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Interviews with Geoffrey Waldon

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TRANSCRIPT OF

AN INTERVIEW WITH GEOFFREY WALDON BY PETER BOWKER.

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The questions fall into three loose categories with a fair degree of overlap. The first set are concerned with the ideas, the second with the ideas in relation to evolution and the development of human society, the third set with human development when something goes wrong. It's possible we won't get past the first questions and in answering them may cover much of the later ground. The questions reflect my particular interests and level of understanding and also reflect subjects raised at a series of informal meetings in Leeds over the past nine months.

PB As human organisms we have a distinctive sort of shape, a limited size and something which drives us to move which you call motivation. Is motivation the same as energy? Presumably you wouldn't say an energetic person was necessarily a well-motivated one?

GW I have only really a feeling about what I mean by motivation. In children it seems to be linked to the power to move the body so initially it seems to be related to physical energy. But quite clearly, as time goes on, the child will put just as much of this kind of drive to do things into actions which don't require so much mechanical energy so that a physicist would say there was no more energy being expended and at this point I tend to see the effort, very often, as being emotional effort. Thus a child reaching further to lift a bigger brick over a greater distance initially will be using more mechanical effort and will be using more motivation initially. Later on, the same child struggling to pick up a thin, flat object like a tiddlywink and having to orientate his reaching hand to push it through a little slot, for example, will expend a great deal of motivational effort, or whatever it is, without increasing the total amount of mechanical energy involved. Subsequently the child may puzzle over some sort of problem, struggling to find a solution, without moving his body very much externally at all. So, somehow or other, it seems to be something which initially is very closely tied up with physical effort and indeed with small children that's how one tends to

accentuate the amount of motivation in a child, by having him work physically harder over a longer period of time.

But somehow or other the drive, the motivation, can be abstracted from that physical effort, so the physical effort itself can't be the motivation, it has to be something else. So you ask if it's energy - perhaps it's what the social psychologists would call 'psychic energy' or something like that. I really don't know. It's the sort of concept which I feel must have a physical basis but I can't really go further than to say that somehow it's contained in physical effortful activity at a certain stage. Later on, the struggle against one's tendency to go to pieces, that is to say the struggle for control, contains it and eventually the struggle to analyse, to seek solutions to problems and so on, contains it but it's something I haven't got any further than that with.

PB So it would be likely that the struggle with thinking that goes on as an adult is accompanied by much the same sensations....

GW Yes, it seems to me that it must in the first instance contain the same processes, that it must be the same thing in some way and I feel that probably - in fact my own impression is that - it feels the same; that mental activity feels the same as physical activity: and mental activity against problems that keep baffling one, where one keeps struggling, coming up to blind alleys and so on, dead ends, and sometimes feel quite frustrated about it, seems to me exactly analogous to struggling to overcome a physical problem. I think they are basically the same thing and somehow the mental one is an abstraction of the other as far as I can judge - but I think I can guess, I think they are - I think the sensations do feel - basically the same thing.

PB It's so much easier to tell when someone is putting in physical effort. You can only, to a large extent, take someone's word for it when they're engaged in something that requires less obvious physical movement.

GW That is very true but I think it's probably also true that we can say that that's our problem, not being able to observe mental effort, in a sense, where we do have the power to observe physical effort but I imagine that just as we could see someone putting physical effort into something, and we could alter the circumstances to really test what the physical effort was like, by gently adding to the problem. If we were looking at someone playing tennis, an example which comes to mind at the moment, and during the game we wanted to know just how much effort he was putting in, we might very slowly incline the tennis court, for example, so that he was actually having to play uphill, unknown to him. The same thing we could do with a child by simply putting the things further away or putting obstacles in the way.

I think we could probably do the same thing with - though we can't actually see the mental effort, but really we can't see the physical one either, we can only see the manifestations of it - so by exercising someone in simple mental activities and then gradually laying on obstacles, inclining the court, so to speak, I think perhaps one

would be able to judge in a similar sort of way, if one was clever enough to do so. Its sort of a nice idea, isn't it? I might look into that.

PB You touched on analogy before and you've said in papers etcetera that language can't in fact transmit novel understanding. Can it do so through analogy: that is, can it do so when the words' literal meaning isn't important, it's their suggestion and their reference which are important? Is that a way in which language can bring about novel understanding?

GW Well, I think in the first instance that somehow or other novel understanding is a kind of crystallisation during activity in the individual first of all. The extension, the comprehensiveness and the amount of variation and so on in any kind of activity manifesting understanding periodically will somehow exercise the current understanding and in bubbling beyond this will reach a stage where somehow things fall into place at a more complex level. Now, from outside, the environment, acting as a series of constraints and so on, either deliberately, in the form of a parent or teacher or someone else, or by pure chance, by causing greater activity in some areas and greater constraints in some areas, can bring about concentrations and focusing of this spontaneously generated activity and perhaps cause certain increases in understanding to occur earlier than they might have done or to take place in directions different from those they might otherwise have done and so on.

This means that there is a kind of communicational process between the environment - I'm not saying this is conscious or deliberate on the part of the environment - it may be that conditions have just happened to be there and these bring about changes, so really and truly all the changes take place within the individual in interaction with these sets of constraints which allow certain things not to happen but give space to other things to happen.

Those constraints could be translated into linguistic form, so that, as far as I'm concerned, the primary function of conventional language, the language we speak, is to bring about influences in the behaviour of the hearer - I'm talking about spoken language - changes in behaviour which were of course entirely possible before the language became associated with these behaviours. What I'm trying to say is that in bringing about changes which in themselves are entirely within the repertoire of the hearer, the learner, nevertheless these changes may cause constraints or open up areas which will lead to the individual learning some novel understanding. So strictly speaking, the language, simply by re-arranging the environmental constraints and so on, can do the same thing.

What can actually happen, with or without conventional language, is that the environment may actually cause sets of behaviours to occur, so in a sense they could be considered to be reactive behaviours, in an individual, such that once these have become an established part of the repertoire they become subsequently focused upon, analysed, assimilated and represent understanding.

PB So it's entirely an accidental process in relation to language and language acts - these are just another environmental constraint?

GW Yes. Conventional language is just an indirect form of communication in this sense. A direct form of communication would be that one walks in a straight line, meets a wall and has to be deflected by this and if someone says "Turn right", at a certain moment in time, one may get the same sort of deflection but obviously it had to have been possible without the language or it wouldn't have been possible to respond to it, to a linguistic form. So all the time it is the learner who is actually creating the understanding. There is no transferral of understanding from the outside and that I think perhaps is the most straightforward thing to say.

When we feel that people are learning through language, we somehow feel that something actually is travelling through the language to the hearer and I think that is a complete fallacy. All the language is doing is bringing about changes, all of which were possible before hand, but arranging that they occur at the same moment or in a certain sequence and all of this could of course be done by other, more direct means. People seem to think of language as a wonderful, direct form of communication and it is a wonderful thing, no doubt, but it isn't actually a direct form. I think it's a very indirect form of communication between human beings.

So whether you'd call that accidental, I'm not sure, but I take the view that each of us is really a completely separate being and that any changes related to our outside world are, so to speak, induced in us but we actually produce them even if they are induced in some way from outside, rather as a conducting isolated plate, so to speak, might be modified by the electrical activity of something nearby which causes a rearrangement of charged particles and then when that other thing disappears, the plate may or may not retain that redistribution. So I suppose you could say that all of these things in one sense are adventitious.

PB So there's nothing special about analogy, that's just another version of that? It always seemed to me almost a more effective means of communicating ideas....

GW Well, I think what we mean by analogy here really is that an analogy takes us away from the particulars towards the core or the principle and that's the way in which it's still very effective. Once we can recognise what two different patterns have in common - in this sense I suppose you could say that the analogy between two things is, one of my common favourite words, the intersection between those two things. In reality it's a very powerful way of communicating and I suppose that conventional language is one of the most powerful ways of using analogy.

PB What part do you see the imagination as playing in all this? Do you see it as a separate thing? Is it something that develops or which becomes more restricted by adulthood?

GW Well, I see it as something going in both directions, really. On the whole, imagination seems to me to be very closely related to this business of tolerance and constraint. How well we deal with anything, how well we think about something and so on, is determined by the balance between the underlying constraints which are giving shape to the thought, or whatever it is, and the degrees of freedom, the tolerance which allows for variation and greater space, so to speak. If the tolerance is

too great we tend to lead towards chaos, confusion or merging into other things: if the constraints are too great, there are too few variations and so on. So on the whole I would see that there can be an optimal development in which there are very wide tolerances but very well-defined constraints, sort of core constraints. If one has well-defined constraints and wide tolerances then the increase will be in terms of expansion and variation of the actual patterns themselves.

So I see imagination as related to flexibility and we could see an analogy in play. We see someone playing with bricks and so on who, if you like, fiddles with the things/situation. There is too little constraint coming from inside. Or we see someone who makes the same patterns over and over again in a very stereotyped way.

Between these we may see the child who plays in a way which leads readily from one thing to another but seems always to stay near some central core. The child is still playing with those particular activities in certain kinds of way even though there are enormous ranges of behaviour in which he can indulge without ever quite losing track, and I would see this as imaginative play.

As far as I'm concerned, this doesn't say anything about whether the bricks are supposed to represent anything else - I mean that's just a particular form of imaginative play.

So here one would expect, or I would expect on the basis of my study, if I didn't actually know human beings, that this imaginative thing would progressively become greater and greater as the imaginative variation increases. So as we grow up and our bodies become more sophisticated, we are able to utilise much larger amounts of understanding and we can deal with things which have not yet happened, we can prepare for the future and so on. So the whole thing should expand marvellously well.

However, all of that takes place on the basis of some sort of reinforcing mechanism which progressively supposedly introduces more and more available pleasure into the system to energise all these things. But the same mechanism actually requires a regulating or controlling influence which must act from a fairly early stage and is obviously acting from about half-way through the first year, for example, and this leads to something it's a bit too much to go into at the moment - but it does lead to understanding being curbed by lack of familiarity and this leads on to, under the influence of social forces, which tend to be pushing the individual into dealing with his immediate environment, becoming a responsible person, learning how to deal with that particular culture and so on with the result that commonly human beings soon become unable to tolerate uncertainty and have a very strong urge to make everything familiar, not by practising simply expanding it but rather by closing it up.

If one has a certain amount of familiarity, so to speak, available to one, and by producing variations on what one does one actually diminishes the amount of familiarity, one expands one's world without knowing it quite quickly enough, then this state is something which may be felt to be intolerable. The result is that the tendency is to close down on it and to close in to those very behaviours which I mentioned earlier on, at an earlier level, and stereotyped behaviours. If this happens it means that it goes against the tendency to enjoy increasing amounts of tolerance.

So ideally, one would keep increasing variations in what one does, expand the total awareness, filling that awareness continually with new variations and new combinations in one's understanding so that the total familiarity, so to speak, the proportion of familiarity, remains rather similar. As one increases one's understanding, one also increases one's familiarity with everything within that understanding.

In practice this isn't usually what happens. Usually what happens is that from a certain time onwards, the cultural pressures force the individual to give more time and attention to dealing with everyday events and so on with the results that it becomes necessary to save time, to save energy, to get things done more quickly and so on. Societies on the whole, being already in the state towards which the individual is heading, are very insecure in situations which are left open and undecided so indeterminacy is something which society is not very keen on and doesn't really encourage in the individual. So in practice I think individuals become progressively less imaginative, less able to expand and produce variations in their understanding.

It's a little difficult really at this point in one sense, because many, many people refer to others as being imaginative in ways where I wouldn't have thought so. I mean, to me, I would have said 'That particular behaviour appears to be extremely stereotyped.' People are saying 'imaginative' when they really mean different from their own particular way of doing things. It's very difficult to know. It's quite likely that people who are restricted in everyday life may produce surrealistic ideas of their own, so to speak, which I wouldn't necessarily see as particularly imaginative - I mean it depends how you look at it, but I certainly think that imagination is stifled, I suspect in virtually all cultures, one way or another, by the cultural demands themselves which don't really see any particular value in it, they may enjoy particular manifestations of imagining in some particular individuals but it's not something which is encouraged in a lot of others, that I can see.

PB So most adults get to the stage of too much constraint and too little tolerance?

GW Exactly so. Yes, this is it. And this of course not only makes them very narrow in what they're doing but it also makes them very fearful of moving outside the range of constraints, because they have no practice in dealing with indeterminacy. It seems to me that small children not only are built but can actually be seen to be able to deal with uncertainties very well indeed. We spend a lot of time telling ourselves that they can't and doing our best to help them overcome the uncertainty and their problem with uncertainty which I don't think exists in the first place and soon they are properly frightened of the world, as we are. We soon condition them into a state of fear and insecurity which is the proper human state, of course.

PB Would you separate emotional development in any way from the development of general understanding?

GW No I wouldn't separate, I can't separate, learning from the development of understanding and I think that the idea that there is an emotional life and there is a cognitive life which are somehow separate from one another - I not only don't think

this can be the case - I mean the whole theory that I've come up with is one that - without outside influences - it wouldn't even occur into the theory that there is any possibility of dissociation between these. It seems to me that it's possible that the only reason we talk about the emotions is that we've got a language which orally divides them up in some way. But there are certain feelings that we have and these basic feelings seem to me to be concomitants of the reinforcing factors in learning and these are actually shaped by the more cognitive patterns that they accompany. It's only in a sense when they become shaped in such a way that we can actually talk about something like 'anger' or 'envy' or whatever, that we start calling them emotions.

The forces of which these are the feeling concomitants are essential forces to the learning in the first place so anything that separates these off in any way other than for temporary convenience - obviously with many things we sometimes have to work piecemeal; we sometimes have to focus on something and temporarily disregard something else - but the idea, which we do have in our world, we do have people who work with emotions and people who work with cognitions, and the psychologists of the Twenties and Thirties, other than the behaviourists, also had another category, the conations, which might be roughly equivalent to what I'd call motivation, striving, so to speak, so I think the psychology books were actually divided up into 'Cognition', 'Affect', and 'Conation' or whatever the order was and I think we talk as if we still felt that way, I mean people still talk about motivation separately, just as we talk about the ability to concentrate and the ability to be distracted and so on. These are all fragments of something which seems to me to be cored in one particular thing.

I can understand that it is convenient to focus on them momentarily but not to treat them as separate things. No, I don't think the emotions can in any way be separated. We can separate them in a sense and this is by behaving as if we have separated them and I think we do actually truly divide them up in people because of our biases. If you like, we teach people that these are different things.

PB So initially we've tricked ourselves, if you like, by describing them?

GW I think so, yes. I think they're artefacts. It would be interesting to know what would happen in a society where language showed no sign whatever of distinguishing between thinking and feeling. I somehow never felt the need to separate them, as far as I know, anyway, and since I've been thinking along certain lines for twenty-five years or so, I don't feel the slightest inclination, in fact it irritates me that we do have people interested in different areas as if they were quite separate psychic entities or psychological entities. I think they're basically artefacts.

It is true that looking at learning I do see certain mechanisms which have to do with marking patterns as if the learner had decided that this pattern should appear more or less frequently in the future. This kind of marking which psychologists refer to as reinforcement and which leads to strengthening of these behaviours is, I think, the basis of what people think of as emotional behaviours because there are some feeling associations with these reinforcing influences. When the reinforcing influences act, in human beings at least, there comes a point where a sufficient level is reached that we become actually somehow aware of them. This awareness is a concomitant of the first, though it may then begin to influence us in other ways. It by no means is a separate kind of activity.

PB Do you see personality as a product of the same sort of interaction? We like one thing, we dislike another, mainly because of a sort of associative learning, not because of a given personality and the sum total of the associations is what we call somebody's personality?

GW Yes, on the whole I go along with this. I think that in one sense you could see an almost ideal person - I should say right away that if you had ten thousand of these ideal people together they wouldn't look stereotyped, they would all be very, very different even though they'd all fulfil the criteria of reasonable development - whether any one of these exists doesn't matter, there is a kind of possibility. But normally most of us, in our ability to create experience - let's put it that way - and also to exploit it in dealing with problems, do produce predilections of various sorts, first of all in this area of general understanding.

There's quite a range where perhaps the deep down form of personality may be first more closely related to the general understanding, something which is created not by association but from the sort of build-up, so obviously we might say that someone has gone further or someone has gone less far, someone has expanded more widely, someone has put more eggs into a particular branch-basket than another one and so on, and this produces quite a large range of possibilities for personality at that very basic level. After that, we then have the various kinds of interactions with people themselves and obviously these are ones which are going to affect - as you say it's this bundle of behaviours which we have and it's the bundle of behaviours which are actually recognised by other people that we think of as personality, don't we? So all sorts of behaviours that we produce in our interactions with other people will be the sort of next stage of representing this personality. But this will be further influenced by, rather more negatively, by whatever means we choose - or come to utilise - to deal with our fears.

So if we have a very wide-ranging, well-developed understanding, and of course that goes with a high motivation, then we're always about to do something but we can select from the whole range what we do, so we would seem to be able to do anything. As I mentioned earlier on, in actual practice we usually have certain predilections so that if we were highly motivated we do tend to choose from certain areas - other people choose from other areas and so on - this range of interests. But in some areas early on, especially in our dealings with other people, we find ourselves at disadvantage, what I call 'in a state of handicap', a temporary state of handicap, and we deal with this by various means. To a very large extent it is the set of ways that we deal with this as a small child which will further colour our personality later on. I think in many people's eyes, these would be the features which would be thought of in terms of personality. The sort of things that people try to measure are on the whole attempts to deal with states of insecurity, so to speak. They're much less those that we use to choose what we particularly would like to do at any particular moment in time.

So you have those people who have dealt with problems by withdrawing from situations, I think they fall into a certain class; there are all sorts of different ways of withdrawing of course and we may find ourselves there in the realm where people talk about 'introversion' and 'extroversion' dimensions and so on. Some people may feel

that as small children they deal with problems by attack, so to speak, so that they very social children jump in very quickly and dominate a situation, control it in some sort of way. Maybe later on these people, some of us, may in fact be those who naturally deal with things in that sort of way and then we would be considered to be outgoing or social creatures or as having histrionic tendencies or whatever.

So it seems to me that the underlying shape is really much more closely related to the state of the general understanding itself. At the level of interaction with other people, this will be largely made up of the sort of behaviours that, in their extreme form, I call 'handicap behaviours' and 'retardation behaviours' in their pathological state. These are roughly speaking behaviours which we early learn to deal with emotional discomfort and those which we early learn to deal with excessive amounts of demand on our energies. More or less that's what I would see as what people refer to as 'personality'.

PB This question's already been touched on previously. The capacity to anticipate and plan for a wide range of eventualities seem to be a human characteristic. It seems to enhance our survival potential. Its roots seem to me to lie in having the ability to seriate and extrapolate. Yet tied up with anticipation, for me there always seems to be a fair degree of anxiety. Do you see that as inevitable?

GW I know what you mean. May I just run through what you said are the roots for a moment and see whether it brings my mind on to the lot. I mean initially, this capacity I see as growing at the end of the first year, when every action that each of us produces - I'm trying to find the word for the organism we're talking about, so I'll use the word 'learner' for the moment if I may (I'll have to find a better word really) - the learner at the end of the first year has of course produced every action on the basis of a kind of thing I call a 'design', a kind of recipe which produces certain constraints which in reaction with all the other forces brings about the manifestation we call the behaviour. Clearly the design must happen before the behaviour and the situation you're talking about, in a sense, is this capacity to extend the duration between the selection of a design and the actual appearance of a behaviour itself.

Without going into great detail, towards the end of the first year we begin to see the child behaving in such a way that if a partial obstruction interferes with a physical action, the physical action may actually circumvent the obstruction, and may even continue the action if it is interrupted by the obstruction. I think this, in a sense, is roughly what Piaget calls the concept of permanence of an object but what I call 'inertial memory' because it seems to me what's really happened is that the design has given rise to an action and the design is now embodied in that action, so while the action is taking place the design is still living, so to speak, for the child. To me it's the beginning of the sort of memory which I think is important.

As the child comes into the beginning of the second year this capacity increases, and in keeping with something you were saying about seriation, it increases and is essential to the kind of behaviour which I call 'continuant behaviour', or the rhythmic, ongoing sort of behaviour necessary to moving things from place to place, making a continual effort to make a mark with a pencil, drive a peg through a board, etc., and

on which, one way or another, all future understanding rests. The extension of this capacity itself becomes seriation. So this continuant behaviour, as it strengthens, allows things like sorting and matching, brick-building and drawing in their earliest forms to ride upon it as if it were a moving belt, a carrier phase. The carrier phase itself extends into this ability that you've already referred to as 'seriation' and it's this capacity which allows us to anticipate and to infer things about future events and so on.

Now obviously this capacity itself is essential to survival and a noticeable thing is that as the learner becomes able to anticipate what's going to happen, it also becomes possible for them to do things in order to deal with current problems. So whereas a very large part of the activity of the learner still at two, two-and-a-half, three is concerned with a learner actually meeting with a situation and then being influenced to do whatever else as a direct result of that meeting as things change, more and more over the next year or so, the learner comes to be able to meet with a task or a problem and to decide what it needs and plan to deal with its needs. So instead of doing something or other with whatever it's got, it begins to be able to decide what it needs and what it's going to need and to look for these as a means of overcoming. This takes place, I've particularly noticed, from about three-and-a-half or so and onwards from there.

This, as you advise, is really absolutely necessary as the beginning of the capacity to deal with problems to some extent by being prepared for them beforehand.

I'm trying to think how to get on to the anxiety part. When you were talking it seemed pretty clear to me. Would you like to interrupt me at that moment? Go up to the point where it is clear and I'm agreeing with you that it is an essential thing in our adaptive ability, our ability to survive, and to be able to anticipate events.....

PB What I was saying was that tied up with that sort of anticipation, it seems to me to generate anxiety and I don't know if that's inevitable or not.

GW Well I don't think it's an inevitable, necessary thing but it's related to something we touched on earlier when I was talking about uncertainty and indeterminacy. It seems to me that if the individual learner all the time maintains its understanding by consolidating its resources then it tends to fill its awareness very largely with familiarity based on its understanding. If this balance is right then what we are anticipating, so to speak, is the whole range of possibilities based upon our current, highly competent, state of understanding. This means that although we don't know the future with any great certainty, we should be able to structure the possibilities - we should feel perfectly secure about deciding what are the possibilities and how we should deal with them if they come up.

If it so happens that our understanding is not as competent as it might be, then our total awareness of possibilities becomes greater than the understanding that we have to fill that up with familiarity. So there's a discrepancy between the realm of awareness and the familiarity content and this discrepancy determines how much emotional discomfort we feel, how much internal distress we feel. If for some reason or other our understanding isn't as competent as it should be, we are much more likely to be fearful in association with thinking about the future.

If we actually wanted people to be fearful about the future, what we should do, and what we do do, although we're trying to do exactly the opposite as obviously we don't usually set out to make people fearful about the future but we are very concerned about this fear, so we give people pre-fabricated ways of dealing with the possibilities in the future. But these are not part of the understanding: they are, if you like, an attempt to add pieces on to the system, so we spend a lot of time trying to prepare children for what we expect them to come into contact with. As we do this we also commonly tend to neglect other cultural demands.

The culture puts these demands on the individual learner at a certain stage and the capacity to expand the understanding, to become more able and more imaginative as we said earlier on, is curtailed to some extent by society's demands for being responsible and so on which really means being prepared for the future. So instead of preparing the individual learner for the future by saying 'We don't know what the future is, so we want them to be the best individual learner possible', we guess at what the future is going to be, as a culture, and then we rather hurriedly try to put various kinds of stratagems together and to train the individual in this way. The individual, really and truly, becomes less and less able to be prepared to deal with the future. So when the future begins to open up, we have a lot of triangular and conical shaped solutions to problems which are rather different shapes, so to speak.

A good analogy is what we do when we're teaching children, or rather introducing them badly, to things like mathematics and so on. We train them to recognise certain kinds of problem by name - not what the problems are but when you see it and it's got that shape, it's one of those. So they memorise a number of types of problems and then they have another list of formulae and they're told that maybe one day they will know how the formulae were derived but never do. They learn this list of formulae and the object of the exercise is to remember that when you recognise type B problem in real life, or on the exam paper to begin with, you then have to remember which formula to bring in to the situation. This is a guessing game, really. You see the same thing in small children at the moment when you give them a problem like, 'Five boys each have a bag of three sweets'. There are two figures in that, the five and the three, and the guessing game is, do you times it or do you take it away from something or other or do you add it all together. Roughly speaking, there's a one-in-four chance of getting it right by guessing, which is what actually happens. So instead of the child thinking, 'I can see a fat boy and a thin boy and a tall boy with spots' and so on, and one's got a green bag with large sweets inside, which would be the sensible thing, to translate that into a real situation, if necessary saying 'Well, there's a sweet behind that one, so that makes eighteen', and so on, the teacher just says 'No, it's twenty, because you should have said five times four' or whatever I said.

It seems to me that's what we also do in our preparing for the future and we see it also in our own field of special education where the making of a cheese sandwich is a major step forward to survival. I'm not suggesting that making a sandwich isn't an important thing but it would be better to see it as a spin-off from a lot of other things.

So the answer in one sense is I don't think ideally anxiety is inevitable at all but I think that under the way we that we do tend to do things at the moment it's a very, very likely sort of thing and there must be very few of us who are not - well, if we're not actually worried about the future all the time, this is because we've got rather good

ways in our personality of dealing with problems which have allowed us to shelve them in one way or another. I'm more or less familiar with thirty percent of my own ways of dealing with this; I don't know if everyone else probably knows the other seventy percent....

I think it's a very unfortunate thing and I don't think it's a necessary human thing at all. If we were looking towards solutions to human problems and so on, fear of this kind is totally unnecessary.

PB I wanted to start looking at the ideas in relation to evolution. Do you see the basic mechanism of evolution, the process of natural selection, where chance mutations are acted upon by the environment, as analogous to the process of fundamental learning as you describe it, thinking in particular of the number of variations that are possible actually increasing the chance of survival and this seems to run through both these branches of thought?

GW I think it is basically the same thing: one could probably argue that it actually is the same thing, that if you started off by looking at evolution but very much in terms of something which I think evolutionary theorists probably don't do, for very good reasons, thinking very much about a particular creature as somehow possessing a tendency to perpetuate its existence, and this sort of thing, as far as I can see, must actually drive the evolutionary process because that creature bumping perpetually against circumstances may exploit its current possibilities and if then chance mutations come into the situation it extends its possibilities, then we can see perhaps how, over millions of years, the descendants of the creature can become more and more adaptive. We have to be little bit careful about where the chance comes in, of course: the mutational nature of the chance is one thing; the chance nature of the encounter is a rather different thing. But if one saw the early creature as having this very strong drive, in some way, perpetually tending to exploit everything that was available, then we would see something very similar, I think, in the growing up and development of the general understanding.

Here there is a very distinct pathway which appears to be laid down and is basically inevitable, though it can be curbed and modified, of course. Thereafter chance would play a very considerable part in the various encounters it produces. Could you remind me of what you said before?

PB I'm wondering if the actual mechanism is the same and that the more variants, the more possibilities there are, the more survival potential is increased. So just as with general understanding, the more possibilities there are arising from a number of behaviours or a number of activities, the more the individual has to choose from when outside influences come to act on them.

GW I think probably that if we said, in the terms we were using earlier on, it is largely a matter on the one hand of the constraints versus the tolerances and that within that system there is this primeval urge, so to speak, to produce almost a maximal number of variations, then I think it really is the same thing, in a sense. It's not even quite true

to say that it's analogous: I think it probably is the same thing. You have to have both sides, the creature itself and the environment, in this.

PB Let's concentrate for a moment on a conflict of interests that you once highlighted between our evolutionary heritage and the demands of our current morality. As far as I understand it, you said that although we have some sort of desire to protect and care for those with difficulties, we do so in an irrational way. In the past we would have allowed weaker members of the group to die but now our morality doesn't allow that. You suggest a certain discrepancy that's emerged, as though we're not up to dealing rationally with our own moral standards. Could you go into that a bit more?

GW I think that we are much more governed by instinctual influences or mechanisms than we like to think.

I'm quite happy with them and it doesn't worry me but people do feel somehow or other that certain things, that I think are the case, are unpalatable if true. In the situation you mentioned I think that we live in a society where I suspect it's comparatively recent that people are so concerned about those who don't fit in so well - I have no real way of knowing, I don't know enough history, but at the same time it does seem to me that biologically we still work under influences which would tend to eliminate the elderly and the infirm and so on from the system. Consciously, we've built up an ethical system which has us looking after the elderly and the infirm and attempting to help children with difficulties and so on.

I do think that these are in some sort of conflict. I'm not suggesting that the ethical system is in any way wrong for this reason, of course, but simply that I think it would be easier if we recognised our biological drives, that we would find it easier to control the situation if we were able to do this. At the moment it turns out that we - let's assume that our morality is acceptable to us all, that is that we do treat every human being as a very important person - to deal with this then we really need to recognise that if we were another species which didn't do this then our general behaviour towards the infirm would tend to hasten their decline, generally speaking.

Interestingly enough, I think that still happens with human beings under the cloak of pretending to do the opposite, which I'm sure is not only well-intentioned but is a genuine thing. It does seem to me at the moment, that many of the things we do whilst we're attempting to help are actually having the same effect, more or less, as would have happened if we'd been a culture where we were actually setting out to eliminate. In many ways, many of the things we do in our educational system - all the things, virtually, that we do in the ordinary educational system which I think are suspect in that we put a great deal of time and energy into preparing or thinking we're preparing our children for the future when we're really loading them up with problems, it seems to me - and this is accentuated in the special education system where it no longer is just a proportion but tends to be the whole thing. Obviously we do it in different ways and some teaching communities are less inclined to do this than others. So I think these things are in conflict.

What we should, I think, look at, is the fact that as bringers-up of children, in many ways we're governed by the same sort of forces that many very much simpler animals are governed by, except that we rationalise what we do. To bring my ducks in: just as if a mother duck has some babies, she can see and hear those babies, they can see and hear her, the system works reasonably well. If one duck is cut off from the others, this baby duck makes a lot of noise. This agitates the mother and the making of a noise is a manifestation of agitation in the small duck: when they come back together the noise stops. Whatever the mother does, it seems that she is agitated by the sound of the baby duck so we say, 'Poor mother; her child is in difficulties; she is distressed.' Maybe she flies around and gets very upset if the duckling is on the other side of the fence or something, and then it all comes right and everyone's happy again. But if in fact the same scenario occurs again and someone goes up to the duckling and wrings its neck, which sounds pretty horrible, the mother duck becomes quite happy again and suddenly we realise that the mother duck wasn't in fact very obviously worried about her duckling: she was agitated by the sound of its crying.

That's rather how the system tends to work. Really, at this particular point, the adult animal is built to be put in a state which is eccentric to her equilibrium, so to speak, by sounds which somehow signal that the whole family situation is eccentric to an equilibrium. The moment that the duck stops crying, either because it's brought back in and the equilibrium is restored that way or it stops crying because it's dead or out of sight and you still maintain an equilibrium - it just happens to be one duck short and the mother duck doesn't count the ducklings, so in fact it's just as well off as it was before. If all the ducklings were gone another kind of need might come into action.

Really and truly, despite how we look at things in a sentimental way, that's how it is, and you can see this by doing nasty things to animals. You can demonstrate that they're not doing things for quite the same sort of reasons that we might assume they're doing them. I'm saying that we are much closer to that than we like to think. Generally speaking, we have needs in relation to children. When we can see children, or as we're human beings and can think about them when they're not actually there, be aware of the children, we have certain needs in relation to those children and those needs are largely summed up in the behaviours of the children and to some extent in their appearance so if the children produce behaviours which satisfy our needs the whole thing is in equilibrium. If the children produce behaviours which do not satisfy our needs, or don't produce the behaviours which satisfy our needs, then the situation is in disequilibrium and we become agitated as grown ups, as parents, and so on.

We see it partly over the business of crying, in which if one can manage to get away from the notion that crying is somehow an element in distress and see it primarily as a means of dealing with distress which happens also biologically to be a signal to other people that there is some distress, we can behave differently towards crying children from the way we commonly do. Actually, the way we commonly do is, generally speaking, fine, of course. It ought to be because obviously the evolutionary process has been very efficient so far, so it would be rather surprising if most of the time our behaviour was in some way at variance with that; it would be very strange.

At certain stages we need to hear our children talk. The interesting thing about it, if you watch situations in school or hospital practice and so on, is that irrespective of whether the adults are intellectually well-endowed or not, it is the children's talking

that is important, not the meaningful content of what they say and, generally speaking, not their capacity to understand the speech of other people. So a highly intelligent parent will be quite satisfied at a certain stage with a child talking in empty ways entirely inappropriate to him and so on but would be very upset if that child didn't talk at all. Now, it seems pretty clear to me that reason doesn't actually come into this. It also means that if a child produces a behaviour which is inappropriate to the child's well-being or doesn't produce a behaviour which would in fact be beneficial to it, we are unimpressed by that unless it also has some relation to our own needs in respect of the child.

This means that we can contentedly allow children to deteriorate or to get into difficult situations because we don't recognise this particular need because it is a need which doesn't impinge upon an adult. On the other hand, a child who is perfectly all right can be driven to produce behaviours which are inappropriate to it and may be damaging to it, simply because the adult has a strong need for that particular behaviour. All this is covered up by rationalisation, so on the whole when we say that we are upset by a child in distress and we go to it to help it for its sake, I'm not suggesting that isn't true in one sense, but primarily it's our sake that we go for. This is a good biological reason and makes much more sense than going for the child's sake. If evolution depended on our doing it for other people's sake it wouldn't have worked. We have to look upon it as a very self-centred system.

Because we've got this dichotomy, it works at all these levels, including this particular one I'm talking about at this moment. At one level we hide our selfishness because - although I think self-centredness is what makes the world go round, it's part of that initial drive - for some reason or other our morality has decided that self-centredness is not a virtue and therefore we go out of our way to deny it. So I'm suggesting in a prescriptive way that if we could recognise that in reality selfishness is the most important drive that we have and that unselfishness is just a perspective, not the opposite of selfishness but just a particular external perspective on selfishness.....If I happen to find that I really can't get to sleep because someone is groaning all the time outside because of some injury and I get up in the middle of the night and go out and see to this person, someone may say 'How terribly unselfish that chap is' - absolute rubbish! I may not feel that I'm doing it for my sake - I may wish it had happened down the road so that someone else would have had to deal with it - which is in fact one's real reaction to such a thing.

Unselfishness or altruism to me is a kind of illusion, a very convenient one, or simply a perspectival thing, something seen from outside. It has nothing to do with observation, with doing things with things, but it has to do with secondary observation, that is to say with what we see of behaviours as something a second person sees in each of us. I feel that in many ways it would be much healthier if we were to investigate this and if it's true - that we should be much freer and air the fact that this is our primary motive and there's nothing wrong with it. It doesn't diminish the notion of unselfishness in any way at all in reality, it just puts it into a different perspective and allows us, when we're on the edge of pathology, when we're in the situation where there's something going wrong, and we're trying to help somebody, to see more easily what the problem is looking at it in this light.

I spend a lot of my time, as you no doubt spend yours - I know you come into contact with parents and so on or perhaps teachers who don't see it the way you do - trying to persuade people that what one is doing at this moment is not only not creating long-term ** distress in the child but is in fact diminishing the distress which not doing it is causing. I have to say to lots of parents that the crying child isn't quite what they think it is, and if they can gradually come round to recognising this, not only can they at first tolerate the crying rather more but their behaviour will actually diminish and it can be overcome. And many of the feelings - if someone says, 'That poor child there, he needs me to put my arms around him and comfort him' - if one asks whether that is really true or whether you just need to put your arms around him - if he pulls away from you and you then become distressed because he has rejected you - in the first instance you were behaving quite inappropriately to him so you've actually hurt yourself in the long run as well as in that situation.

So I would like us to recognise that there are a few very basic biological drives, which we could certainly put in the realm of instinctual drives, which go on influencing us. These are amongst the constraints and they are basically good: they are something that empower. Using them actually enlarges our capacity, our flexibility, our imagination if you like and our not recognising them to some extent causes something which we could call a pathological state and causes more problems.

Going back to the beginning of your thing, I believe it's the same thing that is making it much more difficult for the very children and the people we are actually, at another level, setting out to help. If we could recognise that looking at it slightly more rationally doesn't have to be at odds with this we could assimilate it into it and, after all, these drives are probably the origin of our reason anyway, if we go back further.

PB As far as I can see, looking at it, there seems to be a question of where the actual desire to cover things up, to disguise things, comes from and to some extent that seems to touch on something we mentioned before about tricking ourselves by describing it. We want to describe certain things and we actually do so in such a way that it distorts things rather than makes things clearer to us but there still is this morality, or at least some moral codes. To some extent something like looking after the weaker members of society would be regarded as something of a luxury if you were living in a very impoverished society: it's a luxury for the survival of that society and you just can't afford to do it. I wondered if it had occurred by accident almost in the beginning and that when certain sorts of creatures, apes perhaps and humans started behaving as a group and had some sense of group survival enhancing their survival chances, so maybe food sharing, if that by accident sometimes protected members that wouldn't have survived and that that perhaps is the root of it.

GW That's an interesting thought actually. You must remind me of that in just a moment. When you mentioned about the disguising part of it, that I think links back to what we were talking about earlier on, that we find it necessary to suppress those things which cause us displeasure, whether they are the uncertainties, the indeterminacies we mentioned earlier on, or discrepancies and we have a whole series of ways of dealing with them but among them is this process of what I call 'closure', that by sealing something off, we no longer need to be irritated by it.

A powerful way of doing this in human beings is to label it. In many ways the labelling process is one of the more powerful ways of dealing with problems: as soon as you've labelled it, you behave almost as if you've solved it. Then after a while the label becomes associated with the opprobrium, or whatever, attached to the original problem and we have to change that label and this is a sort of process of euphemism or genteelism which we use in this particular way. It just suddenly occurred to me when you were talking.

The other point - you're suggesting that maybe the care for the infirm has grown out of our dependency upon one another as we become more social and cultural creatures.

PB Yes, that early group behaviours which would actually have promoted group survival and through that promoted the survival of the particular species did in fact by accident protect weaker members who perhaps normally wouldn't have been fed or would normally just have been left behind.

GW It seems quite likely. If in fact our - I don't know if this is related to what you're saying - if, when we do feel very insecure there is a kind of short cut to security, that is by association with something which is already associated with security, the 'teddy bear effect' as I'd probably call it, so that in some respects another human being may bring some security, even if that person becomes a dependent on one - and I've heard anthropologists describing groups where anomalous members were treated almost as if they were semi-deified - I can think of an American Indian group where, say, an albino would be treated with tremendous respect, in fact not allowed to go out on forays but left at home with the squaws and so on, and looked after and not allowed to work - whether we hang on to the infirm partly because we are dependent on their existence in some sort of way.....does that fit in with what you're suggesting?

PB It extends what I was saying. I suppose I was still trying to suggest that the whole sort of ethical system or systems which have come about, have come about initially through accidents....

GW A need to live together....

PB Yes, a need to live together has promoted certain sorts of behaviours which have by accident protected weaker members of the group who weren't at that time contributing much towards the group's survival.

GW That would certainly fit in. I have a view which I could perhaps briefly refer to at this moment. A thing which struck me some considerable time ago was at the time when I began to feel as if I'd got a clue as to how the child would learn and develop an understanding which would make him a survivor - and I always tried to keep my mind clear of all the various cultures - it struck me, it seemed almost suddenly, at a time when the pattern in my mind was fairly clear, that everything made this human creature into an adaptive survivor, made him actually into an individual, solitary, independent survivor. Everything seemed to me to go that way and yet all the time, of course, one is nowadays surrounded by people who are saying that human beings are social creatures and most people seem to start with this idea. It struck me that everything that I felt I'd described pointed away from this.

Somehow we've evolved not as social creatures at all, we've evolved as primarily independent creatures but we've also evolved as increasingly adaptive creatures. So it seemed to me that if we were solitary creatures living in a very sparsely populated region, I don't know, maybe one human being per mile or more, and we biologically met up occasionally for mating under the same sort of principles as the great bears do, and the babies remained with their mothers for several years - I mean obviously seven or eight years plus - during which time other babies would be likely to come along, then generally speaking the system could obtain very similarly to the great bears. They remain very much solitary creatures, the males almost entirely solitary, the females solitary except that they tend to accumulate cubs. They remain absolutely individual creatures.

But bears are highly specialised creatures so they in fact, on the whole, do not adapt particularly readily. On the other hand, if there was a period of months or maybe years when the area became more provident, more fish in the rivers, more fruits and so on, then it would be found that the population of bears would be likely to increase to some extent and they would live somewhat closer to one another because there would be less competition. And of course if problems arose again we would expect there to be changes. Now imagine what it would be like if you had creatures very similar, except they were highly unspecialised, highly adaptive creatures.

An adaptive creature like a human being is likely at some stage to use hand tools, and then to actually design hand tools, to actually recognise needs and design them and, because they are able to plan, could actually make things over a period of time and store these up. A hand tool is something which prefers considerable advantage by doing something rather better, more quickly, with less effort, less damage and so on, so quite quickly when you've designed your tools, you become dependent upon them. Having made your spade you then dig with it. And if you lose your spade - well, if you don't have a television you're all right but once you get used to the television, it becomes a necessity, so to speak, but obviously more so with things like spades and ploughs and so on.

So we'd expect this highly adaptive creature to actually utilise its environment in a technological way, to exploit it through really using it as an environment and a system of tools, including actual hand implements. This would, say prefer an advantage. But obviously during the growing up time, each individual creature spends a fair amount of time with its mother in interaction and so on, and during that time would become relatively dependent and then, like the bears, would be driven out at certain point, driven away to look after itself. However it would retain the hint of this tendency to be able to interact with another creature. With bears this doesn't happen, largely because they are solitary creatures and the population is sparse.

What would happen, if you imagine these primitive people becoming more and more adaptive and conditions also improving, so although they would keep their tools themselves, more could arise, they would make more and more encounters per unit time and of course being adaptive creatures and tool users they would start to use one another in adaptive ways. In using one another in adaptive ways they would also become dependent on these tools, which happen to be other people's behaviours in this particular case. So in a situation where the conditions were right for the population and the people met with one another more often, it seems to me that they

would be likely to become progressively more dependent on one another. They would be drawn together not because they so much liked one another as because they could not afford, emotionally, to be apart.

Although they are actually physically dependent on one another to some extent, they become also emotionally dependent, so other people then would represent a kind of security. An infirm person would also be endowed with this, even if that particular person wasn't able to give anything to the system.

Under these conditions we now get a group of individuals who are built to be independent and to live solitary lives who have come to be forced to live, to some extent, social lives. At the very least, this seems an extremely dodgy state, which I think is the one we actually live in. That is, that we are in fact groups of individuals who have become dependent on one another and this is encouraged by our cultures on the whole. We take it for granted that this is necessary, on the whole, and of course the more we build up historical cultures and so on and we pass down information, art, technology and so on, the more dependent we become on the system. So we get to the point where we begin to believe that we really are social creatures and yet there's very little resemblance between the kind of societies that humans have and anything that any other animal has. I don't think that you'd be able to find any other animal that shows the slightest resemblance to human societies at all. I mean there are very primitive ones in one or two of our adaptive cousins of course but.....

So here it would seem to be, in keeping with what you suggested, that although under these conditions we would get division of responsibility, temporary or permanent leadership, the making of plans, the production of rituals and celebrations, so to speak, as means of holding groups who may be separating - I suppose we're now talking about the sort of things people talk about as hunter-gatherer periods of time - when people grouped and then split and moved in small groups and so on, I presume that's the sort of time I'm talking about. Despite the fact that on the whole people might be living some of the time very much a hand-to-mouth existence, we don't necessarily feel the dependence on one person very much more than on another. All people presumably would be teddy-bear objects in a sense for us, including those who are in fact anti-social, as well as those who are infirm in some way or incomplete in some way.

P.B. Do you think it's possible for an adult to make him or herself a good learner again, by an act of will almost, or is that a fantasy? There seems to me to be a problem once thought gets tied up with language. Once you start saying to yourself 'Well I want to think with the same sort of intensity and the same motivation that a child shows in its activities there seem to be a lot of problems in actually doing it, one of which is that once something's learned, it seems to me impossible to imagine a state of not having known it.

G.W. Well, first of all I do think it is possible. Not only that, it happens quite a lot I think. I think generally speaking it's a question of hitting upon something oneself and then moving toward the state or meeting up with someone already in that state and sort of taking over from that person. It's possible I think for someone to deliberately

cause another person to get back into that state as long as there isn't resistance to it. I see no reason why anyone shouldn't get into a good learning state, though how far one can go to overcome what I would call the prejudices it's difficult to say. But I think we do - theoretically it's possible to go a long way I would have thought.

I imagine some people being triggered off by the open University and so on, who could get some way back, although many of the Open University things seem to go along the same sort of ruts as ordinary universities go along.

There are certain things that one would learn and go along with, thoroughly believing but could later analyse and discover they had no foundation and feel very differently: that, I imagine, happens to a lot of people. Or one becomes dissatisfied with the grounds on which something is based and so on: that happens when one becomes involved in a movement, and one probably benefits from it in any case but at some later date one starts to feel that there are more feet of clay than one had realised to begin with and eventually one may repudiate the whole of the thing, not by an act of conversion but rather just feeling that it really wasn't as adequate as one thought it was.

When it comes to a complete – I don't know if you were, say, thinking of a child reaching a certain kind of stage of logical reasoning – to be able to return to a state prior to that for example, for some reason, would obviously be rather difficult but it might mean that sometimes, theoretically, a stage of understanding from which we move on to another stage, if it were worked out completely, might be capable of giving rise to several different kinds of understanding and it might be that if it had originally given rise to one form one might come back and by revising that, discover that there were other major possibilities. How much more than that one could undo.....

I certainly see it as very difficult to understand, even to remember, what it was like before one understood some major new concept. I think it's salutary to try – this is what all this business about making the artificial machines is partly to do with, trying to get oneself away from the fact that one is in this present state and one doesn't remember what it was like before one could argue in a reasonably logical way, for example.

One sees children at that kind of level making very logical, but not the same kind of logical behaviours, or one sees things being handled very differently and after a while one gets the feel of what it must have been like, I think, but I don't know how close one can get to it.

But in a general way I would have thought it's always possible to re-awaken a stage because I think usually the reason why most of us come to an end as creative thinkers, which, all being well, we have been as children, has to do with this business of competition for time and energy and emotional equanimity between the demands of the culture and the demands of one's own tendency to play. In a sense what we're doing now really comes under the heading, as far as I'm concerned, of play and at a much higher level than applying it technologically to helping somebody, so to speak. So we are very fortunate in being able to play and, at least we fondly imagine, be reasonably creative but most of us get to a stage where the whole system tends to tell

us that we're wasting time, that we should be spending more time making a living and so on and we should be thinking of the future.

In a sense, creative thinking in children and adults must be tied to living for the present, living really in the present and maybe some expanding this in both directions as well. But in reality, as children begin to get beyond the five years level really the whole society starts asking them to live for the future which seems to be the most pernicious way of having them not be able to live for the future so that they're neither allowed to live in the present when they would be really creative as far as living for the future, nor do they improve their chances for the future.

So for the most part to have to re-awaken thinking and change our ideas is largely to overcome what has happened as a result of this kind of competition between cultural demands for time and attention, as I say, and our internal demands for play – doodling or whatever you want to call it.

P.B. Isn't this another failure of extrapolation? If you're here and now and you haven't got the capacity to say 'How did I arrive at this point? How did I arrive at these views?' then that seems to be a sort of failure of extrapolation.

G.W. Yes I think that's so. It seems almost as if one has somehow meandered to that particular point. It would almost imply that one had reached it through some adventitious route rather than by some route through which everything had grown logically from everything else.

P.B. Looking at the state of the world now it seems to be top-heavy with technology and refinements. Do you see that as a distortion of the capacity to use tools which is initially very important to human development?

G.W. Well, if we can imagine the human being and the group of human beings as being able to advance in some sort of dynamic equilibrium so we could say, if you like, that's a 'good' state...It seems to me as I've just said a few moments ago, with the individual, the cultural influence is to extend and utilise the exploitation, that is, the technology, and this tends to come about at the expense of the creativity or the science. So I see play giving rise to experience, which itself gives rise to experience which gives rise to experience, so to speak, as being equivalent in society to science, so that as a child grows up there are two things: one is, he increases his understanding so as to be able to increase his understanding even more effectively in the future, the other that meanwhile he comes to exploit the understanding. The balance there, would be, I feel, such that the exploitation in no way interfered with further creation. As I implied, our cultures on the whole do exactly that. They cause the children very early on to stop creating new ideas and becoming better at creating new ideas but persuade them to utilise the technologies based upon the current ideas and to extend these into effort-saving, time-saving, space-saving pathways, all of those being necessary to technology but being the antithesis of science.

The exploitation of ideas to some extent contradicts the creation of ideas. It needn't, but I feel that the macrocosm, so to speak, is exactly a reflection of this so at the moment we allow our exploitation to run away with us well ahead of our capacity to understand what we're doing with it. The exploitation allows us to use up resources at

rates which are far greater than our capacity to deal with using up the resources and the disposal of waste products and so on. It seems to me that our educational processes encourage this.....they are extremely effective in this way, unfortunately.

Yes, that's how I see it. It seems odd in a sense, again going back to what you were saying earlier on, that although creative thinking does all the time involve looking at problems and so on, hypothetical problems, and attempting to solve these, enjoying finding solutions to these kinds of problems, taking this to the full we recognise that we're supposed to be looking at all the ins and outs of what we're exploring in that sort of way, so we ought to be able to foresee the effects of what we do. I suppose that for a while, the kinds of ideas that people have invented, the kinds of tools and systems that the technologies bring forth, for many many centuries were very local affairs making use of relatively small amounts of resources and so on. So humans just really wandered about the world, leaving their rubbish and devastation behind them and feeling that it was an endless situation. Even though under those conditions we managed to create deserts and so on, it seems that now, of course, the speed of the whole thing is so great and technology is much easier to produce than science so that any idea anyone has can be exploited anywhere in the world very very quickly, long before anyone's had a chance to think out whether it was a good thing to attempt to exploit it in the first place.

The only possibility I can see is an educational philosophy in which children are actually encouraged to be creators of ideas and limiters of technology. I don't mean limit in the sense of 'prohibit' – I mean that would be nonsense – but to recognise that there are many interesting technological things which don't require to be carried out. It seems at the moment, in this world system in which we seem to be turning the only bit of space we've got into a rubbish dump, odd that people make something and calculate its value, that governments say 'This is too expensive to pursue' so to speak, 'we must do this one', but the problems of disposal and so on are not taken into account. So if someone sells something for twenty-five pounds and everyone thinks how comparatively cheap it is, but its real cost is probably twenty-five thousand pounds because no-one recognises that somewhere along the line a government has to put billions of pounds into getting rid of some noxious material which was actually created by that particular factory.

It's not a new worry. I think Dr. Schumacher pointed this out quite recently in one sense but quite a long time ago in another sense, but we still go through the same motions and unfortunately we seem to worship the technology rather than the science. By 'science' I include all the things most people would think of as being art – anything which is creative, originating thinking. On the whole, almost everything people talk about as science at the moment, particularly on television, is really technology, as far as I'm concerned. The only way I can see round it is that one could get three good generations of people who had been encouraged to think flexibly and to be sceptical, a bit cynical and highly critical: otherwise it looks a most pessimistic picture to me.

P.B. This morning, when we talked about how things go wrong and become distorted in human development, it seemed that it was the reinforcing mechanism which is the most susceptible to interference in that learning process and the rest of it's fairly robust but the actual reinforcing mechanism, the internal mechanism, necessary to

cause people to move and learn from that, is in fact quite vulnerable. That in a way seems to be the thing that we keep coming back to that leads to these sort of distortions.

G.W. Well, I think if you go beyond something which may occur very early on, which may put an individual on an inappropriate track – if we leave that for a moment - and come more to what you're saying here, there seem to be two, possibly three but obviously two, main factors which are in fact associated with reinforcement in one way or another, and which produce distortions.

If for some reason or other we reach a stage where the motivation or the power supply – which must continually increase with time to compensate for increasing needs – if this power supply, which is operating into the load (which is the individual and the various actions the individual has to engage in) is too low, for whatever reason, so that the individual is under-powered, then the choice of activities is immediately distorted. Because it means that this power must somehow be put into something that avoids the lines of greatest resistance. It's rather like an electrical circuit: if you want the power to flow one way, you put in two resistors, one bigger (higher) than the other one – now you can divide the current and it will take the easy route in proportion to the resistances.

The same sort of thing applies to us: if we are underpowered then on the whole we tend either to choose the activities that bring us the greatest amount of pleasure – actually the most familiar ones – or simply we avoid those ones which require the greatest amount of effort. So we can say that the loading produces a distortion for this particular reason. (I'm talking here about motivation but of course as far as I'm concerned the motivation actually is very closely allied to the reinforcing mechanism.)

So one kind of distortion occurs this way and of course with children I refer to this as retardation (which is a lot more complicated than I have suggested); but the routes which are chosen are on the whole low-effort routes, low resistance routes, low-load routes, and this may be made more complicated by the deliberate introduction of effort-saving manoeuvres which further distort the situation.

Now quite separately from that but often working hand in hand with it, we have the mechanism which is also related to reinforcement but this time to the negative reinforcement, the controlling influence; this is the mechanism by which our choices are governed by the familiarity content of those choices. So, if we are about to engage in something, we are more likely to choose those things that have a high familiarity content than those that have a lower one. If for various reasons our total state is a bit on the asthenic, weak, sort of side, then we may also have to eschew certain regions quite deliberately - not just simply choose the more familiar but very deliberately avoid choosing the ones with low familiarity contents. This is going to produce a further distortion, which will accumulate like the other one. With the other one, the less you engage in those areas which have a high load, the less you are able to, because those gradually accumulate to become greater problems. On this side we now have problems that (in order to avoid negative emotional distress) we distort by choosing the more familiar and eschewing the other, as I have said.....

So that we have two quite different forms which produce enormous distortions and both of them as you properly said are related to reinforcement, one particularly related to positive reinforcement leading to motivation; the other one related to the negative or the controlling/regulating mechanism. Both of those are related to further distortions in which, once the system itself has been, or is being, distorted – either because of mechanisms like that, or because of the primary mechanism which has gone wrong, - one may find that a particular pathway which perhaps due to inadequate motivation has not given rise to offshoots and so on, will run alongside another one which has also not given rise to offshoots and failed to produce liaison between these two parallel ones which would normally have occurred as a direct result of the variations on these parallel patterns.

Sometimes where the individual ones would have liased and given rise to a compound which would then move on and become important.....when there is failure to do this, they actually peter out and become what I call cul-de-sac habits; and these can become extended out as behaviours which go out and out and out, never actually getting anywhere. An example of this, pathologically, would be spinning behaviours – where a child gets stuck at about the 12 month level but goes on playing so much that it becomes incredibly skilled at maintaining objects in motion, which is from the child's point of view a heavily self-reinforcing behaviour. So the child becomes progressively good at balancing things and yet is never in a position to make use of balancing as an adaptive manoeuvre.

Once there is something wrong with the reinforcement mechanism of learning, or something wrong with the regulating mechanism, or there is something wrong with the system so that those things are out of phase, then progressive distortions will inevitably occur.

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