention to the social and cultural context within which it has developed and continues to exist in India.

R.L. The universalism can be looked on from one point of view, that of the caste hierarchy with the Brahmins on top. These, being nimble-witted and acute thinkers, have evolved a system of thought which has the characteristics of a universal philosophy with ethical and religious principles. It is like a river system: you have a big river and all sorts of tributaries that flow into it. I call this the Great Tradition—a useful term coming from Robert Redfield and the Chicago school. You see, this is an abstraction because sooner or later you come across someone, a Brahmin, who is saying something about what he believes, and what he believes is coloured by where he is from, what is his linguistic culture and so forth. But nevertheless there is a sort of movement towards a universalisation.

Q. What are the characteristics of this universalism? From what you have just said I find it difficult to distinguish the universalism from certain pluralisms.

R.L. That is a brute of a question.

Q. Perhaps if you could answer it, you would be conning people. You did mention something you called “the Great Tradition.” I, as a Western philosopher, know what is meant by the “*Philosophia Perennis*.” How would you say this Indian tradition was related to that? The Western philosophy has gone from Plato onwards. But you are speaking of a different “Great Tradition”, an Eastern not a Western one. I should have thought the difference was that in the Western tradition people were always concerned with avoiding inconsistencies. This has not been emphasised in the Indian tradition.

R.L. In my book I mention respect for the Moral Code of the *Manushastra*, striving for release from the round of rebirth, the sense that the personal ego is ultimately an illusion; the concept of time as a cyclical process; and the central position of the teaching found in the two epics—the *Mahabharata* and the *Ramayana*—on the lives of the entire Hindu population. These are all important. Then there are more intimate and widespread things—we are not now talking doctrinally but about a kind of sensibility. You often

find that if an Indian of any tribe or caste or sect is asked what is his aim in life, his answer will almost always be in some way related to “peace of mind”, and this is marvellous, very informal, but beginning to touch the quick of what people are really focussed on. Certainly I would prefer to answer your question at the level I have done than by expounding a universalism that is a con. It is more to do with sensibility, and it is very deep, and an Indian from the Himalayas can recognise it in one from Kerala.

Q. I think there is a big rift between people who think of language as words written on a page, though they pay lip service to spoken language, and those who regard a word as a dynamic thing. There is a layer in pretty well everybody where changes can be caused by words.

R.L. The mantra in India.

Q. Yes. I think this is still known in various holes in the West, the Catholic Church being quite a big hole, but even there it is no longer mainstream.

R.L. One aspect of the yogic mode of thinking and training of the mind is a marvellously dry technique. Throughout every domain of Indian cultural activity there is always one aspect which is very dry, down to earth with a curious cool detachment. This is the ability to be dry in a wet situation. It is like the lotus leaf on the pool. Because the guru is detached from all the emotionally charged questions he is asked, it has occurred to me that in his response the guru is a sort of computer.

U.K. The institution of the guru goes back to ancient India, and is originally, and for a very long time throughout Indian history, linked to a socially exclusive and strictly controlled transmission of esoteric sacred knowledge. The guru operates within a specific social structure tied to a different notion of authority than we know in the West. Even given the fact that the position of the guru in modern Hinduism has become a more flexible and open-ended one, is it possible to transfer his position of authority and his teaching into a totally different social context?

R.L. If one is considering the very specific nature of the *guru-shishya* relationship — that is, a special bond between the guru and the disciple — then I tend to think this would not survive outside

a society composed of Indians. But if one is considering the *teaching* of a particular Indian guru or master, since this relates to universal human issues in a general sense, then surely it could have meaning, indeed considerable significance, to receptive persons of any culture. But the *guru-shishya* relationship has an initiatory pattern of tutelage, with ramifications so highly culture-specific that I doubt if under modern western conditions of secularism, for example, it is exportable — at least in the foreseeable future.

J.L. In speaking of the guru as computer, are you suggesting the relation between the guru and his disciple — a very central one in much Indian thought — is not a personal one?

R.L. No, I am certainly not saying that. But it is a very special relationship. By speaking of the guru as computer I meant to restrict this to describing the question, or the agony, of the person who seeks out the guru, as hot or humid, and the guru as cool and detached. There is a lot more to the guru-disciple relationship than this. But of course the guru is not hung up on the things the disciple is hung up on.

Q. This is in no way different from the theory of confession in the Christian Church.

R.L. The short answer to the question whether the relation to the disciple is personal is that most emphatically it is not, but this does not mean that the relation is a sort of academic one.

J.L. In the obvious sense of the word “personal” I would have thought it was eminently personal. Who may be a guru for you may not be a guru for me. We can describe this relation as personal in the sense that it is one in which two people trust each other and recognise the lasting value of their association. It is not personal in a more profound philosophical sense, if you ask, “What is a person?” because the word “person”, for some schools (e.g. Shankara) is rooted in ego-perception.

Q. In some sense you could say the notion of person is a Western notion. But this need not mean that personal caring is limited to the West. In Yogananda’s Autobiography, when he meets the guru, this old man at the end of a street, and the old man says, “I offer you my total disinterested love; will you give me yours?” You can hardly call this non-personal because it contains the word “disinterested”.

J.L. I don't accept that the concept of person doesn't exist in very central areas of Hindu philosophical and theological thinking. If by "person" you mean a subject of conscious experience which can morally be described as an end in itself and to which you can attribute knowledge, bliss, volition, then many important schools of Indian thought stress the concept of person, in contradiction to Shankara. Even there I shouldn't say "impersonal", I had rather say something like "suprapersonal."

But to come back to what you said earlier about inconsistency. Is it the view here that Indian thought revels in inconsistency? That it is not concerned with consistent propositions or ways of thinking, and that anything goes so long as the experience is there?

R.L. No, I think it is much more articulated than that. The inconsistency is much less important than the evident concern to transcend opposites.

Q. So you must have the opposites to transcend.

R.L. Yes, and you can't cut out the opposites. At one level they are very real and are not going to be explained away.

J.L. As in all Indian thought, there are so many levels. For instance, the half male, half female figure: the fusion and sublimation of the two. In art and poetry there is a tremendous amount of reconciliation of opposites. In the theological schools they glory in pointing out the logical consistency of their own stance and the inconsistencies of their opponents. There is a great logical tradition in Indian thought.

Q. We are coming to see that there are different kinds of logic, of which our Western may be a particular case. There are books on the Hindu ultimate kinds of classification which don't make contact with books on the propositional calculus. Rupert, you are a scientist who has worked in India with Indian scientists as colleagues. Are you conscious of differences in deductive or rational processes?

R.S. I agree with the point Richard Lannoy makes in his book about things being kept in separate compartments and not really integrated. I was working with Indian scientists in a context of agricultural and economic development concerned with applied scientific research, and I was interested in how far they tried to

make a synthesis. What I found was just what Richard says in his book—practically everyone has two separate compartments. At work they are scientists with Ph. D's. In the evening they are sitting at home with their wives conducting *puja*—religious devotions—in the background and then, when you go to dinner, the wife serves you and goes out again. I often tried to discuss with them whether they were working towards a synthesis in thinking. My colleagues delighted in pointing out aspects of Western thought, like matter and energy being the same, and the world being made up of vibrations, and Einstein on relativity—which are all seen as consistent with Indian patterns of thought in some undefined way. Whenever anything of Western thought fits in with what they think of as traditional, they are quick to pick it up, particularly anything to do with modern physics. I went to a conference in Hyderabad organised by the Maharishi, where a well-known Indian physicist was saying that the quantum vacuum state was the background to the universe. It was all rather vague, but there was a wonderful glow as people felt that it all fitted in.

Being a biologist, I delighted in bringing up the topic of karma and reincarnation. My colleagues were plant breeders with an academic background in genetics, and I asked them how their belief in genetics as a completely material view of inheritance could be reconciled with karma as a theory of inheritance of characteristics acquired from previous incarnations as people of unrelated families, castes and even countries. They usually hadn't thought about this or seen it as a conflict. But their attempts to deal with it were firstly to say there must be something coded in the DNA. Then they saw it couldn't be, because most of the anecdotal evidence they raised about memories of past lives was not of people related in any way. Finally, when they had to admit there was an inconsistency, they would say, "But Western science is still in its infancy; maybe these things can't be explained now but they will be in the future." So if there was a conflict, they resolved it by the simple device of saying Western science will no doubt change and be seen to be consistent with the doctrine of karma. But if one is a geneticist actually working in genetics in India, one might think some radical revision is required to fit in with a different theory of inheritance. This is

the sort of conflict that could be potentially a creative one. But I don't think it is really discussed.

J.L. David Gosling made a statistical study of this. About 600 Indian scientists were questioned about whether they thought karma was compatible with their scientific principles. His findings corroborate what you say only insofar as they show the Indian scientists are not at all familiar with the philosophical theory of karma. Having been brought up in India myself, I support what you say about the compartmentalisation. They go to the factories and offices during the day and Brahmins mingle with non-Brahmins. They come back at 5.30 and the caste rules take over again and marriage is conducted on the traditional rules. Coming back to karma: in the theological schools, questions of genetics are not dealt with, the theory is really a moral one, to solve the problem of suffering and evil in the world, and it is not the ego which has the particular associations you talk about which is reborn. It is the Atman. The Atman is a layer of being not touched by molecules, etc. I am surprised the Indian scientists didn't come up with this one. You can accept all the geneticists' theories on the empirical level because the Atman is trans-empirical.

R.S. That argument came up. But that very same person, if you asked if there was any empirical evidence for reincarnation cites anecdotal cases of people who remember previous lives, not the high Shankara doctrine that the Lord is the only reincarnation. So there is this conflict in their own tradition; many of them understand it to be a personal reincarnation, with personal memories. I have never met an Indian who says this evidence is of no interest because it is only at the empirical level.

There is the other conflict, between karma and grace. In the Bhakti cults you have the notion that devotion can lead to liberation through the grace of Krishna or some other personal god. As soon as you allow grace to come in and dissolve karma, there is another conflict—with the usual notion of an inexorable law.

J.L. There are many views of karma.

R.S. But the point is the scientists I talked to had views that conflicted with genetics. If they had gone to professors of philosophy

they might have found a way of rising above the conflict. But they did nothing about it. So there wasn't the creative conflict Richard Lannoy was looking for.

Q. To have a creative conflict you have got to be aware there is conflict. You have got to feel the pull of the different views and be really worried by it. But if Rupert is right they aren't worried.

R.S. They aren't worried because they don't believe any conflict of this sort is a real one. Either they think it can be resolved philosophically or by the West coming round to their view. I personally am interested in a theory of inheritance not just based on genetics. But I have to struggle over it scientifically. Of course the much more pressing problems in India are not so much philosophical and theoretical as practical. Above all there is the problem of the population explosion and of food production. Since Independence food production has roughly doubled, but so has the population, so there has been little change in the food supply *per capita*. The population will double again, even if family planning programmes are very successful, in twenty-five years, simply because so large a proportion of the population consists of young people coming up to reproductive age. But increased food production cannot depend on bringing a larger acreage under cultivation, as it has done to a considerable extent so far, because almost no more land is available. And increased production per acre as in the "green revolution" largely depends on chemical fertilisers. These are becoming increasingly expensive because of the rising costs of energy, and growing world-wide shortages of raw materials such as rock phosphate.

R.L. But from about the ninth century I suspect every generation has viewed the situation in the same doom-laden way as you have. I mention this to raise the question of the nature of your anxiety over India. I'm not saying you are wrong, but I think we should draw a distinction between our humanitarian concern with a population threatened with starvation and our anxiety and frustration about the way the authorities are facing food shortages and the population explosion.

Q. We can't limit our humanitarian concern to England. The trouble is that anything we could try to do about it does seem futile.

I don't like to say, "They enjoy themselves: let them get on with it" because I don't take that view of starvation.

R.L. I wonder what Indians would say here.

Q. I am thinking about what Pratima Bowes, with whom we had an earlier discussion*, might have said if she were here. She also wrote an article in which she contrasted what she called the moral and the aesthetic approaches as fundamental religious attitudes. She, as an Indian, was diagnosing her own attitude and defending it. She said they cared about the immediate people, especially their families, and about helping them in need. But they hadn't the moral notion she said Christians had that they ought to go round trying to relieve suffering wherever they saw it. In India, she said, we have an aesthetic attitude which enables us to take the hardness of existence. You care very deeply about the people immediately round you, but the world beyond that is vast; there are cycles of existence; it has all happened before. And there is a great relief in accepting this aesthetically, and not always bothering your head about what you could do to put these things right. These, she said, are two different attitudes.

R.L. There is something which I enormously regret that I didn't get into my book. It is that when you look from the outside at Indian philosophy, in comparing it with those of other cultures, perhaps it appears to be wading into almost inaccessible and superhuman levels of experience, and yet one of the most amazing paradoxes of India and one of the most beautiful is that when you live there you find something very immediate, everywhere, and that is the extraordinary affection and loyalty of families in relation to each other and to outsiders. It is a very touching quality and it means that India with all its poverty and all its problems yet has that grace and human warmth within the family that is irresistible and very real, and has escaped all formulation and is almost uncelebrated. Perhaps it is this human quality one would want to refer to in saying what is the best thing about India. If this is so, then we must not impose an alien moral straitjacket on the Indian aesthetic attitude for then we will fail to reach that quick of human experience that

*T. to T. Vol. XII ii. See also XII iv for her article.

resists critique and where the real human potential may lie. We lack a language to grasp that reality. When we get het up, are we ignoring something we can't see?

U.K. We speak too often of the poverty in India but let us also look at its riches, the richness of its culture, civilization and religion. Instead of always thinking what we can give India, let us learn what India can give us.

Q. You are saying there are these good things. But can't you have them and as well have the human active concern to relieve suffering?

J.L. I thought you were saying in one way the Indian way of looking at things is less individualistic or personalistic. Because of the caste system and the Atman being in a sense dissociated from the ego, all these having their impact simultaneously, the Indian is not as individualistic, insisting on his rights and so on, as in this country. This comes out in family affection, in the mother's losing of herself—which can also become something possessive.

Q. There is a case for saying that in the West we suffer from the cult of personality. But I think the emphasis on personality is one of the glories of the West. There is a very definite disagreement in Weltanschauung, between those who value individuals as being different and those who see differences of individuals as irrelevant to the value of the society.

U.K. I would like to express my appreciation of what you have just said because it is very difficult to bring out the qualities unless one has lived there as I did for five years. I do think one must not criticise a culture until one has learnt to love it and have compassion. I have felt that it was a culture so immensely rich in terms of so many aspects—art, social relations—and in terms of the human relations you spoke of, the warmth and the hospitality. I do not think it is simply a question of India being a continent of villages, where there is a close family network, as there is also in villages in the West. I think there is something more important, and I would have to go deeper to bring it out. I think it has to do with what you said, Julius, about the perception of the community and the way one lives in it and in the family.

R.L. In emphasising the personal warmth of the family, I was wanting to bring out how we can make a system seem exotic when it is simply human. Because we have been talking about complicated problems on a vast scale there is an inclination to exoticise. So I hoped to make a point on a matter which I believe is immensely important. This may be a way of handling these acute problems, but doing so within a certain wider awareness.

Q. This discussion has taken a very strange turn: we were thinking about the possible starvation of India in 20 years, and were edged away by hearing about the many virtues of the Indians. The more virtues they have, the more important it is for them to go on living.

J.L. They are threatened with starvation but they won't be wiped out. They have a remarkable capacity for survival. Also they may be going to discover oil off the coasts of India. There have been reports of this in the last few weeks.

Q. If in fact they have a power to survive, it may be because of the spiritual depth in their culture.

NOTE I

Leonard Schiff

I have read what has been discussed with interest and would like to add some comments in the light of twenty years in India which go back to 1929 when I first met Gandhi and Nehru. A factor not mentioned by anyone else is the effect of the west in challenging Hindus to social reform and a more dynamic sense of history as maybe having a goal and not just cyclical. This certainly influenced Indian Socialists. The 19th.c. was a period of growing concern for reform. It began with Ram Mohun Roy who prevailed on the Raj to abolish Suttee — he wrote a work called “The Principles of Jesus”. He founded the Brahmo Samaj — one of its later heads was the father of Rabindranath Tagore — and, in common with other reformers such as Dayananda, founder of the Arya Samaj, found his inspiration in the Vedas only (and the Upanisads), thus criticising the caste system and the ‘idolatry’ of the temples.

It is quite possible to be a Hindu and yet be an atheist or to be quite hostile to the temples and all the popular worship. A personal ‘sadhana’ or spiritual discipline is all that matters and each person makes his own religious commitment in accordance with his stage of evolution.

The Ramakrishna Mission through the inspiration of great Swami Vivekananda, started hospitals, orphanages and schools.

The revolutionary nationalists found their inspiration in the Gita, especially in the Karma Marg or Way of Action — dispassionate action as discussed in the Gita was called for.

Gandhi, who really summed up more than a century of reform attacked Untouchability and called for a “puritan” gospel of work. He was very different from the portrait painted by his biographers (hagiographers!). He was immensely loving and full of humour. The first time I met him was at a great gathering of people, mostly peasants, and he used me as a visual aid, “see how large and strong this young man is! It is because he is fed well but you are not — why?”

He then went on to speak at length on the best ways of disposing of night soil.

Apart from the Gita his favourite books were Ruskin's "Unto this last" and the Sermon on the Mount and some Tolstoy.

Nehru would have probably criticised most of the discussion. He had little love for the religious and it would be accurate to describe him as a scientific humanist. For him Hinduism was only of interest as part of Indian culture and his reply to the complex pluralism of India was the building of the secular state.

Many young people in India when I was there and perhaps even more today were quite secularised with little contact with their ancestral roots. The exception might be found in the Jan Sangh, Hindu revivalism with "fascist" overtones.

The Nehru family had broken caste and ate with anyone and those who dined with Nehru would have to break caste or only eat fruit as one Brahmin politician always did when invited to Nehru!

I would very much support what was said by U.K. and others as to Indian kindness and family hospitality. This was always my experience over a period of more than 30 years. Though somewhat obscured by the arrogance of bureaucrats I am sure this remains as true as ever. I agree with R.S. Indians have an awkward capacity of believing incompatible opposites with equanimity. Whereas the West insists on either-or, in India it is always both-and, whatever the logical consequences. I too have met brilliant scientists who yet consulted astrologers.

I conclude by suggesting that one secret of India's viability, despite the enormous problems confronting her, is the hidden (often) influence of India's women and worship of God as Mother. This is associated with the survival of the Joint Family with the security it gives both material and psychological. Indians can endure in great crowds and remain peaceful and solitary under conditions which would drive westerners to an extreme of violence. All this can happen when the great tradition remains and it *does* still, despite erosion.

NOTE II

Ursula King, who is one of the participants in this discussion, was a founder member of the Teilhard Centre, the interests of which are close to our own. We exchange journals. Teilhard looked to a “trans-theistic” mysticism which would go beyond Christianity in its classical forms and unite with the scientific impulse as the spiritual root of an evolutionary vision of the world. Some of Teilhard’s most revealing thoughts on this were contained in letters, notebooks, and occasional lectures still unpublished, and others are available only in the volumes of the French Edition of his *Oeuvres (Editions de Seuil, Paris)*. Ursula King has recently published a synoptic view of Teilhard’s thought as shown in these scattered writings. (“Towards a New Mysticism, Teilhard de Chardin and Eastern Religions” Collins). She does this under the rubric of seeing how he developed his own characteristic mystical philosophy by comparing and contrasting it with the mysticism in Eastern religions, and she shows how he was looking for an inter-faith oecumenism rather than a Christian inter-confessional one. His own mysticism was one in which spiritual energy was seen as transforming and transfiguring the world in direction towards an “Omega Point”, where the potentialities of this spiritual energy could be unified and also diversified. In the Eastern religions he found a cosmic sense of the unity and also the vastness of the world (orthodox Christianity in contrast has a cosy universe). But he also saw them as essentially world-negating. Ursula King shows that he overdoes this, and she gives a more sympathetic view of Indian religions. She also brings out how Teilhard saw the way forward as a neo-Christian Mysticism incorporating the scientific impulse and the love of humanity.

(Editor)

Sociobiology and Genetic Determinism

PATRICK BATESON

If anything got sociobiology a bad name it was the way in which evolutionary theories were used to justify a naive form of genetic determinism in the development of individuals. The pity of it was that the whole subject of sociobiology, much of which is attractive and intellectually vigorous, has been tainted by an apparent assumption that some simple correspondence would be found between genes and behaviour. I say "apparent" because I think that a great deal of miscommunication between the sociobiologists and their critics has arisen from sloppy use of language and not from any commitment to genetic determinism on the part of the sociobiologists. In this article, which is taken from a longer piece (Bateson 1982) about the two-way flow of nourishment between studies of ontogeny and phylogeny, I consider some of the problems of sociobiological language and how difficulties could be quite simply eliminated.

Genes for Characters

When sociobiologists in general are attacked for claiming so much for genes, the criticism is undoubtedly indiscriminate. It is not fair to tar everybody with the same brush. Indeed, none of the sociobiologists I know has disagreed with the following statements about the famous (though still hypothetical) "gene for altruism". (a) The mutant gene makes the difference between an animal behaving altruistically and not doing so if other things are

Theoria to Theory, 1981, Vol. 14, pp. 291-300
0049-3686/81/1404-0291\$06.50/0

Published by
Gordon and Breach Science Publishers Inc. 1981

equal. (b) The mutant gene is not sufficient for the expression of the behavioural character because it works with a great many other necessary conditions to produce the behaviour pattern. (c) The developmental process generating the behaviour must be influenced by many facets of the environment and may involve learning; change the environment or opportunities for learning and the nature of the behaviour may be dramatically altered.

Evolutionary theories that consider the costs and benefits of possessing a gene which exerts a specific influence in a particular context, must necessarily be silent on how the developmental process works. But it is not enough to gain acceptance on this point because much of the language used by contemporary sociobiology is preformationist in character and implies that a behavioural trait spreading through a population in the course of evolution is somehow represented in miniature form in the relevant gene. The effect is that critics and naive disciples alike believe that the developmental process has been dismissed as being altogether trivial and uninteresting. I accept that the majority of those who are playing an important role in forming opinion about sociobiology do not believe that. Nevertheless, confusions will persist until the language is cleared up.

I believe, then, that the "gene for a character" language should not be used even as a shorthand. The long-winded "gene that makes the difference between one character and another" admittedly uses more type but at least it is unambiguous. Only those who are incurably convinced that a source of a difference is a sufficient condition for obtaining that difference would then remain muddled about what sociobiologists are trying to say.

What is Selected?

"We now know that selection acts primarily at the level of the individual, or to be more precise, at the level of the gene . . ." (Krebs & Davies, 1978 p. 8). Confident statements like this abound in modern text books and are, I shall argue, a major cause of

muddle. Two separate processes are run together. The competition between characters (if that indeed is what is involved in evolutionary change) and the way in which the characters are replicated are quite distinct. Let me illustrate this point with an analogy. Having told the public for many years that there was no demand for crusty bread, a few supermarkets cautiously offered such bread along with the flabby stuff which was supposed to be so popular. Many people immediately started to select the crusty bread. The presumed effect of the selection pressure was that recipes used for making crusty bread proliferated at the expense of those used for making the other kind. The notion of selfish recipes manipulating consumers is entertaining. Nevertheless, normal usage of language does not imply that when you buy your bread what you are really doing is selecting the recipes.

Returning now to biology, a behaviour pattern such as licking offspring may be favoured by natural selection in the sense that offspring are more likely to survive if they are licked. Now, at one stage in evolution the difference between those parents that licked and those that did not may have been one gene (defined as a unit of mutation). But does it follow that the gene is where natural selection has acted, as Williams (1966) and Dawkins (1976, 1978) have argued? For me, at least, Darwin's metaphor does not have that connotation. Darwin contrasted natural selection with the artificial selection of plant and animal breeders. He was specifically thinking of analogies with the way a breeder might, for instance, select pigeons with more tail feathers than was usual and he was concerned with the natural selection of *characters* – not selection of recipes for making those characters.

The importance of separating the set of processes by which one character competes with another in a natural environment from the set of processes by which characters are transmitted from one generation to the next, is that these sets are so different and involve such dissimilar issues (Bateson, 1978a). Richard Dawkins (personal communication) now makes a distinction – between “vehicle” and “replicator” – a change in his thinking which is all the more welcome since he refers to “replicator survival” rather than “replicator selection”.

I emphasize that my insistence on character selection and nothing else does not commit me to considering just the attributes of individual organisms. The characters could be properties of symbionts such as competing lichens or mutualistic groups such as competing bands of wolves. Of course, if characters are transmitted genetically from one generation to the next, character selection must necessarily involve changes in gene frequency, but these changes are *consequences* of selection. I accept that the gene's-eye-view approach to evolution, of which Dawkins is the most brilliant exponent, has brought a sharp new light to bear on old problems, one of them being animal communication (see Dawkins & Krebs, 1978). However, a subtle difficulty arises at the point where the operational character-selection language appears to intersect with the teleological selfish-gene language. A winning character is defined in *relation* to another one while genetic replicators are thought about in *absolute* and atomistic terms. The difficulty is brought home if you ask yourself, what exactly is Dawkins' replicator. You might answer: "That bit of genetic material making the difference between the winning and losing characters." You would have stated that a replicator must be defined in relation to something else. Alternatively, your reply might be: "A replicator consists of all the genes required for the expression of the surviving character." In that case you are saddled with a complex and unwieldy concept. Either way your answer would show how misleading it is to think of replicators as the atoms of evolution.

To return to the main point, varieties of competition raise questions that are central to a particular set of theories about evolution. Varieties of methods of replication and transmission raise questions that are mainly to do with the way critical information passes from one generation to the next but also touch on how that information is expressed in an individual's development. That is why it is so important to keep the different kinds of process apart in our minds. The distinction ravages the fatal allure of the idea that the character is the gene. If the conceptual membrane separating studies of phylogeny and ontogeny is to be made more permeable to thought, the selection metaphor should be used, as Darwin originally intended, for the differential survival of characters.

The Question of Innateness

Anybody interested in natural selection is bound to become involved sooner or later with the issue of inheritance. So it was perhaps inevitable that the resurgence of interest in evolutionary theory should have revived terms like "innate behaviour", "genetically programmed behaviour", and so forth. However, in resurrecting the old innate/learned dichotomy, a crucial technical discussion about behavioural development has simply been ignored. The practical problems of how to recognise "innate behaviour" are not trivial (see for instance, Hinde, 1968; Lehrman, 1970; Bateson, 1976a). And the difficulties are compounded if we wish to recognise higher order "innate rules" for development.

I must emphasise that this difficulty of using "innate behaviour" as one part of a field of possibilities is not one of principle. It is easy to conceive of adaptive behaviour that does not require learning processes for its development and which owes its qualitatively distinct character to genes specifically affecting it and nothing else. That having been said, the occurrence of the behaviour may be facultatively dependent on environmental conditions. In locusts, many generations may go by without migratory behaviour being expressed (e.g. Dempster, 1963). Furthermore, the form of the behaviour may depend on external conditions that are normally constant from one generation to the next. This becomes especially obvious when animals are brought into the laboratory. For instance, in an environment of *ad libitum* food, constant temperature, constant humidity and so forth, rat mothers do not care for their pups as much as they would in natural conditions. The deprivation has a major effect on their offspring's behavioural development (see Thoman & Levine, 1970). The long-term effects can be prevented if the pups are handled by humans while they are still with the mother. The presumption is that the handled pups emit ultrasonic distress calls which stimulate the mother to behave more as she would have done in the natural environment. (The irony of this particular example is that for many years the unhandled rats were regarded as the "control group"). Buffering mechanisms required to cope with the ill-effects of having non-maternal mothers presumably

never evolved because such mothers do not exist outside laboratories.

When "innate behaviour" is used in the sense of "behaviour that is not learned" it seems to invite a dichotomy. A moment's thought, though, makes it obvious that the degree to which a given pattern of behaviour had been influenced by external events could vary from a little to a lot. However, I do not think it is enough to emphasise this point by breaking up the continuum of possibilities into a larger number of arbitrary categories. Alcock (1979), for instance, has used four categories ranging from "closed instincts" to "flexible learning". While this is an improvement over the old dichotomies it ignores the variety of ways in which environmental conditions can influence development (see Bateson, 1976a; Gottlieb, 1976a). In my view any classification of behaviour in terms of its origins that does not take account of the multi-dimensional character of developmental determination is doomed to immediate failure. The major *practical* difficulty with the category of "innate behaviour" in a multi-dimensional field of possibilities is the problem of interpretation that arises when dealing with experiments that purport to have excluded learning. Ambiguities arise for a number of quite separate reasons.

a) *The specific-general continuum.* Konrad Lorenz (1965) proposed the metaphor of a blueprint for the origin of behaviour patterns which he thought were "coded in the genome". The metaphor was helpful in the sense that nobody would suppose that blueprints were sufficient for a building. Clearly to raise a building, a workforce is required along with bricks, mortar, and so forth. However, a sharp distinction had been made by Lorenz between the "information" on which the detailed characteristics of the finished building depend, and the conditions necessary for translating that blueprint into a building. The distinction is between a determinant with a specific and qualitatively distinct effect on behaviour and a determinant which has a general effect on all behaviour. In practice, this distinction does create problems. It is extremely difficult to know what to do when considering a spectrum of environmental conditions ranging from those that exert a highly specific effect on behaviour, such as those required for learning, through to those that produce general effects on behaviour such as a low protein diet. Where do we

draw the line and say from here on the experiences are no longer providing relevant information? For instance, simple exposure to patterned light can speed up the processes by which chicks peck accurately at seed, approach potential foster-parents, and learn about visual targets (see Bateson, 1976a; Cherfas, 1977, 1978). In Lorenz's sense, are these environmental supplements to the blueprint, or are they part of the workforce? It really does not matter, and if we insist on an answer we have been trapped by the metaphor. Nature is not going to package herself conveniently to match our distinctions.

b) *Equivalence*. Even when considering experiences that have a specific effect on behaviour it may be very difficult to know in advance when an animal is likely to generalise the effects from one kind of training to a novel situation. Can we really be so certain that we know what are equivalent types of experience for an animal? We might, for example, be inclined to treat tactile input as being so different from visual information that experiences of an object in one modality would not help recognition of that object when using the other modality. In rhesus monkeys, opportunities to discriminate between potential pieces of food in the dark, using tactile cues, make it easier for them to discriminate between the same objects in the light when they have to choose on the basis of visual cues (Cowey and Weiskrantz, 1975; Weiskrantz and Cowey, 1975). It is difficult to have useful intuitions about these kinds of equivalences in animals living in different perceptual worlds from ourselves.

c) *Equifinality*. It is possible for a given pattern of behaviour to develop by several different routes (Bateson, 1976b). The term "equifinality" is used for cases in which the given end point can be reached in more than one way (Bertalanffy, 1968). An isolation experiment that deprives an animal of a particular kind of experience may force it to develop a pattern of behaviour that normally depends on such experience in another way. While this result would be very interesting, it would not show that the excluded environmental factor had no influence on development when it was normally available. To argue like that would be similar to arguing that travellers who are forced to use bicycles because of a fuel shortage do not need petrol to run their cars.

d) *Self stimulation*. Even though an animal is isolated from relevant experience in its environment, it may do things for itself which enable it to perform an adaptive response later on. Normally treated Mallard ducklings are able to respond preferentially to the maternal call of their own species (Gottlieb, 1971). However, if they are devocalised in the egg so that they do not make sounds and thereby stimulate themselves, they do not show the same ability to recognise the calls of their own species (Gottlieb 1976b). In other words, feedback from their own activity is an integral part of normal development. In many cases it may be difficult to cut such feedback.

It is because of all these difficulties that people who study the development of behaviour generally regard the concept of innateness as giving more trouble than it is worth. I mention all this as a warning. Sociobiologists have a hard enough time translating principle into practice because of problems of determining paternity, measuring fitness, and so forth. The introduction of "innate behaviour" or "innate rules" into the vocabulary simply compounds the difficulties of doing decent empirical research. In any event, "innateness" is unnecessary to an evolutionary argument. If we accept that natural selection acts on phenotypic characters the precise way in which a character develops is irrelevant. It does not matter to the evolutionary argument that normal development may depend on instruction from a stable or reliable feature of the environment.

Conclusion

I have been critical of the untidy linguistic habits that continue to give sociobiologists a bad name. It is not enough for them to claim that they know how to clear up the house if they go on living in a mess. The time has come to get the broom out. In summary, I have argued that the "gene for a character" shorthand is liable to encourage preformationist thinking as is the view that natural selection acts on genes. Character differences should, where appropriate, be related to genetic differences. The metaphor of selection should be confined to differential survival of characters

which need not necessarily be the property of individuals alone. I went on to argue that the concept of innateness tends to encourage dichotomous classifications of behaviour which are misleading. This is partly because external events having specific and qualitatively distinct effects on behaviour can vary from few to many. Also the influences of experience cannot be arranged on a single dimension. Since the practical difficulties of operationally defining "innate behaviour" are many and serious, the term causes more trouble than it is worth and should be abandoned.

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Three Approaches to Biology: Part III. Organicism

RUPERT SHELDRAKE

The Atomistic and Organismic Philosophies of Nature

The atomistic philosophy of nature had become widely accepted by scientists by the latter part of the nineteenth century; and even today it is still taken for granted by most biologists. But whereas nineteenth century physics appeared to support it, twentieth century physics does not. By now it seems very improbable that the whole of nature could ever be explained from the bottom upwards in terms of ultimate, indivisible, eternal, material particles or 'atoms' (Greek: a-tomos, that which cannot be split).

The far-reaching changes in physics associated with the theory of relativity and the field concept were an important starting point for the new philosophy of nature developed by A. N. Whitehead in the 1920s. Although many aspects of Whitehead's philosophy were somewhat obscure, one of his ideas proved extremely influential in the development of the so-called organismic or holistic philosophy. He argued that enduring entities should be regarded not as material objects, but as *structures of activity*. He referred to the latter as *organisms*, using this term in a deliberately wide sense to include not only animals and plants, organs, tissues and cells, but also crystals, molecules, atoms and sub-atomic particles. In effect, Whitehead proposed a change from the paradigm of the machine to the paradigm of the organism in both the biological *and* the physical sciences: "Biology is the study of the larger organisms, whereas physics is the study of the smaller organisms".¹

The organismic philosophy has now been advocated by many writers, including biologists, for over fifty years.* They all recognize in one way or another, the existence of hierarchically organized

Theoria to Theory, 1981, Vol. 14, pp. 301-311
0049-3686/81/1404-301\$06.50/0

Published by
Gordon and Breach Science Publishers Inc. 1981

natural systems which, at each level of complexity, possess properties which cannot be fully understood in terms of the properties exhibited by their parts in isolation from each other; at each level the 'whole' is more than the sum of its parts. These wholes, or organisms, are made up of parts which are themselves organisms at a lower level. Thus crystals, for example, are organisms made up of molecules, which are themselves organisms composed of atoms, which are in turn organisms whose parts are sub-atomic particles. At each level these wholes are governed by laws which are not fully reducible to the laws which govern the separated parts.

As a matter of fact, the organismic philosophy corresponds far more closely to the way in which science is actually carried out than the atomistic philosophy ever did. In the many different branches of the physical and biological sciences, scientists study systems at different levels of complexity, and in doing so use concepts appropriate to the systems they study.

In general, science has proceeded from the study of wholes to that of their parts, from the macroscopic to the microscopic, rather than the reverse. The classical laws of mechanics and optics were worked out before chemical atoms were identified, and before the electromagnetic nature of light was recognized. Magnets were known and laws of magnetic attraction and repulsion described before microscopic magnetic domains in iron and other ferromagnetic materials were found. The study of chemical compounds enabled the existence of elements and the laws of chemical combination to be inferred. This knowledge of the chemical properties of the atoms of the elements preceded the discovery that they were themselves composed of parts; a study of the properties of atomic nuclei preceded the identification of protons and neutrons; and these particles were only subsequently found to be decomposable into others, which were later found to fragment still further. In biology the anatomy of the organs was described before that of the tissues, which preceded the description of cells, which in turn preceded the discovery of organelles within them. The study of inheritance in whole organisms led to a prediction of genes; only later were these found to be located in the chromosomes; and the chemistry of the genetic material was worked out later still.

When the properties of wholes can be explained in terms of their parts, it is only because the properties of the parts have previously been explained in terms of the wholes. Electrons were not found first and then used to predict electricity; DNA was not discovered by molecular biologists and then used to predict genetical inheritance; microscopic magnetic domains were not found first and then used to predict the existence of magnets, the laws of quantum mechanics were not discovered first and then used to predict the properties of chemical compounds. And even after the properties of these lower-level systems have been discovered, the range of predictions that can be made is very limited. For example, to this day, the only chemical system that has been fully described in terms of quantum mechanics is the simplest of all, the hydrogen atom. It was, indeed, on the study of this system that much of quantum mechanics was based in the first place.

According to the organismic philosophy, just as the properties of an atom cannot be fully explained by a study of its parts in isolation, or those of a molecule by atoms, or those of a crystal by molecules, so the properties of a living cell cannot be fully explained in terms of its chemical constituents, nor those of a multicellular organism in terms of its cells. At each level of complexity, new properties emerge. Thus living organisms are not fully explicable in terms of the sciences of the inanimate. In this respect the organismic philosophy agrees with vitalism, but it goes beyond it in seeing this difference as part of the general scheme of things rather than as a unique discontinuity in nature.

Organismic Theories of Morphogenesis

Vitalism had been eclipsed by the end of the 1920s, but the problems of morphogenesis remained. A number of developmental biologists, influenced by the organismic philosophy, proposed that the wholeness and goal-directedness of living organisms should be understood not in terms of vital factors, but rather in terms of *fields*.³ These morphogenetic (or developmental, or embryonic) fields not only in some way controlled and directed morphogenesis, but were

also responsible for the regulation of embryonic systems after damage, and for regeneration. Thus they were considered to have a role very similar to Driesch's vital factor, entelechy (discussed in the previous article in this series).

A new concept, related to that of the morphogenetic field, was introduced by C. H. Waddington in the 1950s: the *chreode*.⁴ He explained this in terms of his model of the 'epigenetic landscape' (Fig.). The ball represents the developing system, and its rolling downwards the process of development. An embryonic cell or tissue is initially undetermined and capable of developing in various

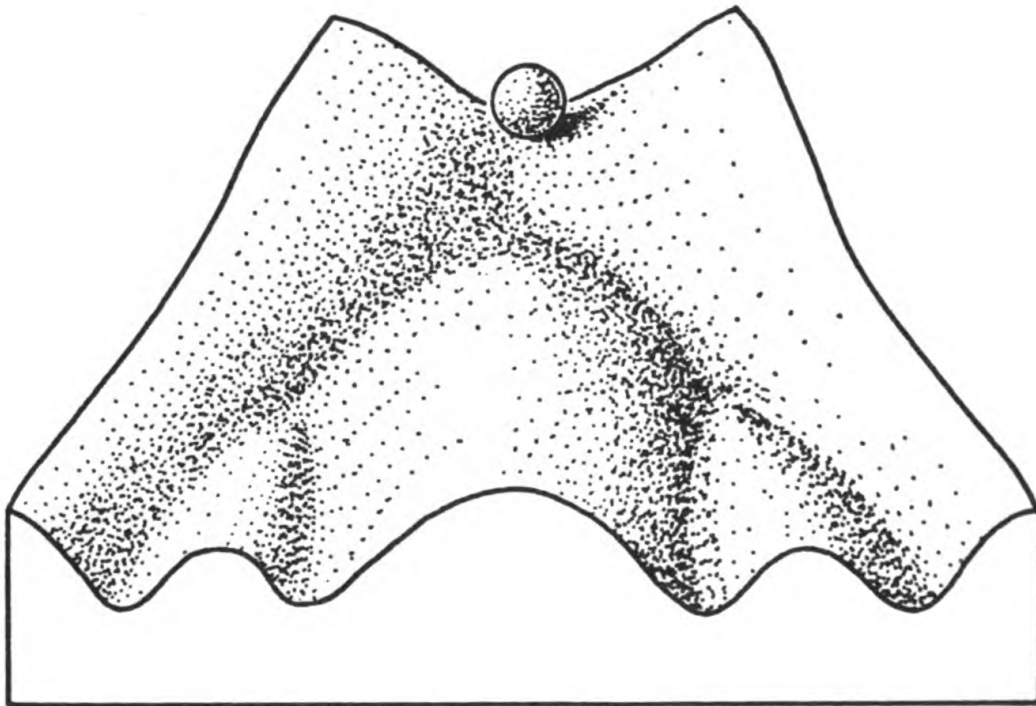


FIGURE. Part of an 'epigenetic landscape'. (After C. H. Waddington, 1957).

different ways; as embryology proceeds it becomes determined and enters into a specific developmental pathway, represented by a valley in the epigenetic landscape; this may in turn branch into further valleys, and so on. Genetic changes or environmental perturbations may push the course of development away from the valley bottom up the neighbouring hillside, but there will be a

tendency for the process to find its way back, not to the point from which it was displaced, but to some later position on the 'canalized pathway of change' from which it was diverted. This represents regulation.

These canalized pathways of change are chreodes. A chreode channels development towards a goal which it somehow contains. It thus corresponds even more closely than the concept of the morphogenetic field to Driesch's entelechy, bearing 'the end in itself'.

The main difference between these organismic concepts and Driesch's concept of entelechy was that Driesch regarded the latter as a causal factor and tried to say how it might work, whereas organicists have avoided making any such definite proposals.

Recently, the concepts of the morphogenetic field and the chreode have been developed by the mathematician René Thom as part of a comprehensive attempt to create a new mathematical formalism capable of describing morphogenesis, behaviour and language. This approach involves the construction of mathematical models in which the end or goal of a process, the final form, is represented by an 'attractor' within a morphogenetic field. Thom postulates that every object or physical form can be represented by such an attractor and that all morphogenesis "can be described by the disappearance of the attractors representing the initial forms, and their replacement by capture by the attractors representing the final forms".⁵

In order to develop topological models which correspond to particular morphogenetic processes, formulae are found by a combination of trial and error and inspired guess-work. If a mathematical expression gives too many solutions, restrictions have to be introduced into it; and if it is too restricted, a more generalized expression is used instead. By methods such as these Thom hopes that it should eventually be possible to develop detailed mathematical models which correspond to actual morphogenetic processes. But even so they would be essentially qualitative, and would probably not enable quantitative predictions to be made. Their main value might lie in drawing attention to formal analogies between different types of morphogenesis.⁶

What are the Organismic Laws?

One of the attractions of the organismic approach has been that it seems to provide an alternative to mechanistic reductionism, while at the same time avoiding mechanist-vitalist controversy. This is illustrated by the following statement of Waddington's, written towards the end of his career:

"Since I am an unaggressive character, and was living in an aggressively anti-metaphysical period, I chose not to expound publicly these philosophical views. An essay I wrote around 1928 on 'The Vitalist-Mechanist Controversy and the Process of Abstraction' was never published. Instead I tried to put the Whiteheadian outlook to use in particular experimental situations. So biologists uninterested in metaphysics do not notice what lies behind—though they usually react as though they feel obscurely uneasy."⁷

But while biologists could adopt this kind of strategy relatively unobtrusively, the explicit advocates of the organismic philosophy were more exposed to accusations of vitalism. And since vitalist theories were so commonly dismissed by mechanists as obscurantist and unscientific, most organismic theoreticians tried to avoid laying themselves open to this charge.⁸ This is perhaps the chief reason for the vagueness and ambiguity of so much organismic writing.

However, although organicists have sought to transcend the mechanist-vitalist controversy by referring in general terms to the emergence of new laws at higher levels of complexity, the basic issue underlying this controversy has not gone away. The question remains: do these organismic laws involve any new causal factors or principles at present unrecognized by physics? If the answer is no, then it is in agreement with the assumption on which the mechanistic theory is based. This position, which is that of a number of influential organismic theoreticians,⁹ can be described as mechanistic organicism. In so far as it states that different concepts are necessary in order to understand systems at different levels of complexity, it is in agreement with the actual practice of science, and is both unexceptionable and unsurprising.

In effect, mechanistic organicism differs so little from the straightforward mechanistic theory that it is more like a sophisticated version of the latter than an alternative to it. This is shown by the

fact that it leads to no testable predictions which differ from those of conventional mechanism.

However, there is nothing in the organismic philosophy that necessitates this adherence to presuppositions of the mechanistic theory; the question of causal factors is left open. More complex systems *may* depend only on new laws but not new causal factors: for example the understanding of a tape recorder would require a knowledge of the laws of electronics which are not required for the understanding of a simpler electromagnetic device such as an electric bell.

On the other hand, more complex systems may depend on additional causal factors which are not apparently expressed in simpler systems: for example a simple wind-up gramophone works according to purely mechanical principles, but a modern stereo system involves in addition the operation of electrical and magnetic factors. In order to understand the latter, vague notions about organismic laws would be of little help; it would first be necessary to recognize the existence of electricity and magnetism.

Similarly, the phenomena of life may involve a causal factor not so far detected in non-living systems. But whereas vitalist theories would assume that this factor was confined to the realm of life, in an organismic context this new type of causal factor would be expected to be at work not only in living organisms, but also in the inorganic realm. To return to the gramophone analogy: although the functioning of a modern stereo system depends on electricity and magnetism in a way which a wind-up gramophone does not, electromagnetism still plays a fundamental role within the latter; it is intimately involved in the atomic, molecular and crystalline structures of its components.

Vitalists proposed that a new type of causal factor, unrecognized by physics, was responsible for the ordering of morphogenesis and behaviour in living organisms. Organicists propose instead the concept of morphogenetic fields. But if this is regarded simply as a way of *talking about* the properties of physico-chemical systems, as a mere "descriptive convenience",¹⁰ then it can provide little more than an ambiguous terminology. The concept of morphogenetic fields can be of value as a scientific hypothesis only if it leads to

testable predictions which differ from those of the conventional mechanistic theory. And such predictions cannot be made unless morphogenetic fields are considered to have some sort of physical existence.

The Hypothesis of Formative Causation

I have recently developed a hypothesis, called the hypothesis of formative causation, which takes as its starting point the idea that morphogenetic fields are indeed physical. It is put forward in detail in a forthcoming book,¹¹ but can be summarized briefly as follows in order to illustrate the possibility of formulating a specific, testable scientific hypothesis cast within the framework of the organismic philosophy.

This hypothesis proposes that specific morphogenetic fields are responsible for the organization and form of material systems at all levels of complexity, not only in living organisms but also in crystals, molecules and atoms. These fields order the systems with which they are associated by affecting events which, from an energetic point of view, appear to be indeterminate or probabilistic; they impose patterned restrictions on the energetically possible outcomes of processes of physical change.

If morphogenetic fields are responsible for the form and organization of material systems, they must themselves have characteristic structures. So where do these field structures come from? The answer suggested is that they are derived from the morphogenetic fields associated with previous similar systems: the morphogenetic fields of all past systems become *present* to any subsequent similar system; the structures of past systems affect subsequent similar systems by a cumulative influence which acts across both space *and time*.

According to this hypothesis, systems are organized in the way they are because similar systems were organized that way in the past. For example, the molecules of a complex organic chemical crystallize in a characteristic pattern because the same substance crystallized that way before; a plant takes up the form characteristic of its

species because past members of the species took up that form; and an animal acts instinctively in a particular manner because similar animals behaved that way in the past.

The hypothesis is concerned with the *repetition* of forms and patterns of organization; the question of the *origin* of these forms and patterns lies outside its scope. This question can be answered in several different ways, but all of them seem to be equally compatible with the suggested means of repetition.

A number of testable predictions can be deduced from this hypothesis which differ strikingly from those of the conventional mechanistic theory. Two examples will suffice. The first concerns the inheritance of form, which according to the hypothesis of formative causation depends *both* on recognized genetic factors *and* on a direct influence from similar past organisms. The larger the number of similar past organisms, the greater should be this influence. Thus, for instance, in first-generation hybrids produced by crossing plants of two varieties, A and B, the form of the variety which has had the largest number of past individuals should generally tend to be dominant. If both varieties have had similar numbers of past individuals, the hybrids should generally be of intermediate form. Now if hybrid seeds produced in such crosses are kept in cold storage while very large numbers of one of the parental types, say B, are grown, and then if these seeds are taken out of storage and sown, the form of the resulting plants should resemble the parent B type more strongly than in the original hybrids, even though they were grown from identical seeds. Thus in the hybrids the dominance of one parental form over the other should change even though the genetic constitution of the seeds remains the same.

The second example involves changes in the rate of learning of new patterns of behaviour. If an animal, say a rat, learns to carry out a new task, which can be specially devised for the purpose of this experiment, there should be a tendency for all subsequent similar rats (of the same breed, reared under similar conditions, etc.) to learn more quickly to carry out the same pattern of behaviour. The larger the number of rats that learn to perform the task, the easier should it be for any subsequent similar rat to learn it. Thus, for instance, if thousands of rats were trained to perform a new task in a

laboratory in London, similar rats should learn to carry out the same task more quickly in laboratories everywhere else. If the speed of learning of rats in another laboratory, say in New York, were to be measured before and after the rats in London were trained, the rats tested on the second occasion should learn more quickly than those tested on the first. The effect should take place in the absence of any known type of physical connection or communication between the two laboratories.

Such a prediction may seem so improbable as to be absurd. Yet, remarkably enough, there is already evidence from laboratory studies of rats that the predicted effect actually occurs.

This hypothesis leads to an interpretation of many physical and biological phenomena which is radically different from that of existing theories, and enables a number of well-known problems to be seen in a new light. Its value will be uncertain until some of its predictions have been tested experimentally. But for the time being, it may serve to show that a specific organismic hypothesis is at least conceivable.

Notes

1. A. N. Whitehead: *Science and the Modern World*, Chapter 7. Cambridge University Press (1926).
2. E.g. J. H. Woodger: *Biological Principles*. Kegan Paul, London (1929); L. von Bertalanffy: *Modern Theories of Development*. Oxford University Press (1933); L. L. Whyte: *The Unitary Principle in Biology and Physics*. Cresset Press, London (1949); W. M. Elsasser: *Atom and Organism*. Princeton University Press (1966); A. Koestler: *The Ghost in the Machine*. Hutchinson, London (1967); I. Leclerc: *The Nature of Physical Existence*. Allen and Unwin, London (1972).
3. This concept was first put forward independently by P. Weiss and A. Gurwitsch in the 1920s. A systematic statement of Weiss' view can be found in his *Principles of Development* (Holt, New York, 1939). For a discussion of the influence of organismic ideas on Weiss and other experimental embryologists, see D. J. Haraway: *Crystals, Fabrics and Fields*. Yale University Press (1976).
4. C. H. Waddington: *The Strategy of the Genes*. Allen and Unwin, London (1957).
5. R. Thom: *Structural Stability and Morphogenesis*, p. 320. Benjamin, Reading, Mass. (1975).
6. R. Thom: From a model of science to a science of models. *Theoria to Theory*, 10, 287-302 (1977).
7. In C. H. Waddington (ed.): *Towards a Theoretical Biology II*, pp. 72-81. Edinburgh University Press (1969).

8. For example, W. M. Elsasser in his *Physical Foundations of Biology* (Pergamon Press, London, 1958) proposed that new 'biotonic' laws were required in the realm of biology, but he later withdrew this suggestion (in *Atom and Organism*) because he did not want to be mistaken for a vitalist.
9. e.g. L. von Bertalanffy: *General Systems Theory*. Allen Lane, London (1971), and W. M. Elsasser, op. cit.
10. C. H. Waddington in Waddington (ed.), op. cit., pp. 238, 242.
11. A. R. Sheldrake: *A New Science of Life: the Hypothesis of Formative Causation*. Blond and Briggs, London (1981).

Knowledge of Subjectivity

TIMOTHY SPRIGGE

The following pages are an extract from a book nearing completion which defends a certain panpsychist and monistic view of reality. The editors of Theoria to Theory having kindly invited me to contribute an extract from the book dealing with the nature of consciousness in general, I have extracted the following from the first chapter, which should be intelligible on its own. It is concerned with the nature of the knowledge we may possess of others and ourselves considered as subjects rather than objects.

There are, then, two sorts of knowledge, and two sorts of thing to be known, about people and animals. There is knowledge of such an individual as a subject, and there is knowledge of such an individual as an object . . .

But what of the idea, likely to be mooted by some, that I can only know others as objects, and can know only my own subjectivity? And what of the complementary suggestion that I can know myself only as subject, never as object? . . .

It is not easy to steer the right middle course between two extremes of philosophising about our knowledge of other minds. At the one extreme we have the view that the consciousness of others is a more or less absolute mystery to us, we simply cannot know what it is like being one of our fellows. Not far from this extreme is the view that we can know only the most abstract of facts about sentience not our own. At the other extreme, and normally as a reaction against the first, we find philosophers for whom all hint of the mysteriousness of others seems lost, and all truths about the sentience of a person are open to public check by everybody.

Philosophers, usually under the influence of Wittgenstein, who take the latter tack tend to concentrate on the validation of certain rather bald sorts of statement such as "He is afraid". However, the

most interesting knowledge of another's mind is possessed by someone who can imagine what it is like being him. There is no need to say that this knowledge is verbally inexpressible, for the skills of a novelist can convey ideas of this sort, but it is certainly not a type of knowledge the nature of which is adequately examined when a man's state of mind is classified merely by bringing it under some conventional category. It is true, indeed, that the states of consciousness we live through are intimately related to the conventional categories accepted in our society for the classification of states of mind. As is often pointed out, ways of being in love are to some extent determined for each individual by his culture. Nonetheless, the actual consciousness as it passes by moment by moment, will never be adequately known merely by bringing it under these concepts. This is not only a matter of the inability of such concepts to do justice to the detail. There are all sorts of specific ways of feeling about things for which there is no simple label.

How far then can one imagine the state of mind of another person? I do not think one can say there are any particular *a priori* limits, but it is an *a priori* truth, rooted in what it means to be distinct persons one from another, that there are limits it is not easy to overcome. For one has to throw oneself imaginatively into a situation more or less unlike one's own, as it must be for the other to be other.

This way of putting it suggests that what one has to do is imagine what one would feel oneself were one in that situation, and ascribe the result as the content of the other's consciousness. This is not incorrect, but it is liable to have the misleading implication that one can never get beyond the question, what one would oneself feel, to the question, what he or she is feeling. However, there is no real difference between the question: 'What would I feel if I were he in such and such a situation?' and: 'What would he feel in such and such a situation?' for they both mean: 'What would a mind of that certain sort feel in that situation?' though each answers it, at least partly, on the basis of creative extrapolation from what he recalls of what a mind of his sort has felt in certain situations. It is, indeed, difficult to find an adequate answer to the question how I know

what it must be like to be in situations, including bodily and psychological states, which I haven't been in, (though such an answer will refer, among other things, to the intrinsic affinities of which we spoke before) but there is no real difference between the question, 'What would Julius Caesar have felt in such a situation?', and 'What would I have felt in it had I been Julius Caesar?' The word "I" here really stands for mind as such, and in that sense I was Julius Caesar.

There is, of course, a distinction between the question 'What would mind feel in such and such a situation?', and 'What did mind feel in such and such a situation?' since the latter implies that the answer concerns something actually experienced. If I wonder what you feel by asking what I would feel, I am moving from a view as to what would be felt in such a situation to the view that it actually is felt since a mind is in that situation, — a mind which is not *this* mind which I am.

To the question: 'Do I know others only as objects?' The answer may now be given that this need not be so. I may grasp with more or less success various aspects of what life is like for another person or even (I suggest) animal. On the other hand, for much of one's thinking people do present themselves merely as behaving objects. Such is, indeed, the basis of our ordinary selfishness.

Doubtless the most common way in which we view each other is not merely as physical objects, as matter in motion according to causal and teleological laws, nor as distinct subjects of experience, but as objects bathed in phenomenal qualities which are constituted by our emotions towards them. To find another menacing is neither to envisage his outlook on the world nor merely to characterise to oneself the pattern of his likely movements and their effects on my subjectivity, it is for him to have a certain threatening look about him.

Consider the look of a smiling or a dismal face. The essential qualities in question can appear in the simplest of outline drawings and a mere inversion of the curve representing the mouth serves to exchange them. To see a mouth, real or picture, as smiling is to see not merely a shape but a shape charged with feeling. Nonetheless to see people as having qualities of this sort is still essentially to see

them as objects rather than as subjects. They figure as objects presented to one, as does a beautiful sunset, whose emotional qualities are aspects of how they present themselves to an observer, not of their own outlook upon the world.

Turning now to an individual's knowledge of himself, we may dispose rather quickly of the suggestion that I know myself *only* as subject. Clearly, granted I can have information about the physical world at all, I can have knowledge of that part of it which constitutes my organism, and know truths about its physiology, its physical behaviour, and so forth. There are peculiarities in the perception of my own body. I can only see my face in a mirror and I see other parts from a rather peculiar point of view. I become aware of the movements of my body "from the inside"; I feel the position and movements of my body. With regard to voluntary movements, it is often claimed that my knowledge of them is not primarily perceptual at all, but I think this is a mistake. I feel myself doing various things, though I am also aware in a peculiar way of their conformity to various purposes I have. In any case, whatever the mode of awareness, it is not open to serious dispute that I know objective facts about my behaviour.

But, as suggested before, knowing something as an object is not merely being aware of its most purely physical properties, of traditional primary and even secondary qualities—shape, movement, colour and so forth. When I see an object as *beautiful* or *menacing*, these terms refer to the way it presents itself as object to a subject, and do not describe what the thing is like as a subject, if it is one. It is, in this sense, that it may seem I cannot easily know myself as object, as lamented by the poet: 'O would some Pow'r the giftie gie us, to see oursel's as other see us'.

But is not this simply a difficulty in seeing the object we are as others see us, a difficulty not so different from that I have in seeing another person, my enemy say, as his friends see him? I may still see myself as an object, with qualities of the same order as *menacing*, (as charming or pitiable perhaps) only it is as object for myself.

But if this is seeing myself as an object, can I know myself in any other way? I must become aware of myself, surely, by making myself an object for myself. Besides, if by seeing myself as an object I

mean seeing myself as others see me, knowledge of my own objectivity is knowledge of the subjectivity of others. Since one could hardly say of the knowledge of things as objects in general that it is the knowledge of the subjectivity of others, there is an element of paradox here.

To deal with these problems, let us recall what was meant by knowing about someone else as a subject. It meant, the grasping what it was like to be him in the situations he has lived through, or, what is the same, to grasp imaginatively how the world and himself present themselves to him.

To know oneself as subject, then, should mean grasping what it is like being oneself, which means grasping how the world and oneself appears to oneself. This must be a quite different matter from the kind of looking on at oneself which ensues in recognition either of one's physical activity or in a sense of oneself as being charming, pitiable, or whatever.

Certainly one *is* oneself having the world and oneself appearing to one in a certain manner, but it may seem that there is no sense to be attached to grasping what it is like thus to be oneself. Or is something further, either always or sometimes, super-added which is an awareness of one's having these experiences? The familiar difficulty here, of course, is that unless there is a further awareness of this super-added awareness, one seems to have failed to grasp a crucial aspect of what it is like being oneself.

It would not necessarily dispose of the idea of knowing oneself as subject if one allowed that there was really no such thing as knowing what it was like to be oneself at the present moment. Knowledge of something is normally understood as concerned with its past and likely future states as much as with its present one. One can try to remember what it was like being oneself in certain past situations, and this is quite different from thinking of oneself as an object in the past. After a difficult interview, one may wonder how, as object for others, one comported oneself, or as to how one really behaved, how one appeared, or would have appeared, to an external omniscience. This is different from attempting to recapture the flavour of one's emotions in the interview, or the way the faces around one actually then looked to one. Likewise, if concerned to

plan one's future on a largely selfish basis one may speculate as to how things might be felt by one under various "objective" circumstances.

Such retrospective knowledge of oneself is certainly to some extent possible, but it is by no means automatic. One can completely forget what it was like to live through certain situations and grossly misjudge how one will feel about things in the future. In some ways, its status is much the same as the knowledge one has of the subjectivity of others. Whether knowledge of one's present subjectivity is or is not a coherent conception, retrospective and prospective knowledge thereof clearly has the larger compass. If it is no more infallible than is knowledge of the subjectivity of others, that simply emphasises how mistaken it is to identify knowledge of people as objects with knowledge of others, and knowledge of people as subject with self-knowledge. Still, one shouldn't exaggerate this point. Memory, however much it may fail on occasion, does provide us with a peculiarly warm and intimate idea of what it was like living through certain situations, such as we can seldom or ever have of what it has been like to be another.* Moreover, though there is a distinction, there is not a sharp distinction, between turning one's attention on some likely future event involving oneself (or even an actual past one) and turning one's attention on the way it probably will (or did) present itself to one. One attempts, in the latter case, to conform one's present vision of a situation to a future or past vision thereof on one's part, while in the former case one attempts an independent present vision according to the evidence presently, as opposed to then, available, a vision such as one may have of events one will not be there to see.

Thus even with reference to the past and future, knowledge of one's own subjectivity melts into one's own subjective knowledge of

*On our knowledge of our own past, and especially just past, experiences, the reader may find it interesting to refer to F. H. Bradley—*Essays on Truth and Reality* (Oxford 1968) pp. 161-166, and later in the same chapter, and to Edmund Husserl—*Ideen zu Einer Reinen Phänomenologie und Phänomenologischen Philosophie* Estes Buch (new edition Martinus Nihoff 1950) pp. 178-179 (trans. W. R. B. Gibson as *Ideas* London, 1931, pp. 216-217). Here, as elsewhere, Bradley and Husserl reach similar conclusions as, I must say, the present writer has also done, not always only subsequently to studying these writers.

objectivities. The contrast, as we have already seen, is still harder to draw where it is one's present consciousness which is in question.

Three views are possible as to knowledge of one's present state or states of consciousness. 1) It may be held that properly speaking there can be no such knowledge, or 2) it may be held that such knowledge may sometimes exist but need not always do so, or 3) it may be held that such knowledge is always and necessarily present.

1) Those who propound the first view will say that the assertion that a person knows that he is having an experience means nothing more than that he is having that experience, and that to speak of the so-called knowledge is just to speak of the thing known. Properly speaking, therefore, there is no mode of awareness in question referred to by the expression "knowledge of a present state of consciousness".

It does seem rather plausible to say that in any substantive sense of "knowledge" the knowledge that X exists must be something different from X itself, and that if the premiss of this view be granted, its conclusion follows.

2) That premiss is, however, rejected by proponents of the second view. They say that an experience I am having may or may not be something I currently know that I am having. As to what is added, when the subject knows that he is having the experience, there may be different views. Some would say it consisted in the subject's having a description of the experience handy, others would say that it consists in a cognitive mental act which has the other mental acts present in the subject's consciousness as its objects.

There is nothing contradictory in this view. It will maintain that to be a state or mode of consciousness, one (say) in which something else is cognized, is something different from being an object of consciousness, even to him whose state it is. One's total state of consciousness may consist of mental acts of various levels, some directed on "external" things, some directed on other of the included mental acts, but it will be bound to contain some mental acts not themselves objects of any mental act within that total state.

Although this view may allow that any particular sort of mental act could be an object of consciousness, and perhaps that any particular sort of complex of mental acts could be, it must

nonetheless hold that the complex which, as it happens, is the whole of one's state of consciousness, cannot be such an object, since it will be bound to include at least one mental act which is not so.

The two views, then, have an important point in common. Both hold that an individual's total state of consciousness can never be an object of knowledge.

With regard to the total state it seems that we must hold either that it is necessarily always, or necessarily never, an object of knowledge to the individual in question. For if it was only sometimes such a state, that could, presumably, only be because a mental act of some sort might or might not be directed onto it. However, such a mental act would have to be an uncognized component in the total state of consciousness.

3) If one's total state of consciousness is to be known other than by a distinct mental act directed on it, it must be because in the case of one's total consciousness being, knowing, and being known are one. Such is the third view. It is that put forward by Bradley when he says that immediate experience is a "being and knowing in one" (and, in effect, he meant also "a being known"). Immediate experience, understood as being one's state of consciousness as a whole, is (on this view) self illuminating, its being what it is consists in feeling what it is.

Sartre is one of many other philosophers who have contended that "to be and to be aware of itself are one and the same thing for consciousness" and the views on such matters developed in this section have much in common with some of what Sartre proposed in the work from which this quotation comes, *The Transcendence of the Ego* (Jean-Paul Sartre, trans. F. Williams and R. Kirkpatrick, New York 1957, The Noonday Press, Inc. p. 83). However, there are also significant differences (which it would take us too far into questions of exegesis to discuss here). (cf. also *Studies in Phenomenology and Psychology* by Aron Gurwitsch, Northwestern University Press, 1966, p. 293).*

Formally, it sounds in some way vicious to say that the being of immediate experience is one with its knowing of itself. Must not an

*See also Hans-Georg Gadamer—*Philosophical Hermeneutics* (transl. Linge) p. 123.

object be distinct from any knowledge which grasps its character? This, however, is the logic of *objecthood*, and with immediate experience in its totality such expressions as “a being and knowing in one” seem unique in their appropriateness as articulations of the facts as we feel them.

It is worth remarking that on this present view volitional activity belongs to consciousness, when it does, in just this same sense as does cognitive activity and sensation. There is a willing in which the being and the knowing of it are one. Indeed, volitions of which this is not true must be regarded as realities (or constructs) of a quite different category, not as the same thing minus awareness. Of course, volitional activity which is in this sense a mode of consciousness may not be the object of any distinct act of conceptual or recognitional awareness. “Unconscious desire” tends to be ambivalent between desire as a mode of consciousness of which there is inadequate or misleading conceptual grasp, and a supposed reality producing effects like desire which is not a mode of consciousness at all, and, as said, not in the same category of being (unless, indeed, the bold view be taken that it is a mode of consciousness found within another really experienced centre of experience which is distinct from, and not felt together with, the consciousness which is properly speaking *mine*). (For a typical example of modern British unawareness of these points see *Descartes* by Anthony Kenny, Random House, New York, 1968, p. 76 et ff.)

Two objections, in particular, may be pressed as against the upshot of the other two views.

First, there is the fact that one can know about an immediate experience one has lived through previously. That is, one can remember what it was like and even give some expression to one’s memory. But it seems very odd to say that one may remember the occurrence of X but cannot know of it at the time. Memory is surely retention of knowledge, and that implies that there was a knowledge, prior to memory, to be retained.

It may be objected that what one remembers is always only a component in the whole immediate experience, never the totality, and that the second view allows that the components be known. But this will not do, since the second view insists that one’s total state of

consciousness always contained some components which were not presently cognized, and therefore there could be no memory of these, granted that memory implies previous knowledge. Yet it seems quite false and misleading to suggest that there is an intrinsically unrememberable element in every total conscious state, and that only those elements specifically introspected at the time can be recalled. Moreover, though one may not be able to remember everything about a whole previous conscious state, it may still be the flavour of it as a whole, and not particular components therein, which are recalled, and thus, in a relevant sense, the whole, not parts, which are remembered.

The second objection to the notion that immediate experience cannot be said to be known, is that it makes it impossible to express naturally the obviously common-sense-ical point, that, at least in some sense of "know", I know better what it is like being me at the moment than anyone else does. Doubtless this is the kind of simple remark which university philosophers are trained to pounce upon, but when all is said and done, it remains highly unnatural to deny it.

So far then as conformity to what it seems natural to say goes, I believe the third view comes out best. But I also believe it is an effective way of drawing attention to what is really most distinctive to consciousness or experience, to say that an experience is not just something which *is* but something which *feels* itself *being*, without this feeling being a *further* experience.

In accepting the third view, we may still point out certain merits in the other two views, which, however, may be incorporated within it.

We may agree, with the second view, that a state of consciousness may be, but need not be, an object of present conscious examination. As I have a feeling I may at the same time be scrutinising the feeling. Perhaps the being a subject of such scrutiny gives a certain quality to the feeling which it would not otherwise have had, so that certain precise sorts of feeling or other mental state can only be recalled, not currently introspected. Nonetheless feelings and other mental states can, some of them, be the objects of simultaneous mental acts belonging to the same consciousness. The inference that

one's mental state must include elements which are not thus introspected, and must therefore as a whole be unintrospected, may also be pronounced correct.*

What cannot be accepted is that these elements and the mental state as a whole are altogether uncognized. There is another sense in which the being in a conscious state involves the knowledge of being in it. The first view is correct to emphasise the importance, and the basic problem posed by, this sort of knowledge. It sees rightly that there is a sense in which to have an experience and to know that one has it are the same thing.

It draws, however, a wrong inference, in maintaining that this means that talk of knowledge is misplaced here, that because the reference to it is in a sense redundant, it is therefore misleading. Not only do we have verbal paradoxes if we refuse to talk of knowledge here, as has been pointed out, particularly in the sense that one must be described as being able to recall what one never knew at the time. More important, the special mode of being of experience fails to be made plain, if we refuse to allow that these experiences are self-cognitive.

Objection may be taken to my readiness to speak of the experience as knowing itself. It is a mind, or, it may be insisted, a person who knows he has an experience. Passing mental events do not know things.

There are, however, mental acts of holding or judging that something is the case, such as are acts of knowing that it is so, when certain further conditions are met. Such acts are, in the broadest sense of the term, experiences, and experiences which a person who knows anything must have from time to time if his knowledge is to be

*Husserl, it may be worth noting, emphasises that in phenomenological investigations of the mental acts of the ego, there is a splitting of the ego into a natural ego which is immersed in the world and a phenomenological ego which looks at these acts without sharing their immersion (thus practising the *epoché*) and that this phenomenological ego can only be inspected by a further splitting which produces an ego of a yet higher order. (cf. *Cartesian Meditations* transl. Dorion Cairns, The Hague, 1969, p. 35). Reinhardt Grossman has developed the same kind of point carefully. (See *The Structure of Mind* Chapter One). One may also usefully consult Aron Gurwitsch-*Phenomenology and Perception*, North Western Univ. Press, 1966, Page 292. It is, however, Bradley who has dealt best with the point that, after all, there still is a sense in which the uninspected inspecting self is *known*.

any sort of genuine mental possession. I see no harm in saying that such an experience knows the truth in question, though I can see that it might be more correct to call it a knowing of it. A philosopher must have the right to use language flexibly and in the way he feels best suited to draw the right sort of attention to the phenomena he discusses. The terminology used here is continuous with that of William James, a thinker remarkable for his lively sense of the lived character of conscious experience.

Experiences which carry propositional knowledge may be said to know truths about whatever they concern. They also, like all other experiences, carry with them or are knowledge of their own existence.

But what does this amount to? In what sense is immediate experience a being, a knowing, and a being known in one?

The main justification for so describing it is that it represents one aspect of the ideal which is sought under the name of knowledge. To seek to understand something, to know what it really is, is to seek a grasp of it which one obtains in its most perfect form by being it, but not merely being it, but by consciously being it, by its being one's experience. One might refuse to call the *ideal of knowledge* (this condition to which all vital knowledge perpetually aspires) by the term "knowledge" on the grounds that it surpasses it, but one risks thereby having it treated as something not answering cognitive demands, whereas what it actually does is answer them completely. If I have wanted to know what hate is, and then I feel it, I have my answer.

There are other components to the ideal of knowledge, this goal of the enquirer's quest, which such being and knowing in one does not, at least normally, satisfy. It does not set the object known in an explanatory context. But insofar as it satisfies an aspect of what I lack, when I do not know what something is, Bradley's description of it seems apt.

There are, then, two ways in which an experience, or a component in experience, may be known by the subject at the time of its occurrence. It may be known as the object of another mental act occurring within the same consciousness. Some experiences are, and some are not, known as objects of such introspective examination.

Or secondly it may be known by itself and by the subject, in the sense that its mode of being is to be consciously itself and, qua phase of a continuing subject, to be what the subject at that moment consciously is.

What may be known in this latter way must be so known. But we have left it unclear whether this is true only of one's experience as a whole or also of its individual components. The question is a little unreal and is best answered by saying that the whole immediate experience knows itself as a whole by consciously being itself and also knows each of its elements as the precise element in the whole which it is, in virtue of this being precisely that element in what it consciously is.

The open texture of oral tradition

BARRY HALLEN

Five years ago this journal published an article¹ in which I advocated that philosophers take another look at abstract thought in traditional cultures. I suggested that they would find it of greater philosophical interest, in its own right, than anthropology has led them to believe. Since that time I have been practising what I preached, and it is therefore appropriate if I return to the pages of *Theoria to Theory* to air one of my preliminary conclusions about theoretical thinking in non-literate societies.

I will begin by pointing out several omissions from my first paper that have since come to light. I recommended that the academic philosopher seek out his traditional counterpart or *colleague* and then, treating him as a professional equal, attempt to engage him in discussions of philosophical significance. This fails to take into account whether it is realistic or legitimate to assume that the traditional 'wise man' will look upon the academic philosopher as *his* equal.

The *babalawo*² devotes the greater part of his time to first-order, practical endeavours—curing illness, providing marital or business counsel, etc. The academic philosopher has long since surrendered his special claims to do these kinds of things to other more specialized and qualified professionals. One afternoon at the conclusion of our discussions I therefore found myself being asked by a *babalawo* what I actually *did* to earn a living. In other words, sitting and talking in his sitting room was something of a luxury that, he presumed, would have to be supplemented by something more practical.

I may have been prepared to look upon my traditional counterparts as colleagues. But I am not sure, even now, that they would be

Theoria to Theory, 1981, Vol. 14, pp. 327-332
0049-3686/81/1404-0327\$06.50/0

Published by
Gordon and Breach Science Publishers Inc. 1981

prepared to do the same with me. I sometimes find myself slipping into the role of an apprentice. The *babalawo* are certainly prepared to enter into frank and lengthy discussions about their thought system. But they are also concerned that *I* should develop and broaden my own skills so that I too can make practical contributions to society.

A second flaw was that my first paper tended to gloss over the very real problems of translation.⁵ Translating meanings between languages may be possible on the level of simple empirical statements, but when one has to deal with theoretical abstractions of some complexity the problem of interpretation becomes much more difficult. This is something I will return to later on in this paper.

A recommendation I did originally make and which I have found to be of enduring value is that the academic philosopher direct his attention to the kinds of *explanations* and *reasons* produced by his traditional colleague.⁴ This is what I intend to do in the present paper with reference to the subject of oral tradition. What do the *babalawo* themselves have to say about the epistemological status of this extremely important source of information?

Thanks to the social sciences there is a contemporary paradigm (or stereotype) of oral traditions as systems of information. According to it oral tradition is the most important locus of *knowledge* in non-literate cultures. However the form in which the information is recorded and learned says something about the quality of intellectual life. For example, because it is passed on, essentially unchanged, from generation to generation, less emphasis is placed upon the underlying reasons, explanations and reflections that might be given to support or to refute the information. Oral tradition is collective rather than personal, rote-learned rather than reasoned.⁵ This last point, in particular, has led to its being dubbed as of minimal philosophical interest.⁶

The paradigm that emerges from the explanations of the *babalawo* differs fundamentally from the above. In normal discourse the Yoruba use any number of expressions to indicate an appeal to tradition: "*Agbo wipe*" (We hear from our people that . . .); "*Awon baba nla wa ni o so eyi*" (Our forefathers used to say that . . .); "*Bayi ni awon ara kan nso*" (This is what our people are saying . . .);

"Bayi awon baba nla wa so fun wa" (This is what our forefathers told us . . .).

But the Yoruba do *not* classify oral tradition as knowledge, at least in terms of the Yoruba-English equivalents proposed by the most widely disseminated dictionary.⁷ The problem with bilingual dictionaries is that they usually fail to say whether the criteria governing usage of one term in one language are the same as those governing its supposed equivalent in the other language. In the absence of any qualifying statement the dictionary user assumes that they are the same. In the case of the equivalent for "knowledge" this would be misleading.

The two basic categories by means of which the Yoruba classify information are "*mo*" and "*gbagbo*." Bilingual dictionaries usually translate the first as "to know" and the second as "to believe." Neither is entirely accurate.

A Yoruba will regard something as "*mo*" if he is a *witness* to its happening (as part of his own personal experience) and if he *understands* what is happening at the time. Other information that he assimilates but to which he is not a witness is regarded as *gbagbo* (which can be translated as "agreeing to accept what one hears from someone else").⁸

A model for oral tradition frequently referred to by the Yoruba themselves is when a father wants to pass on information to his offspring:

When you have a child you begin to teach him wisdom. When the father becomes old, then he will begin to say, "'This' and 'this' are the things which they told us." Whatever he has seen (i.e., *mo*) or heard (i.e., *gbagbo*), he will be saying the same thing (in turn) to his son. But the son has not seen all of this. Whatever we have not seen but of which we are told is something of which we say "'This' and 'this' are the things they told us."⁹

A Yoruba will not regard something as knowledge ("*mo*"), as reliable to the highest degree, unless he himself has been a witness to it. As the overwhelming proportion of oral tradition is not witnessed, is received by the individual from other human beings, it cannot be regarded as *mo*, as reliable to the highest degree:

This is what you hear from other people. This is what you don't know but which you are saying.

To what degree, then, is it considered reliable?

In the past, when they taught you medicine, or when a story was told, they put it inside (i.e., learned it). It lived inside. Whatever you are told as a story now, you put it inside 'book' (i.e., it is being written down). And it will appear there forever. There is no reason for another person to tell the story again. You just take the book and begin to read it.

In English-language philosophy, 'book learning' is usually classified as "knowledge-that"—as *knowledge* of something which one has *not* witnessed. I am entitled to say, "I know that Leningrad is a city in Russia," even though I have never visited that country and seen Leningrad myself. But a Yoruba would not regard book learning, or oral tradition in general, as *mo*, because "what you are told (either orally or in writing) may not be true."

If you are a person who asks many questions, you will ask a question from someone and you will keep on asking from three or four (more) people. If they advise you, you will understand more than someone who keeps quiet. You will understand what you want from the words of these three to four men who answered your question. You will have one or two ideas from what these people told you. Whenever a question is asked about a similar problem, you will be able to provide an answer which will be similar to the answer (to your own question) which you once received.

Oral tradition is composed of a number of theoretical and practical possibilities that a person *may* find useful for purposes of explanation, prediction and control. The more a person is familiar with his traditions, the more possibilities he can bring to bear upon his experience and thereby better cope with it.

It is possible for one of these possibles to change its status from *gbagbo* to *mo*. This happens when an individual *tests* something he has learned via tradition by applying it to his own experience and finds that it is, indeed, effective. There is rote memorization, but there is also rote memorization plus testing.

The impression one gets from the stereotype is that oral traditions are to be treated with intellectual reverence. Their authority and truth transcend the individual. Negative evidence is therefore suppressed, ignored or converted into positive by means of *ad hoc* devices.

I think that the above material and quotations are sufficient to refute much of this. From the outset a Yoruba approaches the

traditions of his society *only* as things that *may* be true. Their evidential status remains in doubt until they withstand actual testing. They are not truths. They are much more like hypotheses, *possible* truths. This adjectival qualifier allows for the possibility that they may also be proven false, and supplanted by new possibles. This argues against the stereotype of oral tradition as frozen and resistant to change.

When I have summarized these findings for several of my colleagues, I have been cautioned against over-use of my own powers of interpretation to make the *babalawo* sound 'just like us'. In other words, they suggested that the reason I interpret the Yoruba attitude towards their oral tradition as hypothetical is likely to be because of my (rather than their) own familiarity with an allegiance to the scientific method.

This I cannot accept. The gentlemen I had my discussions with are not literate, speak no English, and their knowledge of Western culture is only incidental. I am therefore convinced that this is the way they, as traditional men of science and philosophy *in their own right*, regard the oral traditions of their society.

Although they may sound remarkably 'like us' when reflecting upon their traditions on a theoretical level, when it comes to the actual testing process — to practice — it would be wise to allow for the possibility that the differences become marked. For it is possible that the kinds of evidence (telepathic phenomena, natural phenomena as indicative of human problems, etc.) as well as the kinds of specialists and their methods (witches, wizards, incantations, etc.) that are utilized do in the end give oral tradition a radically different methodological framework.

However I still feel that more attention ought to be paid to remarks like the above that *babalawo* have made in discussion. They make it difficult to agree with Robin Horton's interpretation of traditional world-views as closed (not open to alternatives or to new possibilities), relatively inflexible and having frequent recourse to secondary elaboration.¹⁰

I indicated that I would have something more to say about the problem of translation. What is the significance of the Yoruba preference for classifying 'knowledge-that' as *gbagbo* ('belief') rather

than as *mo* ('knowledge')? Does it matter precisely what word a people use to classify something, as long as their language system still makes a place for it somewhere?

It is an error to conceive of translation as a process of one to one correlations between the abstractions of one language and those of another.¹¹ As with the English language, internal to Yoruba there is a *system* of epistemological categories of which *Gbagbo* is one and *mo* another, and one needs to see how they are connected. Knowledge obtained on the basis of *mo* is inflexible because it is so certain. *Gbagbo* is not, and because it is not, there is good reason to reject that misleading stereotype of oral tradition that has for too long reigned supreme.

Notes and references

1. "A Philosopher's Approach to Traditional Culture," Vol. IX, No. 4, 1975.
2. A title (meaning lit. "father of secrets") which the Yoruba may apply to both diviners and traditional healers.
3. Quine, W. V. O., *Word and Object*, Chap. 2 ("Translation and Meaning"), M.I.T. Press, 1960. I have been discussing this in detail in an at present unpublished paper entitled "Indeterminacy and the Translation of Alien Behaviour."
4. For another example of this approach see Wande Abimbola and Hallen, "Secrecy (*Awo*) and Objectivity in the Ifa System of Knowledge," published in Proceedings of the Annual African Studies Association (ASA) Meeting, Baltimore, Md., USA, November 1978.
5. For a recent vigorous dissenting opinion, see Goody, J., *The Domestication of the Savage Mind*, Chap. 2 ("Intellectuals in Pre-literate Societies?"), CUP, 1977.
6. Wiredu, J. K., "How Not to Compare African Traditional Thought with Western Thought," *Ch'Indaba*, Vol. I, No. 2, July/December 1976.
7. Abraham, R. C., *Dictionary of Modern Yoruba*, University of London, 1958.
8. This thesis is extracted from a forthcoming paper entitled "An African Epistemology: the Knowledge-Belief Distinction and Yoruba Thought" (with J. O. Sodipo). I should like to express my gratitude to the Central Research Committee, University of Ife, for help in funding this project. An introductory account of the Yoruba may be found in Bascom, William, *The Yoruba of Southwestern Nigeria*, Holt, Rinehart and Winston, 1969.
9. Another figure of speech used to indicate an appeal to oral tradition.
10. "African Traditional Thought and Western Science," *Africa* xxxvii, 1 & 2, 1967.
11. Hallen, B., "The African Art Historian as Conceptual Analyst," *The Journal of Aesthetics and Art Criticism* xxxvii, 3, 1979.

Comment: On physics and mysticism

CHRIS CLARKE

Among reactions to Fritjof Capra's stimulating book "The Tao of Physics", discussed in *T. to T.*, 11, 287-300 (1978), was an article by S. P. Restivo entitled "Parallels and Paradoxes in Modern Physics and Eastern Mysticism" (*Social Studies of Science*, 8, 143-181 (1978)—an article which, while drawing mainly on Capra, also critically surveys the general thesis that there are parallels between physics and mysticism. The author's critique has many interesting things to say about this parallelism; but first I want to take issue with him over a question of methodology.

At the start of his main analysis of the "Pitfalls of Parallelism" is this striking declaration (p. 151):

"The basic data for parallelism consist of common language (for example English) statements on the nature and implications of physics and mysticism, varying in technical content. The methodology of parallelism is the comparative analysis of such statements."

How far is this true? It might be entirely justified if one were drawing parallels between two purely verbal activities: for example, between novels produced by two different writers; where it could be argued (and has been argued by the "destructuralist" school) that it is futile to try to go behind a written document to the hypothetical motives of its writer. But neither physics nor mysticism is a purely verbal activity. The primary sources for physics are experimentation and mathematical calculation; in mysticism they are personal experiences of states of consciousness which are unaccompanied, or only incidentally accompanied, by internal verbalisation.

With this in mind, let us consider the validity of Restivo's purely verbal approach. If we are comparing the primary activities of

Theoria to Theory, 1981, Vol. 14, pp. 333-337
0049-3686/81/1404-0333\$06.50/0

Published by
Gordon and Breach Science Publishers Inc. 1981

physicists and mystics—the performance of an experiment with an accelerator and the performance of meditation—then it is surely undeniable that it is useful to draw on any direct experience of these that we may have, as well as using the documents produced by others. But even if we are dealing with theories, as opposed to experiments, we cannot ignore what I have called the primary sources: experiment, mathematics and contemplation. In the case of physics, the theories are expressed in a mixture of both natural language and mathematics, while theories derived from mysticism tend to be expressed in natural language alone. Thus there are two possible methods of comparison: either, one must use statements about physics in natural language but formulated on the basis of both the non-mathematical and the mathematical parts of physical theories, and compare these with statements formulated from mystical theories (the approach of Capra); or else one must formulate mystical theories in mathematical terms (as Masterman has done in various articles in *T. to T.*). In neither case can one ignore the mathematical dimension.

Nor, for different reasons, can one ignore the experiential dimension of physics and mysticism in discussing the theories they engender. For, unless we compare phrases snatched out of context from the writings of mystics and physicists, we are involved in the interpretation of these writings, for which we must return to the primary experiences in so far as we can. Moreover, as J. Westphal pointed out in the cited *T. to T.* discussion, we must also consider whether the theories are true; i.e. to what extent they are grounded in experience—since any parallels found, however striking, would be useless if the theories involved were baseless romances.

Restivo clearly acknowledges that a mere verbal analysis can produce parallels that are vacuous. For example (p. 166):

“If attempts to describe physical reality sound like mysticism, it may be because there are certain linguistic patterns that people turn to when they have to describe the indescribable.”

On the other hand, he points out at the end of the “Pitfalls” section that

“experience in one or both of these realms [of physics and mysticism] does not eliminate the pitfalls. The problem of translating experiences into words for oneself and for others remains.”

True enough! But it is still not unreasonable to expect that any writer who seriously wishes to study the field will be benefitted by experience, however small, of its empirical data. Capra himself is far from unqualified: he is a practising physicist who states that his thought has its origin in a low-level mystical experience and who, as one who has been taught T'ai Chi Ch'uan, has presumably had the physiological experiences that form part of the Chinese theory of Ch'i which he discusses. Is not the moral that we need to combine the experience and insight of Capra with the philosophical sophistication of Restivo?

Most importantly, we are not necessarily looking for one individual compounding Eckhart, Kant and Dirac (who would in any case be too busy to tell us anything). First, a little experience is better than none at all; and secondly, these experiences need not be combined in one individual: the knowledge of several can be pooled in a joint enterprise if a real dialogue can be established.

Turning now from methodology to specific parallels, consider the question of paradox. Is it the case, as Capra claims, that physics is like Zen Buddhism, in so far as both contain paradoxical statements? Restivo denies the parallelism because the functions of paradox are different in the two realms (p. 158):

“paradoxes in mysticism are generally part of the nature of things. In physics, by contrast, they are subject to study with the expectation that they will be ‘resolved’ – that is, brought into the sphere of rational comprehension . . . ”

Restivo is perhaps a little too quick to dismiss Capra's case for parallelism here. Paradoxes can often be posed as questions, to which every answer seems impossible. The situation demands the release of tension, both in physics and in mysticism. In the case of the Zen koan, release is achieved by a change in one's mental set which does not answer the question but, in Hofstadter's phrase, “unasks” it. In physics, although it is sometimes the case that the question is simply answered in a clever way, it can also happen that

the question becomes unasked. "What is the position and the speed of this electron?" In quantum theory all answers lead to contradiction; we must so alter our ways of thought that this question cannot be asked, suggesting at least a distant parallel with mysticism.

But Restivo still wins on balance, because the extent of the mental change required for the unasking is so great in Zen Buddhism as to make the parallel too tenuous to be useful. For the resolution of the Zen koan typically involved the abandonment, not only of the particular concepts that gave rise to that question, but of all conceptualisation whatever (at least insofar as conceptualisation reinforces the Ego); whereas in physics, as Restivo says, the resolution merely involved the replacement of some concepts by others.

Another question that Restivo illuminates, but without, I think, solving, concerns the empirical, the observational side (already discussed in connection with methodology). Is the mystical experience, as it is for Capra, an observation, and hence parallel to science in its empiricism; or is it, as Restivo at one point suggests (p. 165) "a state of non-ordinary thinking", and, if the latter, does it parallel the mathematical, rather than the observational phase of physics? This raises the deepest questions as to the nature of the mystical experience and almost certainly no simple answer can be given. Restivo is surely right to mistrust the argument that mystical experience is just a perception (a perception of an internal state) and so analogous to any other perception, including physical observation. For, while the internal state is of course perceived, the perception is bound up with its production in a way different both from physical perception and from the introspective analysis of, say, toothache or inebriation. Admittedly, mystical writers stress the "infused" (externally given) nature of the experience and the passivity of its "recipient", which might suggest a pure perception as of something external. But we should realise that this passivity is not lumpish quiescence; but rather a state where one's individual will, at first fiercely striving, becomes absorbed in a larger Will; so that, as the Tao-Te-King stresses, action and inaction are no longer relevant categories.

So the parallel with physical observation may be rather distant. I am inclined to think that the parallel with mathematical theorizing

is also distant. Restivo makes the interesting suggestion that (p. 168):

“modern physicists, more so than their predecessors, may be working on or toward the level of transcendental, or ‘higher’ brain functions. Mathematical formalism may, at the frontiers of modern physical theory, involve mental functions different from those associated with the capacities of either hemisphere, or with the ‘normal’ capacities of the brain revealed in ordinary experiences.”

But from my own experience, and from talking to my colleagues, I doubt if mathematics per se warrants this exalted view. The pinnacles of mathematical thought may touch the mystical; but this is true of the heights scaled by Genius in every subject.

What emerges from Restivo’s work, is that the exercise of comparing physics and Eastern mysticism brings many old questions about their natures into a new light. But the resolution of the questions demands a genuine dialogue between scientists, philosophers and contemplatives.

Comment: Neo-Darwinism, continued

The unit of natural selection

ROHAN COLLIER

Neo-Darwinism has been criticized in *Theoria to Theory* for assuming an illegitimate reduction from phenotype to genotype (1). Its basic tenet is that the gene is the unit of natural selection, if this can be shown to be false then any hope of reduction is dashed. Richard Dawkins explains in his book *The Selfish Gene* (1976) how for him, as a neo-Darwinian, evolution follows from the selection of genes; he says: "the fundamental unit of selection is not the species, nor the group, nor even strictly the individual, it is the gene" (p.12). To assess this claim we need to know what characteristics an entity must have in order to be a unit of natural selection; only then can we judge whether it is groups, individuals or genes which qualify as units.

For neo-Darwinians natural selection is the only mechanism which explains evolutionary change. Natural selection occurs following changes in genes (due for example to mutations). These changes provide a source of variety upon which the forces of selection can operate; different genes give rise to different features, some features are better suited to their environment than others, so the genes which produce the more successful features survive. They, for neo-Darwinians, are the units selected in evolutionary processes. Apart from the question of whether genes are indeed the units of natural selection, there is the questionable assumption that natural selection is the *only* mechanism for evolutionary change. The assumption rests on the idea that every aspect of a living organism is perfectly adapted for a particular purpose; this is reminiscent of the claims made by the supporters of the argument from design. It implies that organisms are divided into parts which can only be

Theoria to Theory, 1981, Vol. 14, pp. 339-345
0049-3686/81/1404-0339\$06.50/0

Published by
Gordon and Breach Science Publishers Inc. 1981

understood in terms of their separate fitness values, since only those parts which are fit survive. Yet there are characteristics which have evolved for non-adaptive reasons, the chin for example is the outcome not of a separate gene but of architectural constraints (2), in this case the alveolar and mandibular growth fields which are both regressing at different rates thereby producing a chin. If there are some features which can only be explained in terms of the whole organism then any reductive account of evolutionary change that deals only in parts of organisms will be unsuccessful. This means that this facet of neo-Darwinism may fail irrespective of whether the gene is, or is not, the unit of natural selection.

Natural selection is not the only mechanism for evolutionary change, but without doubt it is one of the most important mechanisms. What kind of entities therefore can function as units of natural selection? The unit of natural selection is that which survives; tautologically whatever survives is what is selected. Since natural selection is the differential survival of entities, some degree of permanence and reproductive success is required for such entities (3). Actual (token) groups, organisms and genes die, what survives is their type. This means that whether groups, individuals or genes are the units of natural selection will depend on whether they are capable of reproducing themselves accurately, of being what Richard Dawkins calls 'replicators' (4). A good replicator would be an entity capable of reproducing exact copies of itself, thus insuring that the *type* survives. The unit of natural selection therefore must be that which survives in copies of itself. It is also that which benefits from selection pressures in as much as it will increase in frequency in ensuing generations.

For Richard Dawkins the replicator unit is the gene; only genes survive in exact copies of themselves, retain their individuality and faithfully reproduce any changes that occur within their structure. Individuals and groups he says are not replicators since they vary from generation to generation; they are "like clouds in the sky or dust storms in the desert. They are temporary aggregations or federations. They are not stable through evolutionary time. Populations may last a long while but they are constantly blending with other populations and so losing their identity" (5), and romantically

he adds that “genes, like diamonds, are forever”. For neo-Darwinians not only are genes the units selected but genes also play a causal role in evolutionary change; they exert ‘power’ as Richard Dawkins puts it (6), in as much as they direct the synthesis of proteins and therefore the making of bodies “machines created by genes for their own survival” (7). It would therefore seem that evolutionary processes should be understood ultimately in terms of genes alone (this claim does not mean that genes *cause* evolution but only that evolution results from changes in genes). And in addition to this, that genes (and this time it is a causal claim) are solely responsible for making bodies, i.e. genes are the only effective elements in terms of which characteristics of individuals and groups need to be understood.

To discover what is a unit of natural selection, those terms needed to explain the theory of evolution by natural selection must be identified. If sentences using terms such as ‘individual’, ‘group’ can be rephrased in an evolutionary context without loss by sentences using only the term ‘gene’, then indeed genes are the units of natural selection. They are those entities which in the long run survive, not only in the sense of being essential to the theory but also in the sense of being the entities which actually do benefit from natural selection. That is to say, they would be those entities which need to be said to exist in reality for natural selection to take place and which need to be referred to when formulating a theory of evolution by natural selection.

If it were possible to account for evolutionary change in terms of genes being the only units of natural selection, then the neo-Darwinian reduction would be successful. An objection often levelled at such a view is that selection pressures act not on genes themselves but on the way they are expressed in the phenotype (8). A gene survives because it has advantages over other genes in a particular environment, but it interacts with the environment only through the phenotype. The force of natural selection therefore acts only indirectly on the genotype. Whether it is groups, individuals or genes which are the units of natural selection, biologists agree that selection itself operates on the phenotype, but the question is what survives as a result of this selection (what is replicated)? Is it

phenotypic characteristics or is it genes? For neo-Darwinians it is genes, since only they reproduce exact copies of themselves, unlike their phenotypic expressions which are blurred and blend with each other in subsequent generations: the phenotype "is the all important instrument of replicator preservation: it is *not* that which is preserved"(9). This of course assumes a one-to-one correspondence between phenotypic traits and genes. Such a reduction is not possible (10). Some phenotypic traits do result from only one gene or one set of genes, but many result from any number of genes (i.e. different genes can give rise to the same trait).

Undoubtably genes initiate the process which produces a phenotypic trait but the direct expression of a gene is a protein; many other components enter into the making of a trait. The fact that a genotypic change will probably have an effect on the phenotype does not mean that a particular trait is reducible to a particular gene. One cannot give a complete analysis of selection without reference to phenotypic traits themselves. This is evident in for example explanations of mimicry, where an edible species of butterfly imitates the wing patterns and colours of a distasteful species thus avoiding being eaten by predators. It is those wing patterns and colours the predators single out, natural selection favours a certain wing pattern and colour regardless of which genes produced it; what survives is that wing pattern and colour. Any explanation of the evolution of mimicry by natural selection which did not take into account phenotypes would be incomplete. Genes can be units of natural selection only where there is a strict one-to-one correspondence between a gene and a phenotypic trait; a complete reduction of phenotype to genotype is not possible.

Groups are sometimes units of natural selection. Simple cases of group selection probably operate when several genes act together as a unit. For example animals which had a set of genes producing the following combination: 'fur-brown in summer-turning white in winter' (like the ermine) would be well adapted to an environment where the snow fell only in winter. It isn't the gene for 'fur' 'white' or 'brown' which is being selected, but a combination of these genes. This is obvious if one considers the possibility of there being two species in the same environment, one with that combination and

one without, the one with the combination would survive. The same point could be made for cases of metamorphosis; the life cycle as a whole is selected. A well documented case is that of sickle-cell anaemia (11). This is an inherited disease of the red blood cells; individuals with sickle-cell anaemia die before puberty. In areas where the disease exists, most individuals are heterozygous for the gene coding for red blood cells, that is to say they have one gene coding for normal red blood cells and one gene coding for sickle-cells. These heterozygotes do not get sickle-cell anaemia, only homozygotes for the sickle-cell gene do. Heterozygotes are also protected against malaria by their sickle-cell gene, because their red blood cells have a tendency to sickle (collapse) before the malarial parasite can complete its reproductive cycle; heterozygotes therefore are selected as advantageous over homozygotes. Homozygotes for normal red blood cells die of malaria, homozygotes for sickle-cells die of anaemia, heterozygotes are protected from both illnesses.

Richard Dawkins feels that ESS (evolutionary stable sets of genes) adequately account for such cases (12), each gene in a combination being selected in turn against the background of other genes which are part of its environment; "gene-pools come to consist of genes, that do well in each others company" . . . "If we find harmonious and intergrated units at one level, these do *not* have to be produced by selection among units at that level. ESS theory shows us how harmony and integration at a high level can be produced by selection among component parts at a lower level" (13). But selection *cannot* be understood without reference to the combined action of the genes; what survives and is replicated is the combination.

Group selection also explains sexuality. Sexuality is the mechanism which maintains variety within a group; without variety groups cannot adapt to environmental changes and become extinct. Sexuality arose as a result of gene selection, but the fact that sexual species predominate and asexual ones die out, suggests that selection *is* operating at the level of the group.

Other cases of group selection have been reviewed by Elliott Sober (14), who quotes laboratory experiments by M. Wade (15) where populations of flour beetle *Tribolium castaneum* were selected for

'smallness of population size'. This is a property of the group, it cannot be tied down to any particular genes since populations within the same species achieved smallness by various methods, such as cannibalism, lengthening of developmental time, rise in infertility. Sober also refers to field observations concerning populations of myxoma viruses and populations of rabbits (16). Viruses and rabbits survived in Australia because selection favoured 'low virulence' amongst populations of viruses (who thus did not kill their hosts) and immunity amongst rabbits. Both these are group properties; since in a population of viruses, for example, all the individuals have different virulence, the property selected is the overall virulence of the group, each individual virus benefiting from that overall property, independently of its own virulence. These cases show that groups are sometimes the units of natural selection.

Although neo-Darwinians claim that group selection is a special case of gene selection and ultimately reducible to it, this is manifestly not so; group selection will occur whenever there is a differential survival amongst groups.

Neo-Darwinians maintain however that even in such cases it is still genes which are faithfully reproduced and survive, so it is still genes which are the units of natural selection. This seems to be an over-simplification, it isn't genes themselves which survive, but gene types (17). But group types survive too; *individual* groups are, as Dawkins said, unstable, but group *types* survive just as much as gene types. If a group with a certain set of characteristics survives, then in future generations it is that *phenotype* which is being replicated, which survives and which therefore is the unit of natural selection by the terms defined by neo-Darwinians themselves. Natural selection therefore acts on tigers *as* tigers and not on their genes; it is the *same kind* of organism which is being reproduced.

Notes

1. *Theoria to Theory* Vol. 13, No. 2 and Vol. 13 No. 4.
2. See Lewontin, R. C. 1976. Sociobiology - a caricature of Darwinism. *PSA* 12 pp. 22-31 and Gould, S. J. and Lewontin, R. C. 1979. The Spandrels of San Marco and the Panglossium Paradigm: a Critique of the Adaptationist's Programme. *Proc. R. Soc. Lond. B.* 205, 581-598.

3. Richard Dawkins says the following properties are needed: "Longevity, fecundity and copying-fidelity" 1976. *The Selfish Gene*, Paladin, p. 37.
4. For Richard Dawkins a replicator is "an entity in the universe which interacts with its world, including other replicators, in such a way that copies of itself are made". 1978. Replicator Selection and the Extended Phenotype. *Z. Tierpsychol.* 47, 61-76.
5. *The Selfish Gene* p. 36/37.
6. Replicator Selection and the Extended Phenotype p. 67.
7. *The Selfish Gene* p. 2.
8. See Berry, R. J. 1977. *Inheritance and Natural History*. Collins. pp. 61 & 306. and Lewontin, R. C. 1974 *The genetic Basis of evolutionary Change*. Columbia University Press, N.Y. pp. 20ff.
9. Richard Dawkins. Replicator Selection and the Extended Phenotype. p. 69.
10. This point is well argued by Goodwin, B. 1979 in On Morphogenetic Fields. *Theoria to Theory* Vol. 13, No. 2 and in the discussion on neo-Darwinism in the same issue. Also by Bateson, P. 1980. *Theoria to Theory* Vol. 13 No. 4.
11. Berry, R. J. 1977 *Inheritance and Natural History* p. 69.
12. See Richard Dawkins. *The Selfish Gene*. p. 90/91.
13. Dawkins, R. 1980 Good Strategy and evolutionary Stable Strategy. In G. W. Barlow and J. Silverberg (eds.) *Sociobiology, Beyond Nature/Nurture?* Westview Press, Boulder, Colorado.
14. Sober, E. 1980. Significant Units and the Group Selection Controversy. Unpublished article.
15. Wade, M. 1976 Group Selection among Laboratory Populations of *Tribolium*. *Am. Nat. Acad. Sc. USA.* 73. 12.
16. From Lewontin, R. C. 1970 The Unit of Selection. *Annual Review of Ecology and Systematics*.
17. See Mackie, J. L. 1978. The Law of the Jungle. *Philosophy.* 58, pp. 456/457.

Sentences

The first step to a real understanding of any religion is to shake ourselves free of taking the world for granted and to look at it with fresh eyes. In doing this we become sharply aware of a twofold condition of dependence: the total mutual indebtedness and interdependence of the whole world as we know it (and perhaps beyond), through the incessant process of life given and life received; and, even more fundamental than this, the entire dependence of this complex organism upon ultimately mysterious power. This universe with its intense life and reality and its accessibility to precise investigation is none the less rooted in silence and mystery as to its creating and sustaining cause. We are bound to ask, —Is there a Voice which calls us into this silence, which invites us to share this mystery? or does man's search and adventure break off, like an unfinished sentence in mid-air? If there is any completion of this drastic anacoluthon, it is to be found in the whole religious experience of mankind, and the mind which disregards this leaves part of its capacity unused. The beginning of faith is the need to bring our knowledge and our ignorance into some relation and the admission of a possibility that such a relation could exist. In this context of thought, the opposition between faith and reason fades. Faith is seen as an intellectual quality, the proper form of the mind in its approach to ultimate mystery, and the religious history of the world becomes an essential object of thought and investigation. It is not a fossil deposit which can instruct us about the past but cannot affect the present, but the place where we must look for some clues to the hidden mystery on which the known world depends.

*From a posthumous unpublished MS., "Leaves from a Notebook on the Entry to Belief" by Amy K. Clarke. ©Kathleen Clarke.

It may be that the first religious experience is dread. But it grows into a consciousness of the dreaded power as not striking with a blind inevitability, but willing and creating; and not as implacable, but merciful. There is a correspondence, as we should expect, between these religious ideas and the behaviour of our physical environment, where we see some kind of creative drive and also, when destruction occurs, a movement towards restoration. In the life of nations and individuals the same is true. We can all remember moments, both public and private, when the most disastrous and entangled situation takes, slightly but surely, a turn for the better. These two movements, of creation and restoration, do not always win their victory, but the whole healing and building work of the world is an expression of their inherent force. They correspond, in our environment and our own active lives, to that 'primacy of affirmation' which seemed to offer us a justification for constructive thought.

* * * * *

"I once had the thought," I said, "that I should like to be the listener-in at a heavenly dialogue, between Kant, and Descartes, and Ludwig Wittgenstein." The angel smiled, as if the collocation pleased him.*

"It seems to me," I ventured to say, "that you share my shy taste for the philosophers."

The angel was silent for a little while, before he spoke again. "Do not misunderstand me. We admire your minute and detailed observation, your delicate analysis of what you observe, the unwearied research and investigation by which you uncover the patterns of the universe, the skill with which, when discovered, you use them. Many things are wonderful, but none is more wonderful than man. Indeed, in the richness, flexibility, variety of your operations, you seem to draw nearer than ourselves to the inexhaustible fecundity and variety of God. These things too the angels desire to look into, with love and without envy. But certainly it is in your philosophical thinking that you seem to draw closest to

* A strictly academic angel looking over the writer's shoulder.

ourselves and to be speaking something nearer to our language. Were you to come among us you would recognise, I think, some of the great words of your philosophers blended into the heavenly song."

"Then I am right," I said, "in so reverencing philosophy and approaching it with such wonder and delight. But can you tell me more clearly why this is?"

My visitor was again silent and I began to think that he had left me.

"You must remember," he said at last, "that what you call the religious instinct in man is not always good in its operations. It can devote itself to evil: it can be enslaved to falsehood. Though its direction is to the light, it is gross and opaque in its beginning, and because of this its action can be dark and cruel. The great clarifiers and purifiers of religious ideas have been science (even in embryo) and philosophy. Through all the history of religion they have been her truest friends, opening her eyes on the world and purging and enlarging her thought about it. The quarrels between them have been the fruitful strife of friendship. — Surely," he added, "your best thinkers have been those who refuse to see a dual world or to separate science from religion. The two belong to each other, — and if you have a special joy in philosophy, this is because it is the bond between them. Tell them, O tell them" (and as my dream faded it seemed that all the bells of Heaven were ringing it), "tell them that this is no time for the severance of friends."

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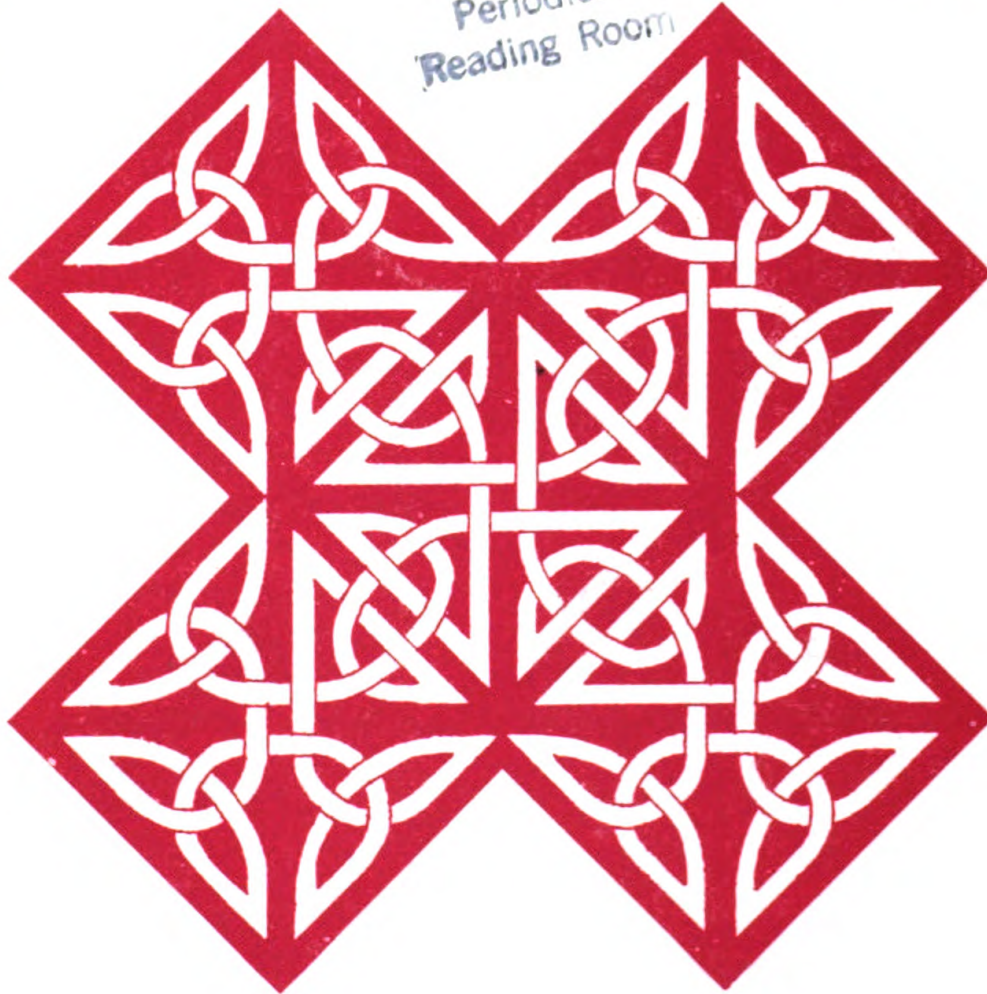
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Volume 13, Number 2 (1979)

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Individuals who warrant the journal is for their own personal use, per volume, postpaid: \$23.00/£11.1
Libraries, research institutions and others, per volume, postpaid: \$48.00/£24.00.

The subscription rates include a distributing charge of \$12.00 for postage and handling.

Subscriptions should be sent to Gordon and Breach Science Publishers Ltd., 42 William IV Street, London WC2, England.

OCTOBER 1979 issue

©1979 The Epiphany Philosophers, Gordon and Breach, Science Publishers, Inc., One Park Avenue, New York, N. Y. 10016. Distributed by Gordon and Breach Science Publishers Ltd., 42 William IV Street, London WC2N 4DE, England. Printed in Great Britain at The Lavenham Press, Lavenham, Suffolk.

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Editorial

In this number we have a discussion of Neo-Darwinism with some biologists and a geneticist. We intend to follow this up with further discussions, and we invite comments. Neo-Darwinism is a matter of current interest, partly because of David Attenborough's splendid television programmes "Life on Earth", which showed natural selection, and indeed a great deal more besides, going on in the wild; partly because of the popularity of Sociobiology, sparked off in this country by Richard Dawkins' eminently readable best seller "The Selfish Gene". Sociobiology, based on genetics, is now the subject of a number of articles in journals such as *New Scientist*, both in Britain and America. It is in fact on the way to producing a new myth. So we are concerned to look at this myth. Also, since *T. to T.* is concerned with seeing places where philosophical questions come up in the sciences, we shall be looking, with our friends among the biologists and geneticists, at some very real ones posed by Neo-Darwinism. This will be a longer term enterprise: this editorial will try to do no more than open it up by looking at how Sociobiology is creating a new myth.

No doubt this is not what serious geneticists intend, but how much are they doing to counter it, and how much does their language encourage it? Modern genetics, the study of what are held to be mechanisms for the spread of heritable characters among populations, distinguishes Neo-Darwinism from the older Darwinism. That too produced its 19th century myth in "Social Darwinism". If success in competition for scarce resources was the condition for survival in nature, and was indeed a law of nature, then it was also to be taken as a law of society. Neo-Darwinism puts the emphasis not on the survival of individual animals and plants, but on the

spread of their genes within a population. This is where the new myth comes along: we get the gene thought of as if it were what Mary Midgley has nicely called “a dedicated and monomaniac conscious agent, addicted to dynastic ambition” (“Man and Beast”, p. 147. Harvester Press 1979). This picture comes about through a particular use of the notion of altruism. The idea of life in nature as a general competitive struggle came up against observed facts of behaviour which was disadvantageous to an individual animal, but which made it more likely that its kin would survive and reproduce, and thus carry on its genes. It is this kin selection, and not the vague notion of “good of the species”, which is seen as explaining what looks like altruistic behaviour, e.g. the tending of queen bees by sterile workers, an animal’s defence of its young against predators. But what sort of explanation is it? It is a way of saying that such “altruistic” behaviour is selected because, although it may not be to the advantage of the individual animal, it makes it more probable that its genes will be perpetuated in its relatives. These consequences making for selection are presented in language which can even be that of cost-benefit analysis. So W. D. Hamilton, in “The Genetic Evolution of Social Behaviour”[†] says “This means that for a hereditary tendency to perform an action of this kind to evolve the benefit to a sib must average at least twice the loss to the individual, the benefit to a half-sib must be at least four times the loss, to a cousin eight times and so on. To express the matter more vividly, in the world of our model organisms, whose behaviour is determined strictly by genotype, we expect to find that no one is prepared to sacrifice his life for any single person but that everyone will sacrifice it when he can thereby save more than two brothers or four half brothers or eight first cousins”. (In a model of this kind one factor is varied while everything else is held as constant. This has its problems which we hope to look at in a later context).

[†]*Journal of Theoretical Biology* 7 (1964). Reprinted in “The Sociobiology Debate”, edited by A. Caplan, p. 208. Harper and Row 1978. J. B. S. Haldane started playing this game in the 1930s. The computations depend on the fact that in the division of sex cells in meiosis the number of chromosomes is halved, so that offspring receive half their genes from each parent.

There is also the use of language of human motivation—“selfish genes”, “altruistic genes”, “spiteful genes” (these last being defined as producing behaviour deleterious to others without any advantage to the individual). So these clever little genes get represented as Machiavellian agents, conning individuals into behaviour which will further their own perpetuation. For our bodies are “survival machines” for genes, which “swarm in huge colonies, safe inside gigantic lumbering robots, sealed off from the outside world, communicating with it by tortuous indirect routes, manipulating it by remote control. They are in you and me; they created us body and mind, and their preservation is the ultimate rationale for our existence” (Dawkins, “The Selfish Gene”, p. 21). It should be noted that what are preserved are not the original bits of DNA which make up the individual’s genes, but the replications of these in other individuals: so the gene can be considered as “*all replicas* of a particular bit of DNA, distributed throughout the world” (Dawkins, *op. cit.*, p. 95). This is a matter of definition; however, the dramatic effect of “selfish gene” talk comes partly from this ambiguity between the notion of the gene as an individual and a distributed entity (rather like the old philosophical problem about “what is substance?”).

The geneticists claim that they have their own rigorous uses for terms such as “altruistic” and “selfish”. Nevertheless they, or rather the Sociobiologists, and notably E. O. Wilson in his monumental “Sociobiology: the New Synthesis” (Cambridge, Mass. 1975) have launched these terms, with all their associations with the normal language of motivation. So we get titles of articles in recent numbers of *New Scientist* such as “Genes Play War Games” (21-28 Dec. 1978); “Genes take care of their Own: Altruism isn’t all it seems” (Jan. 4th 1979); and of course the title of Richard Dawkins’ “The Selfish Gene”. Dawkins insists in various places that he is not postulating conscious motivation, but simply referring to unconscious programmed behaviour which has certain selective advantages. Yet the dramatic appeal of the book draws largely on the associations of this language of motivation. One wonders whether behind this appeal there is the natural human desire for explanations in terms of personified causes: you give up the notion

of the Great Designer, but you have a lot of little designers, working on cost-benefit schemes. (There is indeed a question as to how far genes should be thought of as *causes*, above all as separate units of selection in strands of cause and effect, rather than as transmitters of information within a complex of factors. The discussion in this number brings out that, if we are speaking causally, the effects of the amino-acids of the genes can be traced to their action in protein synthesis; beyond this, their correlation with particular traits in the phenotype is extrapolation).

And now for the myth. This way of speaking about what looks like altruism in the individual as covert selfishness in the genes feeds a very old tendency—to assume that selfishness is natural and “scientific”, whereas unselfishness and cooperativeness are not, and should therefore be explained as forms of self-interest. So if it looks as if someone was behaving altruistically, it is said that he must have had a “motive”, assuming that motives really to move must be self-interested. Now they may say that he must have a “gene for altruism”, or, if they are slightly more sophisticated, they may say that he has a selfish gene which is conning him to behave altruistically for its own purposes. For as E. O. Wilson has said, “When altruism is conceived as the mechanism by which DNA multiplies itself through a network of relatives, spirituality becomes just one more Darwinian enabling device”. (“Sociobiology: the New Synthesis”, p. 120).

Ethology, as the detailed study of the social behaviour of animals based on actual observations, is a splendid thing, and there are some splendid examples of it (Jane Goodall and her chimpanzees in the rain forest for instance, and Brian Bertram’s lions in the Serengete). But Sociobiology as “the New Synthesis” can give too limited a view of the possibilities of intelligence and cooperation among animals as well as among humans. With regard to humans, Dawkins does indeed say in his last chapter that culture has produced new possibilities, even that we “can rebel against the tyranny of the selfish replicators”, and that many may have a capacity for “genuine, disinterested, true altruism” (*op. cit.*, p. 215). But less note is likely to be taken of this postscript than of the dramatic tenor of the rest of the book.

In a review in *New Scientist* for March 28th 1979 of "The Sociobiology Debate", edited by A. Caplan, which is a collection of the main articles in this controversy, John Maynard Smith says that these articles show how full of confusion all this is, but he concludes that here confusion may be less dangerous than certainty, whether about the bearing of these views on human morality or about the extent to which any behaviour can be said to be genetically determined. This is not to say that animals and men are not so constituted biologically that they can learn to do some things readily and others with difficulty, if at all—hence terms like "instinct" and "innate", which are unsatisfactory, but which point to facts that upholders of the contrary ideology want to deny. The contrary ideology is the largely political one of those who attack Professor Eysenck, for instance, for believing that hereditary factors may have anything to do with people's capacities to learn.

So we get ideology and counter-ideology, spreading into the schools as well as in the popular press and the media, and encouraged by catch-penny titles such as we have cited from not so popular journals such as *New Scientist*. The serious literature contains qualifications about the implications of such titles: Wilson himself, for instance has said in several articles that what he takes to be genetically based tendencies in human nature do not prescribe the ethical rules which *ought* to be followed. It would indeed be embarrassing for the sociobiologists if they did, for fitness as measured by reproductive success can hardly be the chief ethical guiding light in a world in which there is a population explosion. But such disclaimers are not so likely to catch attention as are other remarks of Wilson's such as that spirituality is but one more Darwinian enabling device.

Here, then, are some ways in which Neo-Darwinism based on genetics is producing a new popular myth. It raises other questions, perhaps more philosophical and less ideologically charged, and we hope to look at some of them in later contexts.

ERRATA

In the discussion “Three Kinds of Rural Community” in T. to T. XIII, i the following corrections should be made:

Page 6, lines 7 and 8. “Our Trust farming company” should read “our Trust and our farming company”.

Page 6, line 20: For “model” read “nodal”.

Page 16, lines 22 and 24: “and we were in the wrong place. . . so that we had to bring clay up and down” should read “and you were in the wrong place. . . so that you had to bring clay up and down”.

We offer our sincere apologies to Raymond Cochrane in whose contribution these mistakes (our fault and not his) occur.

We also apologise to Georg Feuerstein whose name was given in T. to T. XIII i as George.

Discussion: Neo-Darwinism

R. B. BRAITHWAITE, DEBORAH CHARLESWORTH, BRIAN GOODWIN, GERRY WEBSTER, JONATHAN WESTPHAL and members of the Editorial Group (Q).

R.B.B. We are here to discuss neo-Darwinism. We ought to agree about what propositions we are going to discuss. I have been reading Popper's autobiography *Unended Quest*,¹ in which he states what he takes neo-Darwinism to assert. He gives the following things: "(1) The great variety of the forms of life on earth originates from very few forms, perhaps even from a single organism: there is an evolutionary tree, an evolutionary history. (2) There is an evolutionary theory which explains this. It consists in the main of the following hypotheses: (a) Heredity: the offspring reproduce the parent organisms fairly faithfully. (b) Variation: there are (perhaps among others) 'small' variations. The most important of these are the 'accidental' and hereditary mutations. (c) Natural selection: there are various mechanisms by which not only the variations but the whole hereditary material is controlled by elimination. Among them are mechanisms which allow 'small' mutations to spread: 'big' mutations ('hopeful monsters') are as a rule lethal, and thus eliminated. (d) Variability: although *variations* in some sense—the presence of different competitors—are for obvious reasons prior to selection, it may well be the case that *variability*—the scope of variation—is controlled by natural selection; for example, with respect to the frequency as well as the size of variations. A gene theory of heredity and variation may even admit special genes controlling the variability of other genes." I thought this was quite a fair account.

Theoria to Theory, 1979, Vol. 13, pp. 87–107
0049-3686/79/1302-0087\$04.50/0

Published by
Gordon and Breach Science Publishers Inc., 1979

D.C. It's a fair account. I would say out of focus rather than wrong. I don't think a biologist would put it like that.

R.B.B. Of course not.

D.C. Especially, I think, his last point about variability. I certainly think that it would be controversial, even wrong.

R.B.B. He clearly put that forward as an extra point. But up to there would you on the whole agree?

D.C. Yes, although one would quarrel with the detail. I wouldn't put it in those terms, and especially the phrase about organisms reproducing themselves faithfully. What are reproduced faithfully are genes, not individual organisms. The point about "small" mutations is right. Unfortunately we can't say much about the origin of species. Population geneticists that play with computers deal with much smaller component parts of the problems, handling often just one gene.

J.W. But isn't this just the problem? What any account of origins has to face is the big parts, the big jumps.

R.B.B. Popper isn't interested in the origin of species. What he's concerned with is what is happening at present.

D.C. That's what most population biologists are interested in today. The problem of the origin of species – well, everyone is aware of it, as a problem. Darwin didn't really explain what his title led one to think he wanted to explain.

J.W. I thought that evolutionary biologists claimed to have an explanation of the existence of different kinds of organisms. They surely think that in something like melanism they have the model of the kind of explanation wanted for large scale evolution. Do you mean that biologists don't want to make the jump from processes on the scale of melanism to macro-evolution any more?

D.C. No, the distinction I'm making isn't quite like that. People are interested in the origin of species, but there are two problems. One is adaptation. You can discuss this sort of adaptation in the terms you were just using. But this doesn't give one an explanation of differentiation between species, why they don't mate, for example. One would say today that the origin of species is the origin of this separation, and studying it is studying how two formerly continuous groups of animals or plants came to divide into two distinct species.

People working in the field would feel that they can reasonably put forward explanations for adaptation. That's what most work has been done on. The problem of species formation has also received a lot of attention, and we think we have pretty clear ideas about the most common course of events: differentiation of geographic races of a species, which then get cut off from one another and may sometimes ultimately evolve into two separate species.

B.G. Granted the basic form, one can then show how specific aspects of this form are adapted to a given environment.

D.C. You tend to think of natural selection operating on part of the organism, tending to make it grow bigger, for example. You're happy to extrapolate to differences between species with respect to structures for which one can see a function.

Q. You're using function here in a colloquial sense, I presume.

D.C. Yes, one tends to look for a function first. Can one see a function? You're obviously not going to accept a teleological explanation for its evolution, but if you didn't see a function to be explained, you wouldn't have a problem. In present day population genetics there are things which don't have a known function, for instance differences between individual protein structures, and there everybody is completely at sea as to whether one should bring in explanations in terms of natural selection, or whether it's totally irrelevant.

Q. Could you say how you use the term function? Does it mean something like the contribution a factor makes to a system to keep it an ongoing concern?

D.C. I don't think I could define a function in a couple of sentences. The concept has historical roots in the notion of a Designer. Was there an alternative explanation?

B.G. Could one look at the organism as a problem-solving device, and these functions as solutions to particular problems?

D.C. Yes, but one needn't assume that, because irrespective of origins one can see very clearly that certain aspects of organisms serve a function. The black colour of the moth, for example, has the function of protective coloration.

J.W. But you don't need the concept of function to explain the evolution of melanism.

D.C. If you were writing a scientific paper on the evolution of melanism, you wouldn't say function; that would be naughty.

Q. So something's naughty in science, but you do it anyway.

D.C. When one talks in terms of functions, one is in a different stage of inquiry from the explanatory stage. That's why it would be naughty to say that black coloration has the function of protection. You only talk about function at the stage when you're first looking at the problem, not as part of your evolutionary explanation.

J.W. But why talk about it even then? What's the difference between saying that the colour has the *function* of protection and merely that it *does* happen to protect? It surely makes no difference to the question to which the explanation is an answer, namely, why this colour? And besides, if functions don't provide explanations, then what would an explanation be like?

D.C. Well, it wouldn't involve the word function at all, except that what we're trying to explain is a function. Our explanation would be that a mutation occurred giving black coloration, and this resulted in a much lower predation rate on the melanic individuals.

Q. It seems to be altogether too easy to be able to have mutation every time you want it.

D.C. There's got to be independent genetic evidence. To use mutation as an explanation it's often enough to know that genes exist which can have particular effects, for example, an increase in the size of an organism like the horse.

G.W. From classical genetic observations you can only establish correlations between mutations and phenotypic changes.²

R.B.B. But how literally do you observe genetic variations as opposed to observing their consequences in breeding? How much do you observe genotypes as opposed to observing phenotypes?

D.C. One observes very little at the level of the D.N.A. sequence, which would be the genotype. However, much work is being done today on the amino-acid sequences, which is very close to the basic genotypic level.

B.G. An example of this is found in sickle cell anaemia where the mutation results in a specific alteration in the amino-acid sequence of the haemoglobin.

J.W. But still, there's a difference between something going on

in the haemoglobin, which is chemically observable, and saying something is occurring at the genetic level.

D.C. The logical jump, insofar as there is one, comes in saying that every body which has sickle cell anaemia has this abnormality in the red blood cells.

J.W. Yes, that jump is innocuous, but the question is about the link between the chemistry of the blood and the genes.

D.C. So you're interested in the actual jump between the amino-acid sequence and the genes. Well, that's easy, because the genes have been sequenced. Recently the D.N.A. base sequence has been determined. From now on people are going to be sequencing genes more often.

J.W. The question is whether the gene is a theoretical concept or not. I should have thought it pretty obviously was. How can it be invoked as a *causal* factor?

Q. How near are you getting to observing these factors and how much are they still hypothetical entities behind the amino-acids?

D.C. There will always be an element of correlation.

B.G. The causal chain extends only to the protein, and then you have the big hiatus between protein and phenotype. This is where many different hypotheses about how the system is organised can be entertained. Many biologists would maintain that from the genome you can predict the form and behaviour of the organism.

Q. This seems most unlikely.

D.C. Can anybody actually predict the three-dimensional structure of a protein from a knowledge of its primary sequence?

B.G. The answer is that there are cases where you can and cases where you can't, so that a general statement isn't possible.

G.W. There was a time when the genome was effectively a black box, and you could ascribe any useful properties to it that you needed. One of the virtues of molecular biology was that it enabled one to specify fairly precisely what the D.N.A. does, and in a sense it doesn't do so very much. When you reach the primary structure of the proteins, as far as we know that's it. So what's been shown is that genetics is not very interesting for those concerned with problems of biological form. Nevertheless, neo-Darwinists do often seem to maintain that the phenotype is equated with the genotype. They

spend all their time talking about changes in gene pools, yet give the impression that they're talking about changes in organisms, and this can only be true if in some way genotype and phenotype are collapsed into one another. All classical genetics can explain is the difference between organisms, nothing about why there are mice and rabbits and different species. But this seems to be rarely acknowledged.

Q. But would you expect a professional geneticist to publicize the inadequacies—for example, the extent to which genetic explanations are *elastic*? One can postulate the presence of genes to explain any character one wishes, such as black and white moths, and eyeless mutants and the business of suppressors in *Drosophila*. And isn't this part of the wider, well-known difficulty, that all the key terms in both classical and neo-Darwinism are defined in a circular way?

D.C. To take the case of the black and white moths, there must always be good genetic evidence for such claims. One is not satisfied until this is found. When claims are made which are not substantiated by such evidence, there is always someone who gets up and says, "Well, have you done the genetic tests?" It's often very difficult, however, to give complete genetic explanations of particular cases, and you often end up with a variety of alternative explanations, without being able to distinguish between them.

J.W. But this certainly doesn't sound a strong enough platform from which to say anything very definite about the basis of evolution.

B.G. The explanations, after all, are only correlations. You don't have a causal explanation in the sense that the presence of a particular gene tells you how you get, for example, eyeless *Drosophila*.

R.B.B. The question is, to what extent are genetic explanations explanatory rather than simply descriptive?

G.W. In Darwinian theory the form of organisms is thought of primarily in terms of functional adaptation. There was a tradition before Darwin from which this view is derived, which is basically Natural Theology. Now there is a whole stream of thinking dating from the end of the eighteenth century, through to Darwin.

including Cuvier, St. Hilaire, and Richard Owen, which said there were irreducible principles of structure which govern the form that organisms have; in other words, there are autonomous laws of form. My impression is that such ideas are built on the model of Newtonian mechanics, and this is the sort of analogy Brian and I want to use. It helps us understand the relation between genes and organic form, and how it is one of correlation and not determination. Before Newton, you had observations such as that different forms of motion, the ellipse, parabola and hyperbola are correlated with different initial conditions. For example, if you change the velocity, you change the form of motion. Newtonian mechanics give a complete set of laws of motion which enable you to generate all the different forms of motion that you observe by writing in initial velocity as a parameter in the equations. The forms of motion are then the set of conic sections, and Newton can explain them. Pre-Darwinian comparative anatomists and comparative embryologists probably had this sort of thing in mind, and wanted laws of biological form which had comparable scope, if not a similar formulation, and which would enable one to deduce the actual forms which are observed. So we'd have structuralist concepts rather than the historical ones which Darwinism provides.

Q. How does one go about identifying these laws?

G. W. Pre-Darwinian comparative anatomy, which was used by Darwin himself as evidence for his theory of evolution — it was rather evidence for evolution in general, not just Darwinian — proceeded by looking at the structure of adult organisms and stages in their development to see if there are any empirical regularities in the forms which would suggest laws. There is a unity, for example, in the plan of the vertebrates, despite diversity of detail. The pentadactyl limb is an example of a typical form found among all vertebrates. Underlying the diversity of observed form is a unity. Seeing the different vertebrate limb forms as transformations of this basic pattern would be like showing how the different forms of motion under the action of a central force are transformations of one another. This isn't intended as a critique of Darwinism, but an alternative formulation of the problem out of which some rather different answers might emerge.

J. W. But it might take on what neo-Darwinists seem unwilling or unable to take on, namely the question of origins.

G. W. Yes, but why should the two exclude each other? We could get a principle which generates forms which are then subject to Darwinian selection based on whether they are functionally adequate or not.

J. W. But both theories *are* trying to describe origins. You're just giving Darwinism the left-overs.

G. W. It seems to me that Darwinism is perfectly O.K. on the preservation of adapted forms; it just has nothing much to say about the origin of species.

R. B. B. You wouldn't deny, would you, that man is descended from hominids, or something not classified as men?

G. W. No, I wouldn't. But this is not an explanation.

J. W. It's an historical sequence which has itself got to be explained.

G. W. It's just a brute historical fact that human beings have apes as their great-great grandparents.

J. W. But isn't the Darwinian idea that apes and man have a common ancestor which is neither? Whatever this ancestor is, anyone, whether he believes in evolution by natural selection or not, would agree that man is descended from something which is not so very like him as he is now. Nobody disbelieves evolution, but does it have to be Darwinian? Neo-Darwinism is surely a theory about the *mechanism* of evolution.

B. G. Our view does derive in part from a criticism of neo-Darwinism. If Darwinism is functionalism, then our idea of an organism as a generated structure with adaptational features does not oppose Darwinism. But it is in opposition to neo-Darwinism. For us neo-Darwinism has an incoherence in it.

Q. It would be helpful at this point for someone to define the difference between Darwinism and neo-Darwinism.

B. G. Darwinism is defined in extrinsic terms; organisms are adapted to their environments. It gives no causal mechanism whereby the variability postulated to underly this process of adaptation comes about, whereas neo-Darwinism ascribes variability to the shuffling of the gene pool, and mutation in the genes. What we

would contend is that we are not given any way of generating phenotypes from genotypes in neo-Darwinism. Therefore the theory is in this respect defective.

J. W. If as we said earlier the genotype is *theoretical*, in the sense in which philosophers of science have used this term, it's not surprising that it can't assume a causal role. But are you saying that it's not explanatory either?

B. G. Neo-Darwinism assumes a continuity from genotype to phenotype, but it does not demonstrate how it comes about, and therefore it ends up with no more than a correlation between one and the other, as we saw earlier. And we would claim that molecular biology, which is the great white hope of neo-Darwinism with respect to filling this gap, just can't do it. We are going to need more than the DNA-RNA protein story and molecular interactions to generate organisms.

G. W. I find what neo-Darwinists do say about the relationship between genotype and phenotype very confusing. Would it be claimed, for example, that mice look alike because they have the same genotype, and different from elephants because they have different genotypes?

D. C. That sounds strange. I couldn't imagine anyone actually claiming that, because throughout one's genetic training one emphasizes that a genetic *difference* determines a phenotypic difference, but of course one is thinking mainly of genetic differences between organisms which are otherwise genetically the same, such as a mutation or a polymorphism within a species like man, sickle cell anaemia versus normal. You don't have much idea of what you can make of a case where two organisms have very different genotypes like the mouse and the elephant.

J. W. In other words you don't have much to say about the big differences.

G. W. But how do you even know they're different genotypes?

D. C. Well, that would be easy to see, because the DNA is different.

G. W. Is that known?

D. C. No, but it's been done for mouse and man, and it's known that it's very different. At least, those bits that have been looked at

are different. So one is fairly confident that it would turn out to be so.

J.W. Maybe the mouse manufactures different DNA because it's a mouse, rather than being a mouse because it has different DNA. If you've really only got a correlation, what would there be to choose between two causal directions?

D.C. How much the difference between mouse and man is due to their genotype is not known. It's a difficult question even to formulate.

G.W. That's the point. With neo-Darwinist concepts, it's a difficult question to formulate. The impression one gets is that from the difference analysis in genetics, whereby one says that a phenotypic difference is correlated with a genetic difference, by a sleight of hand or mind rather one goes on to imply that a phenotypic sameness correlates with a genotypic sameness, and that this means that the organism is determined by its genome.

D.C. Well, yes, except for convergence in evolution, as in the case of the hover fly resembling the bee and the wasp. In such cases, when one studies the physiology of the organisms, one finds that they are quite different, so one concludes that the similarity of form is a result of convergence.

G.W. A relevant empirical point here. It is well known that a population of fruit flies carrying a mutant allele is very variable morphologically, so there is no direct relation between the genetic structure of an organism and its phenotypic structure. This is what geneticists mean when they talk about penetrance and expressivity.

D.C. If you construct a population of fruit flies with identical genotypes (barring mutations since they were produced by their parents) they are phenotypically variable.

B.G. The variability is then ascribed to unknown factors of nutrition and environment.

D.C. Yes. Differences of size may be due to differences in the amount they had to eat. This is the basis of one's belief that even a *Drosophila* bottle is by no means a uniform environment. The terms penetrance and expressivity are used when one has evidence for non-identical genotypes having non-identical phenotypes.

G.W. In Darwinian theory there are only two things to play

with: the genes and the environment. But in non-Darwinian theories such as the ones we are proposing there is more to it, in particular the laws which govern changes in form.

D.C. I don't really understand what would determine the rules of form which might exist. I would interpret them as developmental rules, so that they would be historical.

G.W. What do you understand by historical?

D.C. What I had in mind was that the rules of form for one group would be different from the rules for another.

G.W. Agreed – they might well be.

Q. In D'Arcy Thompson's *On Growth and Form* he shows, often mathematically, how different forms come out of different pressures, interactions between organism and environment, etc. Is this the kind of thing you have in mind for generative rules, or are you thinking that there is something more archetypal?

G.W. D'Arcy Thompson's explanations are in the right direction.

B.G. But he was using very general principles which derived entirely from physics. We are looking for general principles, but they should be derived from biological phenomenology. Some aspects of biological form will be for the most part determined by physical forces, but it seems naive to suppose that this would work for the generation of the whole organism. Observation of organisms gives the rules we want, we abstract and generalize them, and then compare them with the rules governing physical fields. I think this is the direction we're going in.³

Q. I'm a bit lost how one gets these rules from observation. Could you illustrate this?

G.W. These rules would be more like the rules of a game, such as chess, than they would be like universal laws which apply throughout the universe.

Q. The rules of chess have been laid down by convention. There's nothing natural about them. This seems very different from saying that rules derived from biological phenomenology generate form.

J.W. Yes. Who is laying down the conventions?

G.W. I only mention the chess analogy to bring out the difference

between historically contingent 'rules' and 'laws' which are not historically contingent.

B.G. The rules of chess can't be derived from physics and chemistry. And we would argue that the same is true of the rules of biological form.

J.W. But there's no analogy here. The reason the rules of a game can't be derived from physical laws really is quite different from the reason, whatever it is, that biological rules can't.

D.C. Take the question why vertebrates have the kind of kidneys they do. It will certainly have an historical component, and that's where things get difficult. If we had lots of examples of the evolution of kidneys, we might be able to see some predisposing cause for their evolving rather than something else, but with just the one case of the vertebrates it becomes purely historical.

J.W. By historical you mean that the answer to the question *why* something happened is just: this is how it happened?

D.C. Yes. Another way of doing it may have been perfectly possible; it could have come about in other ways.

J.W. This seems to be another way of saying that the concept of adaptation will cover anything that *does* happen, but can't help us say why it happened.

D.C. You could certainly make up a theory for why it's adaptive, but this is unsatisfying because you could probably make up two, or ten.

J.W. So what does that say about the concept of adaptation?

D.C. It means that in this case we don't seem to have any technique for giving an adaptive explanation.

J.W. But do you in any case? Why hang on to the idea at all? Is there in fact any general criterion for deciding whether or not something is adaptive?

D.C. No, I don't think so. Not a general one.

J.W. A particular one, then?

B.G. This is where we started out. There isn't a clear definition of what is meant by function or adaptation.

D.C. I don't think that makes the concept unclear or worthless.

J.W. In *Ever Since Darwin* Gould proposes a perfectly clear but very vague criterion — "good engineering design."

Q. Does he give any illustrations? Can one define a thing like good engineering design?

J. W. Whether or not one can, the definition would have to include something about what the designed object is *for*. Otherwise anything and nothing is a good design. Either you have a teleological concept such as adaptation in which case Darwinism is in hot water since it's staked so much on excluding teleology, or you don't, and the explanatory element is gone. Gould says "morphological, physiological and behavioural traits should be superior *a priori* as designs for living in new environments. These traits confer fitness by an engineer's criterion of good design, not by the empirical fact of their survival and spread." But you can surely only tell whether something is a good design *a posteriori* by the fact of survival and spread. What if the environment changes? Then the definition of *an environment* will carry the circularity here. You simply can't tell *a priori* what changes there will be in the environment. Like the Irish elk. An engineer would have to be pretty stupid to design that, but it survived for a long time, so it's said to be a good design. If you say it isn't, then good design has nothing to do with fitness.

D. C. Some structures, such as the appendix, are considered to have been useful or adapted at one time, and are now no longer so, and one would expect them to be lost again in due course, although they haven't yet been. This may seem like a pretty feeble explanation when one can't think of anything better.

J. W. Yes. You've got to invent a whole environment against which the elk or appendix is adaptive, and what reason is there to do this? There isn't any evidence on this point at all. But this is the famous circularity again. Take for example human blood group polymorphisms. Maybe they were useful or adaptive at one time, and they have been left behind. But this is entirely speculative. There's no reason to *reject* this sort of explanation, but unless it can be shown that the conditions in question under which they were useful did *in fact* obtain, there's no reason to accept it either. And it just can't be shown.

D. C. Another idea is that if a particular structure or function is selected it might be so advantageous that even if it has had bad side effects, such as the expansion of the brain affecting the sinuses, it

will be selected if the benefits outweigh the costs. These would be tricky explanations, unsatisfying unless you had actually seen the process of change occurring. They're plausible enough, and these sorts of process are inevitable, but when you come to give an explanation of a particular case, they look pretty *ad hoc*.

J. W. So how do you know they're inevitable?

D. C. If you accept the premises of Darwin, then natural selection must happen and such events must occur. We know that mutations don't just have single effects, they have multiple effects, and we can see cases in artificial selection where a desirable effect is accompanied by multiple undesirable effects.

J. W. If you accept the premises..... but isn't that just what we're discussing, so to speak?

R. B. B. I've collected my wits about what was said some minutes ago about forms. I'm going to criticize it on the ground that there is no virtue in generating form unless you have many forms.

G. W. But the ellipse, circle, parabola, hyperbola are different forms.

R. B. B. But these can be considered as different species under the same genus. The distinctions among the conic sections are minor.

G. W. The distinctions are not minor if you're shooting men to the moon. Your view would be like saying that all vertebrates are the same, and in one sense indeed they are. But they are also different.

R. B. B. Quite so. But they're not the same as the invertebrates, that's the point. I just don't see how a theory of form gives the relevant distinctions.

B. G. What is universal in Newton's theory is the postulate of the gravitational field, and the rule of gravitational attraction.

R. B. B. There really are two things. The laws of motion defining the dynamics, and the gravitational field.

B. G. Yes, the dynamics and the field together constitute the universals. We think that there is a similar type of principle which is universal to organisms as we know them on this planet.

R. B. B. Can you state this universal law of form?

G. W. How universal is universal? It's an empirical matter to

find out to what extent whatever rules one manages to construct are universal. We just have to try and see.

B.G. Richard is asking for an example.

G.W. Yes, but I think it's necessary to bear in mind that initially we must start with very radical abstractions, such as what makes one end of an organism different from another.

B.G. You can take a biologist's abstraction of form, for example that of N. J. Berill, an embryologist. He says that there are basically three types of form. One is axial organization with radial symmetry, another is bilateral symmetry, and the third is segmentation along an axis. These three forms can all be generated as solutions of field equations, derived under certain limiting conditions which seem to apply to organismic form. When you impose constraints such as limiting the solution to the surface of a sphere, then you only have certain functions available. You can argue that where you have organisms with the characteristic that their form is derived from a spheroidal structure with a thin shell, in a regenerating hydroid, then the solutions are restricted to specific forms and patterns. You then compare this with the actual morphology which is regenerated. If there is a correspondence, you have something like an explanation.

G.W. With more complicated forms, such as the vertebrates, what you find in an adult organism doesn't come into being in one fell swoop. There is the developmental process in which the form is very gradually elaborated.

Q. You mean that the form must be at least four dimensional?

G.W. Yes, it is realized in time.

R.B.B. I don't see how diversity can come from unity gradually. You need a sort of catastrophe, in the sense discussed in Catastrophe Theory.⁴

G.W. The unity in diversity that we were discussing earlier in relation to the animal kingdom means that organisms can be grouped according to unity of structure in spite of diversity of species. How does the pattern in a given organism come into being gradually? This is a different question, and one starts off with a simple pattern which is gradually elaborated.

J.W. But this doesn't meet Richard's difficulty.

B.G. The principle of explanation that we want to use in relation to organismic form is that one should be able to generate these forms from a simple set of principles, which have a mathematical formulation.

Q. But they have to be interpreted, don't they, to give the correspondence with the organism?

B.G. Yes. There must be a rule of relationship between mathematical and biological form. We use a principle of correspondence which is rather more stringent than that used by embryologists. For example, it's been said that a single spatial gradient can generate any required form by a process of interpretation within the organism. This is too loose a correspondence for us. There must be a closer relationship between the formative force, determined by the field, and the structure that is generated. We're after something more specific than simple topological equivalence, something which is related to symmetry relationships. An organism that generates a ring of tentacles at one end must be described by a field that has the same periodicity in it and is unipolar, the periodicity occurring only at one end.

Q. How do you justify using one set of rules rather than another?

B.G. The rules are partly derived from the phenomena of development. For example, a number of experiments suggest that the behaviour of the real embryonic field can be described in terms of spatial averaging: every point within the field has a state whose value is the average of those of its neighbours. This defines a property of smoothness within the field, and it's a very powerful principle.

Q. Does this work in all instances?

B.G. Only a certain number of cases have been sufficiently well studied. In all these it does work. It isn't always obeyed at a boundary; the field behaves differently at such a point in the embryo, but this is consistent with the field description.

G.W. Spatial averaging gives predictions which have been fulfilled in particular experiments using very different sorts of animals.

Q. Could a geneticist make these predictions?

B.G. Gene action doesn't give any principle of spatial organization. This is really very important, and it's one of the reasons we think molecular biology can't explain pattern formation. One needs a field for this.

D.C. I have been wondering what extra you would want over and above the DNA in order to specify the organism. Would the substances in the egg be sufficient?

B.G. Adding a whole lot of discrete cytoplasmic factors to the genetic factor in the egg is not, I would say going to give you an organism.

D.C. Even discrete factors with a spatial organisation?

B.G. Even that.

D.C. Not even the gene sequences and the timing of their activities and the factors in the egg? Would you still say that development can't be specified?

G.W. This wouldn't be a good strategy even if it were possible.

B.G. What is needed is not a catalogue of the positions of particular entities in the egg, but a principle which tells us something about the relationships between parts, so that one can describe how the developing organism would be expected to respond to perturbations. This would describe a field, and my own view is that such embryonic or morphogenetic fields are irreducible. There are many irreducible fields around, and what would be surprising would be not to find one in the biological organism.

G.W. But we can be agnostic about this. All we need to say is that we're dealing with a complicated system, and that we want to regard the field as the totality of relevant relationships in this system. To my mind, an archetype is merely a constant set of relations. There's nothing mystical about it. Newtonian mechanics embodies in its equations the archetypal forms of motion.

Q. Does archetypal mean irreducible?

R.B.B. I think I know what I mean by the archetypal vertebrate. It's got four limbs, and has all the other typical features, vertebrae and so on.

G.W. Yes, within the vertebrates there is a constant set of relations.

R. B. B. The question is, how to explain why all vertebrates have four limbs? Why don't they have six?

J. W. I thought that just this sort of question was supposed to be an embarrassment to neo-Darwinian theory. The idea would be, I suppose, that genetics can explain *details*, like brown hair and blue eyes, but it can't explain why we have two arms and two legs and the form we do. Is the point of the criticism that it can only explain changes to already existing forms?

B. G. You're talking about the symmetry principle which I should try to formulate.

D. C. I don't think Darwinism can't answer these questions. It's just that one can't see suitable kinds of information that would be critical. It's perfectly conceivable that testable theories could be devised, but so far they just haven't. Darwinism has explained lots of things. One dwells on the things it hasn't because these are the things one still wants to know.

B. G. Deborah, your view would be that when the catalogue of organisms is nearing completion, as neo-Darwinism envisages, so that all the DNA sequences and the positions of the factors in the egg are known, then it would be possible to say that this constellation of entities gives rise to the form.

D. C. Yes, or at least to say that if you will also tell me the environments they will encounter, then the range of phenotypic forms can be predicted.

R. B. B. About regeneration. Would your field theory predict that this is a general property of organisms?

G. W. Yes - in principle. There would be a tendency for perturbations, both environmental and genetic, to get ironed out - within limits. So regeneration would be an intrinsic property of organisms.

B. G. In our theory organisms are understood as wholes and not as collections of parts, and this is what underlies this prediction.

D. C. But how do you know which parts will and which parts won't regenerate, or which organisms have and which have not this property?

B. G. We don't.

J. W. Going back from regeneration to generation, which I suppose your theory would connect. Surely what Darwin set out to

explain was the striking variety of animal forms. From what I've heard today this isn't a question to which the theory of neo-Darwinism really addresses itself. To what extent do you agree with Waddington's famous proposition that "the whole of the real guts of evolution—which is how you come to have horses and tigers and things—is outside the mathematical theory" (of neo-Darwinism)?

D.C. The mathematical theory is competent to draw conclusions from particular premises, so that if certain conditions are satisfied then natural selection might take place. But if you take the particular case of an organism that has evolved, you couldn't say that it has evolved as a result of survival of the fittest. The difficulty is determining whether a particular case is due to natural selection or not, whether for example randomly accumulated mutations would do it.

G.W. Then you really are going to have to be agnostic about a whole range of organisms, because realistically you're never going to know.

D.C. No. You can say that you believe certain things are the result of natural selection in cases where you have good evidence and can test it. But in cases such as the horse growing bigger, there's no way of testing the hypothesis, so we just don't know.

G.W. So you can only be really rigorous at the relatively trivial level, such as melanisation in moths. At this level you are only dealing with a slight change in an already existing basic pattern.

D.C. Yes. One is restricted to cases where the genetics can be done. Some might be regarded as trivial, others not. For example, the question of why just two sexes, why not more, is regarded as a fascinating problem by some.

G.W. Wouldn't you agree that within neo-Darwinism it is taken for granted that the theory does have something to say about the broader issues of why mice and horses and so on?

D.C. No. I don't think that neo-Darwinists would claim to be able to explain mice as such, only certain features of mice.

G.W. This is not the impression many neo-Darwinists give. Many of them imply that they can in principle account for the diversity of organisms that have existed and do exist in the world.

D.C. There is an ecological theory of diversity, but I think that

is the only sense in which evolutionists would attempt to account for diversity. But to go back to the question of why are there mice, I don't think that any text-book or any geneticist would claim to be able to explain why there are mice and elephants. It's not even clear what the question means.

J. W. Does this mean that it's not clear what the title of Darwin's book means?

G. W. Deborah seems to be making a very sharp distinction between Darwinism and neo-Darwinism, and the claims of the latter are very modest indeed.

D. C. I don't think they're modest. I think what one can do is very far reaching.

G. W. But modest compared with Darwinism?

D. C. No. I just don't understand what the question would mean: why are there mice?

G. W. Not just why are there mice; why are there mice and elephants and bats and rabbits and human beings, which are all different and yet the same.

D. C. Is the question then how starting with one species do you get two?

G. W. No. I'm asking the question how we are to understand structure and its transformations.

D. C. If we can explain differences between populations within one species, we can explain differences between two closely related species. A more difficult problem is explaining why, given one species, we should ever get two. The evidence is very strong that geographical isolation is the key to this. I think it would be generally acknowledged that we haven't an explanation for the origin of all the morphological differences that we see between species. People would have to know much more about the habits, environment, and so on, of the different types. But the differences between different species are not intrinsically different from those between different varieties which are widely separated geographically.

Notes

1. From "Darwinism as a Metaphysical Research Programme" in *The Unended Quest* p. 170 (Collins-Fontana). This was re-published with some revisions from

the Autobiographical sections of "The Philosophy of Karl Popper" in *The Library of Living Philosophers*, Open Court, Illinois. . Quoted by permission of the publishers and Karl R. Popper.

2. *Genes* are the heritable factors which determine the properties of an organism. The *characteristics* of an organism, e.g. whether it has red eyes or not, are really characteristic *differences*, and together make up what is called the *phenotype*. The *genotype* is the genetic composition of an organism.

These definitions are adapted from G. A. Harrison, "Human Genetics," in Harrison *et al.*, *Human Biology*, O.U.P. 1977, p. 100.

Brian Goodwin gives some experimental evidence in his article "Non Morpho-genetic fields" in this number.

4. For Catastrophe Theory, see the article by R. Thom in T. to T. X iv p. 297.

On morphogenetic fields

BRIAN GOODWIN

THE VIEW OF organisms which predominates in contemporary biology derives, naturally enough, from Darwinism and its 20th Century derivative, neo-Darwinism. There is an intrinsic dualism in this tradition which arises from its two-fold conceptualization of organisms as adapted to the external environment on the one hand, and as vehicles of internal hereditary factors on the other. Since the internal factors, a collection of genes which for any individual is called its genotype, do not themselves interact with the external environment, a third, mediating structure enters the theory: the phenotype, which is what common-sense recognizes as the organism with its morphology and behaviour. It is then assumed that the phenotype is reducible to or determined by the genotype, so that the latter remains primary in the definition of the organism. Living things are then the product of two forces, those of heredity and those of natural selection, giving continuity and adaptation to biological process. The theory thus has an explicitly historical and utilitarian basis. All problems in contemporary biology tend to be reduced to these terms.

Since the collection of genes which defines an organism has no constraints imposed upon it as a whole, the only requirement being that the characters it specifies should be adapted to the environment in which the organism lives, the phenotype has no defining characteristic as a total organized entity: it is an atomic collection of mechanically-interacting parts, each of which can be independently

Theoria to Theory, 1979, Vol. 13, pp. 109 – 114
0049-3686/79/1302-0109\$04.50/0

Published by
Gordon and Breach Science Publishers Inc., 1979

varied by the process of natural selection. Let us see if this description of organisms is consistent with the evidence, which I shall take primarily from developmental biology.

We may start by examining the assumption that the properties of organisms are reducible to its genes, by which is meant that if genes are specified then so is the organism (i.e. the phenotype, defined by the organism's physiology, morphology, behaviour, etc.). Assuming that this is to be taken as a scientific proposition, then the theory should provide a way of deducing or generating the phenotype from the genotype. Strangely enough, it does not do so. This, of course, would be possible only if the relationship between genotype and phenotype were one to one (assuming always a constant environment) so that the former defines a set of sufficient conditions for generating the latter. As a general proposition, this is easily falsified empirically. Thus there are examples in which surgical modification of the morphology of an organism results in the transmission of this modification to all its offspring, without any change in genotype. One of these is provided by Sonneborn's (1970) work with the unicellular ciliate, *Paramecium*. Rotation of a ciliary row on the surface of an individual results in the appearance of a reversed row in all its progeny. Molecular biology gives a possible explanation for this observation, while simultaneously defining very precisely the extent of the chain of determinacy from the genes. This proceeds from DNA to RNA to the primary structure of proteins; i.e., the sequence of amino acids in the polypeptide. However, when proteins are assembled into the structures which determine the observable morphology of organisms, the determinate, causal chain stops and the relationship between genotype and phenotype becomes one to many. Just as the same substance can assemble into different crystalline forms, such as carbon crystallizing into graphite or diamond, so the same proteins can be assembled into different structures (Oosawa *et al.*, 1965). Which structure or form is produced depends upon the conditions within the organism under which the assembly process occurs, such as pH, salt concentration, crystallizing seeds or nucleation centres, and field forces. Since the result of protein assembly (and of other substances such as lipids, carbohydrates, fats, and polymers such

as cellulose, lignin, chondroitin sulphate, etc.) is a spatially-organized structure, I shall refer to that which is responsible for generating this organization as the morphogenetic field (equivalently, the embryological or developmental field). This field is irreducible to genes, for the latter provide no spatial-organizing principles. The genome becomes, in this view, a memory store for the organism, readily accessible because it is present in each cell. That the genes are an essential ingredient in embryogenesis, no-one would dispute; but they provide only necessary conditions for developmental processes, the morphogenetic field providing the additional constraints required for sufficiency. It then becomes a matter of primary importance to enquire into the nature of this field. I can do no more than give a brief treatment of this subject here.

Let us first dispose of a widely-held assumption in developmental biology which is readily falsified empirically. This is that every major "decision" taken by cells during the process of differentiation from a relatively unstructured initial state to a fully-differentiated form such as a leaf guard cell, an insect bristle, or an optic neuron, involves genes as the primary decision-makers, operating on the analogy of a central (nuclear) logical switching circuit (Kauffman, 1969, 1975; Wolpert and Lewis, 1975). As a general proposition, this is refuted by many examples drawn from the behaviour of simple organisms such as protozoa and algae, but one from the latter class is particularly instructive. The green alga, *Acetabularia mediterranea*, which grows in shallow water on rocky shores of the Mediterranean and is commonly known as the mermaid's cap, is somewhat remarkable in that each organism consists of a single very large and highly differentiated cell. At one end there is a parasol-like cap about 0.5 cm in diameter, at the other a branched root-like structure, the rhizoid, and joining them a long (about 3cm), narrow (0.5mm) stalk. The single nucleus resides in the rhizoid. If cap and rhizoid are cut off a plant, leaving the stalk, a new cap is regenerated at one end (usually at the apical end where the cap had been, but often at the basal, rhizoids end). Rhizoids are less commonly regenerated, and the nucleus is never reconstituted from the cytoplasm. The important point is that an undifferentiated stalk can, in the absence of a nucleus, regenerate the highly-

differentiated cap, so that all the "decisions" concerning where to synthesize specific enzymes, assemble particular proteins, and regenerate the complex and intricate structure of the cap, are taken in the absence of a nucleus. Furthermore, the plants which regenerate the cap at the old rhizoid end of the stalk reverse their original polarity, so that one cannot suppose that the genes had in some sense layed down a template for secondary cap formation before they were removed. One must conclude that a morphogenetic field of some kind operates in the cytoplasm of this organism.

A very interesting feature of this field is that it can be affected by electrical potentials and currents. Thus by imposing between the two ends of a stalk segment a potential difference of about 30mV, one can control the polarity of the regenerate: the cap will form at the end where the external electrical field is more positive. This suggests that electrical fields or currents, or both, are an aspect of the morphogenetic field in this organism, and indeed if one measures the potential difference between the ends of a regenerating segment, the cap is found to form where the external voltage is greater (about 4-6 mV positive relative to the end where no regeneration occurs). Apart from this DC component, there is a recurrent spontaneous action potential which looks very much like the familiar electrical activity of nerves, except that it is much slower, a cycle of depolarization and repolarization taking about 2 minutes compared with a cycle time of about 1 millisecond in a motor neurone. The regenerating plant thus has an "excitable" membrane, and we have found that plants which are not excitable do not regenerate. Excitability can be controlled by regulating the concentration of calcium in the medium in which the plants are growing.

The points which I wish to make from the example of regenerative capacity in the mermaid's cap are that the morphogenetic field is primarily a property of the cytoplasm since it functions independently of the presence of a nucleus; and that one aspect of the field is that electrical forces can affect it. Other developing and regenerating organisms have also been found to have interesting and significant electrical field patterns, but I would not wish to suggest that the morphogenetic field is essentially electrical. Chemical substances also affect polarity and other spatial aspects of developing or-

ganisms; and again I would not wish to draw the conclusion that the morphogenetic field is essentially chemical or biochemical in nature. My belief is that its investigation should proceed on the assumption that it could be any, all or none of these things; but that, despite this agnosticism regarding its material nature, it plays a primary role in the developmental process.

A consequence of this view is that the living organism itself is primarily and essentially field-like in nature, because the maintenance of organic form and function in the adult is a space-time process which is just the continuation of development, although it proceeds at a slower tempo. A basic property of the organismic field is that from a part, the whole can be reconstituted. This part may be a limb-stump which regenerates the missing elements of a severed limb, as occurs in newts and salamanders; it may be a fragment of the adult organism, as in hydroids; it may be a single phloem cell, as occurs in plants; or it may be the egg, a part of the adult which develops into a new organism after fertilization, the usual manner of sexual reproduction.

A biological theory which is adequate to its subject matter must be able to give an account of such fundamental properties of the living state. I argued earlier that neo-Darwinism and molecular biology are unable to provide a theory of development because they lack concepts of spatial organization and of the relationship between whole and part, the organism being seen as a collection of atomic elements, whether molecules or cells or adapted characters, whose principle of integration remains undefined. These theories, which belong within the same tradition based upon the evolutionary paradigm stemming from Darwin, are therefore inadequate as unifying principles of biology, although they are generally considered to fulfil this role. It is interesting that the primary entity which biological science must account for, the living organism with its highly integrated, unified nature and its essential capacity for generation and regeneration, is precisely what these atomic or reductionist (in the material sense) theories are unable to give any adequate account of. Gerry Webster and I have, therefore, proposed that the Darwinian conceptualization of organisms be abandoned and replaced by a structuralist theory of organisms

which is based upon the concept of living entities as patterns of relations with specific properties relating to invariance, transformation, and relationship between part and whole. This defines a field theory of organisms, some of whose properties are described in our paper (Webster & Goodwin, 1979). Evolution is then seen as a secondary process which is to be understood in terms of the transformations of form or pattern which can occur within the invariant potential set of organic forms. The emphasis is then shifted away from the historical, empirical, and utilitarian basis of the Darwinian tradition, and towards a synchronic, rational, and harmonious conceptualisation of the living state and its diverse manifestations. The enterprise is in its infancy and requires a great deal of development before it can cope adequately with the diachronic aspects of the living process, giving an account not only of the structural relationships between different organisms, of the relationships between whole and part, and the logical order of increasing complexity in ontogenesis and in phylogenesis; but also details of the temporal order of actualisation or manifestation of this potential, logical structure.

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Psychological theory and the religious mind

III. Meditation and perception

FRASER N. WATTS

THE SPIRITUAL LIFE calls for the cultivation of certain powers of perception. It is not unique in this. The artist also needs to cultivate the ability to see more than the obvious if he is to portray a situation effectively. In a similar way, though less obviously, morality requires a careful attentiveness. Simone Weil has emphasised the centrality of attentiveness in religious morality, a theme that Iris Murdoch has taken up and developed (Murdoch, 1970). For her, attentiveness is the 'just and loving gaze directed upon an individual reality' that is the 'characteristic and proper mark of the moral agent'. It is the moral effort to see clearly, unhindered by idiosyncracies or illusions.

Such perceptiveness is not unique to the spiritual life; but I suggest that it is necessary to it and characteristic of it. Oriental religion has typically seen the material world as a veil to be pierced; and the task of the religious man to perceive the spiritual realities behind the veil. Christianity, even though it has a more positive regard for the material world than most religions, calls for a similar perceptiveness. If it is the material world that we look at, we find as Hopkins put it that—

The world is charged with the grandeur of God.

If it is our fellow humans beings that we look at, we are enjoined to see their true nature and potential as sons and daughters of God. This requires a perceptiveness that goes beyond the merely

aesthetic in emphasising the behavioural consequences of what is seen.

In this paper I hope to go some way towards making clear, in the terms of psychology, the kind of 'perceptual style' on which this religious perceptiveness depends. I propose to take some basic principles of the psychology of perception as a framework, and to place the religious perceptual style on this conceptual map. In particular I shall examine the kind of perceptual qualities that are developed by meditation and shall rely heavily on the relevant experimental studies of the perceptual effects of meditation. My purpose is to describe the kind of perceptual style that underpins religious perception and makes religious insight possible. I shall not have much to say in this article about the distinctively religious application of this perceptual style, and so my account will not pretend to be complete or adequate. As throughout the series it will become apparent that psychology has more to say about the preliminaries to the spiritual life than it has about its heart.

I shall begin with the perception of the physical world. Though this is of less central importance in the religious life than the perception of people, psychology has a better theoretical understanding of the perception of physical objects and so affords a better developed conceptual map on which the meditative perception of physical objects can be placed. It might also be suggested that those embarking on a meditative path would do well not to neglect meditation on physical objects. There is less risk here than with other forms of meditation of embarking on a path of fantasy and illusion.

Perhaps the most interesting research to have been conducted on meditation on external physical objects is that of Arthur Deikman (1963, 1966). The subjects, who had no background of mystical experience, came to a series of 12 sessions, each conducted in a quiet, subdued room, in which the central object was a blue vase. They each sat in a comfortable armchair, and were told that they had to concentrate on the vase, not thinking *about* it, but just seeing it 'as it exists in itself', and to exclude all other thoughts and sensations. Each session was followed by a tape-recorded inquiry in which the subjects described their experiences.

All the subjects reported some unusual perceptual phenomena. The shape of the vase became unstable, and its colour became more intense, vivid and luminous. On occasions subjects reported other experiences such as that they felt they were merging with the vase and that the vase was radiating heat towards them. Time seemed to pass very quickly, they became very absorbed in the session and increasingly untroubled by auditory distractions. Some difficulties in reporting the experiences were found, and descriptions were quite often internally conflicting, e.g. that the vase did, but also did not, fill the visual field. Though it is likely that these experiences were genuine, it must be noted that all the subjects were personally known to Deikman, and that he conducted the inquiry at the end of each session himself. The possibility of some unintentional influence over their reports cannot be ruled out.

Deikman considered that in this simple setting using untrained subjects, he had produced at least a partial analogue to mystical experience, though his comparison of his subjects' reports of their experiences with passages from the *Cloud of Unknowing* is perhaps overdone. A more relevant comparison would be the traditional exercises of concentrative meditation, especially those such as the Tibetan ones that make common use of visually perceived objects (see Brown, 1977). The central psychological concept that Deikman uses to explain these phenomena is "de-automization" by which is meant re-investing actions and perceptions that normally proceed automatically with deliberate attention.

However, before proceeding with a discussion of such ideas, it may be helpful to say something about normal perceptual processes. Perhaps the most important point here can be put very simply. Perception is normally an *active* process in which we select and organise the available information about the world to arrive at our experience of it. There are several lines of evidence converging on this conclusion (See Ornstein, 1975, Chapter 2). Physiological psychology has documented the way the cortex controls information transmitted through the visual pathways. Developmental psychology, especially that of Piaget, has described the gradual development of the child's construction of the external world. There is a lot of evidence from the study of visual illusions that perception

depends on interpretation, also from the study of attention that what you are aware of is dependent on how you direct your attention. Finally there are the general effects of motivation and experience on our readiness to perceive certain kinds of things (Solley and Gardner, 1960). This selective, constructive approach to perception operates much of the time without conscious direction. When Deikman speaks of de-automatization he means that we find a way of *not* using these automatic, selective processes by which we normally perceive the world.

Deikman (1971) has gone on to discuss a fundamental dichotomy between what he calls two "modes" of perceiving the world, an active and a receptive one. The kind of perception induced by meditation he regards as an example of the latter. Though this may be a correct view of many forms of meditation, I doubt whether all meditation is an exemplification of a receptive mode of perception, and I shall argue in due course for the importance of active perceptual processes in at least some kinds of meditation. Nevertheless the basic point about de-automatization seems a sound one.

The immediate task is to try to characterise more explicitly the "passive" perceptual style that meditation can induce. One formulation flows from what was said above about the constructive nature of normal perception. Meditative perception may simply suspend the later stages of perception in which people synthesize a representation of the object before them. This view has received its most elaborate formulation from Brown (1977) in his exposition of the stages through which visual perception develops in Buddhist Yoga. One of the earlier stages of concentrative meditation is an apparent separation of cognitive and perceptual content. The meditator is left with pure perceptual content consisting of mere "signs". If he is meditating on a stone he is aware of roundness and brightness, but the object itself becomes insubstantial and loses the obvious solidity and durability that it has in normal perception. The disintegration of normal perception goes further, until only a point remains. Later, even this point is dissolved and only "subtle cognitions" remain in which the meditator is directly aware of the perceptual and cognitive phenomena that are normally united in "gross cognition". The suggestion that what is being described here

is a progressive abandonment of normal constructive processes in perception has a lot of plausibility.

Halwes (1974), in making a similar point about the unconstructed nature of Buddhist perception, has emphasised the difference between tacit and articulate modes of cognition. A simple example would be scanning for some particular object, perhaps scanning a newspaper for certain names. To do this, it is not necessary to become explicitly aware of each word that is scanned. Indeed it is a good deal more efficient to scan the words without this, i.e. tacitly. It is a skill that needs to be learned. People who work as newspaper scanners seem to need to learn *not* to construct a representation of the words at an articulate level, but to respond directly to the information in the optical array. Halwes sees an analogy between this skill and the style of perception that is learned in Buddhist meditation. Tacit cognition, apart from being faster and more efficient, may also be qualitatively different from articulate perception. It may make distinctions that we don't normally make consciously and not make distinctions that we normally do make. In particular it may be less restricted than articulate cognition and enable us to become aware of things that we are not programmed to construct representations of.

It is an important insight that meditative cognition is largely tacit, though it would be a mistake to think that all tacit cognition is like meditation. Much of it, including newspaper scanning, is clearly rather different, as is much of the tacit cognition that has been studied in psychological laboratories. Here knowledge about an object that has been tacitly recognised often lasts only a few milliseconds unless the information is used. I doubt whether this is true of meditation. More importantly, it is not clear that a tacit mode of cognition is necessarily more likely to produce knowledge that it was not programmed to produce than is an explicit one. It may do, but that surely depends on how the capacity for tacit cognition is used.

The kind of perceptual style that I call "unconstructed" has gone under a variety of names in the psychological literature such as passive (cf. analytic), undifferentiated (cf. differentiated) and field-dependent (cf. field independent). Though the connotations of

these terms vary slightly, they refer to substantially the same phenomena. The concept of field-dependence has a particular interest as it has been linked to some simple, reliable measures and to a large body of psychological research (Witkin, *et al*, 1962). When the effects of meditation are studied in this context, it becomes clear that meditation leads people to adopt a more field-independent (i.e 'analytic') style in their *subsequent* perception (Linden, 1973; Pelletier, 1974). However, this does not contradict the view that I have been putting forward on theoretical grounds, namely that the style of perception in which people are engaging *during* traditional oriental meditation is a relatively passive one. There is nothing inconsistent in the idea that practising one state of consciousness during meditation induces a rather opposite state while not meditating. For example it has been shown that people are unusually *unresponsive* to a repeated auditory stimulus during Yoga meditation, but that the same meditators are unusually responsive to the same stimulus while not meditating and do not show the normal phenomenon of habituation (Anand et al., 1961).

The constructive view of perception, on which I have largely relied in the argument so far, has not gone unchallenged. Though there is agreement that perception is not a purely passive process, similar to taking photographs of the external world, there is some disagreement about whether it is appropriate to break down perception into the registration of basic sensory information and a subsequent act of synthesis. Against this some psychologists, notably James Gibson, have argued that there is a direct relationship between external objects and the information produced in the optic array that is sufficient for our knowledge of the world. Over the course of human evolution and of personal development, it is argued, we have acquired the capacity to respond directly to certain "invariant" patterns of energy distribution in the input to the visual system. It is a view of perception that emphasises direct response to well selected information. For Halwes, Buddhist meditation induces a style of perception in which this kind of direct responding takes over from constructing as the predominant perceptual style. However, as Brown (1977) points out, theories of direct perception really square better with classical accounts of meditation in Hindu Yoga

than with the Buddhist system. It is intriguing to find some aspects of this modern debate between perceptual theories anticipated in the contrast between Hindu and Buddhist theories of meditation. Perhaps it is an unresolvable debate. Certainly it appears that accounts of meditative perception can be developed from either point of view.

There is one important respect in which it may be misleading to describe the style of perception in which people engage during meditation as passive. Meditation, especially some non-traditional forms of meditation, requires considerable imaginative effort. An interesting example is Goethe's method of 'exact sensorial fantasy' (though the connotations of fantasy are misleading here). His principal application of the method was to meditation on plant forms. The first stage could be to form clear images of the series of leaves on a plant, and then to use imagination to think through the changes in forms until it became possible to actually see the process of metamorphosis of the leaf form. The perceptual style involved in an imaginative exercise such as this can hardly be described as passive. But, on the other hand, neither would an analytic style be conducive to the perception of metamorphosis. People with an analytic style are less likely, for example, to see movement and causality (Vernon, 1962) and would probably find it hard to see the metamorphosis. I suggest that the perceptual style involved does not fit easily into the dichotomy of analytic or passive. This is a matter I shall return to later, as I believe such 'hybrid' styles may be of particular importance in the religious life. But first it will be helpful to discuss the perception of *people* in the terms that have been used to describe the meditative perception of physical objects.

The passive style of perception of physical objects found in traditional meditation has a parallel in the non-condemnatory approach to people that is characteristic of the religious mind at its best. St. Paul speaks for the Christian position here when he says (Romans, Chapter 14) 'Let us not therefore judge one another any more'. The Christian will also try to refrain from unnecessary evaluation and comparisons of people, and will have a humble awareness of the fallibility of his own judgment in comparison with the divine judgment.

Psychology can throw some light on the distorting factors that operate in personal judgment (e.g. Cook, 1971). We tend to use ourselves as a reference point in judging other people, and consequently to see them as being either more like or more unlike ourselves than they really are, depending on our general view of them. This produces the most serious distortions in judging qualities that we possess markedly more or less than average. Next, we tend to employ stereotypes (or 'association rules' about which qualities are linked together) which may have no basis in reality. Such stereotypes are especially serious in their effects when our information about someone is limited, but unfortunately they may prevent us ever getting to know someone well enough to invalidate the stereotype. Another common source of error arises from the failure to employ a degree of cognitive complexity that is adequate to the subtlety and variety of the personality we are perceiving. In general people who are able to integrate disparate aspects of personality into their overall perception are more accurate in their judgments of people. A very common kind of over-simplification is the failure to allow for the way people change over the years and from situation to situation, and to express judgments of people in terms of personality traits that ignore these differences). These are some of the sources of fallibility in assessments of people.

One response to this, as I have indicated, is to abandon the judgmental stance as much as possible. Instead we could try to pay attention to people as they are in themselves, rather as Deikman taught his subjects to attend to the blue vase. If we were to stop comparing people with ourselves, stop evaluating them, stop classifying them, but instead were to simply attend to them we might even begin to perceive them with fewer distortions. There is nothing uniquely religious in this approach. It is part of the stock-in-trade of counselling, and passes under the rubric of "acceptance" of people. We find something similar in clinical listening, what Theodor Reik (1948) called 'listening with the third ear'. This involves maintaining an evenly distributed attention, not looking out for particular themes and intellectualising about them, but simply remaining ready to respond to whatever material arises. When therapists maintain this kind of free-floating attention (cf. close attention)

they respond often to single words that the patient uses rather than to connected ideas, more to what topics are raised than to what is said about them. If a therapist responds in this way, it can increase the accuracy of this empathy with the patient (Spence and Lugo, 1972). There is also some evidence that a passive perceptual style is associated with a weaker sense of physical separateness, and a less clearly articulated body boundary (Wapner and Werner, 1965). The passive style reduces our sense of both physical and emotional separateness from other people.

However, it is clear that a passive perceptual style is not sufficient for empathy. There are aspects of this style that are valuable in preparing the ground for empathy, but more than this is needed. Two separate studies by Witkin et al., (1962), one on adults and one on children, have examined the relationship between empathy and field-dependent (i.e. passive) and field-independent (i.e. analytic) perceptual styles. The results were the same in both cases. The majority of highly analytic people are cold, aloof and uninterested in people. But passive people, though they tend to be more sociable are generally not truly empathic but simply conformist and approval seeking. In contrast, empathic people were found to combine an analytical perceptual style with "emotionally soft" qualities that were the opposite of those found in most analytic people. The hybrid style involved here, like Goethe's exact sensorial fantasy, does not fit easily into a simple dichotomy between passive and analytic. Indeed the imaginative effort needed to perceive the metamorphosis of leaf forms may not be dissimilar to that needed for empathy with other people, especially for the perception of their *potential* as redeemed children of God. Further, the qualities needed for empathy with other people may also be conducive to the experience of unity with God. They may enable us to 'live in Christ' ('I in you and you in me'). For both empathy and for the experience of unity with God it is necessary to have a sense of relatedness that is more associated with a passive perceptual style, but to combine this with an imaginative capacity to enter into someone other than ourselves.

What is the role of meditation in preparing the ground for this kind of experience? There is some experimental evidence (Lesh,

1970) that the daily practice of Zen meditation over a period of a month resulted in a greater improvement in accurate empathy than was found in a control group of non-meditators over the same period (though the experiment can be criticised for its non-random allocation of subjects to groups). How does meditation have this effect? I have argued that the style of perception experienced *during* meditation is a passive one, but also referred to evidence that meditation makes people's subsequent perceptual styles more analytic. Meditation may thus involve learning to alternate between a very passive style (during meditation) and an increasingly analytic style (between meditations). Such alternation between extremes can be a useful preliminary to the integration of aspects of the extremes into a single unified style of functioning. Maybe this is what helps meditators to achieve the hybrid style that is conducive to empathy.

I have emphasised the importance of the sense of relatedness in empathy, but equal emphasis deserves to be placed on the autonomy that is required. As Gorsuch has argued in an excellent treatment of this theme (Gorsuch and Maloney, 1976), all too often religious people are merely conventional, and frequently prejudiced, in their social judgments. However, it seems to be a characteristic of the more strongly religious people that they achieve a kind of moral development that goes beyond the conventional and rule-following. This is associated with the overcoming of social prejudice. Gorsuch calls this level of interpersonal sensitivity "social transcendence". The religious overtones are intended and perhaps justified, but not adequately defended.

I have attempted here to identify the perceptual style associated with meditation. Initially I concentrated on the better understood field of the perception of physical objects, though I have been concerned in the latter part of the article to extend the analysis to sensitivity to people. My hope is that the analysis throws some light on the psychological processes through which the spiritual life may help to achieve the sensitivity to the needs of other people and the sense of unity with them that is a central point of the religious path. Tentatively, I have suggested that the qualities needed for this personal sensitivity may also facilitate the sense of unity with God.

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Metaphysics contributes to ornithology

CHARLES HARTSHORNE

PHILOSOPHERS have often been something more than just philosophers. Many have been mathematicians, formal logicians, empirical scientists of note, or theologians; a few have contributed to all these forms of inquiry. Intellectual history also shows that purely metaphysical speculations have sometimes (not always!) had fortunate effects upon the development of empirical science. The Democritean atomic theory of the 5th Century B.C., helpful in the rise of modern science, was a brilliant modification of the Parmenidean doctrine (6th Century B.C.) of *being* (or all reality) as one, indivisible, and unchangeable. Democritus and his teacher Leucippus regarded, not all reality, but each atom as indivisible and unchangeable in its internal being, yet able to occupy successively diverse locations in the “non-being” of space. This view, still apparent in the work of Newton in the 17th and Maxwell in the 19th centuries, was superseded only in the present century.

In my own intellectual work, metaphysics and a branch of empirical science have been the most persistent concerns. The metaphysics was widely different from that of Parmenides, and the branch of science was more narrowly specialized than physics, being a limited part of ethology, or the study of animal behavior. My limited part of this is the study of bird song, or, a little more generally, of the making by nonhuman animals of sounds having objectively some resemblance to those which in the human case are called musical. Perhaps instead of ethology I should say animal psychology, since my interest has included the effort to imagine something of the experiences of the music-making animals, for example, how a

Theoria to Theory, 1979, Vol. 15, pp. 127 – 140
0049-5686/79/1502-0127\$04.50/0

Published by
Gordon and Breach Science Publishers Inc., 1979

singing bird — or Gibbon Ape or Humpback Whale — and its listening mate or territorial rivals may feel about the singing. One could also say that I was doing a kind of zoology, especially ornithology, since birds are the music-making animals (other than human beings) par excellence.

Ornithology is a science to which nonprofessionals have made notable contributions. Eliot Howard, a British business man, established the case for the territorial function of song. At least two other writers had seen the point before, but it was Howard, perhaps unaware of his predecessors (in Germany and Ireland), who in 1920 began to make ornithologists, and through them naturalists in general, aware of the importance, for many kinds of animals, of displays to secure spatial separation for breeding and foraging purposes.' Oddly enough, although some fine ornithologists have been clergymen, others painters, one a dentist, another a ballet dancer, several physicians, the combination of philosophy and ornithology seems to have been rare. Aristotle, who combined so many subjects, could be named as an early example. Wallace Craig, a student of bird behavior and a founder of ethology, has been classed as a philosopher but seems not to have made original contributions to that subject. H. H. Price, well-known English philosopher, has studied problems of bird flight. The fact stills seems to be that I am the first since Aristotle to be equally serious about metaphysics — that quintessential branch of philosophy — and ornithology, or that much of it which is relevant to the understanding of the phenomenon of song.

It happened that my experience as philosopher had special features favoring this combination of concerns. In my fourth year as a college teacher I was suddenly asked to teach aesthetics because the instructor in that subject, J. H. Tufts, had been taken ill. This was at the University of Chicago where (in 1928) I was beginning the second lap of my fifty-year teaching career. Tufts had emphasized primitive art, especially Amerindian; and I used his slides illustrating this topic. Because of my interest since boyhood in bird song, I began to reflect on the question, "Is not the most primitive art prehuman altogether, for instance the 'dances' and 'songs' of birds, and indeed of some other kinds of animals?" Students of

amphibians and certain kinds of insects, for example, speak of the songs of these creatures. I asked myself, "What have all nonhuman music-making creatures in common?" The answer was that all have need to communicate by sound because of inconspicuousness, territoriality, and the absence of any effective alternative means (such as smell) of signalling at a distance. Music-making animals tend to be small and for this and other reasons largely invisible even to mates or territorial rivals; smell is a very minor factor in their lives; and they tend to space themselves well apart from one another. Sound alone can serve their communication needs, and musical patterns are the most distinctive, readily recognized and remembered forms of sound.

Another aspect of my philosophical experience relevant to the study of animal music was my intensive study of the work of A. N. Whitehead. For he, more than any other great philosopher, made aesthetic principles central in his metaphysics. (Peirce, my other favorite philosopher, also affirmed this centrality, although his knowledge of aesthetics was too slight to enable him to elaborate the suggestion.) It was Whitehead's idea that all life—indeed all existence—tries to achieve aesthetic value, defined in terms of the intensity and "mutual conformation of the elements of an experience"—the intensity being achieved through contrast or variety, the temporal form of which is the partly unanticipated. Or, as the musicologist Sachs has it, (aesthetic) "order is the vast realm between the fatal extremes of mechanism and chaos." At one extreme we have aesthetic incoherence or disorder and at the other a lifeless, tediously absolute orderliness or regularity. It seemed to me that singing animals produce patterns of sound illustrating these principles.

The chief question I wanted to answer in these reflections was not, "What in principle is the biological utility of singing because of which natural selection has favored its development in certain species?" I knew and accepted the standard views on this subject. The territorial function I had long known from Howard's book, and the value of song in attracting mates and maintaining pair bonds seemed obvious. But biological utility is a complex and long-term matter. Birds are not zoologists or ornithologists; they build nests,

for example, without knowing as we do the function of nests. They may also sing without thinking about the ultimate utility of this activity, as they (and often people) copulate without thinking of the utility of that. Perhaps they sing, at least partly, because they like and enjoy singing and copulate because they like doing that. Evolution selects for activities that help to perpetuate certain genes; but this does not tell us what is in the individual bird's awareness. In selecting for modes of behaviour, evolution may indirectly select for modes of feeling that promote such behaviour. And so the question, "Is song utilitarian or do animals sing because they feel like singing?" is ill-formed. The two accounts are mutually compatible, but answer different questions.

I knew well the behavioristic drive in all science—a drive curiously ignored by Whitehead, though not by Peirce³—the drive to eliminate from science all self-observed or vicariously imagined feelings or thoughts as such in favor of the mere bodily behavior, which alone (it is argued) can be intersubjectively observed. However, I have always held that a coherent view of evolution requires us to admit the reality and causal influence not only of human thoughts and feelings as more than mere behavior but also evolutionary anticipations of these far down the scale of creatures, indeed all the way down to atoms and farther. In this "panpsychic" or psychicalistic view I was agreeing not only with Whitehead and Peirce, but with Leibniz (allowing for changes in physics and biology since his time), also Bergson, and many other philosophers and scientists, for example Sewall Wright, the geneticist, the finest scientific mind I have known intimately. My original reasons for the view were, however, not derived from these writers, but were based on considerations similar to those which led them to adopt it.⁴

This is not the place to argue further the case of psychicalistic monism. The idea seems absurd to many sophisticated people, but pre-scientific human beings inclined to it, as do children; and it is arguable that the alternative doctrines—dualism or materialism—owe their popularity to a now largely superseded form of science. This was Whitehead's view, argued for in considerable detail; Whitehead was also influenced, as was I, by the reading of Wordsworth and Shelley, for whom it was a matter of experience

that nature is most directly given as, in Whitehead's phrase, an "ocean of feelings", not as totally insentient stuff or processes. The latter version is not derived from direct intuitions but is an inference rather than a datum. The grounds for the inference are open to challenge.

My work on song did not presuppose the acceptance of the psychicalistic doctrine, but only the admission that the analogy between bird song and human music might help us to discover and interpret facts of bird behavior. And this, if so, would give at least mild confirmation to the view that positing too great a gulf between human and nonhuman forms of existence may impede scientific advance as truly as an incautious anthropomorphism.

The song of birds can be seen as a remarkable window into the animal mind, for: (1) it has (in many cases at least) a definite musically analyzable structure, (2) thanks to the tape recorder and other instruments, we have some fairly precise knowledge of this structure, and (3) we also have well-confirmed though of course incomplete knowledge of its biological functions. In addition (4) birds are at once well down the scale in the size of their brains and in limitations in their learning capacities (in comparison to some at least of the mammals) and yet they are remarkably akin, hence intelligible, to us in some of their behavior, for instance in their family life and in their primary reliance on sight and sound rather than smell. Here then is a test case for the behavioristic issue. If we can show the reasonableness of a more than merely physicalistic interpretation of the singing bird, we will have illustrated the value of a more than merely physicalistic view of reality. Our evidence must be from behavior, but our conclusions need not be confined to behavior.

For more than 20 years I published nothing of my reflections on song. Then in 1953 I decided, encouraged by my wife, to go to school (which I had never done) in ornithology by taking courses for two successive summers at the University of Michigan Biological Station under that admirable and most competent teacher Olin Sewall Pettingill. At the Station there were no other philosophers, only instructors and students in biological subjects, with a basic library in these subjects. I began also attending ornithological

meetings, and in 1954 read a paper to the American Ornithological Union. This was published in *The Auk*, the A.O.U. journal.⁵ A number of other essays were published, three in professional journals, others in less specialised media. So I became an ornithologist of sorts.

Although specializing in song, in another sense my bird work was very unspecialized. I was studying, not the songs of this or that region, but of the world. For I wanted to test theories about song as such, and to avoid being misled by peculiarities of the singing birds of a particular region. In connection with my professional subject, I made trips, three of them partly financed by Fulbright grants, to lecture (and so far as possible listen to the birds) in Australia, New Zealand, Hawaii, Japan, Taiwan, India, Costa Rica, Mexico, Argentina, England, Germany. Some trips were made simply for bird watching, including those to East Africa and Jamaica. For various reasons I have been, at least for some days, in more than forty states of the U.S.A. and as many of the world's countries. I assembled a collection of tape recordings, some made by myself, and phonograph records of songs around the world and a library of ornithological books. During my many years in Chicago I had the luck to live near the world-famous ornithologist Margaret Morse Nice. There were also helpful ornithologists, Austin Rand, Emmet Blake, etc., in the Field Museum whom I saw now and then. In Austin I have had as neighbor an extremely knowledgeable expert, Edgar Kincaid of *The Bird Life of Texas*. I tried out my ideas on these and other informed people and received much help from them.

After many years of trying to express my theories in *biomusicology* (to employ a term of Szöke, the Hungarian expert in the subject) in journal articles, I took the long-contemplated plunge of putting it all in a book. This was *Born to Sing*, which appeared in 1973.⁶ The writing of it took more effort than any of my philosophical works. Although the book is packed with facts, no reviewer cited any definite factual errors (of course there must be some, and I have found one or two); and while some questioned my generalizations or theories, others were sympathetic to them.

The basic theory, which I call "the aesthetic hypothesis," is that

songbirds are motivated to sing, at least partly, by an innate capacity to enjoy the making and hearing of musical sounds. They sing a great deal and can hardly be constantly saying to themselves, as it were, "I must sing to warn off territorial intruders or attract and keep a mate," any more—rather less—than human beings make love simply to produce offspring. In both cases sensations or feelings (the former being, as I argued in my first book,⁷ a form of the latter) favor the action, make it self-rewarding or self-reinforcing. And this is what "aesthetic" basically means. Songbirds, in short, have a primitive form of musical sense. Evolutionary pressures favor its development in some species because its behavioral expressions make for reproductive success in those species. *A primitive aesthetic musical sense is in some species biologically useful.* Singing by those species is done so much and so well because it is enjoyed as such. In selecting for the behavior, evolution selects for the feeling that activates it.

With this hypothesis I looked at the facts, those already known and those I was the first to observe. I was not solely interested in testing my hypothesis. I hoped by the way to find hitherto unobserved and unexpected correlations, to make significant discoveries about singing behavior. In this I was like any empirical scientist.

My first discovery I called the "monotony threshold." This may be explained as follows. Singing varies in repetitiveness and in degree of discontinuity; some species simply repeat a single brief pattern many hundreds of times a day, others have a repertoire of patterns and avoid repetition of a pattern (or limit it to a few repeats) until they have interposed one or more of their other patterns. The choice of which pattern to sing next in these latter or "versatile" species seems largely random. There is no fixed order. Thus the aesthetic requirement of an element of the unexpected is met. But what about the repetitious singers? In the overwhelming majority of cases they act as aesthetic principles require, although not by varying the singing; rather by interposing between successive utterances of their one song time enough for other activities or experiences to occur and for the fading of immediate memory. Monotony in the aesthetic sense, especially in a creature with as short an attention span as a bird, need not arise from singing the same song over and over,

provided there be sufficient pauses between utterances. In fact there is a strong correlation of length of pauses between utterances and repetitiousness of the singing. This has been essentially confirmed since my book was published by several investigators. Versatile singers, those with much "immediate variety" (*e.g.*, the Eurasian Skylark), may sing for minutes at a time with scarcely detectable pauses; whereas repetitious singers (many American sparrows and wood warblers, or Eurasian buntings) tend to pause five, ten, fifteen or more seconds.

An admitted and important qualification to this correlation of long pauses with lack of immediate variety is that it seems not to apply to *some* of the many singing species that are not "true songbirds" or oscines (species with highly developed syrinxes or organs for vocalization). This seems to show that some of the physiologically ill-equipped singers (as I call the nonoscines) are also psychologically primitive in their musical sense. Nightjars (*e.g.*, American Whippoorwills) are the most striking cases of this low level of song development. They do indeed often sing monotonously, and their songs are musically crude or ultrasimple. And so the evolution of muscles for singing tends to accompany the evolution of sensitivity to musical values.

The most striking confirmation of the monotony threshold is in the fact, which I was the first to notice, that in a number of species an individual may sing repetitiously and with suitably long pauses part of the day and at other times (usually in early dawn or in late evening) with some immediate variety and much shorter pauses. Another confirmation is in the tropical Nightingale Wren *Microcerculus marginatus*, some local populations of which sing a long song of dozens of notes each sharply contrasting in pitch with its immediate predecessor and with short pauses (fractions of a second), while other populations sing with no or extremely slight (I was not able to detect them) pitch differences and with pauses at least ten times as long (several seconds) as in the versatile case. A third group sings with variety and pause lengths intermediate between the two extremes. This beautifully agrees with the monotony threshold.

My book records a number of other correlations, some of them complex enough to require a computer to handle conveniently. In a

number of respects my book is the first to make extensive use of roughly quantitative methods to test general theories about song behavior. Thus, for instance, I propose a way to measure degrees of singing skill or of song development by the use of six parameters, and show that this skill is correlated with annual amounts of singing (estimated by length of song season and other variables), also with indices of biological need for song, such as territoriality and inconspicuousness, thus strongly confirming standard views about the functions of song. (If a bird cannot be seen yet must influence others, it must be heard, and the greater the distance over which it must announce itself the greater the pressure for distinctiveness in the utterances.) In a circle (or, if it is in a forest, a cylinder) of five meters in diameter, only one species may be calling or singing; in one of 40 meters, perhaps a dozen. And the greater the distance the more difficult is recognition by sight, — if indeed the line of sight is not blocked by foliage, rocks, or tree trunks.

A reviewer found the six parameters of singing skill — loudness, continuity, complexity, tonal purity, musical integration, imitative ability — “subjective.” He does not mention my own use of this word in the same connection, qualified, however by the negation, “not hopelessly,” or my claim that the high correlations with such reasonably objective variables as territoriality, inconspicuousness, syringial development (only true songbirds sing the most developed songs), and amounts of singing per year (song season multiplied by continuity and other relevant variables) show that the admitted subjectivity largely cancels out statistically. Such correlations may be explained away as subjective only if there is reason to view the bias in assigning values under the variables as strongly and systematically favoring the correlations in question. I show that this is highly improbable. In fact the songs I rate as well- or poorly-developed are generally so rated by others who had not thought of the correlations. In one case, that of British songbirds, I use the ratings of two well-known British writers. My correlations are not disposed of by blanket charges of subjectivity. Nor does it necessarily matter that other writers would assign somewhat different values in particular cases. For instance, whereas my highest “scores” (adding the six values for a species) are 48, others might have some of 51 (out of

a theoretical perfection of 54, each variable allowing values 1 to 9) or might have none higher than 40. The songs I term superior might still be so, or nearly so, for these others. It is from a list of superior singers around the world, as well as from some lists of poor, or mediocre, singers that my conclusions are drawn. Nor would it necessarily matter if some species I rate as "nearly superior" were by others rated as superior, or vice versa. What would upset the correlations would be for some careful observers using clear criteria to rate many of my "poor" singers as superior and vice versa. My argument is from extreme cases, not from fine points of difference in ratings.

By superior (in my ratings at least 42) I mean separated from having no song at all by almost as great a difference as a bird is well capable of. If a bird has a single pattern of five notes, that is farther from no song than a pattern of three notes. If the notes are musically refined, as most call notes (expressing alarm or annoyance, say) are not, that too is farther from no song than notes that are as noisy as ordinary call notes. The question as I see it is, "How many small evolutionary steps (transmitted through genes or partly through imitation of elders) were required to get from no song to the song to be rated?" No one would suppose that a Skylark's, Nightingale's, or Hermit Thrush's song was arrived at in one evolutionary leap. But there are some simple or crude songs that one might almost think of in this way. They are ever so slightly glorified, varied, or refined call notes. The ordinary House Sparrow, *Passer domesticus*, has such a song. It is also gregarious and, because of its habits and habitat, conspicuous.

A special feature of my book is the threefold distinction: call notes, song, and *chatter*. The last is like song in being especially connected with mating but unlike it in being neither markedly musical nor (in most cases) territorial and in having as primary function that of cementing the pair bond, both sexes working out a pair dialect—in some cases a duet. I claim to be the first to explain in this fashion the imitative ability of parrots, an ability that no one with much biological sense could seriously take to be without function in the wild. I also explain at least one other function of imitative skill, that of increasing variety, hence making high

continuity possible without monotony and also contributing to the individual distinctiveness of a singer's repertoire.

In my opinion any success I have had in my venture into ornithology is one more example of how metaphysical principles can help empirical science. They do this by suggesting questions that only empirical tests can answer but that mere observation might not lead one to ask. No one had asked, "Do repetitious singers escape monotony by singing discontinuously, whereas versatile singers sing with maximal continuity?" Nor had anyone distinguished, for this purpose, two forms of versatility, only one of which has much to do with continuity. (A bird may have a considerable repertoire of patterns but sing each pattern many times before shifting to another. The American Song Sparrow, *Melospiza melodia*, sings in this fashion. To avoid monotony, it must and does pause nearly as long as a species with but a single song. Only what I call "*immediate variety*" makes unmonotonous continuity possible.) No one had asked, "Can we measure singing skills, and have they any correlation with amounts of singing per year?" Indeed there had been only one or two efforts to measure these amounts. Other neglected questions were: "Why are parrots so little musical yet so skillful in imitation," "Why are imitative species in general somewhat less musically exquisite than many highly developed non-imitative singers?" or "How is degree of song development in various families, or smaller groups of species, correlated with the foraging methods and types of habitats of these groups?"

My book thus contains empirical evidence bearing on many previously unasked questions. None of this might have happened had I accepted the widespread belief that aesthetic values are entirely peculiar to our species. I had come to see that cognitive, technological, moral, and religious values are most distinctive in *Homo sapiens* and that aesthetic principles apply to precognitive and pre-moral experiences as well as to cognitive and moral ones. An infant can be bored by monotony or thrilled by novelty before it can do much by way of thinking and long before it can have a sense of obligation. Subhuman music is a reality, but scarcely subhuman science, ethics, religion, or philosophy.

Methodological behaviorism inhibits investigative imagination in

ways not always fortunate. Materialism and dualism (their difference seems, from some points of view, more verbal than real) amount to this: "Do not expect the analogical generalization of variables found in human experience as such, as more than mere behavior, to tell us anything about reality in general." These doctrines "bar the path of inquiry" in certain directions. Birds sing as if aesthetic principles influenced them. I see this, with Whitehead, as illustrating a general principle. Thus Whitehead takes the pervasiveness in nature of wave patterns—a primitive form of aesthetic order, or unity in contrast—to exhibit a similar aesthetic influence even in the inorganic world.

The mixture of predictable and unpredictable that is envisaged in quantum theory is another illustration of aesthetic principles. To have beauty, reality must be neither sheer order nor sheer chaos. And biologists are now reiterating Epicurus of long ago: "chance and necessity" are both pervasive. In spite of Einstein, God does "throw dice." Tedious, unqualified order and hopeless disorder are alike illusions. There is that in the world which excludes both. Neither classical physics nor classical theology understood that order is the limiting, not the exclusion, of chance and caprice. Instead, in both traditions, predictability in principle, predestination, were virtually absolutized and allowed to obscure the reality which is creative freedom, whose actions have necessary but not strictly "sufficient" conditions. Only approximate, abstract, or statistical outlines of the future are causally settled in advance. Too much predictability is as ugly, and at the limit as impossible, as too little. In the singing of versatile singers, for example, it is vain to look for strict causes determining which song will be sung next. The whole point is that the bird itself must decide this. A biologist has defined animal decisions as "unpredictable" acts, in deliberate rejection of the dogma that in principle everything is predictable. The evolution of song is toward increasing unpredictability, always within limits, since there will be a general style distinctive of the species and, more subtly, of the individual.

The better we come to understand nature, the more, I believe, shall we see that the universal principles are aesthetic. (Is it a mere accident that Einstein and Heisenberg were both musicians and

Maxwell something of a poet?) Since mechanical or absolute order is not aesthetic, we should be pleased to be able to say, with Whitehead, "Disorder is as real as order." Or, in the current jargon, the real order is stochastic. Probabilities are no mere makeshifts to cover our ignorance. They are in principle providential rules for the everlasting game of chance which is existence itself. When Darwin spoke of "chance variations" he was a better naturalist (even a better theologian) than he intended to be, as he showed by explaining "chance" as synonym for our ignorance of causes. It was his hypothesis that chance is unreal that was the fundamental ignorance. The more we learn of causes the less relevant the hypothesis becomes.

Many scientists, from ancient times to the present, have said that they sought the truth because of its beauty; but as to what constitutes beauty they often had a one-sided, oversimple view, identifying it with a total absence of individual caprice or decision-making. Their aesthetics was naive. The Greek worship of circularity, that for a time misled even Kepler, was an example. It takes no great artist to make circles! The cosmic artist does better than that. In our age the tendency is toward the opposite extreme, an undue emphasis on the arbitrary—as in the music of Cage. Extremes are more exciting to argue about than moderate positions. For this too the reasons are aesthetic. Life, existence itself, is an art. Order sets rules for creative action; and the rules themselves must have been created and must be creatively altered in due course lest the universe peter out in deadly routine. The dramatic character of the big bang theory is at least suggestive. Science and metaphysics are once more close together—but on a new level of subtlety and balance.

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Homeopathy in veterinary practice

EVELYN DAY

AFTER 15 YEARS of veterinary practice, working through the period of the advent of chemotherapeutics, antibiotics, antihistamines and steroids, I was dissatisfied with my ability to cope with a number of conditions—mostly the chronics—in spite of a conscientious approach and good access to recommended treatments and laboratory investigations.

The compulsion to bring comfort and to restore maximum health to animals is a particularly strong one. Economics also have to be considered.

A few clients had requested accurate interpretation of their animals' symptoms in order to be able to select homeopathic remedies. These clients were keen observers. I was mystified and annoyed that I knew nothing of all this. Our pharmacological training was obviously strictly allopathic—in fact, the only mention of homeopathy was contained in the statement that it was no longer practised! Briefly, we were trained to recognise disease entities from the point of view of causal organisms, poisons, deficiencies, hormonal disorders, etc., whereas homeopaths observe in the greatest detail the individual's picture of response to disease factors and treat each patient according to his symptoms.

I had no contact with the few practising veterinary homeopaths, so it was difficult to know where to begin. However, a German homeopath, a specialist in "inner medicine" advised me to obtain Boericke's Homeopathic *Materia Medica* and Dr. Margaret Tyler's *Drug Pictures*. He told me that Dr. Tyler was world famous as a teacher. She had practised at the Royal Homeopathic Hospital in London.

Theoria to Theory, 1979, Vol. 13, pp. 141 – 147
0049-3686/79/1302-0141\$04.50/0

Published by
Gordon and Breach Science Publishers Inc., 1979

I learned a little about the work of Hahnemann, the discoverer of the homeopathic principle. He was a physician and a famous analytical chemist who experimented on himself. He discovered in 1790 that cinchona bark (source of quinine), then considered perfectly harmless, produced in himself bouts of fever and ague and great debility. Thus, the agent used to treat fevers (e.g. malaria — cause then unknown) and as a tonic was able to produce in healthy subjects the symptoms which it was expected to cure.

Hahnemann formulated his theory of “*similia similibus curentur*”, based on this and subsequent findings and worked out the method of preparing very minute doses of substances, some of which, in material doses, would be highly toxic. He and his pupils and followers “proved” an enormous range of substances, animal, mineral and vegetable, by giving them in blind trials to groups of healthy people. Doctors, students, medical missionaries, nurses, and, in the case of the highly toxic preparations, (e.g. aconite), convicted criminals have been willing or coerced guinea pigs.

He worked out a precise method of preparing dosages in ‘potencies’ or special dilutions: the greater the dilution, the higher the potency and the more profound the effect. The remedies are used in the form of tinctures, pillules or tablets.

To begin preparation, soluble salts are dissolved in distilled water; solids are broken down by grinding and trituration with the vehicle sugar of milk to a certain dilution and then are further diluted with absolute alcohol. Plant and animal materials are macerated with distilled water and then extracted with alcohol.

Each stage of fluid dilution is achieved by the addition of one part of previous dilution to ninety-nine parts of alcohol followed by a period of twenty minutes shaking or “succussion”.

The whole process has to be carried out most carefully—first scrupulous identification of the agent (for instance plants gathered abroad and identified by competent authorities) then meticulous cleanliness and measurement in the breaking down and dilution processes. (Because of the preparation is labour-intensive and packaging costly nowadays, the price of homeopathic remedies has escalated enormously).

The dose in the final high potencies is of incredible minuteness —

for instance the 12th centesimal potency will contain 1/10000000000 0000000000000000 gr. of the active ingredient. This is a common potency to use but they go much higher. Seeing the effect of these potencies on my patients which are unable to tell lies or to dissimulate makes me perfectly happy to use these seemingly impossible dilutions. Physiological investigations of micro-dilutions are reported in the *Journal of the American Institute of Homeopathy* and in the *British Homeopathic Journal*.

To return to my initiation: I was advised to read the provings of some of the main remedies and, when familiar with them, to wait for a patient to present a recognisable picture and then 'to go to it'. The text books then available in English were all written from the point of view of human medicine. However, I quickly realised that I already had a suitable patient on my list.

She was a 5–6 year old English springer spaniel bitch—much loved—a good gun dog—home, an isolated farm—very thin—active—always very hungry—skin extremely itchy—odoriferous—practically hairless—covered with grey scales of thickened skin—sores—supurating feet, so repulsive and obviously diseased that her owners wanted to keep her from the public gaze.

Visiting the herd on the farm, I had become involved with her, had wormed her, dieted her and had treated the infected sores and the presumed heavy mite infestation very painstakingly, taking her in as a patient every few weeks. She presented the text book picture of advanced scabies, human or animal, but failed utterly to respond to specifics and to antibiotics for secondary infections.

After reading the picture of SULPHUR, I ordered a low potency in pillule form and sent it to Mrs H. with instructions.

Three weeks later, the report was "improving, some hair growing, send more pills". When I examined her some nine weeks after beginning the treatment, I failed to recognize her. She had put on condition amazingly and had grown a good liver coloured coat. She went on improving and was given courses of low potency sulphur at moulting times. After all the previous drudgery of treatment with medicated baths, lotions, pills, injections etc. which had never soothed the skin for many days or improved condition by one iota, it was a delight to the owners and to me.

I worked afterwards through treatment of many conditions, such as corneal injuries, otitis, gingivitis and mouth ulcers in cats, and gland conditions, interdigital cysts, prostatitis, cystitis, gastroenteritis, false pregnancy, foreign body fistulae and so on.

A visit for a few days to the Royal Homeopathic Hospital in London on a course for medical graduates brought much help and encouragement. One eminent physician there was of the opinion that I would have to try to find *some* remedies which I would regard as specific, as the fine and detailed prescribing used in human medicine would not be possible with my patients.

Some of the way was easy. Take ARNICA, for instance, the most effective remedy for bruising and shock in trauma. It has proved invaluable to me over the years for pain relief and rapid healing in the crushing and tearing injuries of road accidents and sprains and the like – such an easy remedy to prove on oneself, but convincingly vouched for by the owners of injured animals, who, when supplied with conventional pain killers and the easily administered pillules side by side, have so often returned the conventional drug saying that “it is after the little pills that the animal is relaxed and comfortable, so these are not needed”. Of course, the owners have also noticed that Arnica in potency gives no side effects such as heavy drowsiness or lack of interest in food and drink, and that functions are maintained. Nowadays, I use Arnica only, chiefly in the 200th potency. It is completely reliable and totally safe.

ARSENICUM ALBUM – virtually specific for acute gastroenteritis, particularly the food poisoning syndrome. Think of arsenical poisoning – extreme nausea, vomiting, acute pain, diarrhoea, vomiting and passing blood – marked prostration and chill leading to coma and death. This description in its various stages may be applied to food poisoning and to many cases of gastroenteritis. The patient may be desperately ill, collapsing with putty-coloured mucous membranes. Arsen.alb. is virtually specific here, very easily administered, readily accepted and normally achieves rapid relief. (The same relief has been personally experienced – the remedy is most valuable for Continental travellers!) I usually use the 30 centesimal potency.

CANTHARIS (Spanish Fly) was used by Old School physicians as

a blistering agent. It is capable of producing fearful inflammation of bladder and kidneys and the whole urogenital tract, and therefore is homeopathically ideal for treatment of suitable cases of painful urinary and prostatic disorders where the pain is severe, and for cutting and burning. The treatment of cystitis solely with antibiotics is far from satisfactory and human patients will vouch for the misery involved. Animals unselfconsciously demonstrate their relief when treated with *Cantharis*.

CHINA (*Cinchona*) is indicated for febrile conditions exhibiting a periodicity. I have used this in monitored treatment of *Toxoplasmosis* and other cases of pyrexia of unknown origin returning periodically.

CYCLAMEN is one of many remedies I originally picked out to treat the distressing condition of false pregnancy in bitches, and is the one I have found most useful. It seems to diminish the secretion of milk and is useful also in drying off lactating mothers safely. I have used it in bitches, cats, mares and cows. It is marked in its control over the mental symptoms of false pregnancy in bitches I have treated, and is, of course, infinitely to be preferred to the use of oestrogens.

HYDRARGYRUM (metallic mercury) was the remedy which after many trials I found most suitable for treating gingivitis in cats. This is a common condition, causes sore mouth, salivation (often bloody), halitosis, loss of weight and, of course, dental damage. I always felt that the symptoms of mercury poisoning pointed to its use in these cases.

I had as a patient a kitten a few months old with a dreadful mouth. She was thin, anaemic, listless, inappetent and a great worry to her elderly owner. The sore mouth made her refuse to eat and drink, she was always dehydrated between treatments and antibiotics had disappointingly poor results. Calls for help from the owner were frequent and necessitated visits as she was an O.A.P. with no transport. I finally supplied **HYDRARG**. The next call I had within a few days was startlingly different. "Please tell me how to cope with the appetite. I feed her all the time. Now she is driving me mad because she goes to one neighbour's garden to eat his precious ice-plants and to another's pond to fish out his gold fish.

She has taken three big fish already. I 'survived' two by taking them and putting them into a bowl of water, but she has just licked one down to its bones!"

The poor animal with the wretchedly painful mouth which was slowly dying, now was able to eat and to hunt, even to the extent of wading into seven inches of water to catch fish. She made up for lost time and grew into a strong adult. I could not have expected to achieve this result even with repeated courses of expensive antibiotics frequent visits, fluid replaced and forced feeding.

MERCURIUS CORROSIVUS (corrosive sublimate of mercury) is the preparation I have found most useful in treating corneal ulcers, which are of frequent occurrence in veterinary practice. Given early, it will at once give relief from pain and therefore avoid self mutilation and make quick healing possible. Animals dread handling about the head when eyes are painful—merc. cor. given orally renders antibiotics and ointments totally unnecessary—unless there is gross contamination or deep perforation.

SILICEA (silica) is a supposedly inert substance. Students of pathology could not fail to be fascinated by the results of prescribing potentised silica in the case of old fibrosed abscesses or foreign bodies. Out of many cases, I will mention one.

A Collie dog, two years old, loving to chase sticks thrown by his owners (a dreadfully dangerous form of play) finally ran on to one when its end stuck in the ground. The stick penetrated the soft tissues of the throat. The dog was very properly given tetanus anti-toxin and a thorough course of antibiotics. The local condition subsided after a few days and he ate and drank apparently normally. Eventually, however, he produced a sinus discharging right at the base of the throat. When sometime later I was asked to see him, I explained to the owners that he most probably had a sliver of wood somewhere in his neck, they were horrified and keen for me to carry out a surgical search. I explained that the channel leading to the foreign body was long and the procedure in that area very risky. I preferred not to inflict such tissue damage and prescribed **SILICEA**. Within 48 hours a swelling appeared below the angle of the jaw 8 10 inches above the discharging sinus opening. The owners wished to have the swelling lanced quickly! Fortunately, I had

known the family for years and I steadfastly refused to operate, so we pressed on with the silicea. An abscess formed, thinned the overlying skin and tissue and burst—a length of bamboo of 4½ inches was safely discharged and healing followed uneventfully. It had lain adjacent to carotid and jugular and the nerve plexus in the throat. Surgically, much dissection and interference would have been necessary.

Without any treatment, the heavily—discharging sinus would have persisted indefinitely. The administration of a few pills and the exercise of some patience gave us infinitely better results. The dog ate and drank throughout the process, but was somewhat fevered.

Years ago, physicians in human practice had to use silica with the greatest care and only in moderate potencies as it was capable of breaking down tuberculous lesions—a very undesirable effect!

The list of remedies I have used in the past twenty years is a very long one. Many of them, though sounding like Shakespearean herbs and simples are tried and trusted friends and I should feel lost without them.

Failures in homeopathic treatments are due to lack of effort and skill in prescribing and one is careful always not to prolong or spoil a case by lack of application. The medical attendant must look to his whole armoury and try constantly to choose the best he knows.

The mode of action of the homeopathic micro-dilutions has not been satisfactorily explained. It has been vaguely suggested that it is connected with their electronic structure.

My own feeling is that we shall find the explanation in the field of immune reaction (which may itself be governed by electromagnetic forces). The power of an organism to react to the tiniest doses of allergen is well known. This reaction is not confined to multicellular organisms—it is marked in bacteria. Over stimulation is obviously damaging, e.g. application of heat or caustics. Small effective stimulation is the basis of successful physiological reactions and probably the very smallest effective stimulation is the safest initiator of the healing process.

Wittgensteinianism and magico-religious beliefs

FEMI OTUBANJO

I

DISCERNIBLE in the Philosophy of Religion is a school of thought which has its pedigree in Wittgenstein's claim that the blunders in religion are too big for it to be simply bad science. This attitude to religion is developed, in relation to magico-religious beliefs, by Winch,¹ who echoes Wittgenstein's rejection of the assimilation of religion to science when he (Winch) remarked that "Zande notions do not constitute a theoretical system by means of which they (the Azande) try to gain a quasi-scientific understanding of the world."²

Winch's rejection of the assimilation of magico-religious beliefs to scientific explanations is expressed in the context of a criticism of Evans-Pritchard's evaluation of "Zande" witchcraft. According to Evans-Pritchard, the belief held by the Azande that there are witches is simply illusory.

As he writes:

It is an inevitable conclusion from Zande descriptions of witchcraft that it is not an objective reality. The physiological condition which is said to be the seat of witchcraft and which I believe to be nothing more than food passing through the small intestine is an objective condition, but the qualities they attribute to it and the rest of their beliefs about it are mystical. Witches as Azande conceive them cannot exist.³

Evans-Pritchard gives as his reason for rejecting Zande witchcraft, the fact that their notions of witchcraft—the qualities attributed to witches and the manner in which they are believed to bring events about—do not accord with 'objective reality'.⁴

Winch's view is that Evans-Pritchard's account of witchcraft is

Theoria to Theory, 1979, Vol. 13, pp. 149–162
0049-3686/79/1302-0149\$04.50/0

Published by
Gordon and Breach Science Publishers Inc., 1979

mistaken; mistaken because it carries the assumption that there is an external reality in terms of which the reality of things can be judged: for Winch, there is no such thing. Reality is not something outside language but is in fact determined by it. It is within language that the distinction between the real and the unreal shows itself: “we could not (as Winch writes) . . . distinguish between the real and the unreal without understanding the way this distinction operates in the language”.⁵

Winch is, in fact, saying that the description (which includes assessment) and explanation of any ‘form of life’ must employ the same conceptual framework as the participants in that form of life. This means that ‘Forms of life’ as Gellner puts it, ‘are ultimate’ and must therefore be understood or criticised in their own terms. Winch illustrates this point in his comment on Evans-Pritchard’s account of contradiction in ‘Zande Thought’.

According to Evans-Pritchard, the fact that one is a witch is often proven in Zande Society by a post-mortem examination of a dead suspect’s intestines for ‘witchcraft substance’. If this substance was found, the dead suspect was proven a witch. Since witchcraft is believed to be transmitted through the male line and all Zande are descended through the male line, “it appears evident (writes Evans-Pritchard) that if a man is proven a witch, the whole of his clan are ‘ipso facto’ witches”.⁶ The Zande, says Evans-Pritchard, “see the sense of this argument but they do not perceive the contradiction (the fact that a few positive results scattered among all the clans would very soon prove that everybody was a witch or that a few negative results scattered in the same way would soon prove that no one was a witch) . . . because they have no theoretical interest in the subject”.⁷

Winch’s comment is that the supposed contradiction in Zande witch-beliefs is one which has substance within the conceptual framework of the observer and not of the participants: “the context from which the suggestion about the contradiction is made, the context in which the beliefs about witchcraft operate . . . it is the European obsessed with pressing Zande Thought where it would not naturally go to a contradiction — who is guilty of misunderstanding, not the Zande”.⁸ The implication is that if we were to understand

these beliefs strictly in terms meaningful to the Zande themselves, we shall but see that the beliefs in question involve no contradiction. No contradiction is involved because oracular pronouncements are not treated as hypotheses.

It is possible to identify two important strands in Winch's rejection of the assimilation of magico-religious beliefs to science considering that the criticism levelled against Evans-Pritchard's account of Zande witchcraft only serves as an illustration of this rejection: they are (1) that 'forms of life' are ultimate and (2) that in consequence, 'forms of life' must be understood (explained, criticized) in their own terms. For Winch, the former entails the latter, that is to say, that once we accept the fact that 'forms of life' are ultimate, we shall necessarily come to see that the only way we can explain or criticise a 'form of life' is, by reference to its conceptual tools. The problem, however, is, how do we know, in the first place, that two bodies of ideas constitute two distinct 'forms of life' and are not merely aspects of the same form of life? How, in other words, are forms of life to be identified?

II

There is always the temptation to project apparent dissimilarities between two modes of discourse or even practices into fundamental ones, and thereby make criteria of rationality in the one irrelevant in the context of the other. Mounce⁹, in fact, accuses Winch of doing this, arguing that to have two different practices is not necessarily to have two distinct language-games. As Mounce writes:

The assumption that one cannot raise doubts about the sense of a practice which has a fundamental place in a society is based not on the notion of a language-game but on a particular interpretation of that notion. The interpretation is that a language-game consists of an independent practice or set of practices. This leads to the assumption that where one finds such a practice one also finds a language-game and that the sense of this practice cannot be questioned.¹⁰

Mounce, goes on to argue that 'whether something constitutes a language-game cannot be determined simply by seeing whether it forms a distinctive practice. One has still to consider the details of the practice'. This, indeed, agrees with the spirit with which, according to Winch, social scientists should go about the job of under-

standing social phenomena; by which I mean that the detailed consideration which according to Mounce, is required before two or more beliefs or practices can be shown either to constitute independent language-games or are merely different aspects of the same language-game can, in fact, only be achieved through the mastery of the particular rules which make those beliefs or practices what they are—a mastery which, as it has already been shown, is for Winch, essential for sociological explanations and understanding.

Confronted with two apparently dissimilar bodies of ideas, it is impossible for us to ascertain to which 'form of life' each belongs unless and until we understand the ideas involved. Since on Winch's view, to understand ideas or beliefs is to understand them in terms meaningful to participants, it follows that a subjective understanding of other people's beliefs must necessarily antedate our ability to affirm that the beliefs in question belong to one 'form of life' or another. In concrete terms, for one to know that some beliefs or ideas constitute a different 'form of life' from science, one in fact has to have a subjective understanding of both the beliefs or ideas and of science: There is absolutely no other means by which one can decide, whatever their apparent differences, that the beliefs in question are not instances of what one would call scientific explanations or propositions. This is like saying that in order to affirm that two 'language uses' belong to two independent 'language-games', one has to understand or master the operative rules in each of the 'language-games'. It is only then that one would be in a position to decide that either the two languages-uses are instances of the same 'language-game' or are two singular instances of distinct 'language-games'.

While it follows from the treatment of 'forms of life' as ultimate that we can only describe and explain them in their own terms, it is clear that we cannot be sure, in cases of apparently dissimilar beliefs, that we are dealing with two 'forms of life', rather than one, unless by first understanding these beliefs subjectively—that is to say, in the same way as the participants themselves understand their beliefs.

It is clear that Winch's claim that magico-religious beliefs are not quasi-scientific hypotheses does not derive from an analysis of these beliefs which begins from the claims of the participants themselves.

Indeed, Winch's claim that magico-religious beliefs are quite separate from and incomparable with scientific hypotheses derives from what he observes to be the case rather than from the conceptual framework of those who hold these beliefs. Consider, his claim that the Azande do not treat their oracular pronouncements as predictions but merely as 'the main way in which Azande decide how they should act'. Here Winch is not reporting the way in which the Azande themselves see their beliefs. He is making an assertion in respect of Zande belief which is based on how the Azande react to oracular pronouncements: The Azande, Winch claims, do not abandon their beliefs in oracles even if oracular pronouncements were not intended as predictions in the first place. But when one looks properly at Zande thought, one finds that they are not completely indifferent to the failure of oracular pronouncements, on the contrary, they take elaborate steps to explain such failure away. Failure may be attributed to 'benge', the substance used in the ceremony or to ritual uncleanness, or in fact to the ineptitude of the witchdoctor. One may ask why these elaborations are necessary if oracular pronouncements are not intended to be predictions of future states of affairs. Indeed it is because they see such pronouncements as predictions that they find it necessary to cover up the embarrassment of failure by bringing in one excuse or another.

We may further ask why the Azande always attempt to act in the way dictated by the oracles if oracular pronouncements were anything other than predictions. After all, as Winch himself writes, "if the oracle reveals that a proposed course of action is fraught with mystical danger, from witchcraft or sorcery, that course of action will not be carried out".¹² If the oracles do not assert anything that may be true or false, it is not clear why some people care to act in accordance with their (oracular) pronouncements.

The point is that the Azande take their oracular pronouncements seriously and the only reason why they do so is that they believe in the predictive power of oracles. Anyone who cares to understand Zande beliefs in their own terms cannot but see that these attempts at secondary elaboration betray an underlying faith in the predictive power oracles are assumed to possess: it is because the various ways in which failure can be explained away are available that belief in

oracular pronouncements remains undiminished by the failure of individual pronouncements.

If the Azande see their oracular pronouncement as predictions and their beliefs in witchcraft, sorcery and the like as hypotheses (explanations of natural phenomena), how come, we may ask, that Winch, who advocates a subjective approach in the description and explanation of social phenomena, does not see them in the same way? The answer, I think, lies in the conflict between the two strands in Winch's treatment of magico-religious beliefs, the Weberian and the Wittgensteinian, that is to say, the conflict between interpreting beliefs by means of conceptual tools of the believers on the one hand, and treating systems of belief as 'forms of life' on the other. Without understanding beliefs in accordance with the former, we cannot even know, in cases where we are faced with apparently, dissimilar beliefs, that we are dealing with different 'forms of life' rather than one.

To view magico-religious beliefs subjectively however, is, in fact, to see that rather than being completely incomparable with science, they are explanations of reality, albeit of a poor kind. In other words, it is to see that magico-religious beliefs do not constitute a distinct 'form of life' and science another, but that both are two extreme points on the same theoretical spectrum.

There is indeed, considerable agreement among anthropologists that people with magico-religious beliefs regard their beliefs as explanations of some sort. Evans-Pritchard, for instance, points out that witchcraft provides the Azande "with a natural philosophy by which the relations between men and unfortunate events are explained and a ready and stereotyped means of reacting to such events".¹³ Thus when an Azande affirms that a particular event was caused by a witch, he is, in fact, attempting to explain or localise the cause of that event: In making a witch the causal agent, the Azande rightly or wrongly believes that witches inhabit the world and sometimes bring men into relation with events in such a way that they suffer misfortune. Thus one finds that the explicit claims participants make about magico-religious beliefs correspond to Frazer's view that these beliefs are inadequate forms of scientific knowledge. It is this agreement between Frazer's view and what the

participants say about their beliefs which, is, no doubt, responsible for the position—a rather dominant one in Anthropology—that the explicit claims of the participants cannot constitute an adequate account of magico-religious beliefs, an adequate account as Malinowski (quoted by MacIntyre) would have it, being ‘constructions unavailable to the untutored awareness of the native informant’.¹⁴

We know that Winch’s methodology has no place for such accounts of social phenomena as Malinowski advocates. But to go along with his (Winch’s) approach is invariably to come to that characterisation of magico-religious beliefs which he rejects. My claim is that his view, that magico-religious beliefs do not constitute theoretical systems by means of which participants in such beliefs try to understand the world, cannot have been got through the application of his methodological principles.

III

It, obviously, has not been my intention to question Winch’s methodology; such a questioning being beyond the scope of this paper. Besides, I do, in fact, accept the claim that in order to describe or explain a social phenomenon we need the participant’s conceptual framework or what Nielson calls “the rules of conceptual propriety distinctive of that ‘form of life’”:¹⁵ To employ the same conceptual framework or conceptual tools as the participants in the understanding of magico-religions, however, is not necessarily to see such beliefs as something distinct from scientific knowledge; it is, on the contrary, to see these beliefs as theoretical systems sharing with science a common explanatory intent. Thus although Winch may be said to have a strong case on the issue of the appropriate method of social inquiry, when one attempts to understand magico-religious beliefs in accordance with his methodological prescription what one will find is that magico-religious beliefs are by no means *sui generis*.¹⁶

Indeed, contrary to the assumption which informs the debate on the appropriate approach to the understanding of magico-religious beliefs, these beliefs are not all one kind. A distinction exists and should be made between *beliefs associated with metaphysical ri*

and *beliefs associated with causative rites*. The differences between these two kinds of beliefs lie in the differences in the rites with which they are associated.

Metaphysical rites are essentially dramatisations of social and moral beliefs and values; they are performed for the purposes of maintaining religious and moral values, socialisation and social control. *Causative rites*, on the other hand, constitute attempts at practical application of beliefs about reality, especially beliefs about the existence and causal powers of spiritual entities. 'Metaphysical rites' are replete with explicit symbolism, by which it is meant elements and manipulations which are expressive of certain values, social relations and the like. A good example of 'metaphysical rites' is the rite of circumcision whose purpose, according to Turner (writing of the Ndembu case) is to inculcate tribal values in novices as well as being a qualification, the fulfilment of which is a requirement for entrance into hunting cults.' Causative rites on the other hand are premised on beliefs such as that the fortunes and misfortunes of individuals and society—in hunting, fertility, harvests, etc.—are due to the actions of mystical powers. They are consequently performed with the belief that they can eliminate misfortunes or promote those ends which are beneficial to individuals and to society at large. By performing rites of the causative type, it is believed that the various spiritual entities can be controlled, propitiated or conciliated. Beliefs associated with causative rites are therefore propositions about reality whilst "causative rites" constitute attempts to control or change the reality so described.

It is against this background of the nature of magico-religious beliefs that one comes to see the legitimacy of applying the same set of criteria in the evaluation of both scientific hypotheses and magico-religious beliefs of the type associated with causative rites.

IV

A follower of Kuhn, however can still argue that even if one accepts the magico-religious beliefs are, in part, putative empirical assertions, beliefs can still only be legitimately evaluated by reference to criteria peculiar to the thought-system

to which they can belong. In so doing, he would be viewing these beliefs as elements of a 'paradigms', which, in virtue of its different conceptual tools, are different from and incommensurable with other scientific paradigms. Rival paradigms are not, of course, incommensurable simply because they contain different tools, but rather because each paradigm, as Kuhn conceives of paradigms, determines what constitutes a problem, the tools for resolving it and what in fact, is to count as constituting a solution that is to say, paradigms are generally conceptually self-sufficient. It is, consequently, not possible to evaluate rival paradigms or make a choice between them by appealing to some objective criteria or facts, for such criteria are themselves determined by each individual paradigm.

What this means for the consideration of the rationality of magico-religious beliefs, of course, is that one may allow the explanatory intent of, say, witch-beliefs and still refuse to accept that such beliefs are irrational. All one needs to do to justify one's refusal is to treat witch-beliefs (which explain disease and misfortune in terms of the malignant actions of ill-disposed individuals) as constituents of a paradigm which is incommensurable with, say, a scientific paradigm in which the onslaught of disease is explained by reference to ecological or biochemical factors of some sort; in which case, one can only make a choice between the two paradigms and a *posteriori* judgments about the rationality of the one or the other, following Kuhn, is impossible.

The thesis that facts and evaluation standards are 'paradigm relative', breaks down considerably, however, when we recognise that there are indeed 'facts' which are not the product of any particular paradigm—are just facts. A S Mitchell points out:

'The claim . . . that proponents of different . . . paradigms do not agree as to what constitute 'the facts' is true up to a point. The facts which may be at issue in this way are those whose specification depends on the acceptance of a theory . . . (but) the . . . theory . . . which is to be taken as providing the 'hard facts' is a matter for decision. But this decision is made within a framework of agreed facts which are not at issue and these include (a) a very large range of facts specified in terms of scientific theories which the proponents of both paradigms accepts (b) commonsense facts of the sort that are not in dispute at all between scientists, agreement as to which is presupposed in all scientific activity'."

Certain of Kuhn's remarks in fact tally with Mitchell's observation. Consider, for instance, Kuhn's claim that 'Most of the puzzles of normal science are directly presented by nature, and all involve nature directly'.²⁰ This is undeniably to concede the point that there are facts which are not paradigm-relative or paradigm-dependent. Were this not, indeed, the case rival 'scientific theories (to quote Mitchell) . . . would not be rival theories at all, for their rivalry consists in their purporting to offer alternative explanations of the same facts.'²¹

If we agree that competition between paradigms exists only because there are 'objective' facts, and with Kuhn that 'nature cannot be forced into an arbitrary set of conceptual boxes'²² or that, 'one scientific theory is not as good as another for doing what scientists normally do,'²³ then we cannot rule out the possibility of choice between paradigms or between those 'conceptual boxes' which are arbitrary and those which are not. After all, Kuhn allows the possibility of formulating criteria for determining which of two or more theories, on the same evolutionary spectrum, is older (or the oldest). Arguing that science is 'fundamentally evolutionary' Kuhn suggests that with any two theories occupying the same 'evolutionary tree', 'it would be easy to design a set of criteria—including maximum accuracy of predictions, degree of specialisation, number . . . of concrete problem solutions—which would enable any observer involved with neither theory to tell which was the older, which was the descendant'.

It is not immediately clear why the choice between paradigms as well as the rationality or irrationality of paradigms cannot be decided by reference to the same set of criteria or some other set of criteria. It is, in other words, possible to formulate criteria by reference to which choice can be made between rival paradigms and by reference to which each individual paradigm can be assessed; criteria, that is, which are beyond the assent of any particular paradigm community - are not peculiar to any paradigm. It is important to emphasize, however, that for two or more paradigms and the hypotheses, theories or beliefs which they encompass - to be assessable by reference to the same standard or set of standards, they must exist in a relation of rivalry, that is to say, they must offer

conflicting accounts of the same facts. What this proviso, in concrete terms, means for one who sees aspects of magico-religious beliefs as putative explanations of reality is that these beliefs and scientific hypotheses or theories can be evaluated by reference to the same standard or standards: It means, for example, the same standard of rationality, by reference to which we determine the rationality or irrationality of the hypothesis that the fertility or infertility of the soil is the result of bacterial action, will apply legitimately to the belief that the fertility or infertility of the soil is due to the action of witches or persons possessing some other religious powers.

V

A defender of context-dependent criteria of rationality can, of course, argue, as it has, indeed, been often argued, that without reference to context-dependent criteria—we could never in fact, come to understand other people's (alien) beliefs. Writing on ritual beliefs, Beattie, for instance, points out that

'... while we may regard such beliefs as irrational in the sense that they are not of the same order as the empirically-grounded and testable hypotheses of science (or "common sense"), they are by no means irrational in the sense that they lack coherent organisation or a rationale . . . ' ²⁵

In this passage, we can discern what is meant when people talk about context-dependent criteria of rationality, they mean coherence among beliefs or ideas and the existence of a 'rationale' for each individual belief or idea, in any one context. The latter is really an aspect of the former—by which I mean that only within a coherent system of thought can a belief be said to have a 'rationale': To take an example, the belief that men can come to grief through the action of other men, exercising a malignant spiritual or psychic quality, has its 'rationale' in, and is consistent with, the general belief in the existence of supernatural beings with the power to influence events in the world. It can thus be taken that where the rationality of any particular belief is made to depend on the existence of a 'rationale' for holding it, what is meant is that its

rationality depends on the existence of another belief or of beliefs from which it follows; that that belief, in other words, forms with others a coherent body of ideas.

Thus when it is argued that beliefs which appear irrational may, in fact, be rational when considered on standards taken from the thought-system to which they belong, we should understand such to mean that a belief which appears to be irrational in, say, a scientific context is so because such a belief is in disjunction with all other beliefs in that context, and that when put alongside the beliefs from which they follow or which they imply they are soon seen to be rational. A belief, in this sense, is rational if it can be shown to be part-follows from, or implies other beliefs—of a system of beliefs, and irrational if it is not, that is, if it exists randomly.

The problem with assessing the rationality of beliefs in this way is that we are unlikely to find in any system of thought, beliefs which either do not follow or imply some other beliefs. Indeed, a belief occurring randomly, with no logical connections with any other belief could hardly exist in any human society for a long time. It is because of this fact that assessing the rationality of alien beliefs in this way is bound to lead to a dead end, in the sense that all such beliefs will, in fact, be found to be rational, since they can always be shown to be connected with some other beliefs. For a belief to be irrational it would have to be completely unconnected with other beliefs in a system of thought, but, then, such beliefs, where they in fact survive, can be shown to be part of some other system of thought, in which case, given the criterion of rationality we are considering, their irrationality disappears once their connection with some other belief in a different system of thought is shown.

Thus, a belief is either part of a particular system of ideas, in which case it is rational, or it is not, in which case it is irrational but since any belief can always be shown to be part of some other system of ideas, there can be no room for judging it irrational until it has been shown to be completely unconnected with any other beliefs—an almost impossible task, considering that one would have to be aware of every combination of ideas.

We can, definitely, not seriously entertain the view that in a coherent system of ideas, there would be no irrational beliefs or

ideas. Beliefs or ideas do not become rational simply because they can be shown to be part of some system of beliefs or ideas: To argue otherwise is I think to be defending a highly implausible thesis.

The way out, of course, is to distinguish between the question of the rationality or irrationality of a belief from the question of its validity or invalidity. We may say a belief is valid (in a rather loose sense of the word) if it is connected with other beliefs – follows from other beliefs or is implied by other beliefs. To accept that a belief is valid by no means excludes questions about its rationality. For example, within the framework of the belief that the earth is flat it is valid to infer that if one goes far enough, one would at a point fall into a bottomless abyss. But no one would, I think, seriously want to argue, now, that this belief is a rational one. Also, the belief that men can cause harm to their neighbours through a spiritual or psychic medium follows validly from the belief in the reality of a spiritual world of super-human or supernatural beings: But is this belief rational?; is, in fact, the whole panorama of beliefs with which it is connected rational? That we show these beliefs to be valid does not make these questions irrelevant or misguided. How then should we go about answering them? Obviously not by reference to what is in fact the only standard which may be passed off as a context-dependent criteria – coherence or connectedness of a belief with other beliefs. Unless there are any other plausible context-dependent criteria, and, of course, we would not be able to assess whole systems of beliefs on these, it would seem that such questions can only be answered by reference to criteria which, put crudely, are not context-dependent.

Notes

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3. Evans-Pritchard.: *op. cit.*, p. 80
4. Evans-Pritchard,,: quoted from Winch,,: *op. cit.* p. 80
5. Winch: *op. cit.*, p. 82.
6. Evans-Pritchard, *op. cit.* p. 24
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9. Mounce, H. O.: *Understanding a Primitive Society*: Philosophy, v. 48, No 168, October, 1973.
10. Mounce, *op. cit.*, pp. 349-50.
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25. Beettie, J.: On Understanding Ritual in *Rationality*, p. 257

Comment

Moral and aesthetic modes in religion

I read Pratima Bowes' recent article "Moral and aesthetic modes of religious expression" with interest and would like to comment on it from my study of Rabindranath Tagore. An examination of the diversity of Tagore's creative expression as novelist, poet, dramatist, essayist, musician and painter illustrates that category of religious expression Bowes characterized as aesthetic. A consideration of Tagore's life offers insight into religious personality.

Tagore's fundamental perception of world was governed by an aesthetic orientation. His sensitivity and receptivity to nature was the critical factor in developing his aesthetic sense. Tagore recognised at an early age the spiritual potential of nature. His openness and emotional response to nature allowed for the awakening and synthesizing process that was the necessary ground for the development of his own spiritual growth.

This receptivity to the beauty and spiritual potential of nature produced certain responses. First was the experience of the fullness of his humanity: the affective, cognitive, conative and volitional dimensions of his being were integrated resulting in a new sense of self. This fullness also evoked the creative expression that brought forth the art object. This experience was also understood as revealing the oneness of all reality, and this new knowledge allowed Tagore to proceed through the diversity of world (*maya*) in a new and more meaningful way. As a result of these experiences, Tagore was able to understand the dichotomous realities of the world and to accept their paradoxical existence as natural and necessary. He lived in and was of this world and his art celebrates life in all its fullness: serenity, despondency, happiness and pain.

For Tagore, the fullness of his own humanity was experienced through the creative encounter. The act of creating was the primary mode of relating world and self. Tagore's self-perception was as artist and his perception of god was as divine artist. The human's natural drive and ability to create was for Tagore the fundamental form of religious ritual: the act of creative expression was in imitation of the creative expression of the creator god. The moment of creativity was experienced as one of self-knowledge and self-revelation. The art produced out of such an encounter was revelatory of the object itself; and self-revelatory: the effect upon the artist. Thus, the artist was transformed after such an experience. And at its most powerful levels, this transformation brought about a new consciousness of self and world.

For Tagore, the goal of the transformative process was the development of rational personality. Such a holistic perception of self and world is brought forth by an integration of all the human sensibilities. This is the harmonious experience of self-knowledge brought forth by what Bowes refers to as the key perception of the aesthetic mode: the ultimate unity of all things. The result of such an experience can take divergent paths: the individual having experienced cosmic harmony may proceed to physically exist in this world while not participating in it; or he may recognise the diversity of the world and live in it fully. Rabindranath Tagore choose to follow this latter path.

Tagore recognized that the artistic modes of prose, poetry, music and painting were able to bring about his own integrated sense of self and world. It was in and through the aesthetic that the transformation process was brought to fruition. Moreover in an effort to engender the transformation of others, Tagore enlisted the enchanting aides of the arts to further the development of rational personality.

His writings deal with issues of political, social and religious reform. The image of woman, the integration of spirituality in life, the development of Indian self-rule, and a new relationship of encounter between East and West were underlying themes in much of his work. Thus although sensitive and responsive to nature, Tagore did not devote his writing merely to describing the beauty of

the world, but he sought also to express concern about the needs of human society.

Tagore's work in education reveals his realization that it was a major vehicle for transformation. His concern for educational reform was rooted in his own unpleasant experiences as a youth. He understood the typical form of Bengali schooling to be dry and mechanical: neglecting the basic human needs of the students. He founded his first school, Santiniketan, in 1901; the village establishment of Sriniketan soon followed; and in 1921, his university, Visva-Bharati, was formally approved by the Indian government. The spiritual, artistic and practical aspects of human development were fostered at Tagore's schools. The goal was not to achieve academic specialization but relational personality. Tagore wrote:

We have come to this world to accept it, not merely to know it. We may become powerful by knowledge, but we attain fullness by sympathy. The highest education is that which does not merely give us information, but makes our life grow, in harmony with all existence.

This brief discussion of the life of Rabindranath Tagore offers a new understanding of those categories of religious expression that Bowes delineates as aesthetic and moral. Clearly, Tagore has integrated both categories in his life and work. He experienced and understood the aesthetic as the primary level of human awareness; and thus, the ground for all human activity. By bringing about integration of self, the aesthetic developed a new relationship between self and world.

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Comment

Experiences of death and dying

The subject of Dr R. A. Moody's research into the experiences of those people in the near death- and beyond situation is indeed a fascinating one, though the accounts given of these experiences in his book 'Life After Life' makes very dull and monotonous reading because of the repetition of almost identical experiences by those interviewed.

However by persevering and reading to the end one is rewarded by the questions asked and the probable explanations suggested in the last two chapters.

I would like to suggest that the real value of this research is not so much the possible discovery of the unknown but rather the realisation of the known.

Dr Moody makes it quite clear in his book that this research is neither a scientific study, nor a philosophical exercise aimed at producing evidence from which conclusions can be drawn and proof reached, but rather it is a middle way of interpreting the facts— neither rejecting them because they do not constitute scientific or logical proof, nor accepting them as proof of immortality.

This therefore leaves us with feelings, questions and analogies. Dr Moody makes the point that proof of immortality is not presently possible. I suspect that this area of truth may never be proven, and will always remain in the dimension of the middle way.

Plato as well as being a philosopher and logician was also a visionary, and for him truth came in an almost mystical experience of enlightenment and insight together with the reasoning of the mind. Were this not so the essential quality of faith which has to do with intuition and mystery would be eroded and something immensely valuable in the apprehension of truth lost.

One dominant and constant phenomenon in the experiences related by Dr Moody is that of progression through darkness towards light—in every case light is a central feature of the experience.

I grew up with no intellectual discipline—I was brought up in the Christian tradition, and evolved into the world of the visual arts—hence my intuitive response to situations rather than a reasoned one.

We are I suspect, committed to our personal convictions much more because of the way we are brought up than because of our intellectual convictions.

Therefore my response and pursuit of truth as revealed in the Christian faith is the central motivation of my life. And in major decisions as well as in day to day behaviour awareness of response is always an awareness of movement towards light—an almost visual choice between light and darkness—between life and death.

From this I would submit that what Dr Moody is describing is something that is happening all through our lives here on earth. It is a phenomenon that is available to us all in our human experience—and those reported in his book are a selection of people who are confronted with this same phenomenon at the point of death.

I have had no near death experience myself. But I did for some twelve years have the care of terminally frail patients many of whom I was with when they died. I can remember no evidence of distress in any of these cases when they died. Always the impression was of a serene departure. I am content not to know where.

I know that the moment of death will be the last great adventure of this life.

Of course some people do have experience of the paranormal and occult that others do not have. I cannot think that this is of any great importance one way or the other.

If the result of these experiences recorded by Dr Moody is that those who have undergone them live more loving, caring and responsible lives, then we must at least take the experiences seriously, even if we question the interpretation.

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Sentences

It is difficult to conceive anything more scientifically bigoted than to postulate that all possible experience conforms to the same type as that with which we are already familiar, and therefore to demand that explanation use only elements familiar in everyday experience. Such an attitude bespeaks an unimaginativeness, a mental obtuseness and obstinacy, which might be expected to have exhausted their pragmatic justification at a lower plane of mental activity.

Although it will probably be fairly easy to give intellectual assent to the strictures of the last paragraph, I believe many will discover in themselves a longing for mechanical explanation which has all the tenacity of original sin. The discovery of such a desire need not occasion any particular alarm, because it is easy to see how the demand for this sort of explanation has had its origin in the enormous preponderance of the mechanical in our physical experience. But nevertheless, just as the old monks struggled to subdue the flesh, so must the physicist struggle to subdue this sometimes nearly irresistible, but perfectly unjustifiable desire.

From "The Logic of Modern Physics" by P. W. Bridgman.[†]

[†]Pp. 46-47. Quoted with acknowledgements to the Macmillan Co., New York.

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Theoria to Theory, 1979, Vol. 13, pp. 171 – 172

Published by
Gordon and Breach Science Publishers Inc., 1979

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GERALD WEBSTER was trained as a biologist and spent several years doing experimental research in developmental biology at Sussex University, where he is now a lecturer. He turned to the history and philosophy of science in an attempt to make sense out of what he had been doing. His main interest now is in aspects of the human sciences.

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