

APPRAISAL

A Journal of Constructive and Post-Critical Philosophy and Interdisciplinary Studies

Vol. 2 No. 2 October 1998

ISSN 1358-3336

Editor and Publisher: Dr R.T. Allen

20 Ulverscroft Road, Loughborough, LE11 3PU, England

Tel. fax and answer-phone: 01509 215438 (09.00 to 17.00 hrs GMT only);

E-mail: Richard_Allen_21@compuserve.com

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This issue's contributors:

Dr Norman Wetherick is a retired university lecturer in psychology. He lectured at Bradford and Aberdeen Universities, and has published papers on the philosophical aspects. He has contributed the entry on Polanyi to the *Biographical Dictionary of Psychology* (Routledge, 1997).

Robin Hodgkin, a mountaineer and geographer, taught for 15 years in the Sudan; was headmaster of Abbotsholme School (Derbys) for 12 yrs; and then at the Dept of Education, University of Oxford. Among other works, he has published *Playing and Exploring* (inspired by Polanyi and Winnicott) in 1985.

Professor Percy Hammond worked in the electrical manufacturing industry and taught electrical engineering in several universities, including Cambridge, Southampton, Stanford (USA) and the University of Malaya. He is a

fellow of the Royal Academy of Engineering and of the Institutions of Electrical Engineers and Mechanical Engineers.

James Lund taught history at a minor public school, a village college, and a comprehensive school. He then became a lecturer in philosophy of education in a College of Education. In retirement, he has written *The Many and the One: Early Greek Philosophy—its History*, on the interrelation of philosophy and history.

Fr Dr Martin Moleski, SJ teaches at Canisius College, Buffalo, NY. His Ph.D. thesis was on John Henry Newman and Michael Polanyi. He is now completing Prof. W. Scott's biography of Polanyi.

Dr Angela Botez is head of the section for philosophy of science at the Institute of Philosophy, Romanian Academy, Bucharest. She has published and edited books and articles on philosophy, especially philosophy of science, in Romania and other countries.

Dr Joseph Labia studied law, commerce and medicine at the University of Cape Town, and then gained a Diploma in Psychological Medicine at the University of London. He worked in psychiatry at several hospitals in London from 1963 to 1969, before retiring for health and family reasons, to Jersey where he studies philosophy and religion among other subjects.

EDITORIAL

Our cover picture in this issue shows a burnt clay statuette, about two inches high, found at Cernavoda, Romania. It is attributed to the 4th millennium BC and to the Hamangia culture. With it was also found one of a seated woman. Inevitably it has been named 'Gânditorul', 'The Thinker', after Rodin's famous statue.

Pace Gilbert Ryle, it is of man thinking: perhaps not thinking philosophically, and perhaps only day-dreaming, yet engaged in mental activity though physically still. For we cannot help recognising in this miniature masterpiece of ancient art an essential attribute of our humanity: viz. the capacity to extract ourselves from immersion in perception, and thus the immediate present and what we can now see, hear, touch and smell. This capacity sets us apart from even the highest animals, and immediately entails our awareness of ourselves and of what we are doing, our responsibility for our actions, and our openness to the world, the totality of things, even though we know only a minuscule fragment of it.

Today it is solemnly debated whether mere machines can think, and even J.R. Searle appears to concede the possibility despite his proper insistence on the foundation of our mental capacities in our living body (see below the review of his recent book). The anti-human reductionism of modern philosophy cannot admit the clearest facts of our self-knowledge.

This issue contains revised versions of five of the papers presented and discussed at our conference in April. They demonstrate the continually vitality of Polanyi's philosophy as a source of inspiration and guidance. Norman Wetherick opens the batting with an account of how, for the most part, psychologically has failed to profit from Polanyi.

As is shown by the presence of James Lund's detailed treatment of the relations between philosophy and *paideia*, we do not confine ourselves to matters explicitly Polanyian. That, we hold, is in the spirit of his own thinking. Among the many issues treated or mentioned in that article is the relation between thought and practice, between Pragmatism and 'Platonism'. Though we need to be aware of the dangers of the rationalist and intellectualist assumption that one must first devise an explicit plan and then execute it, yet it would equally wrong to ignore the importance of stopping and thinking, a capacity exercised at least 6,000 years ago in some form or other as 'Gânditorul' demonstrates. After all, Pragmatism is itself a *theory* of the relation of thought and truth to action. (Incidentally, Max Scheler, for all his phenomenological insistence upon the apprehension of essences, was strongly attracted to American Pragmatism because of his conviction that the real is that which *resists* us, something similar to which is to be found in Polanyi).

Pragmatism makes all thought technical, yet, paradoxically, we lack a clear account of technology, a theme taken up by Robin Hodgkin, in response to Percy Hammond's article in our first issue and developed further in the latter's response. But are *clear* accounts always desirable? That is questioned in Fr Marty Moleski's paper on the beauty and utility of 'fuzzy logic', though some of us may think that what is being offered is a multi-valued logic which remains as determinedly determinate as old-fashioned binary logic. Angela Botez, who could not come as hoped to the conference, compares the epistemologies of Polanyi and Blaga (see Vol. 1, No. 3), both of whom knew that the world cannot be reduced to a set of clear and distinct ideas.

The remaining three papers from the Conference will appear in the next issue, and now we invite papers for the next, on April 9th and 10th, 1999, at the University of Surrey. Short discussion or working papers will be as welcome as finely finished arguments.

Norman Wetherick

1. Introduction

What has to be said first of all is that Polanyi has so far had no influence on psychology. There was a time when it looked likely that he might. There were leading figures in America who believed that his philosophy might be the salvation of psychology. In 1967 Abraham Maslow invited him to give the leading address at the 75th Anniversary Convention of the American Psychological Association and this was published as 'Logic and Psychology'¹. At the same time, and for the same reason, an American journal set in motion the republication of a selection of Polanyi's essays that had appeared between 1945 and 1965², and another printed an interview with Polanyi, summarising his views at length³. All this, and the fact that he had explicitly cited gestalt psychology as one of the sources of his proposed 'conceptual reform', in the preface to *Personal Knowledge* and elsewhere) might have given the impression that psychology was about to take a Polanyian turn but unfortunately that is not what happened.

A major conceptual change did come about at that time—the so-called 'cognitive revolution' in psychology—but it owed nothing to Polanyi. A first generation of psychologists who had been educated as philosophers, who realised that mind/body dualism was incompatible with psychology and were, for that reason, behaviourists of one sort or another, was dying off or retiring. The new generation had been educated wholly as psychologists and were chafing under the restraints imposed by behaviourism (particularly by Clark Hull). They were not sensitive to the danger; few of them were explicit dualists but they were (still are) willing to postpone indefinitely any consid-

eration of the fact that each human being is provided with one central nervous system which has to serve all human purposes and they encouraged the development of separate, small-scale psychological theories that were incompatible (or at best not obviously compatible) with each other. Since human behaviour is infinitely various there was no shortage of topics for investigation and there are now a multitude of journals, publishing positive results that no one attempts to replicate and almost never publishing negative results. Psychology is long past the stage at which any human being could master the available data to a degree sufficient to evolve a general theory from it—even if that were how general theories in science normally come about. This is in fact what most psychologists believe (wrongly) since it justifies them in continuing to collect data—any data. Empiricism still holds sway among them to the extent that 'science' cannot be conceived as anything but wholly 'objective' and they are determined to be seen as scientists, come what may. Their passion for objectivity has been partly sublimated into an overriding concern with method, particularly statistical method, for which there is no parallel in the other sciences. The views of a man like Polanyi, determined to 'hold fast to whatever I believe to be true, in the knowledge that it may in fact be false', are unlikely to be acceptable to such an audience.

The theme of this paper will be that Polanyi developed an account of (scientific and other) knowledge acquisition that is not dualist—either explicitly or implicitly—and that his account will one day be seen as central to psychology. In the other sciences no problem arises; excepting particle physics as *sui generis*, their subject matter is

as it is and does—as it does whether or not it is being observed. In the non-scientific disciplines, dualism may be seen as an advantage—there may really be something that survives after death to go to heaven or to hell as the case may be. In psychology dualism is fatal. The point of postulating a non-material mind is that it should be free from the constraints governing material body. However, the assumption that the latter is governed by ascertainable laws (which seems to be justified in our experience) permits us to take it for granted that if our observations today are not consistent with our observations yesterday then the fault is in us, material body remains as it is, was and will be. Without this assumption science cannot proceed. The subject matter of psychology is human behaviour and experience and if that can be influenced by 'minds' that are subject to no lawful constraint then nothing can be established scientifically about it and psychology cannot exist as a science.

Polanyi does not make it easy for psychologists and, in fact, few contemporary psychologists are familiar with his work. They know that non-material minds are not to be tolerated and Polanyi often wrote as if he believed in their existence. I do not think he did (experts on Polanyian exegesis differ on this point). Polanyi's argument for mind as a separate ontological level that does not imply existence as a separate substance, is subtle. I suspect that, having been spared an education in philosophy and passed his life in physical science laboratories, he simply could not believe that anyone would postulate a substance that was not material; much less that he himself would be accused of having done so. But most people do, explicitly, and most psychologists

do, at least implicitly. Polanyi's arguments are too subtle to exempt him easily from the charge of mind-body dualism which psychologists know they must reject. There is an analogy here with Polanyi's views on the existence of God. For Polanyi, God does not exist 'as a fact—any more than truth, beauty or justice exist as facts. All these, like God, are things that can only be appreciated in serving them' ⁴. Prosch ⁵ pointed out to him in conversation that a belief in the factual reality of the religious supernatural, appeared to be a necessary feature of any religion that became a going concern but Polanyi was quite unwilling to admit the possibility.

2. Perception

Polanyi's 'conceptual reform' was inspired by the findings of Gestalt psychology that patterns are perceived from their elements and that attention to the elements destroys perception of the pattern ⁶ but he was also aware of other experimental results in psychology. Subjects may show physiologically by responses that are not under their conscious control, that they are aware of threatening stimuli that they do not consciously perceive ⁷. In cases of injury to the visual cortex they may deny that they see anything in the affected parts of their visual field but show (by correct guessing) that some visual stimuli are getting through ⁸. The earliest experimental work in psychology was directed to establishing thresholds—the minimum intensities of light and sound that could be perceived by a human subject—but it soon became apparent that intensities too small to be 'perceived' were nevertheless entering awareness because, once again, subjects' guesses were 80% correct.

Polanyi postulates an organism that perceives objects in its environment from proximal cues that may or may not be in consciousness. Knowledge acquisition is a three-

termed relationship but all three terms are part of physical reality. The organism constitutes a nexus in which proximal cues (i.e. physico-chemical events in the sense receptors of the organism) are triggered by reflected light rays, vibrations in the air or water medium, etc., that originate in distal objects, including the organism's own body, and mediate perception of those objects, which may then be approached or avoided by the organism as necessary for its survival. Organisms are simply physico-chemical objects that have evolved a capacity to repair and replicate their structure by ingesting raw material from outside themselves, sometimes in the form of other, smaller organisms and at the risk of serving the same purpose for some other, larger organism. The urge, in organisms, to survive and breed, is, precisely, what may be thought of as the 'urge' in atoms to combine with other atoms to form molecules, and the 'urge' in molecules to combine to form organelles, cells, etc. Only the human organism can, say, live celibate or avoid animal foods, by conscious decision. We shall see later how this becomes possible—no magic is involved.

It may be objected that Polanyi did not put his argument quite as I have put it. But much more is now known about human and animal behaviour and about evolution than was available to Polanyi. I hope my version does not misrepresent him, I do not think it does. What it does do is show how, on the basis of Polanyi's ideas, a genuine science of human behaviour and experience may one day be possible.

The first stage is, of course, perception—the establishment of contact between an organism and its environment that enables the organism to extract information relevant to its survival and, indirectly, to the survival of the species. Each organism is furnished with millions of sense receptors, each of them responding to precisely defined physico-chemical features of that part of the environ-

ment with which it is in direct physical contact. The world is so constituted that many of these inputs yield information about the distal objects in which they originated—the objects that reflected the light rays or initiated the sound waves. There is a narrow band of electro-magnetic radiation that is reflected only by objects that the organism cannot walk through. It is to light rays in this band that visual sensitivity has evolved (some organisms, e.g. rattlesnakes, use infra-red and can see in our dark, some use ultra-violet). Most organisms make do with brightness (i.e. intensity) discrimination without distinguishing colours. It is a fact that every surface reflects light rays of some wavelengths and absorbs others but a surface can only reflect rays that are incident on it and these will frequently have been reflected already by other surfaces that absorbed some parts of the spectrum. Ability to distinguish distal objects on the basis of surface reflectance (a constant physico-chemical property of the surface) is invaluable but to benefit, the organism has to evolve a capacity to take into account and allow for the composition of the incident light, as well as that of the light reflected by the surface. Human and some lower organisms have evolved such a capacity which we call colour vision ⁹. Perception of colour is not a direct function of the wavelength of light!

3. Object perception

Perception of the size and shape of distal objects and of their position and/or movement relative to us is, if anything, more important. For lower organisms that do not perceive colour it is all-important. Vertebrate organisms possess a visual system with a lens that focuses an image on a two-dimensional (but complexly curved) matrix of receptors, the retina. However, the shape of the retinal image cast by an object depends not only

on the size, shape, orientation and position of the object but on the position and orientation of the eye, which moves freely in its socket, which is in a head that moves in relation to the body of the organism, which can itself move around in space. It is not going too far to say that an object never (except in a controlled laboratory experiment) casts the same retinal image twice in the experience of a given organism. Yet the organism rarely has any difficulty in identifying the object as what it is, where it is. This is a very remarkable state of affairs. The explanation offered by contemporary psychologists is that it is all the result of an innately given capacity. But as the Duke of Wellington once remarked, 'If you believe that, Sir, you'll believe anything'. If the capacity were innate we would be required to believe that each of us is born knowing that an indefinitely large and various set of retinal images all correspond to one object in the world outside us, and with sets corresponding to every object we are likely to encounter.

The alternative is to postulate a learning process¹⁰. There are millions of receptors on the retina and each retinal image excites a different subset of them. But if a baby is lying in its cot, looking at a rattle hanging above its head but within its reach, the patterns of excitation associated with each retinal image (dependant on the baby's head and eye movements) will be associated with the arm and body movement that enables the baby to touch the rattle and set it swinging. That is a start—the various visual appearances all correspond to one object in the external world. Evidence in favour of such a theory comes from various sources. Anyone who has access to a baby of seven or eight months can try the following experiment. Take two paper cups and a small, brightly coloured ball. With the baby looking on, place the ball under one of the cups. The baby will knock the cup over and take the ball, giving every sign of

pleasure at its success. Then repeat the process putting the ball under the other cup. The baby will knock over the first cup, the one that does not now conceal the ball. For a couple of months this rarely fails—it is said to work with transparent cups, even though the baby can see where the ball is! The baby has learned something new about its world but not quite the right thing.

The theory postulates a learning process for perception, beginning at birth and more or less complete by the age of nine or ten. The major developments occur in infancy, before the baby is capable of participating in experiments, so direct evidence is hard to come by. However, there is evidence that the postulated learning capacity remains with us into adult life. Since the world we learn to perceive in infancy does not change in relevant respects, we have no cause to use it once initial learning is complete (unless we embark on a career in tea-tasting or chick-sexing). Experiments have, however, shown that if visual input is distorted the system can very quickly learn to cope. It is, for example, possible to reverse visual input (left-to-right or top-to-bottom) using prismatic spectacles¹¹ and the effect of so doing is disorienting, at first. What is in fact on the left, appears to be on the right and we reach for it in the wrong direction. However, if the subject tries to interact with objects in his environment it soon becomes possible to do so efficiently. (It is no use simply looking without trying to interact, that has no effect.) The subject learns to move around, pick up objects etc., without difficulty. What is much more significant is that in a few days the world begins to be seen as it is experienced in bodily contact. It begins to look the right way round and when the spectacles are removed there is a brief after-effect during which the world appears reversed without the spectacles. If the spectacles are worn for only part of the day, the system learns to cope with both normal and dis-

torted input. There is (or was) a film of one subject riding a bicycle round an obstacle course, putting on and taking off the spectacles all the while¹².

The theory holds that a baby is born not knowing what the perceptual characteristics of its world will be, but equipped with a learning mechanism that will enable it to live in the world, whatever they are. Fitting the baby with reversing spectacles at birth would have no effect at all. (I hasten to add that this experiment has not been attempted for obvious ethical reasons.) The theory (proposed by J.G. Taylor in 1962) was ignored and has been forgotten by contemporary psychology. So, to a large extent, has the more recent work of J.J. Gibson¹³, who had no theory of learning but did insist (and tried to show by experiment) that the objects of perception are there, physically existent in the world outside us. The currently fashionable view is that we do not perceive objects in the world directly—what we perceive are models of the objects constructed by our perceptual system. Most psychologists do not go as far as Bishop Berkeley and deny altogether that the objects exist: the matter is left open. They do, however, insist that we must begin with a two-dimensional matrix of points (pixels) having no properties except brightness (and perhaps colour). Where this matrix comes from is not clear. A great deal is known about the structure and mode of functioning of the eyeball and it does not appear to be well-adapted to generate matrices of the kind required—but they are convenient for computers. Since the matrix is two-dimensional, elaborate calculation is needed to restore most of the third dimension but there is always a gap left to be filled by 'previous knowledge'¹⁴. How this knowledge was acquired in the first place is not clear. Moreover, the calculations take some time, even on a modern computer, whereas the visual system would be required to

complete them many times per second. The origins of this kind of theory in Descartes' dualism are self-evident. Descartes believed that the body generates pictures of its external world which are inspected and evaluated by the mind. So, today, do many perceptual psychologists though they would deny, hotly, that their 'mind', was non-material. It is simply, they would say, that investigation of the mind must (modesty demands) be postponed until more data have been collected; sometime in the 21st century, perhaps, but who can tell? None of these problems arise from a Polanyian perspective. The organism is then an evolved part of the physico-chemical world. When the human organism finally got to the point of considering its own nature, the obvious first hypothesis was dualist. Language compels us to distinguish you and what you do, him or her and what they do, and I myself and what I do. The doings are clearly actions of a material body but why should the 'I' be material? Why should 'I' die when my body dies? It is as well to remember at this point that the obvious first hypothesis about the physical world was geocentrism. The world is, after all, flat and the Sun, obviously, goes round it!

Before leaving the subject of perception, I must make it clear, that I have been concerned with the development of adult, human perception (as was Polanyi). Animals very probably have a perceptual world but there is no way to discover how closely it resembles ours. Human beings appear to possess residues of a primitive, sub-human perceptual system and this may, for example, account for the instant, overwhelming physical attraction between two persons that is sometimes observed. Mostly, however, the evidence disappears in the first few weeks of human life. In the first few weeks babies can accurately mimic adult facial expressions, though by other tests they cannot 'perceive' them. A few years ago it was fashionable to

carry small babies in a kind of sling, so that they looked out on the world over their mothers' shoulders. This sometimes gave me the opportunity to scowl at them, or put my tongue out, and they often responded. Once I was caught at it but I am glad to say that my assurance that I was a psychologist was accepted as a full and complete explanation of my behaviour.

4. Cognition

In perception we are concerned with the relationship between one object in the world (an organism) and other objects; some of them also organisms, some not. Information is available to the organism in the form of reflected light rays, vibrations in the air or water medium, etc., enabling it to approach/avoid other objects/organisms in its environment, as necessary. What is so far absent in the organism is the capacity, in Hamlet's words, to 'look before and after' 15), that the human organism at least, clearly possesses.

To be confined to the present, to the sensory input here and flow (i.e. to lack Hamlet's capacity) is, so far as we know, the fate of all organisms except the human and perhaps the higher apes (chimpanzees orang-utans, gorillas). That does not mean, of course, that lower organisms cannot learn from experience. Confronted with the need to make a series of choices between, say, black and white, in which black is always rewarded and white never, the lower organism becomes more and more likely (though never certain) to choose black. Successive rewards strengthen the connection between black and approach behaviour. Sub-mammalian organisms appear to rely wholly on successful choices—those following which they receive the reward. If they do not receive the reward nothing happens but time passes in which existing connections may decay. Mammalian organisms learn from both

success and failure. The connection is strengthened if a reward is received and weakened if not. This difference between mammals and sub-mammals shows itself in many ways. If the reward is withdrawn after learning has occurred, the connection is eventually lost (the technical term is 'extinguished'), but in sub-mammals this is a slow process, taking as long as the original learning—the organism wastes a great deal of time responding to black without reward. In mammals it happens very quickly, more quickly than the original learning and the organism is freed to look for some other useful, predictive cue in its environment, since 'black predicts reward' is no longer true. Typically, sub-mammals are serendipitous feeders, they take food as and when they encounter it, opportunities to learn are few and may, as we have seen, prove counter-productive in the long term. Mammals, on the other hand, develop strategies to look for food in particular locations or at particular times. This is a very significant difference. Being able to learn only from its presence suggests that sub-mammals have no internal representation of the reward; the mammal, being able to learn from absence of reward as well as from its presence, must have some kind of internal representation. (One can learn from what is not there, only if one knows what should have been there!) Confronted with a choice between black (rewarded 70% of the time) and white (rewarded 30% of the time) the sub-mammal learns to distribute its choices quite precisely, 70% to black and 30% to white, getting 58% of the available rewards ($70\% \times 70\%$ plus $30\% \times 30\%$ equals 58%)—both black and white have, after all, been rewarded. The mammal learns to choose black only and gets 70% of the rewards—black has been rewarded more often than not thus strengthening the connection between black and approach; white has been rewarded less often than

not thus weakening and eventually abolishing the connection between white and approach ¹⁶.

Mammals appear to have a clear advantage over sub-mammals in efficiency of exploitation of their environment and the advantage depends on possession of an internal representation of the reward. Human beings are, of course, evolved mammalian organisms; they can do what sub-mammalian and sub-human mammalian organisms can do, and more. The more involves the capacity to 'look before and after'. The sub-human mammalian has it but only for reward objects (usually food). The rat (mammalian) gets disheartened and less willing to respond if the quantity of its food reward is reduced in the course of an experiment. The goldfish (sub-mammalian) goes on as if nothing had happened. Long ago it was shown that monkeys who had seen that one of seven flower pots had a preferred food reward underneath (i.e. a banana) and were then taken away for varying periods to see how long memory for the correct location of the reward would persist, refused a less preferred food (lettuce) on their return and sometimes threw temper tantrums—they remembered well enough what should have been there ¹⁷.

5. 'Looking before and after'

Human beings are not confined to the present, to the sensory input here and now, and they can have in mind many other sorts of representation besides food reward. This is the principal source of our advantage over lower organisms. The latter cannot have in mind what happened yesterday or five minutes past or what might happen soon but has not happened yet. Language is not available to them since such an organism cannot tell that an object in its perceptual field now is the same object that was in its perceptual field yesterday so it cannot use

proper names (it can, of course, react to the object in the same way today as it did yesterday, but that is not enough). It cannot tell that two objects in its perceptual field are of the same type, so it cannot use class names either (though it can react to both objects in the same way). It cannot become aware of its own continuing existence, since that requires awareness that 'I was here yesterday' as well as 'I am here now'. As a matter of fact, organisms other than human beings and two of the three higher apes do not show any signs of self-awareness ¹⁸. They respond to their own image in a mirror as to another member of their own species. Chimpanzees quickly learn that the image in the mirror is them (they appear to share most of our human virtues and vices). Orang-utans also learn (they seem to have despaired of the social world and live solitary). Gorillas fail to learn though they show equal intelligence in other respects (they live together in near perfect peace and harmony—perhaps we can learn something from them).

We have seen that if a sub-mammalian has to choose between black and white, where black is always rewarded and white never, it will eventually go to black on almost every trial. If a sub-human mammalian has to do so, it will learn more quickly and unlearn (if the reward is withdrawn) much more quickly—suggesting that it learns from white (unrewarded) as well as from black (rewarded). A human subject faced with this task may make at most one error. The first choice must be either black (rewarded) or white (unrewarded). In the former case the human subject will probably assume (correctly) that black will always be rewarded and continue to choose black. In the latter, the subject will recall on the second trial that white was unrewarded on the first and choose black. If the first choice was not actually 'black' but 'the card on the left/right' (which happened to be black) the human subject will

still learn more quickly than the sub-human, since on any trial he will be able to recall some at least of the previous trials and their outcomes. Presented with a series of choices between black (70% rewarded) and white (30% rewarded) the sub-mammalian learns to match the probability and gets fewer rewards than the sub-human mammalian that chooses black on every trial. The human subject may go either way. A subject who believes that it is possible to be right every time may try successive hypotheses in an effort to do so that cannot, of course, succeed. Over a period his choices may appear to match probability. If, however, the subject is simply trying to make as many correct choices as possible, he will learn to choose black on every trial.

The human subject's superiority lies in the fact that he can, as well as learning from both positive and negative outcomes, take into account a sample of evidence and not merely the single case that is present to the senses at any given time. Earlier trials and their outcomes can be recalled into awareness and the subject can embark on the next trial with a hypothesis, knowing what will be the consequences for the hypothesis of any possible outcome, e.g. 'The black card is on the left. Last time black was on the right and was rewarded. If I choose black and it is rewarded that supports the hypothesis "black". If black is not rewarded that refutes "black" and supports "card on the right"'. The sub-human organism can, of course, reach the same conclusion but more slowly, by strengthening and weakening relevant associations. The human capacity shows interesting variations with age that support the notion that it is an evolutionary development of the capacities of lower organisms. So far I have described an experimental task requiring only a discrimination between black and white that is within the capacity of any organism. There is nothing else in the situation to

which a sub-human organism might wish to respond and a human subject can simply be instructed that nothing else is relevant. Life is not normally as simple as that. Outside the laboratory there is usually more than one candidate for the position of predictive cue. The judgments that organisms need to make in the real world concern objects that exemplify many attributes (colour, shape, etc.) each of which can take many values (black, white . . . ; square, circle . . . ; etc.). In work published thirty years ago¹⁹, I used letter-groups in which letter positions symbolised attributes and individual letters values of attributes. In the simplest possible case, groups of two letters were employed in which one of two letters employed (symbolising attribute values) appeared in each letter position (symbolising attributes) in the group: e.g. AC, BC, AD, BD. By increasing the number of letter-positions and/or the number of letters that can appear in each position, the difficulty of the task can be increased without changing the instructions. Four- to six-year-old children find the two-letter groups difficult enough. If AC and AD are both rewarded, then A predicts the reward. If AC is rewarded but AD is not then A is eliminated and C predicts the reward. Children under about six usually give the answer A in both cases. From age six to about sixty both correct answers are given—the subjects can accurately select as predictor of reward the factor that appears in every rewarded instance and does not appear in any non-rewarded instance. Over-sixties tend to revert to the behaviour characteristic of under-sixes, suggesting that the capacity to learn from negative outcomes as well as positive, matures late and is lost relatively early in adult life. This is consistent with the suggested, late, evolution of the capacity. (Older subjects were usually tested with more difficult letter-groups.) Performance on this task correlates very well with non-verbal intelli-

gence as measured by Raven's Progressive Matrices²⁰, but it is also independent of intelligence in the sense that capacity to learn from both positive and negative outcomes declines regularly through adult life, even in age-groups matched for intelligence.

6 Commitment

It is some time since any direct reference was made to Polanyi in this paper. I hope I may be forgiven a lengthy account of discrimination learning in animals and man since it seems to me that here is, presently, a main part of the contribution that psychology can make to the advancement of Polanyi's project of conceptual reform. Most of the evidence I have cited was not available to him but he always showed himself willing to take account of whatever psychological evidence was available.

Polanyi insisted that knowledge necessarily involves commitment on the part of the knower to the truth of what he asserts (in the knowledge that it may nevertheless be false). Let us consider commitment in the sub-human organism. The organism has been rewarded several times after approaching black, when given the opportunity to choose between black and white, and has never been rewarded after approaching white. At the beginning it had no preference: it was equally likely to approach black or white but now black is preferred. It is hungry (organisms in this situation are always hungry—otherwise they curl up; and go to sleep). It is not a law of nature that going to black will be rewarded with food: it is a fiat of the experimenter; but in this respect the experimental situation is representative of the experience of the organism. Only human organisms (and quite recently at that) have found means to access genuine laws of nature. In ordinary experience what are more frequently encountered are temporary law-like regularities which depend on laws of nature (usually at sev-

eral removes) but are not in any absolute sense universal. At a particular place and time it may be true that all red berries are good to eat. It does not follow that red berries will always be good to eat, anywhere in the world, but that does not matter. For human and animal organisms living at that place and time it will still be worth knowing that if a berry is red, it is good to eat. The organism has of necessity to work on a relatively small sample of evidence (e.g. rewards received for choosing black; berries that were red and edible, etc.) and when faced with a new situation in which a decision to approach or not has to be made, it will behave in accordance with whatever approach tendency is strongest at the time. Our organism has, in effect, to commit itself to the truth of the proposition 'All approaches to black are rewarded'. Its approach will either be rewarded or not; it cannot, from the point of view of the organism, be probably rewarded. Probability theory requires a degree of intellectual sophistication that was only attained by human organisms in the last two or three hundred years. All organisms rely on small samples of evidence and commit themselves to the view that the universal proposition derived from their sample expresses at least a temporary law-like regularity. Nothing follows for behaviour here and now from 'proposition p is probably true'.

Polanyian commitment begins to take on the appearance of a necessary truth. Human organisms can, in addition, construct definitions, 'Triangles are three-sided plane figures' means 'If a thing is not a three-sided plane figure, I will not call it a triangle'. Here too the element of commitment is apparent.

From 'All A's are probably B' nothing follows about the A here and now. It is either a B or a not-B. I have to decide which (if it matters to me). I need to commit myself (or not) to the universal 'All A's are B' in order to behave appropriately and whatever I do I may be

wrong. Organisms are obliged to act as if their sample of evidence justified a universal (even though, technically, it can never do so) since otherwise they would be frozen into immobility—like Buridan's ass. The realisation that universals can be formulated in words was probably the most important single advance ever achieved in human intellectual function, since from it followed the possibility of logic and mathematics—both depend absolutely on universal propositions. It remains true that commitment is required but the human reasoner can now assert '(If you accept the samples of evidence from which I have derived the following universal propositions . . . and definitions of terms as follows . . . then) you cannot do other than accept . . .' If you and I agree on an evidential base showing that 'All A's are B' and that 'All B's are C' you must accept that 'All A's are C' and we do not need to look for evidence that all A's are, in fact, C. If we agree on an evidential base showing that 'All E's are F' and that 'No E's are G' then you must be wrong in asserting that 'All F's are G' since it follows from our agreed premises that some F's (i.e. those that are E) are not-G. I do not need to show you an F which is not-G to convince you.

With some exceptions (e.g. play, the arts) all the activity of organisms is directed towards minimising the amount of activity that will be required of them in the immediate future. The second-level mental capacity that enables human organisms to derive new knowledge from knowledge already possessed, obviating the need to return via perception, to our evidential base in the external world, is clearly of inestimable benefit to us. Who would have thought that, granted a few self-evident seeming propositions about points and lines, it would be possible to prove that the square on the hypotenuse of a right-angled triangle is equal to the sum of the squares on the other two

sides (i.e. that there are integers, a , b , and c , such that $a^2 = b^2 + c^2$)? Or that there is no integer exponent greater than 2 for which the equation holds? Still less that the first proposition would be proved at the dawn of civilisation, 2500 years ago, and the second only recently, after hundreds of mathematicians had worked on it for hundreds of years²¹?

7. Logical levels

Polanyi distinguished three logical levels in organisms²² and I have followed him so far as possible. Organisms are, first of all, physico-chemical objects. Many such objects are no more than that but from the earliest history of our planet there is evidence that, when conditions are right, chemistry evolves into biology as surely as physics evolved into chemistry shortly after the big bang²³. Organisms differ from objects in being capable of self-repair and reproduction of their structure which requires the evolution of what Polanyi called 'physiological mechanisms' (e.g. breathing, digestion) and 'purposive regulation' to oversee the function of these mechanisms and, primarily, to ensure provision of raw materials (e.g. oxygen, protein) from the organism's environment. The resulting behaviour of the organism is the subject matter of psychology. Polanyi distinguished higher levels of human functioning but here, though the psychologist has as much right to an opinion as anyone else, he has it *qua* human being not *qua* psychologist. I shall confine myself to what can legitimately be said *qua* psychologist. The psychologist's problems arise specifically at Polanyi's second and third levels since human and animal behaviour is a function of both. My account of perception and cognition earlier in this paper allowed for a primitive level of functioning which achieves some of the same goals as adult human perception and cognition without requiring the

organism to have anything in its awareness but what is immediately present to its senses. The lower one goes on the scale of organisms the more important is this primitive level. We cannot tell what kind of perceptual world it yields but it is obviously adequate for the survival of a sufficient number of individuals to ensure survival of the species concerned. Human beings, at the top of the scale, have not entirely lost this lower level of functioning though its traces may only be detectable in early infancy before behaviours at the higher level have matured. The primitive behaviours that are retained usually subserve fundamental biological needs, the repair and reproduction of structure. All organisms resist suffocation and starvation with all the strength they can muster but in the human organism these are relatively rare contingencies and are too quickly fatal to affect long-term personal and social development. The case is other with reproduction, with what Freud called the libido, since loss or absence of opportunity to breed is not fatal.

I first encountered the strength of libido when I was a very small boy. I was deputed to take my grandmother's dog for a walk. No one told me that the dog was in fact a bitch and on heat. I returned precipitately, pursued by at least half-a-dozen undoubted dogs; it took my uncles some time to get them out of the house. Freud's genius lay in discerning and describing mechanisms by which the majority of us succeed in controlling libido and indeed, frequently, in diverting its energy to the attainment of civilised goals. We must control it since the health of our society seems to require at least lip service to monogamy. When a man comes out of prison, having served twenty years for sexual offences, and commits the same offence the following day, we all feel better for hearing the judge condemn him as 'irredeemably wicked' or some such. We should perhaps marvel instead that most of us succeed in

rising above our animal origins—no other animal does anything at all except survive and breed.

There is rapidly accumulating evidence (not available to Freud, or to Polanyi) that the capacity to rise above animal origins depends on a genetic mutation that occurred in one woman, in Africa about 200,000 years ago. Human beings, it is argued, resemble each other far too closely, both genetically and in the languages they speak, for any other explanation to stand a chance of being true. Any two gorillas, taken at random from the same patch of jungle, differ more, genetically, than any two human beings taken at random from anywhere in the world. We are very specialised creatures indeed. I have argued in this paper that human specialisation is essentially in the capacity to 'look before and after'. We, unlike lower animals, are not limited to the immediate perceptual environment.

As I deliver this paper I loom large in the immediate perceptual environment of all of you. But any of you can switch your attention to what you had for breakfast this morning or to what you might have tomorrow, or to whatever else may take your fancy, without me being any the wiser. We are almost certainly the only organism that can do that. Neanderthal man, if we encountered him, might seem to us more intelligent than the chimpanzee or the gorilla but nearer to them than to us, having only the kind of language we can teach them (though Neanderthal man may have developed it for himself). Despite being bigger and stronger than us (as are the apes) he was unable to survive in competition with us. He possessed vocal apparatus resembling ours but was probably not capable of the full range of sounds that we use in speech. His language may have resembled what we now call pidgin. It has been shown²⁴ that, where two human groups (typically masters and slaves) need to communicate, even though each has a fully developed language of

its own, the groups may evolve a pidgin which has elements of both but is concerned only with the here and now. The children of pidgin speakers may however develop a new, fully adequate creole which will not necessarily resemble either parent language in its structure. Human groups appear to have the capacity to construct from scratch languages adequate for all human purposes. This is perhaps the most striking manifestation of the unique human capacity to 'look before and after'. The other manifestations I have considered are all intimately bound up with language though I personally would not wish to accord language any special priority. They all depend on the human capacity to make distinctions in sensory input and universalise the elements at either pole of the distinction. There may, for example, be things in an organism's environment called 'berries' (assuming that the organism has language). These things may not be tightly defined—usually a disjunction of sensory characteristics will be involved. The organism finds that some of these 'berries' are edible and some not. Obviously it would be advantageous if the organism could predict which berries were edible without actually having to eat them to find out. It might appear that, in the experience of the organism, 'red' berries were edible, so a distinction may be drawn between red and non-red berries—until an inedible red berry is encountered. A further distinction will then be drawn, perhaps between round, red berries and the rest . . . and so on.

This dichotomising principle is fundamental to cognition (and appears to be fundamental to the nervous system, which is adapted to fostering it by exaggerating boundary contrasts). But cognition requires material input on which to work that can only come from an external world, organised on principles of continuity that do not involve dichotomies. The paradoxes that follow have been recog-

nised from the earliest times. How is it that Achilles succeeds in overtaking the tortoise? We know very well that he will. Such difficulties did not however weigh against the overwhelming analytic power of the dichotomising principle. It is in fact sufficient to found logic without recourse to axiom sets—but that would have to be the subject of another paper.

Contemporary cognitive science has tried to manage with the dichotomising principle only, neglecting the fact that it needs materials to work on. Probably the reason is that digital computers work on that principle. Polanyi was correct in his assumption that such computers are not much help to us in understanding human nature. Since his time however, connectionism has shown a possible way forward that I can best illustrate with an example. One of the mysteries of human function (there are many) on which psychology has not so far thrown any light is the fact that a first-year undergraduate knows about 60,000 words. The measure used is ability to match a word to its synonym (chosen from one of four possibilities) which clearly falls short of ability to give an adequate, dictionary definition but will do for our present purpose. At age two these individuals knew very few words, if any, so the words they now know have been learned in less than twenty years—at the rate of about ten a day, every day. Other studies show that at most one a day is learned by deliberate intent. In a recent study²⁵ a computer working on connectionist principles was set to read *Grolier's American Encyclopaedia* (4,500,000 words in 30,473 articles). For every word that appeared more than once (there were 60,768) it generated an association with any other word that had appeared in the same article. Many words, of course, appeared in more than one article, so an elaborate chain of relatively weak associations between words was set up, on the basis of extent of contiguous appearance in the data base. The

number of connecting pathways between words and articles was varied from one to thousands. The computer could be given any word and asked to generate the other words most strongly associated with it. It performed best with about three hundred connecting pathways, doing as well as the average undergraduate on the synonym test described earlier! Human beings certainly use more than simple contiguity of appearance in relating word meanings but the study gives us at least an inkling how it is that they come to have more knowledge than was, apparently, present in the information to which they were exposed. There may be no need to appeal (with Chomsky, and Plato) to innate endowment. As far as the association process is concerned, the data base could, of course, have been patterns of sensory excitation as

easily as words in encyclopaedia articles, and the output perceptions of real-world objects.

8. Conclusion

My opening sentence was to the effect that Polanyi has had no influence on psychology, that remains true. None of the work I have referred to in this paper is in the mainstream of contemporary psychology and some of it is condemned out of hand whenever it is noticed at all. That is, as I have tried to show, because mainstream psychology still works in a fundamentally dualist context. Polanyi provides us with a valid alternative; an account of the material world and our place in it in which it is possible to see how human beings evolved to possess all the qualities and capacities that they clearly do

possess, without postulating any causal factor beyond the laws of physics and chemistry—how atoms became molecules, how molecules became cells, how cells became organisms capable of repairing and replicating structure and how organisms compete for the materials necessary to make this possible. I take it to be the function of a genuine science of psychology to elucidate the latter, behavioural stages of this process.

Speaking now in my capacity as a human being (which I promised not to do); God, the Good, the Beautiful and the True will, in my opinion, continue to exist as Polanyi believed they existed, and as they have always existed, by virtue of the commitment to them of individual human beings and in no other sense.

Edinburgh

Notes:

1. 'Logic and Psychology', Michael Polanyi, *American Psychologist*, 23, pp. 27-43, (1968).
2. Science, Thought and Reality, M. Polanyi, ed. F. Schwartz, *Psychological Issues*, VIII no. 4. Monograph 32, (1974).
3. 'A Conversation with Michael Polanyi'. M. Harrington Hall. *Psychology Today*, 1, pp. 20-25 & 66-67, (May, 1968).
4. PK, p.279.
5. 'Polanyi's View of Religion in Personal Knowledge: A Response to Richard Gelwick', H. Prosch, *Zygon*, 17, pp. 41-48, (1982). (See p. 46.)
6. PK, pp. 56-7.
7. 'Autonomic Discrimination without Awareness: a Study of Subception', R.S. Lazarus and R.A. McCleary. *Psychological Review*, 38, pp. 113-122, (1951).
8. *Blindsight*, L. Weiscrantz, Oxford: The Clarendon Press, (1986).
9. '... On the Basis of Velocity Cues Alone: Some Perceptual Themes 1946-1996', R.D. Mollon. *Quarterly J. Of Experimental Psychology*, 50A, pp. 859-878, (1997).
(The section on colour vision is pp. 867-876. Note especially the recent evidence that colour vision evolved thirty million years ago to enable monkeys to discriminate edible reddish-yellow fruits from a background of green leaves.)
10. *The Behavioral Basis of Perception*, J.G. Taylor. New Haven & London: Yale University Press, (1962).
11. 'The Formation and Transformation of the Perceptual World', I. Kohler (trans. H. Fiss) *Psychological Issues*, III No. 4, Monograph 12, (1964). (See also the discussion in (10) above.)
12. J.G. Taylor (Op. Cit. (10) above, p.204). (I have not seen this film, shown at the Brussels International Congress of Psychology, 1957. My colleague, Dr Boris Semeonoff, did see it.)
13. *The Ecological Approach to Visual Perception*, J.J. Gibson. Hillsdale, NJ: Lawrence Erlbaum Associates, (1986).
14. *Vision: a Computational Investigation*, D. Marr. New York: W.H. Freeman, (1982).
15. *Hamlet*, Act IV, Scene iv, 11.34-37.
'Sure, he that made us with such large discourse,
Looking before and after, gave us not
That capability and god-like reason
To fust in us unused.'
16. 'The Comparative Analysis of Learning', M.E. Bitterman. *Science*, 188, pp. 699-709, (1975).
17. 'An Experimental Study of Representative Factors in Monkeys', O.L. Tinklepaugh. *J. of Comparative Psychology*, 8. pp. 197-236, (1928).

Continued on p.68

Robin A. Hodgkin

1. What is a tool?

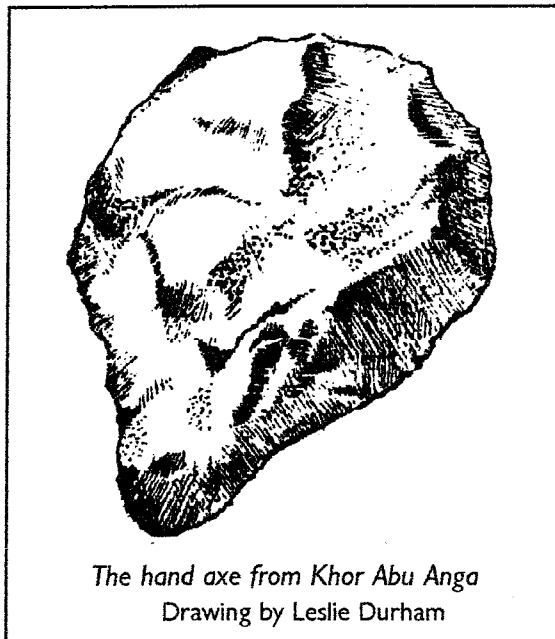
So all things made are works of art and art does not mean a special kind of thing . . . and the artist is not a special kind of man, but every man is a special kind of artist. Eric Gill, *Work and Leisure*.¹

We talk much about technology—its wonders, its dangers—but we are surprisingly vague about what it is. This paper discusses the nature and genesis of tools: how they emerged and developed; at first slowly and then with increasing spurts during the last two million years of human prehistory. Further insights can be gained when we move from phylogeny to ontology, from reflecting on the early humans of our race to those still mysterious ‘early’ humans—our own infants and children. How does our perception of tools, the instruments of both doing and learning, develop and how can our use of them be enhanced, stultified or corrupted? But here we are concerned with speculating about origins.

My interest in this was kindled, fifty years ago, when I was a teacher in Africa. In a dry stream bed, Khor Abia Anga, leading towards the Nile, my friend and I were looking for a golf ball. We found instead an acheulean stone hand axe, then another and another . . . They are called ‘bi-faces’ in the United States, which leaves open the question of what they were *for*. Most of ours finished up in Khartoum Museum, but I still have one on my window-sill. It is in good condition; made from hard Nubian sandstone, at least 200,000 years ago. Similar hand axes are found in much of Europe and Asia. The design remained astonishingly consistent. For almost a million years that flat,

pear-shaped pattern was the standard; with only slight variations. Then, around 30,000 years ago, there was a period of rich diversification which led to the almost miraculous skills and richness of the new stone age. That long, earlier period of gestation or stagnation and the changes which ended it both raise controversial problems about the emergence and nature of *homo sapiens*.

Jonathan Kingdon—zoologist, archaeologist, artist—gives a persuasive and dramatic account in his book, *Self-made Man and his Un-*



The hand axe from Khor Abu Anga
Drawing by Leslie Durham

doing, of how our early technologies shaped us—our culture and our thinking—and how we shaped them. He stresses that, while cultural adaptation and transmission among early hominids would often lead to new habitats being occupied, there were also slower genetic changes happening—bigger brain, handier thumb—which underpinned this capacity to spread and to succeed in new environments. Natural selection and cultural innovations reinforced each other.

In an extraordinary mimicry of natural adaptations, these primates began to manipulate elements and use materials in a way that rapidly multiplied the number of ecological niches they could invade. Each new tool opened possibilities that were formerly the prerogative of very specialised animals. Where diggers [digging animals] had needed heavy nails, now there were stone picks, cats no longer had the monopoly of sharp claws . . . (Kingdon, 1993, p. 37).

Kingdon emphasises that many of the skills associated with tool use must have become ‘built-in and heritable’—the recently evolved opposable thumb and fore-finger, for example. This made the hand better able to grasp a stone but also a better pointer; and so a useful aid to early language. When, however, the process speeded up, the ‘African primates (began) crossing an entirely new threshold when biological adaptation was overtaken by cultural adaptation’ (ibid. p.36. *my italics*). Once this was under way, cultural transmission between the generations—i.e. education—became crucial. One should remember that, throughout these emergent processes, every individual was rooted in a rich substrate of ‘tacit knowledge’ of older skills—how to climb, to flee, to grasp and even what gestures and faces to make.

In view of the now well established great length of hominid tool-making (two to three million years), it is tempting to take Kingdon’s suggestion further. Would not some oscillation be probable between periods of stability, when the slow emergence and spread of heritable characteristics would be in the ascendant, and occasional ‘sal-

tations'—relative spurts—when new cultural discoveries would develop and spread more quickly and with greater diversity? Language, tool-use, two-sided brain function and lengthening of maternal bonds would all have tended to reinforce each other during such times. We may never know. When we consider how *homo sapiens* acquired the propensity not only for language, but also for musical, aesthetic and religious expression, perhaps we should regard those long periods of stagnation and the occasional saltation as, somehow, necessary for forging our remarkably patterned, yet plastic, human nature? ²

The questions and speculations which we now raise about the genesis of technology will be partly coloured by Michael Polanyi's understanding of the deep-rooted patterns for skill and language in peoples' 'tacit knowledge'. But, for various reasons, Polanyi did not follow the problem far enough. Where, for instance, did the ideas embodied in tools and machines originally come from? And what kind of early questioning and knowing might have been involved? Did science also flow from this source?

Thirty years on from Polanyi, and Piaget who influenced him, the questions surrounding early human consciousness and intelligence—in both ancient hominids and present-day infants—have become increasingly complex and interesting.³ Controversy still rages but there is well substantiated agreement about the much longer time scale involved. There seems, also, to be an increasing weight of opinion that some form of language was emerging early in those tool-making aeons; and that the two processes—tool-use and language—were connected. In the chapter entitled 'Three million years of evolving minds', in their book *Fairweather Eden*, Michael

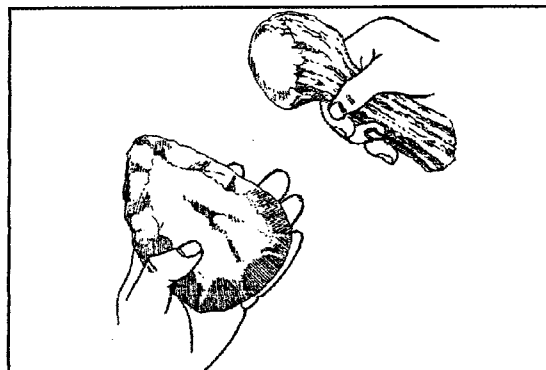
Pitts and Mark Roberts sum up the evidence as follows:

The makers of the acheulean hand axe had brains wired like our own, potentially capable of dreaming up such uniquely human constructs as family trees, myths, language and art. (1997. p. 186).

Later Pitts and Roberts modify this and suggest that language may have been more a necessary condition than a result of these changes. Writing about the still earlier, Olduvai, tools they quote an experiment which involved replicating simple stone choppers:

[This] suggests that the makers of ancient tools were mostly right-handed, a characteristic [which] is thought by some to be related to the ability to talk (p.188).

I take this to mean that, though the Olduvai hominid had brains which were smaller, they did have



The initial shaping of hand-axes was done with a round hammer-stone, on flint or other 'amorphous' material. It has now been established that much of the fine work of flaking the sharp edges was done with a 'soft' hammer, such as a shaped piece of reindeer horn.

See Pitts and Roberts, *Fairweather Eden*.

Drawing by Leslie Durham

some powers of speech and therefore the left-and-right hemisphere dialogue between inner speech and inner picture-making was already possible. That inner but shareable dialectic is, I argue, the condition

for autonomous learning, as it is for all culture. The model which we will be considering now, for the emergence of hominid thinking and talking about tools, fits best into one of the earlier spurts or saltations, when cultural changes might have broken through a dominant pattern of hereditary behaviour. If naming things, picturing them and talking about them were, indeed, on the early hominid agenda, then I think there would have been, at the least, some measure of inner reflection. The hominid pioneer could then hold a picture in his mind and question it; even a picture of himself.

2 The thought in the stone

'Dare we accept the ambiguity inherent in the exploration of a metaphor?' — Clive Sutton, *Words in Science and Learning*

What were these hand axes for? I saw one, in Khartoum museum, that was 30 cms. long; too heavy to be handled as a tool. Perhaps it was someone's Rolls-Royce of a tool. The feelings of confidence and self-esteem which a tool can evoke may well have been part of that early story; especially if you had created it. The ordinary hand axes seem to have been useful in a variety of ways, for digging, cutting, scraping, hitting, throwing. We need to remember that there must also have been a vast accompanying range of perishable artefacts, made of wood, bone, fibre; also that much tool devising and many ingenious techniques would have been the work of women; not to mention the inventive play of children, as they handled all the 'transitional objects' which would afford them entry into the rich domains of adult knowing, doing and sensing (see Tanner, 1994).

A small thought experiment may help to sharpen some of the questions as to just how such stones might have been first identified and thought about. Let us imagine the early use, perhaps the first use, of a digging tool. My model is intentionally a caricature, concentrating many occurrences into one. A group of early hominids is travelling in one of those dry savannah areas which separated the better-watered highlands around the East African rift valley which Kingdon describes. The group, suffering from thirst, start scrabbling for water in the damp sand of a creek. Traces of animal scratches can be seen everywhere. Finger nails are worn to the quick. One hominid picks up a pointed stone to assist in the task and a small pool of water is soon scoured out. They all drink; smack their lips and cheer. That's all; except that I am assuming that *an idea of sharpness/bluntness was around, was derived from remembered finger nails and claws, and was being transferred to one specially selected stone.*

Chance and small incremental advances must have played a large part in any such processes of skill enlargement. But it is not unreasonable to suppose that there were sometimes sudden discoveries and 'eureka' openings. Susanne Langer suggests that such conceptual enlargements are most likely to happen at times of heightened corporate feeling and crisis (1957, p 110)⁴. The shared mood would have been a mixture; as in mountaineering, of an acceptable undercurrent of hunger, elation and fear, alternating with occasional and vivid moments of wonder, surprise and contentment. It would be absurd to push such parallels far but we probably do share some of our moods and feelings with those distant ancestors. John Gowlett, an authority both on chronology and on the cognitive capacities of early man, suggests that if the use of fire goes back, perhaps, two million years, 'as now seems likely, then we can argue that . . . our ancestors

were already human in their basic character'. (1984, p.57). Language of a sort and intense curiosity would already have been there.

It is such an identification, by a person, of a single high-level idea within a complex system—in our case, in a living, multi-functional hand or paw—and its reduction and re-embodiment in a lower-order thing that is the crux of the matter. Using Polanyian embodiment in a lower-order thing that is the crux of the matter. Using Polanyian language, the 'operational principle' or idea of cause and effect was inferred and mentally abstracted from the complex context of the living organism and re-embodied in simpler material; and so there emerged a human contrivance of stone, metal or wood. While the new principle is being conceptualised both as 'finger nail' and as 'stone', it is ambiguous. It occupies a conceptual 'space' as does a poetic metaphor, having two or more levels of reference; and like any lively metaphor or symbol, it enlarges both the mind of the user and the scope of what is done.⁵

One of Polanyi's clearest explanations of what he means by an 'operational principle' is where he describes how several such principles are harnessed in a watch by the application of personally inferred principles.

My watch . . . is kept going by its main spring, uncoiling under the control of the hair spring and balance wheels; this turns the hands which tell the time. Such are [some of] the operational principles of a watch, which define its construction and working. The principles cannot be defined by the laws of nature. No parts of the watch are formed by the natural equilibration of matter. They are artificially shaped and sagaciously connected to perform their function in telling the time. This is their meaning; to understand a watch is to understand what it is for and how it works (KB p.153).

Two other ideas from Polanyi help us to understand the genesis of tools and machines. First, he pro-

vides us with an original and dynamic way of thinking about skills—their deep, tacit roots in our brain and body and how we focus them (largely tacitly, unconsciously) *through* a tool, towards a task; and all the ideas about the importance of authority and apprenticeship which follow. Secondly, Polanyi had the insight and courage to challenge the predominantly reductionist, materialist paradigm of science and to develop much of his thinking within a framework of higher and lower levels of complexity in nature. He recognised that different properties and principles are made possible and are necessary at higher levels which could not exist lower down. They are 'emergent'. Though, of course, lower properties continue to act within the higher system (molecules still bump into each other in my gut or brain). The properties and operational principles specific to higher systems are never found at lower levels. Until, that is, the mind of *homo sapiens* starts interfering.

In our example, the operating principle was 'the acting sharpness of the fingernails' or some such dynamic, causal concept; and the re-embodiment of this was in a specially chosen stone. This abstracting and identifying of a causal process, from a complex tangle of interrelated parts constituting an organism, cannot have been easy; though to us, it may seem obvious.

In the nineteenth century, a rather similar set of ideas about the genesis of science had been explored by C. S. Peirce, who coined a special word—*abducting*—for this kind of precise abstracting. This word emphasises the 'leading out' of a single variable or operating principle from a naturally occurring complexity. It is similar to Polanyi's 'tacit inference'—when we articulate an operational principle. Andy Sanders discusses the *epistemology*. He also discusses some important differences between them but on the basic abstraction/abduction idea they both

agree. 'Every single scientific theory', Peirce claims, '... has been due to abduction'. (Sanders 1988, p.16). Polanyi could have claimed, but I think he never did, that every single technical operational principle has also, at some time, been abstracted or abducted from nature. Though there are possible and debatable exceptions. What about the screws in the watch or the gear wheels? My guess is that even these were originally discovered in the domains of child's play or craft work—coiled clay imitating twisted fibres, for example, thus anticipating augers and screws.

A further, common characteristic in the thought of both Peirce and Polanyi was their emphasis on the fallibility of all explorers and experimenters. Even a genius such as Kepler, can be brilliantly wrong. Polanyi's own definition of technology (PK, p.329) states that it 'comprises all acknowledged operational principles and endorses the purposes they serve'. He does not, here, suggest that it involves embodiment of the principle at lower levels; though elsewhere in his writing he makes this clear (SEP, p.295).⁶

The range of meanings still carried by the word 'technology' is a continuing problem. My suggestion is that the 'abduction' of a principle from a complex organisation and its re-embodiment at a lower and simpler level should be the central element in the definition of both 'tool' and 'machine'. But more clarification is certainly needed. Tim Ingold (Gibson and Ingold, 1993, p.433) makes an important distinction between techniques and technology in his paper on tool use and intelligence:

'technique' refers to *skills*, regarded as embodied capabilities of particular human subjects, and technology [refers to] a corpus of generalised, objective knowledge... capable of practical application.

Ingold goes on to analyse and explore the general shift in our

culture away from the personal and skilled knowledge of techniques towards a falsely glamorised technology, in which quantification is dominant, rather than the discernment of value and principle. The creative power—the heuristic of technique—is replaced by the adherence to automated patterns (ibid. p.434).

To summarise: all science and all technology have the same source, moments of 'tacit inference' when an 'operating principle' is abducted from its natural source by a perceptive human being. All technology, then, involves a mental reduction of that idea or principle from its source to a re-embodiment at some simpler level of being. That is why technical creations are often dangerous; the essential 'ideas' have been stripped of the many checks and balances of their natural context and are equipped only with the contrived safeguards of their human maker.

But what about science? if the source idea flows 'down' to be technology, how does the stream of pure science flow?

3 Developing the theory or turning it into practice: where science and technology branch

The vehicles of scientific thought are not only propositions but pictures models and diagrams. because these control... what propositions appear in the heart of a theory. Rom Harré (1970).

We can now turn our thought experiment to illuminate the oft-debated question about the difference between, and complementary relation of, science and technology. Imagine two contrasting ancestral hominids reacting to those freshly perceived 'operational principles' about sharpness. The first hominid is more introvert—a reflective individual; the other is more extrovert—a man of action. The first hesitates, stays longer with the

theory and chews it over with friends. In this context, he finds himself testing the meanings of sharpness, hardness, pressure, in a variety of circumstances. The second, more extrovert individual, plunges into practical action, working by trial and error until he is satisfied with the qualities and usefulness of what has been made.

Together or singly they are exploring the conceptual space or 'heuristic field' (PK) in which the digging-stone-idea can be used. Perhaps they begin to work out a taxonomy of hard and soft stones.⁷ The theory grows and links up with others. Here, a few new steps are being taken in a shared, primitive science. On the other hand, when our more extrovert individual turns to less abstract activity, when he makes a pictorial or concrete embodiment of the principle, visualising the stone, trying to use it—finding a better one—then he or she would be fractionally enlarging the technology of their culture.

The reference, above, to 'pictorial embodiment' of the principle was made because of our still limited understanding of just how the right hemisphere of the human brain is involved. It is clear that for children, as for pre-literate societies such as the bushmen, ability to handle mental maps and pictures is crucial. For us, it has been considerably damped down by the influence of print; even more, by excessive television, where the 'picturing' is done for us. Whether in remote antiquity or now, the role of right hemisphere picture-making, functioning as it does in an intermediate position between the most abstract verbal thinking and the practical execution of ideas, is crucial; but it is rarely discussed in the literature.⁸

So, to sum up the difference between the primitive scientist and his more extrovert, technological cousin: *The vector of scientific activity*, even with a child, even with a primitive, is towards language, calculation, speculation and

theory, all of which predominantly involve left brain processing; though, of course, practical experiment and picture-making must also be there in a critical supporting role. Otherwise it all becomes fantasy and magic.

The vector of technology is opposite but complementary. It is primarily towards visualising and making things—things which embody high level operational principles at lower, more concrete levels. Picturing and mapping are important, two-way intermediaries between theory and skilled action in the world. But skilled making—in primitive and childish stages, at least—is primarily a manual and bodily activity. Engineers are usually great visualisers but they despise mathematics at their own and

everybody else's peril. Similarly, scientists are imaginative theorists, first and foremost but they soon learn to root their hypotheses and other elements of theory in earthy data and in experiments, which may show them to be mistaken.

Michael Polanyi, shocked by what he had seen of the arrogant, *dirigiste* and utilitarian science of the Nazis and Soviets, tried to define technology in narrowly, almost economic, terms, so that pure science could remain uncontaminated by lucre or politics. An interesting critique on these lines has been made by Percy Hammond (1996)⁹. Looking back, I wish that I had pressed Polanyi about some of the less 'instrumental' technologies, such as those that are embodied in Chartres or Salisbury Cathedrals.

What were those great spires for? Whose intellectual property were they? There may have been other reasons for Polanyi's slightly narrow view of technology and these need further discussion. But at least, thanks to him, we do not have to apologise when we say that the operating principles which are the essence of a watch or a pickaxe *originated in higher levels of being*. They did: in the cycles of the seasons, in the sun, and its shadows, in forests and fingers, in the spinning of a top and in the beating of a pulse; and in personal knowledge of all these.

39 Holyoake Rd
Headington
Oxford OX3 8AF

Notes:

1. The idea expressed here by Gill, that all people are creative and that society should reflect this, is common to Eastern philosophies of art. The phrase is quoted from one of Ananda K. Coomaraswamy's essays: *Christian and Oriental Philosophies of Art*—a radical critique of western, materialist education and art (p.24).
2. Noam Chomsky (1968) and others claim that inherited patterns for language exist in the infant human brain. The question is still open as to how this might have come about. The prolonged 'acheulean' period could have constituted an epoch of transition in which both nature and nurture overlapped and complemented each other. It has been suggested that very fine, tool-making skills were being programmed in the left hemisphere, alongside the fine, genetically programmed skills for language; and they might have developed together. And isn't a word an artefact—a kind of tool—and its accurate uses a skill? For an idea of the interesting but speculative state of the current debate, see Gibson and Ingold (1993).
3. There is a massive literature about this, but once Piaget had established a coherent, though over-rigid pattern of child development (c. 1930-1960), the general trend has been towards accepting more flexible patterns (Bryant 1974). Intellectual and motor skills can be discerned and stimulated in children much earlier than Piaget suggested. My own pedagogic understanding of this has been helped mainly by J.S. Bruner, Margaret Donaldson, Colwyn Trevarthen and David Winnicott.
4. My *Making Space for Meaning* (1997) draws on the ideas of several thinkers in the 1950's and 60's who were showing an interest in the dynamic and occasionally sudden process by which a new insight or concept can dawn: notably, Susanne Langer and Arthur Koestler.
5. Clive Sutton in *Words, Science and Language*, argues forcibly against the view that scientists should always use plain, non-figurative language. He quotes Michael Faraday's letter in 1845: 'You can hardly imagine how I am struggling to exert my poetical ideas . . . for the discovery of analogies and remote figures respecting the earth, sun and all sorts of things—for I think that is the true way (corrected by judgement) to work out a discovery'.
6. In a challenging essay, 'Life Transcending Physics and Chemistry', Polanyi is highly critical of our widespread misuse of the words 'mechanism' and 'mechanistic' in situations of natural complexity situations in which no human operational principle could ever have been introduced. He writes: 'the moment one succeeds in proving that machines cannot be explained [solely] in terms of physics—[for machines always have several human ideas hidden in them]—this appears so obvious that one wonders whether something so trivial could have been overlooked . . .

for 300 years' (SEP, p 295).

7. Traces of more than sixty species of plant were recently found in Palaeolithic caves in Upper Egypt. These were left by hunter-gatherers who roamed the savannah which, in glacial times, extended across Africa at that latitude. A rich folk taxonomy must have gone with this knowledge.
8. In *Playing and Exploring* I stressed that teachers need to gain better understanding of the role or visualising in learning. Left hemisphere/right hemisphere intercommunication is constant, subtle and rapid. It goes on internally via the commissures (massive nerve bridges) and externally, in a more sophisticated way, by each side monitoring what the other side is achieving. This is one reason why learning by doing is so important. The right hemisphere mediates pictorial information 'up' towards language; thus, for example, enriching our reading with inner pictures. It also mediates 'down' towards manual and bodily action as, for example, when a word recalls an appropriate diagram which can then guide our action. Chapter 8 also elaborates on how the use of television can weaken this ancient but essential gift of imaging and imagining, when inner words and pictures co-operate, constantly and creatively. See also another paper. 'Michael Polanyi and the activity of knowing' (1992).
9. Professor Hammond's friendship and alert mind have been of great help in getting me to think about these ideas; as has his occasional gentle criticism.

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Percy Hammond

1 Introduction

In contrast to the enormous literature on the philosophy of science very little seems to have been written about the significance of technology as a human activity, in spite of the important influence which technology has on modern life. Such accounts as there are treat technology either in terms of the description of machinery and processes or as a subsidiary factor which does not require further explanation. Often science is equated with new possibilities for human development while technology is regarded as a cause of failure in bringing the possibilities to fruition. Few people ask Robin Hodgkin's question: 'What is a tool?' or relate tools to the development of language and ideas. Michael Polanyi is a brilliant exception in this as in so many other respects. Although technology is not his primary interest, which centres on pure science, he devotes considerable attention to it. Sometimes he discusses technology explicitly but more often he uses technology to illustrate his general theory of knowledge. For example, in his analysis of tacit and focal knowledge he describes the use of a hammer in driving a nail, where the focal interest is in the nail and the hammer is used tacitly as an extension of the person who 'indwells' it. Similarly a walking stick is used by a blind person as a probe with which to explore the surroundings. With great clarity Polanyi extends the use of simple tools like a hammer or a stick to intellectual tools such as general interpretative models and frameworks. All this fits very well into the practice of technology and provides the personal pole of technological activity. A further insight is given by Polanyi's account of

operational principles, which govern technology and which are always directed towards a specific purpose. Such principles are concerned with the whole of a device or process and cannot be inferred from a consideration of the parts. Polanyi gives a clock as an example.

In all this Polanyi lays the foundation for a theory of technological knowledge. The theory is incomplete and does not touch on the network of connections between technology and economics or medicine or the environment. Nevertheless Polanyi has opened the way for a more comprehensive treatment. It comes therefore as a shock to find that often he turns his back on this own discoveries and that he leaves the subject in a thoroughly unsatisfactory state. In a previous article in *Appraisal*¹, I traced this ambivalence to the desire to protect pure science from Marxist-inspired political interference. He seems to have separated technology from science, so as to ring-fence scientific research. I still believe that this desire strongly affected his view of technology and distorted it. However, there probably were additional and deeper reasons to do with Polanyi's academic upbringing and the very low opinion in which technology was and is held by Western society.

2. Has technology a human interest?

Let me explore this question by citing two recent examples in the popular media. The first is relevant to the perception of pure science. There has recently been considerable interest in Fermat's last theorem, a theorem in pure number-theory stated without proof by

Pierre de Fermat some 350 years ago, which had resisted all attempts of proof until the successful solution by Professor Andrew Wiles of Princeton and Cambridge Universities in 1995. The history of the theorem and the struggle to find a proof were the subject of a television documentary film and a subsequent book². It is a fascinating story full of human interest. Professor Wiles' first published proof was found to be inconclusive. All seemed lost and then victory was snatched from the jaws of defeat! The finally accepted proof is treated, as indeed it was, as a triumph of human intellectual power. Nevertheless there is something surprising about the way the makers of the documentary identify with an achievement, which by their own admission they cannot understand. The proof runs to more than a hundred pages and is inaccessible to all but a handful of number-theorists. Fermat's theorem has no known application and is useless as well as incomprehensible. As 'personal knowledge' it is the private possession of a few specialists. What interest can such a theorem have for ordinary people? The answer lies in the human interest. The puzzle itself does not matter any more than the crime in a detective story. What matters is the detective and his achievement. Even the purest of pure science has box-office potential.

Contrast this with a recent television programme on the Channel Tunnel. On the face of it the construction of the tunnel is a technological achievement and is useful in improving communications and trade between the UK and the Continent of Europe. Such matters, however, did not feature in the programme, which was dominated by interviews with politicians

and financiers and which concentrated on the human interest of the struggles between these individuals. There were pictures of skyscraper financial institutions in the City of London and of the interior furnishings of the British Embassy in Paris. There were close-ups of whisky being poured from decanters into glasses. In the programme I watched, which was the first of a series of three, there was not a single picture of the tunnel except for some computer-generated models. More importantly there was not a single engineer among the people interviewed, nor was there any reference to technology nor to the purpose of the tunnel. To crown it all there was no celebration. The story as told was one of human greed, self-aggrandisement and even sheer dishonesty. Clearly technology has no box-office appeal. The proof of Fermat's theorem is an achievement which stands alone. At worst it can do no harm. The Channel Tunnel on the other hand may do a lot of harm in despoiling the countryside as well as robbing our island of its defensive moat. Surprisingly, pure science has a human face, whereas technology is perceived as an impersonal force subject to an 'operational principle', which is relentless, destructive and polluting. The Channel Tunnel is yet another dark satanic mill.

3. Polanyi's View of Technology

In the introduction to this paper I mentioned Polanyi's reference to tools and probes, which occurs in Chapter 4 of his *Personal Knowledge*. That chapter is concerned with skills and in particular with their unspecifiability. The chapter is full of valuable insights, but it is concerned with tools such as hammers only in passing-on to intellectual tools such as are used in the formalisms of the exact sciences. Thomas Torrance³ helpfully distinguishes between 'existence statements' and 'coherence statements'. Polanyi's interest in tools is in this

chapter concerned with coherence. However, in Chapter 6 §8 of *Personal Knowledge* Polanyi returns to a discussion of tools in terms of existence. He states that the process of hammering a nail into a wooden board causes a material change, which is an achievement but is not a form of knowledge, because knowledge can be true or false, while action can only be successful or unsuccessful. This comes close to denying the possibility of truthful existence statements. Since technology is more concerned with existence than with coherence, Polanyi here turns his back on technology.

This is very puzzling. Previously he has told us time and again to regard knowledge as a personal achievement, but now there is a kind of achievement, which has no claim to knowledge. Moreover success and failure seem to be unrelated to knowledge. Thus Fermat's theorem would convey knowledge, because it has been proved true by logical process. The Channel Tunnel shows successful technological action, but according to this reasoning does not add to knowledge. Surely there is something amiss here. For example, Polanyi frequently quotes Gödel's theorem on the limitation of algorithms. How then can truth or falsehood be entirely confined to logical process?

All sorts of dire consequences follow from the separation of knowledge from action. Polanyi's whole theory is in deep trouble when he asserts 4 that technology unlike science relies on explicit exposition in text books, journals and patent specifications. He has taught us the importance of the tacit component of all knowledge and now we are to believe that the use of a tool can be made explicit in a manual! He describes technology as trick-learning in contrast with science which involves understanding and relates trick-learning to inventions and these to operational principles. Since trick-learning is in his view a low level of learning we are

driven to conclude that operational principles act at a low level. Polanyi then goes on to assert that the exact sciences cannot in principle recognise operational principles. All they can do is to account for the failure of operational principles. He describes the operation of machines in terms of dual control. The higher level is the operational principle which exploits the possibilities of the lower level through putting boundary conditions to the possibilities (Richard Allen has a helpful exposition of this⁵). How can the operational principle act at both a higher level in terms of control and a lower level in terms of science?

The fatal objection to Polanyi's distinction between science as knowledge in contact with external reality and technology as the learning of tricks is that he risks the collapse of his entire system of personal knowledge. Surely the idea of personal knowledge cannot be limited to only some types of human activity. Technology is a human activity and not an independent impersonal force. There is knowledge outside the walls of academia. I comfort myself with the thought that Polanyi had little first-hand knowledge of technology and that nothing would be lost if his distinction between science and technology were simply disregarded.

4. Technology and personal knowledge

One of Polanyi's greatest achievements is the comprehensiveness of his account of human knowledge. His stress on commitment provides a bridge between personal endeavour and external reality. Action and understanding are joined and combined into an adventurous exploration of the unknown. On these insights it should be possible to build a satisfactory theory of technological knowledge.

Some of the many questions which need to be addressed are the following:

(a) Unlike pure science technology cannot be isolated into separate whole objects. For example the Channel Tunnel derives its significance from its purpose. Does it add value or diminish it? This requires an investigation into a network of connections. It also suggests that technology cannot be modelled in terms of hierarchical structure with operational principles on top of scientific

possibilities.

(b) Is Polanyi's heuristic field to be taken as a metaphor or as a separate entity apart from personal knowledge? The electromagnetic field of James Clerk Maxwell is both an analogy and also an independent object having observable properties such as energy propagation at finite speed. Does the heuristic field have such properties? What about other fields such as the ontogenetic and phylogenetic fields?

(c) Paley's argument connects the operational principle of a watch with a

personal designer in contrast with the lack of design of a stone. Polanyi regards crystalline structure as scientific knowledge, but machinery as impersonal, thus inverting Paley's discussion. Would it make theological sense to regard both the stone and the watch as evidence of personal involvement? This would link technological achievement to the environment.

Dept of Electrical Engineering
University of Southampton

Notes:

1. *Appraisal*, Vol. 1 No. 1 March 1996, pp 18-22.
2. Simon Singh: *Fermat's Last Theorem* (Fourth Estate, London 1997).
3. Thomas F Torrance: *Theological Science* (T & T Clark,

Edinburgh 1996). See section 1 of Chapter 4: 'The Nature of Truth'.

4. See especially the first and third paragraphs of p 176.
5. R. T Allen: *Transcendence and Immanence in the Philosophy of*

Michael Polanyi and Christian Theism (Edwin Mellen Press 1992). See the section on 'The Principles of Dual Control and Marginality' pp. 24-28.

Continued from p. 59

18. 'Towards a Comparative Psychology of Mind', G.G. Gallup, in *Animal Cognition and Behaviour*, ed. R.L. Mellgren, Amsterdam: North Holland, pp. 473-510, (1983).
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23. See (e.g.) *Order out of Chaos*, I. Prigogine & I. Stengers. London: Heinemann, (1984).
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NOESIS

An annual review of the History and Philosophy of Science

Published by Editura Academiei Române; Calea 13 Septembrie 13, 76117 Bucharest, Romania*

Articles in English, French and German

Vol. XXII, 1997, ISBN 973-27-0503-5

Papers from the XXth Congrès international d'histoire de la science, Liège, July 1997

* Or send enquiries to The Editor, *Appraisal*

THEIR HISTORY IN RELATION TO PRAGMATISM

James Lund

1. *Paideia and the polis*

The XXth World Congress of Philosophy was held this year in August in Boston, Mass. The main theme of discussion there was *paid-eia*. Advance publicity for the Congress interpreted this theme as 'Philosophy Educating Humanity', the other official languages of the Congress—Spanish, Russian, German and French—agreed in this. Surprise at this return to Greek antiquity in the closing years of the twentieth century is compounded here by a recollection of what happened a generation ago, when philosophy in the medium of the English language last engaged systematically with the study of education. This engagement was not very highly thought of by many philosophers, both in the U.S. and the U.K., while philosophy as logical empiricism was soon found to be practically irrelevant by both student teachers and other practitioners in education, the quality of whose transactions it had been intended to improve¹. Seemingly, things have changed subsequently in philosophical reflection in the medium of the English language, which is likely to be the dominant influence in the forthcoming Congress, if only because of its venue. Why *paideia* should have been chosen is what ultimately concerns this paper, but its central focus is on the historical dimension of this theme, which ought to be of fundamental importance in the proceedings of the XXth Congress. How will the early history of Greek *paideia* and of philosophy as part of such *paideia* be understood by the Congress? As I hope to show finally, that history has important implications for the revised form of pragmatism in philosophy, which is

likely to be a leading influence there.

In the Classical and Hellenistic periods of Greek civilisation and culture, the word *paideia* came to signify what we call the practice of education the origins of which lay nameless in the Archaic period of Greek history². From those beginnings, its curriculum was chiefly constituted by the study of epic and then lyric poetry, to which philosophy, history and dramatic poetry were subsequently added, and, finally, rhetoric. Such a predominantly literary form of education was specifically intended, surprisingly it may now seem, to fit boys and young men for an adult life of active participation in government, both in peace and war, as citizens of a *polis*³.

As the education of the sons of the Homeric aristocracy, the practice of *paideia* had preceded the invention of the *polis*. The *polis* was originally and primarily a course of joint action by its citizens in governing themselves and their dependants. In such practices new legislation came to play an ever-increasing part. Consequently, obedience to the laws of the *polis*, rather than actual co-operation in its government, came more and more to be understood as the principal form of unity among its citizens, given the increasing divergence and conflict of their interests. To that institution, in all its variety and subsequent history of change, such practice had to be accommodated, particularly in terms of curriculum. The advent of tragedy and comedy as dramatic poetry, for instance, was primarily an Athenian development. It followed on from the democratisation of the *polis* by Kleisthenes and his successors from the end of the sixth century B.C.

Such presentations served to engage the simultaneous attention of a large number of citizens with what was often, in effect, political commentary of a dramatic kind. They thereby gained an actual experience of themselves as a body of citizens, both one and many in a single place, who were together engaged in a reflective experience in mythical form of what commonly concerned them in the life of their *polis*⁴.

Inasmuch as *paideia* was an education for political life, it was necessarily concerned with the unity of the *polis*. What the *polis* offered its citizens was a joint freedom of action and speech which constituted an equality between them, whatever their inequalities of birth, possession and ability. This equal ordering, variously shared, was originally conceived as *eunomia*. With the advent of democracy and a greater emphasis upon formal equality, this came to be reconceived as *isonomia*—the status of sharing was thereby represented as more strictly equal⁵. The *bios politikos*, the life of the citizen, was sharply contrasted with the life of the household, a distinction of public from private, the latter having the sense of deprivation in respect of the sort of human possibility which the *polis* alone offered⁶. Paradoxically, shared freedom of action and speech encouraged a sense of individual distinction, whilst imposing a need for unity, if the *polis* were to succeed in what it did. Should it come to be rent by irreconcilable differences of faction among its citizens, it was likely to succumb to tyranny, that is, to monarchy without the protection of law and custom, or to slide into civil war.

As the seventh century B.C. went on, it became increasingly difficult to maintain such unity among citizens of the various *po-leis*, so that by the end of the century, every major *polis* except Sparta and Aegina had, at some time or other, experienced tyranny. Miletus in Ionia, for instance, where philosophy first began, was under the tyranny of Thrasyboulos at the end of the seventh century B.C., and subsequently experienced decades of intermittent civil war between parties of rich and poor⁷. What had initially been aristocratic bodies of citizens became much more diversified socially, giving rise to intensified conflicts of interest and attitude both between citizens and with non-citizens. Such diversification accompanied the expansion of the Greek world from the eighth century onwards through extensive settlement of new *poleis* overseas, a development partly made possible by the freedom of action inherent in the constitution of political life. The very success of the *polis* as an institution brought difficulty in maintaining the unity among citizens essential to its proceedings, so that its future may be said to have been in question by the time that philosophy began.

2. Philosophy as part of *paideia*

The history of *paideia* during these and subsequent changes in political circumstance was traced by Werner Jaeger in a three volume study of that name, which first appeared in German in 1931. His account began with the education of the sons of the Homeric aristocracy and continued down to the part played by *paideia* in the rhetoric of Demosthenes. This was immediately prior to the Macedonian conquest of Greece in the later fourth century B.C., which brought the era of the independent *polis* to an end. Jaeger had been the pupil of the great German philologist, Wilamowitz-

Moellendorff, to whose chair in the University of Berlin he succeeded, and from whom he learnt the breadth of historical, philosophical and literary disposition in classical scholarship which made possible his study of *paideia*. From Wilamowitz also derived his conviction that histories of Greek literature could not be read or written *in vacua*, 'cut off from the society which produced the literature . . .'. As we shall see, Jaeger represented philosophy as an integral part of *paideia* with this understanding in mind, thus implying that philosophy too reflected the world in which it first came into existence⁸.

Early or pre-Socratic Greek philosophy figured, therefore, in Jaeger's view, as an integral part of the curriculum and practice of contemporary *paideia*. Implicit in such a presentation was not only the consideration that philosophy was part of literature: it also contributed to the purpose of *paideia*, namely, the furtherance of political education⁹. Considered as part of literature, the evidence for early Greek philosophy certainly shows verse as a medium of philosophical thinking in both Parmenides and Empedocles, while the supreme memorability of the prose of Heraclitus derives partly from its poetic expression and organisation.

Jaeger's study also serves as an important reminder of what may be meant by identifying forms of literature, such as poetry, history and philosophy, as humanities. The idea of humanity is Roman not Greek, but it was anticipated in the Greek conviction, as Jaeger puts it, that 'humanity always implied the essential quality of a human being, its political character'¹⁰. We have already touched upon the Greek belief that the invention of the *polis* offered men the possibility of a second life, the *bios politikos*, which was shared in the equality of freedom with other citizens in the public spaces of the city as distinct from the privacy of its households. It will do no harm, such is the remoteness of this conviction from

predominant attitudes to politics at the present day, to reiterate the Greek belief that such life offered a possibility of human being that could not otherwise be actualised. To explore more fully what this belief once meant requires an adequate and coherent idea in philosophy of what it is to be human, which currently we do not have. Interestingly enough, the XVIIIth World Congress in Philosophy held in Brighton in 1988 took for its theme 'The Philosophical Understanding of Human Being'. Some ten years later, that understanding is again in philosophical question, but now it is implicit in the political purpose of *paideia*. What is certain is that the legacy of the course of western philosophy in the modern age in respect of the understanding of human being, caricatured by Gilbert Ryle as 'the ghost in the machine', does not afford any such insight. Material bodies and pure minds are systematic abstractions from the totality of our felt experience of ourselves and of others like us. Fundamental to what it is to be human is to feel, recognise and accept our fellowship with one another in both its singularity and plurality. Inhumanity commonly derives from forgetfulness or rejection of one or other of those ties.

Even so brief a consideration as this of philosophy as part of *paideia* and of its purpose in Greek antiquity has begun to reveal difficulties of historical understanding that are inherent in the chosen theme of the XXth World Congress. It appears that it cannot be pursued in separation from a renewed recognition of the primary importance of a literary education in the humanities, including philosophy, for the conduct of political life. This implies a sharp departure in understanding both in education and philosophy, from beliefs which obtained when logical empiricism made its incursion into the study of education a generation ago. It was then generally thought that the proper curriculum was one of useful knowledge. In that curriculum,

the humanities had a traditional but hardly secure position, partly for lack of any agreed, articulated understanding of the relation of such studies to human being. The Greeks and Romans had intuitively associated such being and such studies with the practice of politics, as we have seen. In philosophy in the medium of the English language, however, the close relation of logical empiricism was not to the humanities but to the exact and natural sciences, in relation to which it held itself ancillary and subject, wherever and whenever those sciences pronounced conclusively, and otherwise as having a provisional authority only. Correspondingly, metaphysics and epistemology were held to be foundational dimensions of philosophy so conceived.

The focus of philosophical concern had by then passed from things to the meaning and truth of words. The way of thinking to which such philosophy aspired was increasingly influenced by the conduct of the natural sciences. Hans Reichenbach's *The Rise of Scientific Philosophy* appeared in 1951, at the beginning of what turned out to be a relatively short period of agreement between philosophical departments in the English-speaking world. At that time the U.S. had temporarily abandoned its own philosophical creation, pragmatism, so that neo-positivism and 'Oxford Philosophy' became the dominant modes of thought there. A generation later, however, Richard Rorty was of the opinion that there was 'no more consensus about the problems and methods of philosophy in America today than there was in Germany in 1920'¹¹. That was Rorty's opinion concerning the state of philosophy in the U.S. nearly twenty years ago. What the prevailing situation now is both there and in the U.K. and in Europe, I will try to characterise briefly in the first section of this paper with reference to the choice of theme for the XXth World Congress. Of the greatest impor-

tance in the U.S. is the present revival and revision of pragmatism, for which Rorty is both advocate and apologist. In relation to that development, *paideia*, to some extent, becomes an intelligible choice. What does not, however, appear to have changed, either in pragmatism or elsewhere, is the philosophical understanding of the relation of philosophy to history. What also lacks adequate and coherent philosophical consideration is the question of what we are to think of the human mode of being which has given rise both to philosophy and history. Yet these understandings are, as I have indicated above, of fundamental importance in grasping what the Greek practice of *paideia* was, particularly in its philosophical dimension with respect to the practice of politics and why this practice came to involve the studies we call the humanities, including philosophy.

3. The supposed origins of philosophy in natural science

Paideia began with the study of Homer, whom Plato later represented as the educator of all Greece. Jaeger discusses the exchange in the *Iliad* between Achilles and his former tutor, Phoenix, as a particular episode of *paideia*¹². Indeed the whole poem, presenting as it does the origins and consequences of the wrath of Achilles, with respect to the fate of the Greek expedition against Troy and the fate of Troy itself, may be understood in this way. It was not only that the study of the *Iliad* and the *Odyssey* for purposes of *paideia* continued during subsequent centuries: lyric and dramatic poetry, history, philosophy and rhetoric all had antecedents in the epic poetry of Homer and its educative stance in the representation of human experience¹³.

Poetry taught young men what and what not to do, to say and to feel in a whole variety of situations

of kind that they were likely to encounter in adult life, and in doing so taught them also the habit of critical reflection on human conduct. Such teaching was inseparable from the intensely memorable character of such poetic saying, inherent in which was the capacity also to evoke imitative performances of different kinds which afforded points of departure in learning how to live a life. In this way the young were prepared in imagination for what they might expect to encounter and have to endure and with what response they might meet such experience. Thus, the practice of *paideia*, itself a form of action or transaction, initially concerned with poetic reflection on predominantly active experience, led boys and young men from the private life of the household to what had by the 8th century B.C. become the public world of the *polis*. With this transition came the shift from epic to lyric poetry which tended to reflect the lives of individuals of a particular *polis* from which they came, and the expectation that *polis* had of the sort of *paideia* appropriate to its life and circumstances. We've already considered the advent of dramatic poetry in Athens in the 5th century B.C. in this respect, an earlier example, which particularly interested both Plato and Jaeger, was that of Tyrtaeus, the elegiac poet of Sparta in the 7th century B.C., who not only wrote war songs which the Spartans are said to have sung on the march, but a poem titled 'Politeia', which concerned the reform of the Spartan constitution¹⁴.

How did it come about that philosophy became part of the practice of *paideia* and why? The political crisis in Greek affairs from 750 B.C. onwards was marked by the widespread instance of tyranny and sometimes by civil war in Ionia, where philosophy began, political disunity within individual *poleis* was a particularly acute issue. The danger first of Lydian and then of Persian invasion during the 6th century rendered the need

for unity between and within individual *poleis* is particularly urgent. The history of Miletus at this time shows how difficult it was to secure this. Was the advent of philosophy a response to this state of affairs, an attempt to show the validity of the political ordering of affairs at a time when this was widely challenged from both within and without? The philosophy of Plato accustoms us to the idea that philosophy, *paideia* or education, and politics may go together, yet the current historical account of Platonic philosophy in particular, and of Greek philosophy in general, does not readily allow that Plato was seeking to develop *paideia* through developing philosophy for political purposes. The presumption in such history is rather that the key to any development of philosophical thinking is to be found in its metaphysics and epistemology and not in any political purpose.

The history of Greek philosophy in the English-speaking world throughout the 20th century stems principally from Burnet's *Early Greek Philosophy* first published in 1892 and going into three subsequent editions by 1930¹⁵. Burnet wrote with the intention of refuting and replacing Hegel's account of early Greek philosophy. Hegel's *Lectures on the History of Philosophy* was first published in an English translation also in 1892. Hegel specifically related the beginnings of Greek philosophy to the circumstances of *polis* life and the possibilities of freedom of action and rational reflection which this afforded. Yet he then proceeded to give an account of its early course of development as natural philosophy¹⁶. Burnet's success in deflecting attention from Hegel in this field is indicated, for instance, by the absence of any reference to Hegel's lectures in the first volume of Guthrie's *A History of Greek Philosophy*, the standard large-scale work on the subject in English¹⁷. The whole episode may be understood as part of the reaction against idealism in philosophy in the me-

dium of the English language, known initially as new realism, from which logical empiricism was eventually to develop. New realism, as its name indicates, reasserted the Platonist belief that the proper and ultimate concern of philosophy was with what lay beyond language and was an unchanging rational order. Such foundationalism has again been challenged in the U.S. in the recent revision of pragmatism, but this has not so far led so far to any revision of the prevailing historical account of the origins of Greek philosophy first endorsed by logical empiricism. This was that philosophy began as a reflective response to conceptual questions arising in the pursuit of natural science. In this way such history affirmed that philosophy had always been what it first became known to be in the course of the 17th century with the advent of British empiricism.

Empiricism was and is a form of foundationalism, stemming ultimately from Platonism. Paradoxically, it supposed that the eternal and unchanging order of the real as distinct from its appearances was discoverable, not by the pure intuitions of reason, but by the experimental and mathematical modes of proceeding which name in the course of the 17th century to distinguish the natural sciences. It was left to A.N. Whitehead to remark upon the faith that informed empiricism, in that the real as rational was believed to be discoverable by an empirical mode of proceeding¹⁸. So important was that faith that it precluded the recognition that the natural sciences in the experimental mode of proceeding were concerned not with reality beyond language and thought, but with systematic abstraction from the totality of human experience. To understand the importance of the act of faith involved in the empiricist elevation of experimental and mathematical proceedings to the status of a path to the real world, would require the rewriting of the history of western philosophy for that period, drawing

upon the rewriting proposed here of the history of early Greek philosophy.

How difficult it can be for the historian of western philosophy to free himself from the realist presupposition is illustrated by the case of R.G. Collingwood. Collingwood was unusual among historians of western philosophy in the English-speaking world in that he approached the subject with the advantage of an extended and intense formation in the practices of historical and archaeological enquiry, which preceded his formal initiation into the study of philosophy. That initiation was into the new realism which reasserted the philosophical perspective of the Enlightenment against the Idealism of the Romantic movement, which had contributed the historical influences that had been so formative for the young Collingwood.

Not surprisingly Collingwood's first initiative in philosophy was to maintain against the realists, that not only did the successive answers of philosophers in the course of western philosophy change, but so also did the questions which they sought to answer concerning reality. Collingwood subsequently aspired to bring about what he called a *rapprochement* between philosophy and history in the light of this recognition concerning historical change in philosophical questions¹⁹.

The outcome in his thinking, however, was the attempted assimilation of philosophy to history. Something of the difficulty he encountered in seeking to fulfil this project is manifest in *The Idea of Nature*. In this book he treated of early Greek philosophy in a way that was nominally historical. Yet, despite the strength of his qualifications as a historian for such an approach, the way he treated the evidence serves to illustrate the hold which the ahistorical presupposition of Platonism, Aristotelianism and empiricism had on his thinking. *The Idea of Nature* opens with the statement: 'Natural science

must come first in order that philosophy may have something to reflect on: but the two things are so closely related that natural science cannot go on for long without philosophy beginning' ²⁰. He was subsequently at pains in the book to show that *phusis* or nature, the topic with which all early Greek philosophy was expressly concerned, was a conception of a mode and not a category of being in Greek experience at that time ²¹. Even so, he did not imagine that it was possible that a philosophical concern with *phusis* could have been other than derivative from natural science. He maintained this understanding, despite the fact that, as a conception of a mode of being, *phusis* comprehended not only what we ourselves now think of as nature in a categorical sense but also humanity and divinity. The enquiry into all things as one, understood as a unified, rational ordering of *phusis* as a mode of being, which was distinctive of early Greek philosophy, is, therefore, conceivable as philosophical, independently of any form of natural science. Put another way, rationality in philosophy could exist independently of rationality in natural science.

The difficulty we now have in recognising a philosophical purpose independent of that of natural science is illustrated in another way. The concern of such philosophy with divinity, beginning with Thales' claim that 'all things are full of gods', has given rise in the history of Greek religion to the belief that religion became philosophical with the advent of philosophy ²². Between the rival claims of natural science and religion, historically considered, to have assimilated early Greek philosophy to religious and scientific purposes, the distinctive independent purpose which philosophical enquiry was first created to fulfil is lost. Much of the difficulty here stems from the presence in the history of early Greek philosophy of the unexamined Judaeo-Christian presupposi-

tion that God, man, and nature are quite distinct categories of being. This presupposition enters, without historical warrant, into the interpretation of the evidence for such philosophy. A further and deeper difficulty is that of being able to recognise humanity as a mode of being which is not ultimately assimilatable to either divinity or nature, and that when philosophy first began, it pertained primarily to humanity, specifically to the political dimension of experience, which the Greeks recognised as the dimension of humanity ²³.

4. *Practice as the link between philosophy and paideia*

Although Hegel thought that the invention of philosophy would not have taken place if the *polis* and its distinctively human mode of life had not been invented first, he supposed that what first concerned philosophy was the order of nature conceived as one exclusive category of being. Jaeger, however, in his history of *paideia* did not hesitate in thinking that the beginnings of philosophy were part of *paideia* which he understood as education for political life. He did so in the conviction that there was 'no discontinuity between Ionian natural philosophy and Homeric epics', so that if the study of poetry was *paideia* then so also was the study of philosophy, given that 'the history of Greek thought is an organic unity, closed and complete' ²⁴. This claim touches on an issue fundamental to the historical interpretation of the evidence for the beginnings of western philosophy. On the one hand, such enquiry was new to the Greek world; on the other, it began as part of that world and developed out of it. The historical explanation of these beginnings ought to account for both features. Jaeger rightly held on primarily to the element of continuity with the past: philosophical

reflection was indeed a development of reflection as poetry and as myth and ritual ²⁵. He was less clear, however, concerning such enquiry as a new beginning distinguished by its rationality, observing that it was hard to fix the point at which such thinking begun in Greece. Historical accounts, stemming from Burnet and from logical empiricism, identify philosophy as the advent of rational thought in respect of the disappearance of the Olympian pantheon from philosophical explanation of the ordering of all things, and a corresponding determination to discover a single divine ruling power or principle inherent in all things as the source of rational unity ²⁶.

Jaeger might have found it easier to explain the beginnings of philosophical enquiry among the Greeks as a new form of rational reflection, had he pursued the implication of his determination to treat of them as part of *paideia*. In what way was philosophy as part of *paideia* intended to further the education of future citizens of the *polis*? We touch here upon the ambiguity of the idea of rationality in relation to early Greek philosophy. It has come to be recognised that the actual conduct of such enquiry, as a form of public reflection open to all who had the capacity to respond to its concern with the rational unity of all things, exhibited reason as practical ²⁷. Such practical rationality reflected the political circumstances in which such enquiry proceeded. Was there a relation between the practical rationality of the conduct of philosophical enquiry and the rationality of its reflective concern with the unity of all things? Jaeger's insistence that philosophy was from the beginning a part of *paideia*, which was itself a form of practical action intended to serve the practical action of political life, suggests that this was so. This suggestion may be understood as pointing to a search for a connection between the beginnings of philosophical enquiry and the crisis in the affairs of the *polis*

which developed during the 7th century.

What stands in the way of pursuing this suggestion is the deeply established presupposition of historical enquiry insofar as it concerns philosophy which stems from Platonism. That presupposition is represented by the philosophical conviction that theory in origin always and necessarily precedes practice. Hence political considerations could never have given rise to philosophical considerations. Plato in fact reversed the relation that had been thought to obtain between action and reflection in Greek civilisation and culture. He did so when he shifted the province of being from the realm of *phusis* to that of *nomos*, identified as eternal and unchanging and hence divine, only to be understood theologically and metaphysically through direct intuition. Reflective and contemplative knowledge of Being in this sense thus came to be represented as the proper determinants of action. The original relation between action and reflection in Greek thought had, however, been represented precisely by *paideia* as the active study of literary reflections for the purpose of fitting the young for the practical life of politics. Action and its attendant verbal expressions, or deeds and words, were thus understood to be prior to reflection concerning the question of *why* one had done and said whatever one had. The Platonic reversal of this relation meant that, in order to know with certainty and finality what to do and say, it was first necessary to reflect on the rational order of Being beyond all appearances, and then to apply such knowledge actively, thereby putting theory into practice. It is this understanding of the relation between reflection and contemplation and action that has hitherto prevented historical explanation of the beginnings of Greek philosophy²⁸.

Paradoxically, although Jaeger believed that philosophy began among the Greeks as an integral

part of *paideia*, he understood its subsequent history as a simple progression from the Milesian beginnings to the post-Socratic development of Platonism. In respect of the purpose of *paideia* in the later stages of this philosophical progress, he thought that

the great social problem of all later Greek educators was to determine how individualism might be repressed and the character of every citizen might be developed on one communal model²⁹.

Whether Jaeger was justified in reading the purpose of later Greek *paideia* in this either/or way as a choice between individualism and communalism is questionable. Yet there is no doubt concerning his interest in the relation between the Spartan idea of *paideia* and Plato's idea of philosophy as *paideia*, which Jaeger thought derived from Spartan practice, albeit 'the spirit of it was quite new'³⁰. It is clear that Jaeger's reading of the history of Greek *paideia* represents it as primarily concerned with the interrelation of citizens as both many and one, that is, as individual members of a single *polis*. Considered as a joint course of action among its citizens, in which the enactment of laws became increasingly prominent, the *polis* required unity in action. Resort to tyranny in the growing political crisis of the 7th century meant a resort to unity through enforcement rather than agreement, whereas the collapse into civil war meant that it had finally been lost.

5. Philosophy and the order of the polis

Was then the beginning of philosophical enquiry a response to what had become the prevailing difficulty of political life by the end of the 7th century B.C.? Since such enquiry was a search for a single ruling power or principle inherent in all things, constituting them as a rational unity, there is a *prima facie* case for an element of identity

between what concerned early Greek philosophers, and what concerned those who sought to preserve the *polis* from tyranny and civil war, in that all things in philosophical enquiry included the divine and the human, as well as what we think of as the category of nature, and so it comprehended the life of the *polis*. Evidence that this was so becomes explicitly apparent from what we know of both Pythagorean and Heraclitean philosophy. In addition, the rationality of the actual conduct of philosophical enquiry both in its public character and its distinction of the divine from the Olympian pantheon—appears to presuppose the inherent rationality of *polis* life, grounded as it was in the mutual equality and freedom of its citizens in their relations with one another.

The English-language historiography of early Greek philosophy over the past century has presupposed that the concern of such philosophy with *phusis* was a concern with a category rather than a mode of being. This presupposition has never accorded with the evidence that all things in this philosophical context, as elsewhere in Greek thought at that time, comprehended the divine and the human as well as the natural. References to the divine from Thales onwards are of such importance that they come to figure, as we have seen, in the history of Greek religion. Walter Burkert's history of Greek religion concludes, for instance, with a chapter on 'philosophical religion', despite his admission that 'the picture of religion as practice changes hardly at all, in spite of the deeds of all the intellectual heroes'³¹.

The truth is that 'the intellectual heroes', who were indeed venturing into the realm of the new, were concerned neither with religion, nor with natural science, but with philosophy. What was distinctive of that concern is evident in the way in which sayings concerned with all things as one contain repeated references to justice. Within the frame

of reference of this paper, this is true of Anaximander, Heraclitus and Parmenides. These references have been interpreted in terms of analogy between the order of the cosmos and the political order, whereby the latter order of proceeding is understood to have been invoked for the purpose of throwing a partial light on the former³². Underlying this interpretation of such evidence as analogical is again the mistaken conviction that such philosophy is concerned with *phusis* as a category of being, standing over against the categories of the divine and the human. The mistake involved is clearly illustrated in the famous report made by Simplicius concerning Anaximander's philosophy:

Out of those things whence is the generation for existing things, into these again does their destruction take place, according to what must needs be: for they make amends and give reparation to one another for their offence, according to the ordinance of time³³.

For this Aristotelian commentator, writing in the 6th century AD., the saying he reports is 'poetic'. This is because he presupposes the categorisation of natural, human and divine being which began with Platonism and became fundamental in Judaeo-Christian thought. Here, however, we suppose that Anaximander was engaged in a search for a truly universal principle of law and justice, having reference to all things, including the political order, since together they constituted a living whole. Why did such an enquiry mid such a concern with justice as a universal principle of rule come about?

6. *Nomos and phusis*

It is important to recognise the fact that the political ordering of human affairs among the Greeks ultimately lacked justification. The *poleis* came into existence in consequence of a series of acts of usurpation of royal powers on the part of aristocracies³⁴. That this had been so was

obscured, no doubt intentionally, by the way in which the actual conduct of political affairs became identified with the various cults of gods and heroes. Each *polis* had its reputed founder who was a god or goddess, and other gods and heroes appropriate to its history and locality figured variously in worship throughout the year. In this way, politics as the practice of self-government and the government of dependants, came to go hand in hand with the various cults of gods and goddesses among peoples for whom it was habitual to think of the whole ordering of life as ultimately divine. Each family worshipped Hestia, the goddess of the hearth, and Zeus Herkei Os, the protector of the courtyard. Tribes, phratries, clans and guilds, each cultivated the gods at their own level of organisation. In the *polis* as a whole, meetings of the council and of the assembly were prefaced with appropriate rites, while major reforms of the constitution were celebrated in public acts of worship. Throughout there was emphasis on the support which the gods gave to those who lived in concord with their fellow-citizens, whereas civil war and sacrilege brought not only pollution but also divine retribution³⁵.

The apparent ease with which the *polis* was assimilated to what we call the Archaic period of Greek history was no doubt furthered by the conservatism of aristocratic influence, and by the considerable success of the institution in helping to make possible the expansion of the Greek world and its prosperity through the settlement of new *poleis* overseas. Yet this success brought intensified clashes of interest, both between citizens and between them and their dependants, concerning who should have the right to rule and what laws were just. The ensuing political crisis brought the question of justice, including the justice of the political ordering of their affairs into public issue. Tyranny, a form of monarchy without the safeguard of customary

and lawful restriction on royal power, constituted an alternative, whose proponents sought, ultimately in vain, to establish it as a permanent alternative³⁶.

In such circumstances, it appears to have become clear that religion had failed in its purpose of preventing major disunity within the *polis*, and did not, in fact, justify the *polis* as a form of government. The beginnings of philosophy may then be understood as an attempt to meet this situation. Philosophers supposed that *nomos*, or the order of what ought to be, which included the *polis*, was an integral part of *phusis*, the order of what is³⁷. Hence the philosophical search for a single *arché* or rule of all things, divine, human and natural. That search both presupposed and transformed what had been a supremely important feature of despotic monarchy in both Mesopotamia and Egypt. The rule of the Pharaohs in Egypt, although their power and prestige was relatively in decline circa 600 B.C., offered a remarkable example of stability in a form of government the union of Upper and Lower Egypt began as long ago as 3200 B.C. Visits to Egypt at the time of the beginnings of philosophy on the part of Greeks variously interested in the government of the *polis* are reported of Thales, Solon and Pythagoras. In Egypt and in Mesopotamia the royal order of government was represented both ritually and mythically as part of the divine ordering of all things, particularly the disposition of the order of the heavens. Highly developed forms of astronomy in both civilisations served to demonstrate the regularities of celestial movement constituting that order in quantitative terms by means of geometry, arithmetic and meticulous, long-term record-keeping. In this way, the calendars that predicted the events of the agricultural year and the succession of religious festivals were made possible. In Egypt the heliacal rising of the star Sirius, which was identified with the goddess Isis, roughly coin-

cided with the start of the annual flood of the Nile and came close to the summer solstice. It also denoted the New Year since these events followed on from the heliacal rising of Orion, the constellation identified with the god Osiris, the father of the god Horus, who was said to have been the first in the long line of Pharaohs³⁸. Here we see the same sort of conjunction in mythical terms of the divine, human and the natural, particularly the order of the heavens as known astronomically, which we find in early Greek philosophy as a series of attempts to find a rational, cosmic order. The search in philosophy for such an order was both rationally conducted and rationally conceived, supposing a single divine ordering inherent in both the natural and the human. But its distinctively philosophical motive, represented by its name as the love of actual wisdom or *sophia*, principally concerned the political dimension of the cosmic order, represented as rule-governed throughout.

Pre-Socratic philosophical enquiry certainly supposed a single regularity comprehensive of the natural mode of being. This was, I think, a consequence of all the continuances and recurrences in natural things, often involving numerical measurement of quantities, which had come to be made known piecemeal in the progress of the technical sciences from the Neolithic period onwards. Yet these sciences had developed and flourished in the creation of civilisations which had ordered the lives of peoples in ritual and mythical forms and prized each of them for its particular utility. There is, I would maintain, no direct step from such sciences to the exact and natural sciences which did eventually emerge, not with early Greek philosophy but with Plato and Aristotle. This transition required what only early Greek philosophy first proposed: the idea of the cosmic order that was inherently rational comprehending the divine and the human as well as the natural mode

of being. What related this development to what had gone before was the order of government in human affairs and its connection to a divinely instituted order. In Mesopotamia and Egypt this connection had been made ritually and mythically, but the Greek philosophers of the sixth and fifth centuries B.C. supposed that a cosmic order of divine origin had either developed naturally through a single process or had always existed. Such a supposition was appropriate to the political as distinct from the despotic ordering of human affairs, because the *polis* had been invented by men as an institution which gave them the sort of government they wanted as distinct from one imposed upon them. In an important sense, therefore, the *polis* was natural in human affairs. If it were to be justified as part of a larger cosmic order which gave it its warrant, then that cosmic order had to be thought to be natural or part of *phusis*. At least, that is what early Greek philosophers appear to have thought.

What was wrong with this project was its assumption that an order like the political order, which was in fact part of *nomos*, invented by men who enacted it as a possibility that ought to be, could in fact be simply part of *phusis* also. Extended political experience, particularly in the fifth century with the advent and development of the democratic mode of the political order, began to make it evident to many that there were no inherent natural limits to what laws men might enact. The great Sophoclean tragedy of *Antigone* is concerned precisely with this issue: the *polis* can lawfully order its citizens not to bury their dead. The resulting *phusis/nomos* debate of the latter part of the fifth century constituted a major crisis in philosophical enquiry. Was *nomos* in fact a integral part of *phusis* conceived as a single rational ordering of all things as had hitherto been supposed?

One response to that crisis was that of Plato, followed by Aristotle,

who proposed that what philosophy had sought in *phusis*, namely, the rational ordering of all things as one, was to be found only beyond *phusis*. Such a ordering, Plato maintained, must be eternal and unchanging and hence divine. When philosophy thus became a theological and metaphysical science, there then arose the possibility of exact or mathematical and natural sciences. For Plato and the Academy, where mathematics was first invented, such long-established technical sciences as arithmetic, geometry, music and astronomy came to be deemed mathematical in that they were said to be inborn, at least in some human beings, and philosophically important, in that they revealed what the rational Forms of physical, if not ethical, Being were; for Aristotle, such natural sciences as biology revealed an unchanging order of Being inherent in and determinative of courses of change in living things.

6. The importance of Heraclitus

It is against this interpretation of the background for the beginning and early development of Greek philosophy and for its post-Socratic transformation, that the whole of the evidence for early Greek philosophy has to be interpreted. In particular there is the question of the significance of the successive references to the justice of the cosmic order that are to be found in the evidence for the thinking of Anaximander, Pythagoras, Heraclitus and Parmenides. There is also that of the reasons why Pythagoras and his followers engaged themselves in a long, sustained, highly unpopular, and ultimately unsuccessful attempt to exercise secret direction of the affairs of the *poleis* of southern Italy, so much so as to provoke two violent revolts against them. There is the case of Heraclitus who avowed his own love of wisdom, and who despised Pythagoras, probably because he rec-

ognised that rational reflection in the general terms of philosophy could only enter into the particularities of political action after suitable reconsideration and by way of public persuasion. By a quite remarkable feat of philosophical imagination, Heraclitus accepted the fact of the ubiquity and unavoidability of political conflict, and raised it to the status of a cosmic principle in the conviction that the universal conflict of opposites presupposed an underlying unity. His conclusive saying in this respect was:

The god: day and night, winter and summer, war and peace, satiety and hunger. It alters, as when mingled with perfumes, it gets named according to the pleasure of each ³⁹.

Here we have the ordering of all things, divine, human and natural, constituted as a unity or oppositions, yet also a regulated whole, which individual men understand differently or fail to understand at all.

It is Heraclitus, the early Greek philosopher of whom we know most because he continued to be widely read, recorded, reported and recollected throughout antiquity, who shows us most adequately what sort of an enquiry such philosophy was. Since he is also the philosopher who reveals how misleading the identification of early Greek philosophy with natural science in the English language historiography of the subject has been, the evidence of what he said, and what it reveals concerning the sort of enquiry such philosophy was, quite independently of his own central philosophical conviction, generally gets set aside in relation to the historical question of what the purpose of such philosophy was. This question is commonly answered by reference to the evidence, incomplete as it is, for Milesian philosophy, and that answer is then allowed to govern the interpretation of subsequent, much fuller evidence.

It is, for instance, from Heraclitus that we are able to form an idea of early Greek philosophy as *paideia*. What we know of the Pythagorean Brotherhood carries the implication that Pythagoras taught his followers, who then continued to influence the conduct of affairs in the *poleis* of southern Italy in accordance with his ideas after his death. Heraclitus reveals an educative intent in the first sentence of the statement with which his book began: 'Although this account holds forever, men ever fail to comprehend both before hearing it and once they have heard' ⁴⁰. What followed was a mixture of observation and exhortation concerning what was wanted both in action and reflection to conduct a human life wisely, given that the cosmos was as it was and human beings were what they were. Ultimately, its educative purpose was to bring Greek citizens in Ephesus and elsewhere to a recognition of what united them, supposing as he did, that 'Although the account is shared, most men live as though their thinking were a private possession' ⁴¹. Comparably, when Parmenides chose to present his philosophy poetically, his decision to do so marked both an educative and a conservative intent.

Werner Jaeger devoted a chapter of the first volume of *Paideia* to the topic of the *polis* and its ideal of justice. Inasmuch as philosophy was a response to the political crisis of the sixth and fifth centuries, the question of what was just in law was necessarily a paramount, philosophical concern. Jaeger remarked there that 'early Greece strove, above everything else, for equal justice' ⁴². Justice was, of course, to become the theme of Plato's *Politeia* or *The Republic*. Equality of justice had always been a particular concern of citizens in their actual relations, with one another, but philosophy began to set that concern in a cosmic context, as we saw in Anaximander's philosophy, in order to show that what was just was so in all things. This idea was

again most clearly expressed by Heraclitus. Taking his stand on the cosmic ubiquity of conflicting opposites arising from a fundamental unity, he contended that

One must realise that war is shared and Conflict is Justice, and all things come to pass (and are ordained?) in accordance with conflict' ⁴³.

He chose to emphasise his belief that the outcomes of the conflicts that determine what was just were, in fact, divinely determined: 'The wise is one, knowing the plan by which it steers all things through all' ⁴⁴. Consequently, such outcomes had to be accepted, whatever they were from an individual point of view: 'War is the father of all and king of all; and some he has shown as gods, others men; some has made slaves, others free' ⁴⁵. Part of the universal conflict for justice was the struggle within the *polis* to establish exactly what was just in both policy and law: 'The people must fight for their law as for their city wall' ⁴⁶. Yet they had to recognise that 'all human laws are nourished by the divine law. It prevails, as it will and suffices for all and is more than enough' ⁴⁷. Human equality for Heraclitus clearly comprehended great inequalities, in the capacities of individual human beings in their actual performances, so that 'In Priene lived Bias, son of Teutames, who is of more account than the rest' ⁴⁸. Despite these inequalities of outcome in conflict and in individual performance, Heraclitus maintained his faith in human equality with respect to his philosophical purpose considered as part of *paideia*. Although he descanted on the limitations of citizens everywhere in philosophical understanding, he nevertheless maintained that 'It belongs to all men to know themselves and to think well' ⁴⁹. What Heraclitus had to say concerning justice reflected both experience of the life of the *polis* and the considerations concerning justice as a cosmic principle proposed by philosophy, when both these were

seen from the standpoint of the individual citizen.

7. Justice as *themis* and *diké*

The advent of the *polis* had brought a change in the predominant conception of justice. The Greek judicial system was originally one of 'public arbitration to settle compensation due for injury'⁵⁰. In the relatively static, predominantly agrarian, pre-political mode of Greek life, the tariff of compensatory payments was fixed over generations, and only rarely was there a need for arbitration by the aristocracy between plaintiffs concerning the penal payment due. *Themis* was then the conception of justice, represented mythologically as a goddess, the second consort of Zeus who was originally akin or even identical with Gaia, the goddess of earth⁵¹. The word itself signified 'firmly established custom or law'. *Diké* originally signified the decision that settled the relatively rare cases of judicial conflict. But by the time Hesiod wrote *Works and Days* in the seventh century B.C., it had come to replace *themis*. The change represented the advent of the *polis* and of the citizen as a self-conscious individual, pursuing his own courses of action and interest and thereby coming into judicial conflict with his fellows, including, as in 'Works and Days', his own kin. What was just was by now commonly contested both in courts of law and in the assembly of the *polis*.

Heraclitus on justice, fittingly enough, brought into open conflict the contradiction between *themis* and *diké*. As *themis*, what was truly just was always so: this understanding may be seen as inherent in the idea of judicial penalties as retributive and hence as restoring a just state of affairs that has become unbalanced through wrongdoing. This understanding associates *themis* with divine ruling and is

inherent in the mythical conception of justice as so firmly established as also to be part of the earthly nature of things. Heraclitus emphasised the opposite idea also, of what is just as determined by conflict, whatever its outcome, whereby, for instance, some may be made slaves while others may remain free. By doing so he could be understood, philosophically speaking, as having been engaged against himself, a fitting epitome of his philosophy.

The historical interpretation of the beginnings and initial course of Greek philosophy that is proposed here has the signal advantage of making sense of the evidence of the name which the Greeks gave to the enquiry, and of doing so in two fundamentally human ways. Men act into the unknown, sometimes mistakenly, sometimes foolishly, then reflect on their consequent experience, and may seek to act more wisely in future in the light of such reflection. As rational reflection, *philosophia* signified the motive for such reflection, the love of wisdom, which could however only be secured actually, not reflectively, a truth which was coherent with contemporary understanding of *sophia* as practical and technical wisdom. What men had always done in this way before philosophy ever began, and what they continue to imply today, when they ask one another for their philosophy of life or the philosophy of some enterprise, both senses falling quite outside that of philosophy as an academic study, is what the Greeks first elevated to a formal pursuit in reflection. In doing so, they recognised themselves as constituting a frame of reflective understanding of all that they did and said. By contrast, the claim that philosophy began as an anticipation of, or as ancillary to natural science, is able to make nothing of the supremely important piece of evidence which is the Greek name for the enquiry. The Greeks then began to do formally for political reasons what we must suppose they had previ-

ously always done, both informally and generally.

Inasmuch as *philosophia* was for the sake of the possibility of wisdom in political action, particularly insofar as this concerned justice, and insofar as what such reflection sought to contribute, was an understanding of the political ordering of human affairs as part of the whole cosmic order, it appears that philosophy had set itself primarily to show the justice of the political order conceived as divine *themis*. Indeed a second, perennial popular sense of philosophy and the philosophical, which is also widely found beyond the academic, is the reflective acceptance of what 'is' as irremediable. This is born of the recognition that the way things are cannot ultimately be determined by even the greatest and the most powerful of men.

In the philosophy of Heraclitus, and this is a mark of its accomplished consistency and greatness, *themis* and *diké* are represented as necessarily in opposition to, and yet complementary with one another, so that both have to be accepted. There is a divine plan for all things, including the ordering of political affairs as conflict, which is inherently just, whatever the actual outcomes. Part of such justice is that individual men fight with one another for justice and may individually experience the outcomes of such conflicts as unjust. Justice and injustice, so far as individuals are concerned, are inherently in conflict in the way the world is: an anonymous Homeric commentator, in a *scholia* to the *Iliad*, claimed to have reflected Heraclitus, when he himself said:

For god all things are fair and good and just, but men have taken some things as unjust, others as just⁵².

In this way, Heraclitus illustrates the presumption, common to early Greek Philosophy, which was that *phusis* comprehended *nomos* or 'what is' encompassed 'what ought to be'. Wisdom in Heraclitus is the actions of individuals, informed by reflective thinking concerning fail-

ings in past experience and future possibilities of doing better; it is also the recognition that the cosmic whole and its outcomes, which include the political ordering of human affairs, are greater than any part of that whole, including the fates of human individuals. Indeed they may have to accept things as they are in order to be able to act in the future. Also fundamental to Heraclitean philosophy, however, was the recognition that many citizens and non-citizens had concluded that *nomos* was not part of *phusis*. 'Although the account is shared, most men live a though their thinking were a private possession' ⁵³.

The philosophy of Parmenides may be understood to derive from the recognition that this was so. This philosopher was an aristocrat by birth, who was remembered in the *polis* of Elea in southern Italy as an outstanding *nomothetes* or law-giver and the loyal friend of a Pythagorean, Ameinias. Fundamental to his philosophy was an account of *phusis* as an unchanging unity, that was not therefore, a plurality, which he repeatedly identified with divine justice ⁵⁴. In effect, Parmenides substituted an arithmetic conception of unity for the organic conception that had prevailed hitherto in early Greek philosophy. One, arithmetically speaking is wholly consistent with itself alone, whereas organic or living unity always admits a plurality. By identifying 'what is' as one in this arithmetic sense, and in the face of all appearances of plurality, and by further identifying such unity with divinity and justice through the conservative, educational medium of a poem, Parmenides may be thought to have sought to revive the idea of justice as *themis* in a philosophical form, for which he sought acceptance through rational persuasion. This identification may be related to a perennial, popular sense of both injustice and justice: unjust acts are thought to call for retributive acts of punishment, thereby, suppos-

edly, restoring the lost balance of what is just. Thus, the continuing, popular representation of justice as a goddess figures a balance or scales held in her left hand: the relatives of one who has been murdered may seek to witness the execution of the murderer in the belief that that act will close the episode, the balance of justice having been restored. The Parmenidean conception of justice served, therefore, to extricate it from the unceasing contestation with which Heraclitus had so emphatically identified it, and, in so doing, rendered justice inseparable from the possibility of injustice.

8. Philosophy and politics today

Unfortunately the history of early Greek philosophy was not considered at the XXth World Congress. Yet, since early Greek philosophy was part of *paideia*, and *paideia* itself was education for political life, the Congress will need some explanation as to why this was so, which can hardly be other than historical. The historical argument indicated above, which seeks to show that philosophy began and developed in response to a prevailing political crisis in contemporary Greek life, does afford such an explanation. What we know of what Heraclitus had to say concerning his philosophical purpose, insofar as this concerned the citizens who heard or read his arguments, makes it clear that he sought to bring them to a shared understanding of themselves, and of their lives together in the *polis* as part of the life of the cosmos. Those philosophers who preceded Heraclitus, whilst saying nothing concerning their educational and political purposes (the Pythagoreans only acted educationally and politically), shared the same philosophical purpose of showing that all things constituted a rational unity. Why was that? They are understood to be doing philosophy. What then

distinguished philosophy as an enquiry from both religion and technical science? The answer to this question only becomes fully apparent in the philosophy of Heraclitus, which was such, as we have seen, to provoke the Parmenidean turn that set philosophy off again on the basis of the new conviction, that the unity of all things had to be something unchanging.

The above thesis, concerning the origins of Greek philosophy in relation to politics, suggests that we might look to the actual political circumstances of our own day, for at least a partial explanation of this choice of *paideia* as a theme for discussion by the world's philosophers at the end of the twentieth century. One influential opinion concerning those circumstances is that 'everybody is looking to see how you construct a society that is reasonably cohesive and respects norms of social justice' ⁵⁵. Leaving aside the question as to whether societies are constructed or enacted, it may be said that this is always so in the political ordering of life—Thales and his successors would, I think, immediately recognise the above concern. Two considerations will have to suffice here concerning why this should be particularly so now. Self-government, even when exercised indirectly through representative institutions, needs active, expressive and reflective participation on the part of the citizens in whose names it is carried out. How is the level of such involvement to be sufficiently sustained in prevailing conditions of industrial and post-industrial civilisation? Such conditions have been the occasion of the rise of societies in which social identity is thought to be conferred by jobholding, or the lack of it, rather than by citizenship. It has been said that jobholding tends to require

a sheer automatic functioning, as though individual life had actually been submerged in the over-all life process of the species and the only active still required of the individual were to let go, so to speak, to

abandon his individuality⁵⁶.

So conceived, such societies are likely to be apathetic politically; the current turnout of voters in contemporary elections to the U.S. presidency is only half of those eligible. Boredom, which lends to a variety of forms of drug-taking in dangerous excess and hence to widespread criminality, is symptomatic of the difficulties facing government in the form of liberal democracy in such societies.

Political thought in the liberal democracies of the English-speaking world has been concerned in recent years with a set of questions that might be related to this alternative, economic conception of society. This is because this is a much more influential conception in determining a sense of individual social identity than is the political. And yet, as the economic history of nations governed despotically under communism indicates, a prospering free market economically requires a free society, politically. That this is so does not, however, warrant the related contention that a free society is broadly identical with the free market and all that this conviction has, in fact, entailed historically, in the way of the industrial and bureaucratic regimentation, together with economic exploitation of insecurity. Out of these and related considerations has arisen the question fundamental to the debate between liberals and communitarians. Does liberal democracy, broadly identified with representative government and the rule of law, promote the sort of civil society that is humanly satisfying to live in for all its citizens? Or does it presuppose a fundamental atomisation of human being, whereby individual citizens have come to be identified philosophically as material and mental entities, so that there is in such societies a discouragement of the natural communality of human life, in philosophy in the English-speaking world there has been a prevailing tendency in recent decades to disown such a model of human being as Cartesian

error. There has also been, however, an equally prevailing disinclination to come forward with a more adequate and coherent philosophical model. The consequence is that we have been left with an infestation of western civilisation and culture by the former model, despite its manifest incoherence and inhumanity. Yet some model we must have for our purposes in transaction with one another. The lack of a more adequate and coherent human idea of human being is particularly evident in political philosophy for the purpose of representing systematically the transactions of self-government and the government of dependants that constitutes politics. This lack is particularly evident, for instance, in the *ad hoc* scheme of suppositions which John Rawls was obliged to construct in order to present his account of justice as fairness⁵⁷.

9. Opportunities for a revised Pragmatism

The way has been opened philosophically for the theme of *paideia* at the XXth World Congress by the decline in influence of logical empiricism in the English-speaking world. A recent statement by the International Wittgenstein Symposium concluded that

the diagnosis of many if not most analytical philosophers was that the blind spot in the programme of the logical empiricists had been the missing dimension of pragmatics⁵⁸.

In other words, the meaning and truth of what we say are considerations that ought to be inseparable for philosophical purposes from what we do: logical empiricism was mistaken in treating them in systematic abstraction from the actualities which our sayings accompany and even constitute. This conservative declaration continues by identifying philosophy with 'a satisfactory analysis of scientific knowledge and practical reasoning', but also as a struggle to hold back 'the tides of relativism and scepticism'

cism'⁵⁹. Such a declaration supposes a continuing endorsement of realism in philosophy and its belief in a continuing, invariant structuring of the conditions of what we say and do which admits of analysis. In logical empiricism, for instance, action was and still is represented as a topic falling within the province of philosophy of mind and hence as identifiable with structures of mental deliberation, both before and after the actuality of bodily movement in the moment of action, which the idea of 'mind' cannot comprehend. A more positive influence is that movement in philosophy in the U.S. which in fact identifies philosophy as pragmatism, albeit now in a revised form from that which was created by Peirce, James and Dewey as *the* philosophy of American culture⁶⁰. Various argued for and publicised by Richard Rorty, in particular⁶¹, drawing on the work of Quine, Putnam and Davidson among others, pragmatism was originally a radical, minimal philosophical response to the cultural impact of Darwinism, taken in conjunction with the successive, sharply differing, yet related influences of Hegel and Nietzsche, all being mediated to be more or less acceptable in the actual conditions of what was then contemporary American life. This was a society of distinct religious origins in the Protestant mode of Christianity. It had subsequently given rise to an independent liberal republic, democratically elected, in which the pursuit of wealth, and of some economic and social amelioration of the lives of many of its citizens, were intensively pursued through the industrial exploitation of the resources of a continent, and of a large, immigrant population, mode possible by natural science and technology. Faith in the universal possibilities in and for human being of the sort of disposition developed in the natural sciences and technology for systematic, rational, co-operative enquiry of an experimental kind, was once particularly distinctive of pragmatism

yet has now receded ⁶². Such philosophy no longer draws a sharp distinction between natural science, which it once understood as marked out by both a special method and relation to reality, and all other forms of art and science.

10. The primacy of practice versus Platonism

What is distinctive of pragmatism, both old and new, is what was originally difficult to recognise outside the U.S., and is still difficult elsewhere, particularly so in the U.K. This is, as the name 'pragmatism' indicates, the primacy of action and expression in human affairs, a recognition which was originally implicit in Greek philosophy prior to the advent of Plato. Pragmatism has always been deeply critical of Platonism and its formative influence in what came to be called the tradition of western philosophy, with all that this implies in terms of a self-conscious upholding of a foundation. Positively, pragmatism has its origins in the Darwinian conception of the origins of man as a species which was wholly natural, the evolutionary outcome of a conjunction of chance variation and natural selection. It followed philosophically in pragmatism, that what man did and said and thought had to be interpreted as ultimately significant of an active adaptation to the prevailing circumstances of life, including those which he had himself constituted. As both an evolved and an evolving being, man was represented as living his life forward into an unknown future. Consequently, his powers of action, expression and reflection were thought to be solely determinative of the way he lived and might live better in the future.

It is a point of considerable interest and relevance here that Milesian philosophy had supposed an evolving open-ended ordering of all things, inherent in a single process. From Pythagoras onwards,

however, that ordering, while admitting of cyclical change, was represented philosophically as ultimately determined. Given that philosophy began among the Greeks as an attempt to ground the political ordering of human affairs in a cosmic order represented as divine, to suppose the existence of an ultimately stable cosmic order, albeit comprehending change, was more appropriate than an open-ended, evolutionary proceeding for such a political purpose. Throughout the period of pre-Socratic philosophy, the superiority and genetic primacy of the active, expressive modes of human life in relation to the reflective, exemplified in the *Iliad* by what is implicit in the encounter in Hades between the living Odysseus and the deed Achilles, continued to prevail. Yet systematic rational reflection, exemplified by philosophy, was recognised to be of increasing importance in human life, whilst remaining subordinate to the requirements and possibilities of action ⁶³. In Plato this relation was reversed. Wisdom became identified, not with the actuality of practical and technical conduct but with cognition of the theological and metaphysical ordering of Being, which was now believed to be the ultimate determinant of what ought and ought not to be done in the government of the *polis*. Such theory was systematically represented as always precedent to and independent of the practice it was said to determine. This invariable formulation, theory and practice—never practice and theory—has subsequently continued to prevail in western civilisation.

It is because this has been so in the West for so long, that the importance of Nietzsche's philosophy has been difficult to comprehend and accept in its negative significance. Philosophically habituated to think of themselves both philosophically and in general as subjects, and not as agents who may also be citizens, those so trained intellectually accept what is.

in fact, actually impossible in human being. The condition of subjection, represented as genetically and logically primary in human being, cannot, in fact, give rise to the actual possibility of agency and self-determination. Having thus accepted the truth of what is impossible, the *soi-dtsani* subject finds it impossible to accept what is possible, which is that agents are actually the beginners of what they do, albeit subject always to both natural and historical conditions, which they are nevertheless actually able to transcend. The condition of subject does not allow for the possibility of such self-determining because it is itself determined ⁶⁴.

What is politically involved in this Platonic legacy was represented by Nietzsche in *Beyond Good and Evil*, Where he recalled that Epicurus had said of Plato and the Platonists that they were 'Dionisio-kolakes', the flatterers of the tyrant of Syracuse, both father and son, whom Plato visited on three occasions and from whom he received gifts, possibly on a large scale ⁶⁵. The epithet involved also signifies those who were actors. This sense seems to convey, not only what Epicurus thought of the Platonists, but something of what may now be seen as the political and philosophical sophistication of Athens at the end of the fourth century B.C., before the eventual triumph of dogmatism in western philosophy in both the mediaeval and modern eras ⁶⁶. Given that human life is, in fact, primarily active and derivatively reflective, and that this is something that must be known of necessity to those who are actually acquainted extensively and responsibly with the active mode of human being, it follows that to maintain the theory-practice understanding of this relationship publicly, not only for philosophical but for political purposes, and not least as part of *paideia* or education, was and is to enact systematically what was and is, in fact, known to be a fiction. Certainly Plato, an aristocrat with political affiliations and

thwarted political expectations, was in a position to know that this fiction in Platonism did not accord with what it actually was, and always must be, to govern others as part of what it is to lead a human life. Some such understanding I take to be implicit in the Epicurean identification of the flatterers of Dionysius who were philosophers as also having been actors. This is not, however, Nietzsche's understanding, apparently. In *Beyond Good and Evil*, he contented himself with the observation that Epicurus 'was peeved by the grandiose manner, the *mise en scene* at which Plato and his disciples were so expert' ⁶⁷. But why were they so, we may ask.

This particular historical interpretation of the full political significance of the reversal in Platonism of the understanding of the actual interrelation of action and expression with rational and other forms of reflection, which had hitherto prevailed in Greek culture, is certainly compatible with the revised mode of pragmatism propounded by Rorty and others. Rorty himself, for instance, is repeatedly, emphatically, and variously critical of the influence of realism, the legacy of Platonism in philosophy world-wide. It so happens that in philosophy in the U.S. in the aftermath of the Second World War there was a general abandonment of concern with and for pragmatism, for reasons which probably want more historical account and explanation than they have yet received. Rorty suggests that there was a turning away from the anti-ideological liberalism closely associated with pragmatism, particularly with John Dewey, as 'at best boringly platitudinous' and at worst 'a defensive *apologia* for the *status quo*'. The consequent vacuum was partly filled by neo-positivism and logical empiricism; also, less formally, by a much wider disposition culturally to discover 'a deeper more intellectually ambitious understanding of human being, than pragmatism with its

naturalist inheritance afforded' ⁶⁸. If there was a relatively short-lived, 'special relation' of a philosophical kind in the Anglo-Saxon world at large, featuring the importance of analysis and, therefore, of realism, there was also in the U.S. an exploration of existentialism and phenomenology and what followed from these movements, befitting the freely critical spirit deriving from pragmatism. The subsequent revival of a revised pragmatism reflected these developments: a hostility to realism was renewed and developed in criticism of the dogmas of neo-positivism and logical empiricism, while the hitherto strong identification of pragmatism with natural science and technology was abandoned. At the same time Rorty has been at pains to explore the common ground between this version of pragmatism and developments in Continental philosophy, particularly those inherent in the work of Heidegger, Habermas, Derrida and Foucault ⁶⁹.

11. What a revised Pragmatism requires

It would take another paper to discuss at all fully what is absent from this revised pragmatism, in which faith for the future is identified with what it calls the non-ideological liberalism of contemporary government in the U.S. and elsewhere, and in the political arrangements which make such government possible. Rorty seeks to defend such liberalism against its communitarian critics ⁷⁰. They argue that it presupposes an inadequate conception of both human being and its proper part in government. This whole debate, stemming from Rawls' theory of justice, is in fact crippled by lack of an adequate and coherent conception of human being, grounded in an acknowledgement that, if either natural or divine modes of being enter into human being, they do so as conditions only of human action, expression and reflection. Where philoso-

phy world-wide stands now in this respect may be seen to have been anticipated in the *phusis-nomos* debate of the late fifth century B.C. This constituted the first major crisis in the history of western philosophy, which was ultimately resolved, in effect, by Platonism and what followed from it, albeit not until the Christian era. As we have seen, that resolution partly identified human being with *phusis*, which ought as such to be governed by *nomos*, which was identified as the transcendental, divine ordering Being. However, in order that this government should be possible, such Being had to be reflectively and contemplatively interpreted, and beheld only by those able to know such an order, who were both born to govern, either naturally or socially, and suitably educated at length, both mathematically and philosophically.

What is of the greatest value in revised pragmatism is its deeply critical disposition of this solution, such as it was, to the *phusis-nomos* crisis, in that it rejects completely the idea of any independent rational ordering that can only be known philosophically or scientifically. Yet, insofar as Rorty is its prophet, there is also evidence of a strong, negative determination in pragmatism, not to become involved in any systematic way with what could constitute a reflective, critical condition of whatever currently passes for the progress of liberal democracy. Neither the question of what we should now think systematically concerning human being, nor that of what the actual course of the history of western philosophy has been and why, appear to concern Rorty. It is remarkable, for instance, that he seems to be quite indifferent to what philosophy was as a form of enquiry before it took the Platonic turn which he believes was so profoundly mistaken. Yet that important historical moment was a response to a crisis in philosophy that was engendered by the conviction that if there were a rational ordering of the cosmos, it

did not comprehend human being. Even in Platonism, the rational ordering of Being is something that has to be taught and learnt mathematically and philosophically. The Platonist dogma was that such a proceeding in *paideia* was essentially one of recollection.

Platonism or Philosophy, as it is known in revised pragmatism, was only one of several responses to the *phusis-nomos* crisis, in the course of what had been the relatively brief but wonderfully variegated course of what is prejudicially called pre-Socratic philosophy. It is widely recognised that the historic Socrates also made a distinct response to that crisis, which was not that which came to be identified with that very different figure of fiction, the Platonic Socrates. The former response was, it is widely recognised, to turn away from *phusis* to *nomos*, that is from the idea of *phusis* as a mode of being comprehending both gods and men, as well as what for us is the category of nature. What the historic Socrates turned to was *nomos* in the political-ethical mode of being. This turn partly accorded with the Sophist response to that crisis, which had been engendered by the recognition that the premise on which philosophical enquiry had hitherto been based, which was that *nomos* was an integral part of *phusis*, in that there was thought to be a ruling power or principle inherent in all things, was not in fact valid. The historic Socrates was sometime thought to have been a Sophist. This supposition is intelligible in terms of their shared rejection of the premise that had hitherto prevailed in philosophy. From that same conclusion, however, they appear to have gone different ways. The Sophists turned to *paideia* without philosophy: there was no rational ordering of all things of which men were an integral part, whereby they could be brought, as Heraclitus had hoped, to a recognition of all they had in common. What for the Sophists remained a possibility was to edu-

cate future citizens for a life of active citizenship in the assembly or the law courts in such a way as both to empower and civilise them, and then to let them get on with it. The historic Socrates too was primarily engaged in educating men, but doing so philosophically, although in what sense is a major historical, philosophical question. The evidence that he devoted himself to questioning men as to the grounds for their beliefs, concerning what ought to be done politically, does not have to be understood as a search for definitions of essences. His profession of ignorance is to be taken not ironically but literally. His purpose may be understood as that of promoting the possibility of political compromise through criticism of dispositions to dogmatism, since unity in action arrived at through rational agreement was what the *polis* needed for its continuance⁷¹.

Not only does Rorty neglect the systematic study of the history of western philosophy, leaving himself, for instance, with no clear and consistent idea of the purpose of philosophical enquiry⁷². He also maintains that there is no particular philosophical question concerning human being. Discussing the consequences of pragmatism with particular respect to the question of what a post-Philosophical culture would be like, he readily concedes that the Socrates of Plato may be thought to have been wrong:

that we have *not* once seen the Truth, and so will not, intuitively, recognise when we see it again. This means that when the secret police come, when the torturers violate the innocent, there is nothing to be said of them of the form, 'There is something within you which you are betraying thought you embody the practice of a totalitarian society which will endure for ever. There is something beyond those practices which condemns you'⁷³.

The above supposition concerning what it might be like to live in a society of pragmatists, as Rorty conceives pragmatism, where com-

mon convictions are lacking as to what it is to be both human and inhuman, is paralleled by Rorty's sketch of what it is to be a philosopher in such a society:

We are not doing something different in kind from what the professor of history or literature would or could do in the same situation. We are just enlarging a linguistic and argumentative repertoire and thus an imagination. Beyond this traditional humanist task, we can only do what lawyers do—provide an argument for whatever our client has decided to do, make the chosen cause appear the better⁷⁴.

The self-conscious, contrived echo in this conclusion of the Platonist charge against the Sophists, that their conception of *paideia* as an empowering of their students was unrestricted because uninformed by any systematic attempt to comprehend the good in human affairs may serve as an indication of how apt and timely the choice of theme at the XXth World Congress may prove to be.

If so, what will also be wanted will be what revised pragmatism appears determined to avoid. That is, firmly, a statement of the case for a history of western philosophy capable of showing why the enquiry began at all, why it began with a misconception, namely, the simple inherence of *nomos* in *phusis* and why this misconception was eventually replaced by another, namely, the ultimate transcendence of *nomos* as a reality in relation to all natural and historical change. The possibility of such a history points to the error in both Sophism and Platonism. Human being is always changing, both naturally and historically, often turning inhumanly against itself in doing so, and yet it always remains human being. If it did not, history would not be possible.

The proper philosophical study of human being is human being and its inhumanity. As such, it has the purpose that we might in future act a little more wisely and well, and a little less foolishly and badly, a

very human aspiration. Rorty's pragmatic faith in a non-ideological liberalism based on a democratic franchise as the leading edge of civilisation is a blind faith: it may be that liberal democracy is a better form of human government than any other of which we know, but this does not save it from the self-destructiveness of which human being is capable and which is inherent, like its creativity, in the indeterminacy of freedom fundamental to such being. Pragmatism prepares the way for a more adequate and coherent conception of

the purpose for which philosophy began, in that it rightly insists upon a reversal of the Platonist conception of the interrelation of reflection and contemplation with action in human being by restoring a systematic recognition of the primacy of action. implicit in that recognition is the understanding that neither nature (*phusis*), nor the freedom of action, expression, and reflection in the ordering of human affairs (*nomos*), is primary in human being. This is what it is because its indeterminacy or free-

dom of living being creates the confrontation of *nomos* and *phusis* and the need to maintain a balance between them that is always changing. Acting humanly rather than inhumanly calls for balancing the claims of *phusis* and *nomos*, but such practice is not possible independently of the systematic reflection that philosophy can afford concerning such being.

Spaniard's Rd
London NW3

Notes:

1. The Twentieth World Congress of Philosophy from 10th-16th August, 1998, was held in the name of the International Federation of Philosophical Societies and ranged by its American Organising Committee, 7455 Commonwealth Avenue, Boston MA 02215. What was initially expected from the inclusion of a systematic philosophical study of education, which was identified with logical empiricism in the professional education of teachers, was indicated by R.S. Peters in an essay on that subject in *The Study of Education*, ed. J. Tibble, RKP (1964).
2. W. Jaeger *Padeia*, Vol. 1, Blackwell (1946), trans. from the 2nd German Edition by Gilbert Highet, pp. xvi -xvii; pp. 4-5.
3. *ibid.*, pp. 77-79.
4. *The Oxford History of the Classical World*, ed. J. Boardman, J. Griffin & O. Murray, Oxford (1986), pp. 156-159. J. Gregory, *Euripides and the Instruction of the Athenians*, University of Michigan Press (1991), pp. 105-100.
5. O. Murray, *Early Greece*, 2nd ed. Fontana (1993) pp 279-280.
6. H. Arendt, *The Human Condition*, University of Chicago (1950) pp. 22-20.
7. O. Murray, *op. cit.*, pp. 246-240
8. W. Jaeger *op. cit.*, pp xxv-xxvi, pp. 150-153.
9. *ibid.*, pp. 154-155.
10. *ibid.*, pp. xxvi, 113.
11. R. Rorty, *Consequences of Pragmatism (Essays: 1972-80)*, The Harvester Press (1982) p. 216.
12. W. Jaeger *op. cit.* pp. 25-29.
13. *ibid.*, pp. 151-153.
14. *ibid.*, pp. 77-90; *Oxford Classical Dictionary*, 2nd ed. (1970) p.1102.
15. J. Burnet, *Early Greek Philosophy London* (1892; 1900; 1920; 1930).
16. G.W.F. Hegel, *On Art, Religion and the History of Philosophy*, ed. J. Glenn Gray, Hackett (1970) pp.297-99, 302-3, 262-66
17. W.K.C. Guthrie, *The History of Greek Philosophy*, Vol. 1, Cambridge (1962).
18. A.N. Whitehead, *Science and the Modern World* New York (1925).
19. R.G. Collingwood, *Autobiography* Oxford (1940) pp. 53-77.
20. *ibid.*, *The Idea of Nature*, Oxford (1945) p. 2.
21. *ibid.*, pp. 43-40.
22. W. Burkert, *Greek Religion*, Blackwell (1985) p. 305.
23. H. Arendt *op. cit.*, pp. 7-17.
24. W. Jaeger *op. cit.*, pp. 151-53.
25. *idem.*
26. G.E.R. Lloyd, *Early Greek Science : Thales to Aristotle*, Norton (1910) pp. 11-15,
27. *idem.*
28. H. Arendt, *op. cit.*, pp. 220-30.
29. W. Jaeger, *op. cit.*, p. 83.
30. *idem.*
31. A. Burkert, *op. cit.*, p. 305.
32. G. Vlastos, 'Equality and Justice in Early Greek Cosmologies' in *Studies in Pre-Socratic Philosophy*, Vol 1, RKP (1970) pp. 56-57.
33. C.H. Kahn, *Anaximander and the Origins of Greek Cosmology*, Hackett (1960) pp. 166-67.
34. O. Murray *op. cit.*, p. 36.
35. N.G.L. Hammond, *History of Greece to 322 B.C.*, Oxford (1959) p. 169.
36. O. Murray, *op. cit.* pp. 139, 153.
37. C.H. Kahn, *The Art and Thought of Heraclitus*, Cambridge (1979) p. 15.
38. R. Dauval & A. Gilbert, *The Orion Mystery*, Heinemann (1994) p. 147.
39. C.H. Kahn, *ibid.*, p. 85.
40. *ibid.*, p. 29.

41. *idem.*
 42. W. Jaeger *op. cit.*, p. 104.
 43. C.H. Kahn, *ibid.*, p. 67.
 44. *ibid.*, p. 55.
 45. *Ibid.*, p. 67.
 46. *ibid.*, p. 59.
 47. *ibid.*, p. 43.
 48. *ibid.*, p. 57.
 49. *ibid.*, p. 4.
 50. O. Murray, *op. cit.*, p. 50.
 51. *Oxford Classical Dictionary*, p. 1052.
 52. C.H. Kahn, *ibid.*, p. 6.
 53. *ibid.*, p. 29.
 54. J. Barnes, *Early Greek Philosophy*, Penguin (1907) pp. 13, 134, 130.
 55. A. Giddens, *Guardian Hire*, 20/1/90, p. 11.
 56. H. Arendt, *op. cit.*, p. 322.
 57. J. Rawls, *A Theory of Justice*, Harvard University Press: Cambridge, MA (1971).
 58. *Programme for The 20th International Wittgenstein Symposium*, British Society for the History of Philosophy, New Series, Vol. 2 No. 1, March 1997.
 59. *idem.*
 60. R. Rorty, *Objectivity; Relativism and Truth*, Cambridge (1991) p. 64.
 61. *ibid.*, Also, *The Consequences of Pragmatism; Essays on Heidegger and Others*, Cambridge (1991).
 62. *idem.*, *The Consequences of Pragmatism*, pp. xxxvii-xliv.
 63. H. Arendt *op. cit.*, pp. 25-26.
 64. *ibid.*, pp. 10-17.
 65. F. Nietzsche, *Beyond Good and Evil in The Basic Writings of Nietzsche*, ed. W. Kaufmann, New York (1960) p. 204.
 66. Dogmatism in western philosophy in the modern age derived from a continuing adherence to the conceptual scheme of subject-object and a corresponding rejection of that of the agent-other, cf. J. Macmurray, *The Self as Agent*, Faber & Faber (1957).
 67. F. Nietzsche, *op. cit.*, p. 204.
 68. R. Rorty, *Objectivity, Relativism and Truth*, p. 64.
 69. *Essays on Heidegger and Others.*
 70. *ibid.*, *Objectivity, Relativism and Truth*, pp. 159-96.
 71. The historic Socrates appears to have upheld the idea of philosophy that was systematically maintained subsequently by those who were *skeptikos* or insistent, literally, upon the need for continuing enquiry in philosophy because they supposed that there were no final answers to philosophical questions. This supposition is at variance with Aristotle's contention that the historic Socrates sought to arrive at final definitions of ethical qualities, for instance. This, however, is to confuse the historic with the Platonic Socrates. On the relation of these two figures see K. Popper *The Open Society* Vol. 1, for an account that still stands unrefined.
 72. R. Rorty, *The Consequences of Pragmatism.*, pp. 29-36.
 73. *ibid.*, p. 222.
 74. *idem.*

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THE BEAUTY OF UNCLEAR AND INDISTINCT IDEAS

*Martin X. Moleski, SJ***1 Introduction**

The success of mathematics both in its own field and in allied fields of research, especially the physical sciences, has generated pressure for the humanities to conform to the mathematical model of certitude. For people raised in the culture of Enlightenment, the idea of an idea is that it be atomic (broken down into its smallest units by analysis), propositional, unchanging, clear, distinct, manageable, well-defined, and either self-evident or derived from self-evident axioms.

We are perpetually tempted by the clarity of logic to make it synonymous with reason, and to disparage arguments which fall short of its canons [It is a] human tendency to migrate towards what appears to be simple, clear, tangible and certain (LA, xvii).

The purpose of this essay is to show how three developments in mathematics help to break the enchantment of clear and distinct ideas and lend support to the post-critical understanding of ideas as developmental realities which are deeply intertwined with other ideas, only partially articulatable, meaningful only when taken in context, and bearing with their intelligibility and reliability associated obscurities which can never be entirely banished. We will look at the three developments in mathematics in their chronological order: the self-refutation of foundationalism in the first part of the century, the creation of fuzzy logic in the sixties, and the emergence of chaos theory in the eighties.

2 The self-defeating quest for foundations

From the time of Descartes to the present, the quest for certainty has bred uncertainty (Des, 96, 104.). His dream of clearing the intellectual field by a process of rigorous doubt, followed by the rigidly controlled planting of a few purified seeds of thought, culminating in a harvest of indubitable truths, has haunted many movements in the West: rationalism, deism, Kantian idealism, empiricism, logical positivism and its inverse, Popper's theory of falsification, foundationalism, analytic philosophy, formalism, objectivism, scientism, etc. The same mentality infected the Roman Catholic manualist theologians of the nineteenth century and the various efforts to hold theology and biblical studies to quasi-scientific standards in the twentieth century.

Until I understood this, I was baffled by the German authors who laboured for seven or eight hundred pages to establish their starting point, only to bring the book to a conclusion in the next chapter. They operated on an implicit geometric model, what Philip Davis and Reuben Hersh call the 'Euclid Myth': all of the interest is in the axioms. After they have been stated, it is merely a matter of grinding out conclusions—nothing new can be said that is not already contained in the premisses. The goal is 'truths about the universe which are clear and indubitable. Starting from self-evident truths, and proceeding by rigorous proof, Euclid arrives at knowledge which is certain, objective, and eternal' (TME, 325.). Bernard Lonergan contributed to this lamentable men-

tal by clothing *Insight and Method in Theology* in scientistic trappings. Most feminists seem to have taken up the tradition, straining to establish criteria and methods that will free them from personal responsibility for the conclusions they reach. Hermeneutics, which aimed to chart the science of meaning, has deconstructed itself and the whole world of personal intentions along with it.

The story of the self-defeating search for foundations in mathematics is told most colourfully by Douglas R. Hofstadter in his exasperatingly ingenious work, *Gödel, Escher, Bach: an Eternal Golden Braid* (New York: Vintage Books, 1980 [1979]). The challenge set by David Hilbert at the turn of the century was to devise 'a single uniform notation in which all mathematical work could be done, and with the aid of which any two mathematicians could resolve disputes over whether a suggested proof was valid or not. This would require a complete codification of the universally acceptable modes of human reasoning, at least as far as they applied to mathematics' (23). Bertrand Russell and Alfred North Whitehead supplied such a universal symbolic logic in *Principia Mathematica* between 1910 and 1913 (18). In 1931, Kurt Gödel 'utterly demolished Hilbert's program'; Gödel's approach 'revealed not only that there were irreparable 'holes' in the axiomatic system proposed by Russell and Whitehead, but more generally, that no axiomatic system whatsoever could produce all number-theoretical truths, unless it were an inconsistent system!' (24).

Polanyi adverts to Gödel several times in *Personal Knowledge*:

Gödel has shown that the scope of mathematical formulae is indeterminate, in the sense that we cannot decide within a deductive system like arithmetic whether any set of axioms comprising the system are consistent or mutually contradictory. We must commit ourselves to the risk of talking complete nonsense, if we are to say anything at all within any such system. (94)

Polanyi also uses Gödel's insights as a springboard for reflecting on the role of tacit knowledge as the essential partner of formal operations (259-60).

Even before Gödel had shown the futility of proving formal systems to be both complete and consistent, Russell had found baffling paradoxes about self-inclusive and self-exclusive sets in *Principia Mathematica*. He tried to eliminate paradoxes arising from the self-referential capacity of symbolic logic, but could not create any system immune to challenge. In 'Portraits from Memory', Russell describes how his quest for certitude was defeated:

I wanted certainty in the kind of way in which people want religious faith. I thought that certainty is more likely to be found in mathematics than elsewhere. But I discovered that many mathematical demonstrations, which my teachers expect me to accept, were full of fallacies, and that, if certainty were indeed discoverable in mathematics, it would be in a new field of mathematics, with more solid foundations than those that had hitherto been thought secure. But as the work proceeded, I was continually reminded of the fable about the elephant and the tortoise. Having constructed an elephant upon which the mathematical world could rest, I found the elephant tottering, and proceeded to construct a tortoise to keep the elephant from falling. But the tortoise was no more secure than the elephant, and after some twenty years of very arduous toil, I came to the conclusion that there was nothing more that I could do in

the way of making mathematical knowledge indubitable. (TME, 333) Davis and Hersch argue that in view of the failure of the quest for foundations, mathematicians must recognise that the true source of sound mathematics is intuition, which cannot be rigorously defined, but which can be characterised as the opposite of rigor and is visual, plausible, incomplete, based on a physical model, and holistic (TME, 391).

Even where there have been successes in providing a better foundation for some branches of mathematics, there have been surprising delays in formalising quite successful strategies. Puddefoot shows that the power of mathematics does not derive from a Cartesian strategy combining universal doubt and indubitable proof:

A rigorous justification of the differential and integral calculus, known since Newton and Leibniz, has only been possible in recent times. The basis of arithmetic remained unknown or incorrectly formulated until Frege attacked the scandal of its woolliness in the nineteenth century. The curious spectacle of mathematics justifying itself only long after its results have been accepted and applied indicates that mathematics is not based upon its 'foundations' at all; indeed, as we have seen, the word is misleading, for foundations must precede superstructure, and manifestly they have not done so. (LA, 79-80)

Davis and Hersch tell the story of a three-century wait for 'an adequate theory . . . to interpret properly and legitimise' Cardano's work with complex numbers (TME, 197-98). In the final analysis, they conclude that mathematics is to be accepted as 'fallible, corrigible, tentative and evolving' (TME, 406).

The reign of terror is over. Mathematics has flunked the test it set for the rest of the world. We need no longer strain under the burden of the Euclid myth and its lineal descendant, Cartesian method. Mathematics, like every other human activity, rests on the fuzzy foundations of the reasoning person.

3 Fuzzy logic

Fuzzy logic emerged from early efforts in the field of artificial intelligence. At the bottom of the digital computer's operation is a mathematical system incarnated in tiny electronic buckets (capacitors) that can be relatively full of electrons or relatively empty (most of the RAM chips in use today have leaky bit buckets which need to be topped up with a fresh slosh of electrons on a regular basis). If a bucket is comparatively full, it represents a 1, and allows current to flow through a circuit; if the bit bucket is comparatively empty, it represents 0, and current will not flow through the circuit. Everything that we do on the computer must be reduced to that rigid vocabulary of full or empty, on or off. There are no grey areas allowed at the foundation of the machine. Signals that try to hover between zero and one are latched into one state or the other because everything depends on knowing exactly where that bit stands; no fence-sitters allowed here!

At the first level of software arising from the rigid bit buckets of the hardware, everything is similarly black-and-white. Bootstrap routines fixed in read-only-memory (ROM) and the basic input-output systems (BIOS) depend on Boolean logic, a set of if-then-else constructions based on the principles of non-contradiction and the excluded middle. If computer hardware did not operate on Boolean logic, we would never know what would happen when we turned the computer on; it would become the moral, if not the aesthetic equivalent of a lava lamp.

Computers are superb at classical mathematics, but clumsy in dealing with realities that do not fit into neat categories.

Natural language is inherently sloppy and imprecise. Lotfi Zadeh invented fuzzy logic in 1964 to 'deal with imprecisely defined properties or quantities: 'a few books', 'a long story', 'a beautiful

woman', 'a tall man' (ESFS, 11). The world is full of fuzzy phenomena:

... in the real world, as philosopher Charles Peirce observed, 'All things swim in continua.' ... No sharp line divides day from night. Children grow imperceptibly into adults. Beasts evolved gradually into humans. Red fades into orange and into purple. When is a glass full? A banana ripe? A person rich? Is half an apple an apple? Is Japan a capitalist or socialist state? When is a novel obscene? Exactly what *is* a novel? Is a bar stool with a small back a chair? How can we measure the beauty of a poem, a painting, melody, or person? (WWFL, 155.)

Think of how the word 'big' changes meaning in different contexts. We might speak of a big house, a big dog, a big boy, a big cockroach, a big car, a big deal, a big splash, big government, big business, big ideas or 'Mr. Big'. Humans, even young children, handle shifts like these amazingly well; bit-bound computers generally do not.

For extremely narrow purposes, artificial languages might be developed that have only one meaning per word; but these are of limited value. Russell and Whitehead intended *Principia Mathematica* to provide a symbolic language in which it was grammatically impossible to say anything untrue. Besides the problems of self-referential inconsistency noted above, that narrow form of language also fails to capture the breadth of our human experience:

Any attempt to rid our natural language of vagueness is chimerical. An essential characteristic of a vague predicate is that the boundaries of the domain of its applicability are not fixed, and, therefore, we do not know precisely where this domain ends and some other begins. The question of truth and falsity here is not only undecided but undecidable. ... vague concepts cannot be handled according to classical, two-valued logic. (ESFS, 49)

In the final analysis, it seems better to train a computer to be fuzzy than to force humans to be precise.

Zadeh's notion of 'fuzzy sets' creates tables of data that capture a judgment about particular words or things. The different qualities being judged are assigned a percentage; each percentage is a definite number, hence storable and manipulable as a rigid sequence of bits, but representative to the human users of the fuzzy system of shades of meaning. According to Constantin Negoita, any fuzzy set can be reduced to 'a family of crisp sets' (ESFS, 14). There are formalisms in fuzzy logic that give it consistency. Motorola joined with Apronix in the spring of 1992 to publish the 'Fuzzy System Standard Environment, a data structure by which fuzzy logic systems are represented' (*Computer World*, March 30, 1992, 31.). Using such sets, Negoita developed 'a fuzzy logic in which the truth values are linguistic, that is, are of the form *true*, *not true*, *very true*, *more or less true*, and so on, with each such truth value representing a fuzzy subset of the unit interval' (ibid., 18).

Fuzzy sets and linguistic truth values are not the only method of adapting computers to non-mathematical realities. One of the central purposes of Hofstadter's meditations in Gödel, Escher, Bach was to 'emerge with new insights into the seeming unbreachable gulf between the formal and the informal, the animate and the inanimate, the flexible and the inflexible' so that 'inflexible machines' might be taught 'how to be flexible' (GEB, 26). Hofstadter is a critic of fuzzy logic (WWFL, 159), but he is well aware of the nature of tacit knowledge, and he expects to be able to emulate it in the future by use of suitably complex computers:

We can liken real-world thought processes to a tree whose visible part stands sturdily above ground but depends vitally on its invisible roots which extend way below ground, giving it stability and nourishment. In this case the roots symbolize complex

processes which take place below the conscious level of the mind—processes whose effects permeate the way we think but of which we are unaware. (GEB, 569)

For Hofstadter, the tacit dimension is the realm where a practically infinite variety of sub-tasks run in the background. He believes that 'reasoning is mechanizable' and that even 'will will be mechanized' (GEB, 685-686). He and Puddefoot seem to agree that the existence of the human mind shows what the material universe is capable of achieving; if brain-based minds can operate successfully in a universe that demands vague concepts, tacit knowledge, and informal reasoning, then computers can, too (GMM, 123, 136).

It seems to me that fuzzy logic does not contradict crisp logic. The two forms of logic do not cover the same ground. The emergence of fuzzy logic places classical logic in a wider context. All of the rules of Boolean logic still hold force within their own domain. But that form of reasoning now appears as a small clearing within a surrounding forest of tangled and uncertain connections. The development of fuzzy logic may actually be cold comfort to philosophy and theology, for it shows a way to mathematize (or program) loose forms of reasoning that formerly seemed to be the domain of persons. Instead of toppling the tyranny of Cartesianism, fuzzy logic may extend its reign to the most obscure regions of the human heart. If Hofstadter and Puddefoot are right, computers will eventually outdo us in using informal reasoning and intuition.

4 Chaos theory

The third suggestive development I want to appeal to is the theory of chaos. The mathematics of chaos emerged from a number of areas of research—weather, the rise and fall of animal populations in ecosystems, price fluctuations, the development of noise in transmission

lines, and the phenomenon of turbulence. Models developed to describe these realities turned out to be surprisingly complex due to the interaction of one variable with another; every part of these chaotic systems is dependent on every other part, so that minute changes in the initial conditions generate vast differences in the final state of the system. The pioneers of this new field 'had an eye for pattern, especially pattern that appeared on different scales at the same time':

They had a taste for randomness and complexity, for jagged edges and sudden leaps. Believers in chaos—and they sometimes call themselves believers, or converts or evangelists—speculate about determinism and free will, about evolution, about the nature of conscious intelligence. They feel that they are turning back a trend in science toward reductionism, the analysis of systems in terms of their constituent parts: quarks, chromosomes or neurons. They believe that they are looking for the whole. (CMNS, 5)

Developing mathematical intuition, a feel for the lay of the mathematical landscape, stands at the forefront of chaos theory:

To chaos researchers, mathematics has become an experimental science, with the computer replacing laboratories full of test tubes and microscopes. Graphic images are the key. 'It's masochism for a mathematician to do without pictures', one chaos specialist would say. 'How can they see the relationship between that motion and this? How can they develop intuition?' (CMNS, 38-39)

According to Gleick, chaos theory faced an uphill struggle because so many mathematicians had been trained not to see the data that would alter their assumptions about what is significant and what is merely background 'noise' or 'experimental error' (CMNS, 45, 56, 67, 102).

Perhaps the most eye-opening feature of chaos theory is the Mandlebrot set and the theory of fractals that supports it. Whereas Euclidian space consists of zero,

one, two, or three dimensions, chaos theory supposes that there may be fractional dimensions, so that shapes lie between the rigid confines of point, line, and plane. This bizarre assumption allows the generation of computer graphics of surprising complexity as well as the decomposition of complex shapes in nature into surprisingly simple formulas.

Clouds are not spheres, Mandlebrot is fond of saying. Mountains are not cones. Lightning does not travel in a straight line. The new geometry mirrors a universe that is rough, not rounded, scabrous, not smooth. It is a geometry of the pitted, pocked, and broken up, the twisted, tangled and intertwined. The understanding of nature's complexity awaited a suspicion that the complexity was not just random, not just accident. It required a faith that the interesting feature of a lightning bolt's path, for example, was not its direction, but rather the distribution of zigs and zags. Mandlebrot's work made such a claim about the world, and the claim was that such odd shapes carry meaning. The pits and tangles are more than blemishes distorting the classic shapes of Euclidian geometry. They are often the keys to the essence of a thing. (CMNS, 94)

Mandlebrot used a kind of fuzzy logic to establish the notion of fractional dimensions:

A weakness in Mandlebrot's verbal argument seemed to be its reliance on vague notions, 'from far away' and 'a little closer'. What about in between? Surely there was no clear boundary at which a ball of twine changes from a three-dimensional object to a one-dimensional object. Yet far from being a weakness, the ill-defined nature of these transitions led to a new idea about the problem of dimensions . . . Fractional dimension becomes a way of measuring qualities that otherwise have no clear definition: the degree of roughness or brokenness or irregularity in an object. . . . *Over and over again, the world displays a regular irregularity.* (CMNS, 97-8)

The phrase 'regular irregularity' highlights the fuzzy foundations of

chaos theory. Chaotic systems, like the fractal dimensions used to describe them, fall somewhere between the twin extremes of orderly Euclidian abstractions and purely random behaviour; on the computer screen, definite shapes emerge that combine deep structures with unpredictability: 'Chaos is ubiquitous; it is stable; it is structured' (CMNS, 76). The patterns cannot be captured by classical geometry or mathematics: 'Neither words nor the concepts of Euclidian geometry serve to describe them' (CMNS, 221). There is 'order in chaos', which is evident to the eye but which cannot be captured in linear systems (CMNS, 157).

Feigenbaum and his fellow believers also challenged assumptions about how to do mathematics:

Among mathematicians, too, a reserved attitude prevailed, largely because Feigenbaum did not provide a rigorous proof. Indeed, not until 1979 did proof come on mathematicians' terms, in work by Oscar E. Lanford III. Feigenbaum often recalled presenting his theory to a distinguished audience at the Los Alamos meeting in September. He had barely begun to describe his work when the eminent mathematician Mark Kac rose to ask: 'Sir, do you mean to offer numerics or a proof?'

More than one and less than the other, Feigenbaum replied.

'Is it what any *reasonable* man would call a proof?'

Feigenbaum said that the listeners would have to judge for themselves. After he was done speaking, he polled Kac, who responded, with a sardonically trilled r: 'Yes, that's indeed a reasonable man's proof. The details can be left to the r-r-rigorous mathematicians.' (CMNS, 183-4)

Chaos theory changes the rules about what is 'reasonable' and where to look for 'proof'. It is important to note how successful the intuitive approaches were *prior* to being given a rigorous mathematical foundation. The success of these pragmatic approaches to new methods of reasoning suggests a shift in the ideal of mathematical rigour:

'Rigour is the strength of mathematics', Petigen said. 'That we can continue a line of thought which is absolutely guaranteed—mathematicians never want to give that up. But you can look at situations that can be understood *partially* now and with rigor perhaps in future generations. Rigor, yes, but not to the extent that I drop something just because I can't do it *now*'. (CMNS, 231)

This flexible approach to mathematics runs contrary to the classical view that 'Truth is what you find at the end of a correct chain of arguments' (Jerry King, quoted by Gardner, WWFL, 241).

Chaos theory may join hands with fuzzy logic in the quest to 'model symbols and memories':

A physicist thinking of *ideas* as regions with fuzzy boundaries, separate yet overlapping, pulling like magnets and yet letting go, would naturally turn to the image of a phase space with 'basins of attraction'. Such models seemed to have the right features: points of stability mixed with instability, and regions of changeable boundaries. Their fractal structure offered the kind of infinitely self-referential quality that seems so central to the mind's ability to bloom with ideas, decisions, emotions and all the other artefacts of consciousness. (CMNS, 299)

We need a flexible, intuitive, and fuzzy approach to deal with ideas modelled on fractal patterns rather than Euclidian or Cartesian geometry.

5 The moral of mathematics

For the purposes of this essay, I would like to stretch 'fuzzy logic' to include not only the new branch of mathematics but all of the analogous strategies used to emulate the informal processes of reasoning with which we are all familiar. Interpreting the meaning of fuzzy logic is not, strictly speaking, a mathematical operation. Mathematicians tell us the story of these new forms of logic, but

whoever attempts to define the moral of the story leaves the field of mathematics and enters the lists of philosophy. On these grounds, the mathematicians speak as expert witnesses whose testimony must be weighed on the scales of right reason.

Mathematicians may rue the day that Zadeh named his new approach to logic. His rhetorical stroke may help break up the myth of mathematical infallibility which, in turn, lends so much weight to scientism and objectivism. A less colourful term can be mined from Polanyi's approach. On the model of personal and tacit knowledge, we may speak of the personal or tacit logic embedded in those forms of knowing—and even of personal and tacit mathematics. As early as 1936, Polanyi was conscious of a kind of fuzzy logic in chemistry:

The subject of chemical concepts as opposed to physical ones has always been fascinating to me because it shows the great value of inexact ideas Chemistry is a world of ideas expressed by such terms as 'relative stability', 'affinity', 'tendency', 'inclination', 'general expectation' as descriptions of behaviour. There is not a single rule in chemistry which is not qualified by important exceptions. (VI, 233)

In his conclusion to this letter, Polanyi asserts that chemistry is much closer to behavioral psychology than to physics (234).

Puddefoot, in his 1990 treatment of mathematics and theology, seems to me to overreact to the dissolution of Cartesian method. Puddefoot seems still to long for the soil made barren by universal doubt when he argues that 'Language is a system of interpretation, and does not afford us an undistorted view of the world' (33). This is far too sweeping an indictment. Like Russell's mathematical positivism, it is also self-refuting—if this proposition is true, and if we understand what Puddefoot means, then language has not distorted our view of reality, and the proposition is false.

Puddefoot also employs an implicit Cartesian standard when he declares that 'There are no 'raw facts . . . ' (34). This observation is not a 'raw fact' itself. The search for raw facts, whatever they may be, seems still to be dominating Puddefoot's field of vision. The same analysis applies to his statement that 'There is no impersonal Archimedean Point to act as a criterion of demarcation between the inventions of the human mind and genuine insights into reality' (63-4). Puddefoot's unsatisfied desire for an uninterpreted, direct, and impersonal encounter with reality seems to lie behind his rejection of all systems. He has only one model of philosophy, Cartesianism; if that is discredited, all are discredited:

God can take care of himself. That may sound presumptuously trite, but it is to be understood thus: all our clinging to systems, whether biblical, ecclesiastical, theological or philosophical, amounts in the end to unbelief. (192)

I am not willing to follow Puddefoot in his assertion that neither reason nor revelation have produced insights worth preserving. It is worthwhile to dwell in the great accomplishments of the past, which provide the personal foundation for new insights today. Tradition in the Polyanian universe is not the enemy of discovery, but its springboard.

6 Self as the vehicle of contact with reality

For me, Polanyi's theory of personal knowledge provides a satisfying framework for interpreting the whole of reality. His system is not Cartesian, but it is coherent. He aims to show how each aspect of the universe is related to every other aspect as parts to wholes. In his theory of comprehensive entities, Polanyi outlines a great matrix of being, from the simplest to the most complex. For Polanyi, the reasoning person is the first principle and foundation of knowing. Closely allied with this principle—in my opinion, inseparably

intertwined with it—is the conviction that the knowing self makes contact with reality.

Self is an intrinsically fuzzy concept. My self is the instrument of all of my knowing; it is both part of reality and the means by which I investigate all reality. The harder I try to pin down what I mean by me, the less confident I am that I know what I am talking about. I am who I am. I have always been me. And yet, I have changed many times and see no end in sight for the process of personal evolution. I must be the very same person who was formed in my mother's womb—otherwise, she is not my mother and I am not her son—but I am not at all the same person as I was on the day of my birth. The notion of 'self' must stretch to cover all these various instances of me that I find in my life.

I must know everything I know—that's one of those uninformative but certain tautologies that analytic philosophers love to hate—but I know that I don't know everything I know, because I can never catalogue the contents of my own knowing self. I know far more than I can ever tell in detail. Some days (or decades) are better than others. Sometimes as I search my memory for a name or a concept, I can find the empty place where it used to be stored, and I know that I used to know it; other days, even that scant comfort is denied me and I wonder whether I am on the edge of a hallucination. I am one of the abiding realities that I make contact with. 'Wherever I go, there I am', says Babba Ram Dass. 'Whatever I know, there I am, too', says our guru, Michael Polanyi.

My whole self, which includes body and mind, is my vehicle of contact with reality:

My own awareness of myself is not a special, pure inner something set against the world. To be aware of myself is always and essentially to become sentient of my bodily existence, located here and now in this both biological and social place (Mer-

leau-Ponty, 1944, *passim*). That ambiguous yet pervasive thinking-through-my-lived-body is the datum with which, as a philosopher, I have to begin. (Des, 20-21)

To know is to surrender myself to reality. In the act of knowing a person or a thing, I must die to self and let the other dominate my attention. Polanyi teaches us that we must let self sink into the tacit dimension so that other persons or things can come into focus. If I insist on dredging up the subsidiaries of consciousness, the other reality will vanish from view. I know myself best as a knower not by putting me and mine at centre stage (although there is a place for some introspection in philosophy) but by catching glimpses of myself in union with reality.

'Reality' is the immensely vague, but immensely meaningful term used to sum up all that is other; when I treat myself as an object of inquiry, I enter into the fractal dimensions of self-referential thinking and think of myself as other, as a reality that differs from me. Following the pattern set by Lonergan in *Insight*, we think of ourselves thinking, understand ourselves understanding, and judge ourselves in the act of judgment. In doing so, we come in contact with the realm of nature:

The existence of nature, including animals, ourselves among them, is a starting point, not a conclusion. But note: I do not mean by this some arbitrary 'self-evident truth' or a *priori* principle, only the acknowledgement of *where we are*, of our real starting point It should suffice here to applaud those, obsolete as their views were soon to appear, who saw nature as a rich, hierarchically organised nexus of structures and ourselves as part of it. (Des, 136)

Self-acceptance in Grene's sense provides us with a starting point that can never be exhausted. This is one of Hofstadter's conclusions as he sums up the meaning of his reflections in G.E.B.:

All the limitative Theorems of

metamathematics and the theory of computation suggest that once the ability to represent your own structure has reached a certain critical point, that is the kiss of death: it guarantees that you can never represent yourself totally. Gödel's Incompleteness Theorem, Church's Undecidability Theorem, Turing's Halting Theorem, Tarski's Truth Theorem—all have the flavour of some ancient fairy tale which warns you that 'To seek self-knowledge is to embark on a journey which . . . will always be incomplete, cannot be charted on any map, will never halt, cannot be described'. (697)

To paraphrase the *Tao Te Ching*, the self that I can put into words is not my real self. I am not self-evident, nor am I self-explanatory. I have no formula that defines me precisely. I have no perfect proof that I exist. I am an abiding mystery to myself. This does not mean that I am unreal; it means that the Enlightenment demand to convert all realities into words is unreasonable. For Polanyi, what we know and cannot put into words is more important than what we can articulate.

Polanyi's assertion that we make 'contact with reality' is not a clear and distinct idea, nor is it reducible to other, simpler, more easily established propositions. It is a declaration of a matter of fact, an observation on our existential condition which points to the very heart of all facticity. When this proposition is cast into other terms or artificially constrained for purposes of a formal defense, it becomes vulnerable to the weapons classically deployed by rationalists: the terms cannot be reliably defined; there is no proof that humans know anything other than their own ideas; different cultures mean different things by knowledge; the argument is circular or trivial or meaningless; in the end, it is just one more opinion among many.

I think Polanyi was very wise to portray the idea of 'contact with reality' as a metaphysical vision. It is a Gestalt which makes sense out of all of our human experience. I

say it is true because I see it is true. I cannot communicate this vision directly to another person, even though it makes all the sense in the world to me. Every time I break the vision down into fragments small enough for formal argument against a relentless adversary, the whole vanishes and the parts turn to dust. Puddefoot repeats Wittgenstein's observation that 'we cannot say in language how language relates to reality' (LA, 62). I cannot make another person see reality as I do—unless they are willing to adopt my standpoint (another extremely fuzzy term) and interpret their interior experiences as I do mine. But in that case, they see for themselves, through eyes that have been changed by their own willingness to adopt a new Gestalt.

The undemonstrated and usually unarticulated assumption in Cartesianism is that if something is real, it can be grasped in clear and distinct ideas which, in turn, provide the basis of well-defined propositions and formal operations. Polanyi's standard is the very opposite of this. The more real something is, the less it is convertible into clear ideas and formal articulation. For him, if I can put it into words, it is not a very important reality.

The notion of contact with reality is intrinsically circular. It is both a conclusion about how our minds work and a point of departure for further reflection. It amalgamates an indefinite range of intellectual materials: memory, understanding, and will; sense experience past, present and possible; consciousness of conflicting views, especially the Kantian nightmare that we only

know the inside of our own heads and nothing more. Polanyi's insistence that we make contact with realities that may yet reveal themselves in indefinite detail is a fundamental, fuzzy Gestalt within his interpretive framework.

There are some who want to see Western logic overthrown altogether. I am not among them. For me, reality is not *maya*, illusion, as the Hindus and Buddhists teach, nor does the success of vague concepts and multi-valued logic mean that all efforts to strive for clarity and proof are in vain. As a realist, I believe that reality is what it is, whether I know it or not. The parrot is an integrated whole that I enter into by a similarly integrated act of intelligence and commitment. Before I know the parrot, it is what it is; as I come to know it better, whatever it is that makes it what it is makes me know what it is. The concept that we are in touch with the nature of things runs right down to the smallest details of the universe. An electron is what it is, whether I know it or not. We know now from the discoveries of physics that we cannot get to know an electron or any of the other quantum particles without changing them. Heisenberg's uncertainty principle is not itself uncertain. The development of quantum electrodynamics did not spell the end of classical mechanics; it simply put classical mechanics in a new context and demonstrated one of the boundaries of mechanism's utility.

It would be a mistake to draw the moral from Heisenberg's uncertainty principle that scientists know nothing about the inner structure of the atom or that Zen *koans* are as

good a description of physical reality as the periodic table. Such nonsense is bad science and bad philosophy. It is very wrong to reason from indeterminacy at the subatomic level to indeterminacy at higher levels. Physicists do not expect particle accelerators to be as hard to find as the particles they accelerate. The qualities of the whole are not determined by the qualities of the parts. Fuzzy logic and quantum electrodynamics have a rigour all their own that bars the door to absurdity. Quantum electrodynamics shocks expectations nourished on the behaviour of ordinary matter, but it yields astonishing precision (QED, 7):

Predicted magnetic moment for electrons: 1.00115965246

Measured magnetic moment: 1.00115965221

Both fuzzy logic and quantum electrodynamics have grown up as a consequence of exploring the limits of earlier formalisms; they do not annihilate their classical partners, but work with them to delineate just where indeterminacy lies.

Polanyi's vision of the self-in-contact-with-reality grounds his system in the most luminous fact of our experience: we know things. We don't know exactly how we know, and we can't say all that we see, and our words always mean more than we can tell, but we know enough about the process to take reason to heart, where it belongs.

Loyola Hall
Canisius College
Buffalo, New York 14208

Abbreviations

CMNS Gleick, James. *Chaos: Making a New Science*. New York: Viking Press, 1987.

Des Grene, Marjorie. *Descartes*, in the series *Philosophers in Context*. Minneapolis: University of Minnesota Press, 1985.

ESFS Negoita, Constantin Virgil.

Expert Systems and Fuzzy Systems. Menlo Park: The Benjamin/Cummings Publishing Company, 1985.

GEB Hofstadter, Douglas R. *Gödel, Escher, Bach: an Eternal Golden Braid*. New York: Vintage Books, 1980 [1979].

GMM Puddefoot, John C. *God and*

the Mind Machine: Computers, Artificial Intelligence and the Human Soul, foreword by John Polkinghorne. London: SPCK, 1996.

Continued on p.96

Angela Botez

1. Polanyi's epistemology

Polanyi and Blaga are two centennial philosophers who could be put into comparison. Both are philosophers who have abandoned the attempt to analyse science as the form of culture capable of complete objectivity, to analyse language solely in terms of its referential force, and to make representational knowledge impersonal and to split fact from value.

Michael Polanyi affirms the irreducible involvement of personal commitment in the perception and understanding of transpersonal reality. He is against the representational expressivist theory of language. According to his theory all assertions of fact express beliefs, and are essentially accompanied by feelings of satisfaction or of desire. The act of knowing includes an appraisal, a personal coefficient which shapes all factual knowledge. Polanyi emphasises the role of the activity of the knower in the formation of knowledge and also is aware of their variability while insisting that we aim at truth 'with universal intent' 'although we can never quite get there'. His book *Personal Knowledge* should help to restore science to its rightful place in an integrated culture as part of the whole person's continuing endeavour to make sense of the totality of his experience. 'True' means something different in different societies.

The critical period of Western philosophy, opened by Descartes and brought to its zenith in the Enlightenment, is coming to an end, and the post-critical era is emerging. Michael Polanyi, it appears to me, is the most important philosophical figure opening up this new direction and delineating its basic elements. Regarding the critical pretensions to have found a

way, either through philosophical rationality or by means of scientific method, to a universal perspective, Polanyi points out that thinkers of the critical period have pursued 'a mistaken ideal of objectivity'.

Thus, when we claim greater objectivity for Copernican theory, we do imply that its excellence is, not a matter of personal taste on our part, but an inherent quality deserving universal acceptance by rational creatures. We abandon the cruder anthropocentrism of our senses, but only favour of a more ambitious anthropocentrism of our reason (PK pp. 4-5).

Can we find traces of modernist doctrines in the Polanyi's theory of personal knowing? Starting with *reductionism*, it is quite clear that the answer should be 'No'. Not only is Polanyi's epistemology explicitly anti-reductionist but it is also quite clear that it is thoroughly holistic. And holism, as we shall see in a moment, is precisely a *mark of postmodernism*. Not only do we not find any reductionism in Polanyi's work, but we do not find any trace of the *representational-expressivist view of language* in it either. This is not to say that in his view language is not in the referring or expressing line of business. Rather, Polanyi tries to integrate both functions in his theory of the personal or tacit component, according to which all assertions of fact express beliefs (or judgements) and are 'essentially accompanied by feelings of intellectual satisfaction or of a persuasive desire and of personal responsibility'. This doctrine of the tacit component of assertion is in significant respects similar to Searle's theory of speech acts. So there is no modernism here either. According to the *objectivist ideal*, knowledge, in order to be reliable, must be *totally determi-*

nate, totally accounted for by empirical data. In this epistemological system, the *knower's* function is simply that of seeing clearly the meaning that inheres in the empirical, external data; it is emphatically *not* that of interpreting the data, since interpretation entails a personal participation that contaminates the pure data with an unreliable element.

In the first chapter of *Personal Knowledge*, titled 'Objectivity', Polanyi redefines objectivity, stripping away the objectivist meanings that he has found distorting the proper meaning of the term. Objectivity, he insists, does not mean an utter dependence upon empirical data. The *objectivity* of Copernicus, which objectivism holds up as a model of *reliance on empirical data*, was not this of objectivity at all. In fact, the preponderance of empirical data supported the proposition that the sun orbited around the earth, not Copernicus' heliocentric theory. The objectivity that Copernicus modelled—true objectivity—is a knowledge which *relies to a greater extent on theory rather than on more immediate sensory experience*. Objectivity is the capacity to make the creative imaginative leap that synthesises the data into a comprehensive, rational theoretical structure that can be shown to be true from numerous perspectives beyond simply the logical perspective that one has on the empirical data.

Polanyi says,

According to the theory of *Personal Knowledge*, all meaning lies in the comprehension of a set of particulars in terms of a coherent entity—a comprehension which is a personal act that can never be replaced by a formal operation (M).

The *triadic* structure of personal knowledge distinguishes Polanyi's epistemology from both objectivist epistemologies and subjectivist epistemologies. An objectivist epistemology rejects the vital role of the knower in interpreting or comprehending the empirical data. A subjectivist epistemology rejects the empirical data as contributing to any ultimate meaning. Personal knowledge is characterised by a *bipolar commitment*. This commitment has both a personal and a universal component. Or, as Polanyi summarised it at one point:

We have seen *tacit knowledge* to comprise two kinds of awareness, *subsidiary awareness* and *focal awareness*. Now we see *tacit knowledge* opposed to *explicit knowledge*; but these two are not sharply divided. While tacit knowledge can be possessed by itself, explicit knowledge must rely on being tacitly understood and applied. Hence, all knowledge is *either tacit or tacit knowledge*. A wholly explicit knowledge in unthinkable (KB p. 144).

The implications of Polanyi's conception of knowledge could be :

First, the fiduciary dimension of knowing is recovered. Humans rely upon elements from their social location, tradition, and community in order to affirm that what they believe is knowledge.

Second, the knower in post-critical perspective is not an individualistic knower but rather he is shaped by and relies for validation upon the community and its culture, which the knower embodies. Critical hermeneutics is dyadic in structure—the knower and the known. Post-critical hermeneutics is *triadic* in structure, involving a knower rooted in culture and community, that is being interpreted within its context, and those for whom the interpretation is intended, who are also rooted in culture and community.

Third, the structure makes it impossible to accept the detached objectivism of critical epistemology as a certain path to final Truth.

Indeed, the dichotomy between subjectivity and objectivity in knowing is dissolved, and a quite different conception of what is true and real emerges. As Polanyi puts it 'To hold a natural law to be true is to believe that its presence will manifest itself in an indeterminate range of yet unknown and perhaps unthinkable consequences . . .' We meet here with a new definition of reality. The real is that which is expected to reveal itself indeterminately in the future. Hence an explicit statement can bear on reality only by virtue of the tacit coefficient associated with it.

2. Blaga's epistemology

In the same manner the Romanian philosopher Lucian Blaga, (1895-1961) realised that science is unstable, an instability brought about by the very historical relativity of cultural creations of which science is a part. Science is obviously influenced by the categories of styles, by the force-lines of a stylistic field (matrix). The value guiding man to knowledge is truth. The definition of truth itself as a positive adequacy of a content of knowledge to reality is actually only a desire, notes Blaga. He criticises the theories of science which reduce all knowledge to what he calls, 'Paradisic knowledge' in which certain *invariant categories are applied in perception and representational cognition*. Science also requires 'Luciferian knowledge' which applies *deeper categories, stylistic ones, relating to man's existence within the horizon of mystery*.

Empirical observations, maintained Blaga, obviously go hand in hand with certain interpretations. Interpretations, in their turn, are marked not only by theoretical perspectives, but by psycho-sociological frameworks, too. The numerous interpretations that cumulate in the body of science as pure and available material are far too often imbued with 'theory' and moreover, the same material of

simple observation is in reality contaminated by the 'stylistic' orientations of the human mind. 'We Europeans since a Leonardo da Vinci, a Galileo, a Newton laid the foundation of sciences, since a Descartes, Leibniz, Locke and Kant legitimised the possibility of science, have lived with the belief that it is a perennial intangible and superhistorical entity.

We had to experience shocks like those caused by the theory of relativity and wave mechanics to realise, in a lucid manner, that science is unstable, an instability brought about by the very historical relativity of spiritual creations of which science is a part.

Science comprises a constructional part in which occur theoretical construction obviously influenced by style. Science, therefore, is not superhistorical: it is born in a field of socio-cultural force-lines that shape it. As a matter of fact, the results of science are brewed also on the intellectual horizon of the human being and they emerge as 'values'—alike to those produced in the ethical field and on the aesthetic plane.

For the sake of man's self-preservation, the philosophy of science has reduced science to a type of empirical knowledge. But for science, empirical data are but a threshold: one must go beyond them and interpret them in the light of theoretical stances. Scientific fictions do not appear only on a biological and pragmatic level as technical contrivances do; they are the outcome of a specific intellectual purpose. Blaga's stylistic studies of science demonstrate that anthropology and the study of culture are capable of shedding light on the philosophical problematics of science especially by elucidating the nature of creative factors in the history of thinking. He claims: It is worth observing that, due to the quantum theory, modern physics affirms the antinomic structure of light: the phenomenon of light is perceived as being an 'undulation' as well as something 'corpuscular',

which is a logically incomprehensible paradox. Still, some experiences necessarily demand this antinomic solution. This is why modern physics is subject to a crisis, Blaga believes that he has succeeded in demonstrating that this undular-corpuscular theory of light's nature is actually a *part of a sui-generis type of knowledge, that he called 'minus-knowledge'*. 'It is not a crisis of modern physics but a new type of knowledge that we're dealing with'. We already know that Kant built a theory of knowledge that was actually meant philosophically to justify Newton's classical physics. Newton's physics only represents a particular case for modern physics. Thus, the necessity for philosophically justifying new constructions in physics by means of a new theory of knowledge, is imperative. This is, essentially, what Blaga tried to achieve in *The Dogmatic Aeon and Luciferian Knowledge* especially, by providing the theory of knowledge with the concept of 'direction'. Knowledge has not, the belief is since Kant, a unique direction (plus), i.e. to 'attenuate' mysteries, by means of an infinite theoretical process; knowledge has two opposite directions that is, plus and minus. And there are circumstances when the 'minus' direction is required that does not attenuate a mystery, but, on the contrary, intensifies and radicalises it, rendering it in formulas exclusively antinomic.

Thus, the new idea appears as a 'bridge towards the cryptic' (as an apprehension of essences) in a *theoric* (paradigmatic) kind of thinking. The mechanistic and the relativist ideas, Blaga says, are the *theoric* ideas by which Newton and Einstein, respectively, opened the horizon of a *mystery*, proposing theoretical constructions for the qualitative attenuation of the open *mystery*. More over the *theoric* idea carries weight in the structural joints of *Luciferian knowledge* even when it is dismissed later on (see the idea of phlogiston). The *theoric* (paradigmatic) function can be ful-

filled by a principle, a law, a category, a concept, a scheme. The achievability of *theoric* is one of the problems mentioned by Blaga that represents something similar to the capacity of scientific paradigms and their scope of applicability as imagined by Kuhn. Luciferian knowledge is very often achieved through *Minus-cognition* which means neither a lack of knowledge nor a harmless label stuck on all the mistakes of cognition, but, instead, a type of cognition conducted in a direction somehow contrary to the usual one, a cognition capable of progress and motion ahead. The minus-cognition formulas go from a minimum of incomprehensibility to a maximum of incomprehensibility, which is seen as an abstract build-up, with no correspondence in the factual world. *Minus cognition* is not anti-logic but meta-logic; it does not deny, but, on the contrary, it delineates perceptions through new logic. It expands the unknown by defining it, by formulas, therefore, this kind of condition is properly named minus-cognition, as against the plus-cognition which curtails the unknown.

3. Polanyi and Blaga

In an article 'Some Notes on Michael Polanyi and Lucian Blaga'⁵, R.T. Allen observes that the two philosophers were both interested in the deep structures of the mind and its knowledge, the structures of which they both emphasises. We are not normally aware that they guide our proximate knowledge and action. Both of them were thus radically opposed to those empiricist and representationalist theories which, in Locke's words, regard the mind as a 'blank tablet' passively receiving 'impressions', and to Positivist philosophies which deny the very existence of frameworks of thought and interpretation of experience. Equally, and unlike Kant, they had a sense of the historical and developing character of those structures

and frameworks, yet, unlike many post-modern thinkers, they also emphasised our commitment to truth and to revealing the real world that is independent of our knowing. These are the lines that any genuine philosophy must take. In particular, they both recognised that reality transcends our cognitive abilities and that it cannot be confined within any formulas. Blaga regards mystery as an essential and distinctive feature of man and human awareness, a permanent background to all our knowledge. He criticises the theories of cognition, and especially of science, which reduce all knowledge to what he calls Type 1 (or 'paradisic') knowledge, in which certain categories, not varying greatly across history, are applied fairly straight-forwardly in perception and action. In contrast, science also requires Type 2 (or 'Luciferian') knowledge which applies deeper categories, relating to man's distinctive existence within a horizon of mystery and revealing those mysteries. These categories are much less fixed and general, and are themselves guided by yet deeper, 'abyssal', categories which form a 'stylistic field'. Blaga rejects the Positivist characterisation of such categories, e.g. teleology in biology, as 'useful fiction', and stresses that they function to reveal mysteries. Polanyi likewise emphasises the roles of intellectual frameworks and the activity of the knower in the formation of our knowledge, and also is aware of their variability while insisting that we aim at truth 'with universal intent', although we can never quite get there, a point that Blaga also makes. Polanyi again criticised the 'pseudo-substitutions' offered for the notion of truth ('economy', 'simplicity' Kant's 'regulative ideas') which tacitly trade on the notion of truth which they are supposed to replace. He also maintained that reality outruns our attempts to know it and that it cannot be confined within our formulas. He developed a doctrine of degrees of reality: that the more an object

reveals hitherto unsuspected aspects of itself, the more real it is; so that minds are more real than stones. And in his account of tacit knowing he showed that 'We know more than we can tell' (TD p. 4), that aspects of both the object known and our activity of knowing cannot be made explicit and put into words and formulas. In that respect he too holds that mystery is an essential part of man and his life in the world. Also in Blaga's conception of 'minus-knowledge', the

function of which is not just to show that certain questions, problems and lines of research are empty or fruitless (the discovery that there is nothing to be discovered) but to reveal that there is a mystery and not a final formula, more to be known, and a deepening of the revealed mystery.

A question arises about 'minus-knowledge': How can we know what we do not know? For, it seems, either we know something or we know not; either it is

revealed or it remains unknown. Polanyi provided an answer to this question. All our knowledge is the tacit integration of one set of things *from* which we attend into a focal apprehension. Blaga answers: All the discovered truths enlarge the area of what we do not know, structure the unknown.

Institute of Philosophy
Romanian Academy,
Bucharest

Notes:

1. See, A.F. Sanders, 'Tacit knowing between modernism and postmodernism', *Tradition and Discovery*, Vol. 18, 1991-2.
2. See, Charles S. McCoy, 'The Polanyian Revolution', *Tradition and Discovery*, Vol. 18, 1991-2.
3. L. Blaga, *Trilogy of Value (Science and Creation)*, Bucharest, Editura Fundatiilor Regale, 1942, p.74.
4. Horia Vintila, Foreword to *Eonul Dogmatic (The Dogmatic Aeon)*, French trans., Paris, L'Age de l'homme, 1986.
5. R.T. Allen, 'Some notes on Michael Polanyi and Lucian Blaga', *Revue Roumaine de Philosophie*, nr. 1-2, 1996.
6. Angela Botez, *Blaga, Creation and Cognition*, Bucharest, Cartea Romaneasca, 1983.

Continued from p. 92

- LA Puddefoot, John C. *Logic and Affirmation: Perspectives in Mathematics and Theology*, number nine in the series, *Theology and Science and the Frontiers of Knowledge*, General Editor, T.F. Torrance. Edinburgh: Scottish Academic Press, 1987.
- PK Polanyi, Michael. *Personal Knowledge: Towards a Post-Critical Philosophy*. Chicago, University of Chicago Press, 1962 (1958). 'Torchbook Edition', with unique preface—New York: Harper and Row, 1974 (1962).
- QED Feynman, Richard P. *QED: The Strange Theory of Light and Matter*. Princeton: Princeton University Press, 1985.
- TME Davis, Philip J. and Reuben Hersh. *The Mathematical Experience*. Introduction by Gian-Carlo Rota. Boston: Houghton Mifflin, 1981.
- VI Polanyi, Michael. 'The Value of the Inexact', *Philosophy of Science* 3 (1936) 233-34; *Tradition and Discovery*, XVIII 3, 1992, pp.35-6.
- WWFL Gardner, Martin. *Weird Water and Fuzzy Logic: More Notes of a Fringe Watcher*. Amherst, NY: Prometheus Books, 1996.

WORKING PAPER: SUBJECT AND OBJECT

J B. Labia

The following is an attempt to cope with the above in a non-Cartesian (non-dichotomous i.e. non-dualistic) way, compatible with optimising adaptation.

A. The key conceptualisation is to recognise that subjectivity and consciousness, that inner light and hallmark of consciousness, are generated on a material base i.e. in and through the body and brain of each of us. Personal subjectivity and material objectivity are quite distinct, though variously interlocking, concepts, as are their respective subject matters. Such albeit incomplete, interlinking is illustrated by psycho-somatics, mind and body mutually influencing each other, besides the ability of the mind to affect itself through insight.

Donald Davidson clearly brings out the type/category difference between the concepts of mind and body, making impossible any 1-to-1 mapping between them. Thus, for example any sort of say, electronic recordings of a patient's brain activities could never fully indicate his feelings and thoughts at the time—that would involve an 'intentional' fallacy—though links between them would be noted.

B. Davidson convincingly explains how we use and rely on two different sorts of reasoning and understanding, both appropriately empirically (albeit to, respectively, different degrees of speciality, clarity and precision, and internal consistency, constancy and coherence), and, in various ways, interconnecting.

Thus (a) on the one hand, *scientific concepts and thinking* are essentially intellectual and humanly remote, involving, at their most basic, construing and competently experimentally (empirically) vali-

dating, deterministic patterns of behaviour of fundamental entities or events (the determinism involved being probabilistic).

Though gestaltically and holistically achieved—see below, the building up of such concepts is exclusively concerned with items of scientific type and interest, amenable to the scientific method. The build-up is, successively, based on quantum-physics (microphysics), macrophysics, chemistry, biology up to the level of the central nervous system., and brain development, each *stage* resting on the one more fundamental and immediately below it, *which* leaves intact, but controls, the latter, albeit respecting certain boundary limitations.

These concepts (duly appropriately empirically validated) are directed at the identification of automatically operating causal connections in physical nature, and are accordingly *reductionist* in intention and format (in physics, formulae containing clearly specifiable, operantly derived, variables, which can be accurately measured in uniform units). As such they are specifically denotative, testable and reliably applicable (as operantly defined and constrained).

(b) On the other hand, unelaborated preconceptually experienced, conscious states plus more complex, individually and socially directed, adaptive and involved (whether involving common sense or moral or all round and balanced judging) conceptualisations, constitute the indispensable, *human side of truth*.

They are consensually (intersubjectively) recognised, and consist of variously mutually sustaining, diverse themes. We rely on them in rational argument and for interpreting one another's behaviour) and in setting standards and values, and in

making holo-empirically constructive and sound judgments. Also, our institutions and social arrangements are justified by them. These differ, to a degree, irreconcilably (i.e. with unbridgeable gaps), from the above type (a) conceptualisations:

- (1) their build-ups are also holistic, but more intimately/humanly involving and concerned, than (a) ones, and are more comprehensive and diversified, intellectually and emotionally, in intent and content;
- (2) their format is correspondingly different and varied.

The gestaltic—holistic process in type (b) conceptualisations, in contrast to (a) ones, includes contributions from a greater mix and variety of cues, in which we subsidiarily dwell (see below), in order to reach the focused upon and sought, corresponding solutions/achievements. The cues concerned are drawn from various sources, stretching from relevant humanly-concerned themes (whether intellectually or emotionally based) to various, possibly relevant scientific conceptualisations (essentially of an intellectually more reductionist level). The gestaltic—holistic process involving mixed clues is well illustrated by the making of holo-empirically constructive and sound judgments, and similarly in making diagnoses with a pragmatic and practical approach backed by double-blind trials. Note that the above unelaborated, preconceptually experienced, conscious states are irrefutably and exclusively a direct, genuine guarantee of our characteristically, human conscious sensitivity (apart from our extending their ilk to certain higher animals). As such, they constitute the unequivocal and crucial foundation of human ethics and responsibility,

which it would be dangerous and unjustifiable to accord to very advanced robots, even if they pass, under its circumstances, the inadequate Turing Test.

Note that the subject matters of both (a) and (b) conceptualisations seem clearly to have evolved successively in and through their shared *base in matter (and/or energy)*. (Note too our concepts' great dependence on language.) However, *their* development and use does not justify certain leading scientists, such as R. Penrose and William Hawkin, in claiming that all necessary, adequate and valid understanding is encompassed by scientific truth alone. Such an *idiot savant*, purely reductionist, outlook would do away with (if genuine and taken seriously) humanly vital concepts, e.g. those concerning individual dignity and freedom, decent standards of behaviour, spirituality etc. The latter are conceived of as eternal, whereas conceptualisations in (a) and (b) deal with what is essentially transitory and while their conceptualisations can be enormously valuable to us—see below, they also need, as in those of type (b), to be holo-empirically constructively and soundly evaluated and confirmed as beneficial.

Essentially human is, accordingly, the evolved and civilising belief in, and affirmation of, one's own and others' individual sense of responsibility and worth, and in and of their due promotion and protection, intersubjectively and institutionally (A. Kolnai).

C. Our insights into, and limited understanding of, this transcendently spiritual realm are opened up through study, prayers, meditation, various experiences, etc., and are very important to us individually and collectively (see below), in particularly morality and its development and sustainment. Of course, their practical effects need holo-empirically constructive and sound vetting and, depending on this, their contents and forms of expression may need modifying and updating.

They also require regular refreshing through prayer, meditation and appropriate practices, that enable and strengthen commitment. Daily cultivated, spiritual understanding helps us realise the limitations in ourselves and our powers and achievements (individual and group). It helps us to combine, all too necessary humility, with a due sense of pride, in right, good, innovatively creative and beneficial, achievements by ourselves and others.

It also provides us with a greater, overall (i.e. not merely parochial) perspective, uplifting, civilising and *uniting* (when evaluated and constructively interacted and practised—see above) which also accommodates healthy diversity and encourages and guides our concern for humanity (individually and collectively).

Especially importantly, it helps us to rise up against an exclusive immersion in materialistic concerns (commercial, hedonist, power- and position-seeking, and dogmatic panaceas), and also the better to deal with the certainty of the physical extinction of each of us and our species (99% of all species that have ever existed are now extinct!), thanks to providing a transcendent sense of hope, of our particular, and life's, worth-while-ness, and so to avoid our passing into narrowly rationalistic nihilism. Similarly, it helps us counter the rising tendency towards a technologically sophisticated barbarism (especially encouraged by the electronic media and their general debunking of standards), affecting values, attributes, habits and interests (largely, now superficial, short-lived, sensationalist and dissociated) for the worse. Finally, spiritual insights may lead to our developing inner subjective coherence and direction, as opposed to being at the mercy of the vagaries of chance, whims and fancies. Its cultivation may open to us a sense of transcendent unity, which embraces both the scientific truth, concerning identified and interlocking and fixedly interacting units (as

duly empirically substantiated), and also truth, based on human concerns and ways. In so doing, it could even overcome transcendently, the practical and logically unbridgeable gap between those two types of truth (over and above their recognised interconnections). These two aspects of truth could dissolve into a total unity, thanks to its insights.

D. In addition to concepts and attitudes of types B (B (a) and B (b)) and C, there are also various others to do with our individual personal and authentic bent and the constituents and needs of our idiosyncratic identities. These involve temperament (intellectual and emotional) likes, dislikes, ways, habits, interests, loyalties, ideals, commitments, attachments, 'hang-ups' and sensitivities, any of which may change considerably or quickly. Into these we may be largely lacking in insight, and some may even be due to medical abnormality. However, in sound individual development, these disparate elements respond to education, and adapt towards mature, civilised, creative, and integrated control and corresponding actions (which obey holo-empirically constructive and sound judgment), both in the individual and public spheres of civilised behaviour and organisation.

E. The process of generating B (a) and B (b) [and C] conceptualisations is gestaltic, as lucidly depicted by Michael Polanyi. In reaching conceptualisations bearing upon all types of truth and the solving of problems, we dwell consciously, but subsidiarily, in learned clues (whether intellectual or technical skills or general experiences) which we expect to be relevant, while also simultaneously relying on the associated neuro-cerebral infrastructure.

While thus occupied, we devote our attention to, and focus on, the meaning and answers which we expect to emerge in consciousness. The answer thereafter requires to be duly assessed and tested for a good

'fit' If it is not, the whole process is repeated and new or different clues are used. Note that if we dwell *in* and not *from*, the clues, the answer we seek, cannot appear. Instead, details of the *clues focused upon* will appear. The clues, appropriate and subsidiarily dwelt in, must be allowed to operate and be integrated tacitly, in order that the meaning or answer may eventually emerge into consciousness. In this gestaltic holistic process, our developed language skills are of paramount (? indispensable) importance except for the learning and applying of motor skills. With reference to the latter, Polanyi points out (e.g. in the use of a probe) that they become, once their employment is mastered, an extension of one's ego and fall within the ego's boundaries as one's attention is focused upon identifying the physical characteristics of the object being examined. From and through this process of discovery, *we can see why the best disclosure of one's (subjective) self*, this flowing and directly self-illuminating identity, differs from the more static reference-framework we normally call our identity (a mixture of self images and key loyalties, beliefs, interests, achievements, skills and habits—a somewhat similar one is attributed to as by others, as part of social intercourse) *can be gleaned from one's ongoing feeling, thinking and active behaviour* (pace R. Feynman, who considers that each of us is a constellation of selves, loosely associated). However if we focus inwardly and analytically, i.e. introspect (which can be, under certain conditions, therapeutically helpful), the authentic, proper self is missed (compare what emerges when we focus on clues—as described above). However, one's 'I' is revealed best in its various guises and aspects, when it is inferred from reports and observation of the patient's or person's behaviour, when he focuses outwardly his attention in order to reach meaning.

In this general connection, Michael Tie points out that there is

a type (and not merely token-involving) difference between Phenomenal Appreciation—not yet conceptualised, conscious imaging ('Poised Abstract Non-Conceptual Intentional Content')—and the further phase, Conceptualisation.

F. In general then, we may say that we picture the subject as being, though materially rooted and transcendently guided, a living, conscious, potentially creative and socially responsible, agent. 'He' is intersubjectively conceived and accepted, as such, and, as operating through, while simultaneously being a creature derived from, consciousness and conceptualisations. The latter, in turn, are the dependant products of the powers inhering in an *object*, i.e. the material, constituting our brain (and nervous system). Though Subject and Object are variously connected, there is, as D. Davidson makes clear, an unbridgeable gap between them, and their respectively associated types of truth (concerning respectively, scientific determinism and understanding human relations and actions).

Scientific concepts, as well as those of type (b), are essentially holistically accomplished. They are greatly facilitated and enriched by spoken and written language (and symbols). This is lucidly brought out by Polanyi (and strikingly similar to Jan Smuts' thinking in *Holism and Evolution*, 1926). Those of type (b) are gestalted 'more loosely' from heterogeneous clues, though even the more diverse and humanly concerned ones—to do with interpreting etc. our behaviour—are broadly mutually sustaining and interrelated. From similarly mixed clues arises our indispensable activity of the making of holo-empirically constructive and sound judgments, as an empirico-practical and pragmatic exercise. However, those of type (a) are gestalted from more homogenous clues and cumulatively integrated, as they become ever more coherent and basically condensed.

So scientific truth is reductionistically directed and presented. It is more conclusively specifically and precisely testable, and, as such more readily and universally accepted. It is *denotative*, and is basically concerned with physical nature, with reductive description (wherever possible duly experimentally accredited), and with increasing our manipulative and predictive (and, of course, explanatory) powers.

However, human truth is thematically diversified and less coherent. It is less precisely expressible and less unambiguously conclusive. So, it is less readily intersubjectively acceptable (even where, to varying extents substantiatable). It is *connotative* and concerned with human nature and its holo-empirically constructive and sound evaluation, expression and management.

Thus, though 'Subject' and 'Object' are distinct conceptually, yet, as concepts and hence their subject matters, can in ways be linked and interrelated. No Cartesian dichotomy is involved—as is well illustrated by our making, every day, multi-clued judgments. Accordingly, subject and object can interact, and the subject (man) can advantageously (1) modify his behaviour or (2) develop appropriate skills to modify the environment.

In this general connection, truth would seem to be the appropriately tested and accredited as sound, variously helpful and reliable (more especially in scientific truth), understanding, whether it is 'thing'-related, human-related, purely personal (i.e. non public) or spiritual.

The goal of truth is conceiving, interpreting or reaching (as far as one can progressively go, e.g. in science) the various aspects of reality.

Epistemology is the study which expounds the grounds justifying an approach to truth. In the above case, these are gestaltism and holo-empiricism, constructively motivated.

St Brélade, Jersey

DISCUSSION

'Common Faith'

The following are edited extracts from an exchange of letters about the review, in the previous issue (*Appraisal*, Vol. 2, No.1, p.48), of Mr Kevin Mott-Thornton's *Common Faith*.

We would welcome similar exchanges, whether they arise from items published in *Appraisal* or independently.

KM-T:

I am just writing to thank you for taking the trouble promptly to review my new book, *Common Faith*, in the March edition of *Appraisal*. I am also grateful that you saw fit to be so positive about, at least, certain aspects of the book, e.g. its exposure of untenable assumptions in current educational policy-making.

However, I was disappointed that the more critical section of your review was, I think, based upon some misunderstanding of what I had written and I have taken the liberty of trying to identify some elements of this below so that you might reconsider the merits of what you call my 'more positive proposals'.

You are critical of my attempt to define a notion of 'spirituality'. However, your challenge suggests that you see this as part of a recommendation for the direction of the development for children in schools. If that had been my intention then you would be correct in suggesting that it is too minimalist. However, I take a lot of trouble in the book to explain that I do not intend the definition itself to form the basis for a programme spiritual development but rather a basis upon which policy makers might come to agree, at least, about the area of the spiritual the *development* of which might engender controversy. Given that, I think it is a little unfair to say that while it does not embody (as it stands) the kind of view of a developed spirituality along theistic lines to which you and many others subscribe, it is certainly capable of accommodating and instantiating such an approach *but*, crucially, without ruling

out other conceptions of a developed spirituality that involve no reference to God. If you take this attempt to accommodate atheism as a fault rather than a virtue of my approach then I think you have to attack not my definition but my political arguments against the likes of David Carr and John Haldane.

RTA:

Part of your dissatisfaction stems from the lack of space that I had. It was either half a page or 4 pages! I'm sorry that my cramped comments have caused some misunderstanding.

Firstly, your notion of spirituality. My criticism is not so much that it isn't theistic (though I think that non-theistic spirituality is either thin or dangerous) but that it isn't really concerned with anything that is or has been properly known by that name. As you will have gathered from some of my publications, I totally oppose the Positivism that has ruled 'philosophy of education' (i.e. a non-philosophy of schooling, and state schooling at that) and which has insinuated its own militant Secularism under the disguise of 'neutrality' and a phobia about 'indoctrination' by assuming, and never arguing, that metaphysics and metaphysical beliefs are all nonsense anyway, and therefore quite superfluous. But spirituality is more than the possession of metaphysical beliefs and frameworks (what I have called 'Cosmology and Way'). In one sense of the term, common in German philosophy, we are all necessarily 'spiritual' and not just 'mental', in that we cannot but have a conception of the 'world', the sum of things, and of our place and destiny in it. Yet that

is not the meaning of 'spirituality' in English. So apart from your distinction between a programme for spiritual development and the area of the spiritual, it still seems to me that either you have chosen an inappropriate term for something which I agree is important, or that, if you do mean what is normally meant by the term, what you have marked out is too wide. Moreover, I do not think that any day-school can do much about spirituality in its proper meaning, simply because it takes time and cannot be done *en masse*, unlike religious instruction and public worship which expresses and maintains but does not usually deepen the worshipers' present level of spirituality. That, in all traditions, requires privacy and intimate contact with a guide. Have I misunderstood you? Are you interested in the former and not spirituality proper? If so, some of my criticism does not apply.

KM-T:

In the second section of the review you say that I have insufficiently liberated myself from 'illiberal liberalism'. However, I had hoped to make it clear in the book that I wanted, in part, to work within the liberal framework to demonstrate that it cannot be used to support some of the policy assumptions that 'liberal' educationalists take for granted. I would have thought that I deserved a little more credit for this rather subtle attempt to undermine 'liberalism', as it were, from the inside. Autonomy is not put forward as something precious in the book. On the contrary, I show that an attempt to offer development towards individual autonomy without some prior commitment to what

you might call some particular and substantive 'concrete tradition of spirituality' would actually constitute a violation of the very best principles of liberalism. Again, I would have thought that this rather bold attempt to undermine liberal assumptions, even if unsuccessful, would have deserved at least a word or two of praise from someone with a background in post-critical philosophy, if only for its cheek.

Finally, you criticise my characterisation of the pluralist position that I set out in chapter 7 as 'conservative'. However, you don't mention that I attempt to give a very particular characterisation of the conservative tradition. You assert that I have got it wrong but you don't attempt to say why my view should be anti-British or anti-Christian. On the first, I would say that pluralism is at the heart of what Britain is—after all we are three nations combined. I think you are right in thinking that there is some disagreement amongst conservatives over the relationship between the state and the promotion of Christianity. You may be right in suggesting that I have got it wrong in attempting to associate the heart of the conservative tradition to a commitment to minimal interventionism on this front. However, I think there is much evidence in the direction of Tory reforms of education over the past few years that Conservative politicians see their role as enabling local educational communities to be largely self-determining, at least on the issue of school ethos and personal development. To quote from the previous Tory spokesman on education, Stephen Dorrell: 'Children are different and schools should reflect the differences of the children, the communities they serve and the views of people that work in the schools' (quoted from the *TES* 27/2198, p.15). I think it is a pity that your review tends to suggest a model of the conservative tradition as essentially authoritarian and backward-looking—one that

would only be welcomed by its political enemies. It is through a thorough-going commitment to the autonomy of families and real educational communities, rather than to some global commitment to the autonomy of young individuals that the Oakeshottian conservative tradition is truly liberated from the authoritarian liberalism of the current educational (and political) 'establishment'. I take it from your comments that you conceive of a conservative tradition where policy makers intervene in education to ensure that Christianity is promoted and where the cultural status quo is maintained? How would you justify this where the children from atheist and non-Christian religious families are concerned.

In your view, what should be the approach to issues of spiritual development by policy makers working within the state school sector? Should their approach have to reflect the views of a single religious tradition, for example, Christianity? How might that be justified?

RTA:

I wholly endorse, though until now I did not really appreciate, your attempts to undermine 'Liberalism' and its dogma that we should not have dogmas; its prejudice against prejudice; its mind closed to the need for a closed mind; and its mendacity in passing off its very substantive policies as neutral 'procedures'. In education as in life, there is no neutrality. With an industry and patience that I have rarely been able to summon, so much is my dislike for the deceptions of the 'London liners' (note the difference in tone between my comments on them and the rest of my *Education of Autonomous Man*), you have taken them apart one by one and revealed the particular shifts and dodges of each, and from within the very establishment that spawns them! Here again I may have misunderstood you. Perhaps, in order to undermine

Liberalism from within, you have not criticised all of it and so I have wrongly taken your silence on such matters to imply your continuing consent.

As to whether your position can be properly called 'Conservative', I totally reject any system of state-provided education. I want vouchers: a real choice for all parents of which school, if any, they will send their children to, and real choice by teachers of what sort of schooling they will offer. You rightly see the very important difference, which I had not space to mention, between the Conservative notion of a state which protects and fosters an independent and spontaneous order of society, and all other systems which deliberately seek to interfere with it in promotion of some alien and abstract plan, including historic Liberalism insofar as it went beyond the necessary adjustment of current arrangements to changing conditions in order to preserve them. Our London liners are statists and collectivists: specifically they aim at liberation *via* the state not from it, liberation from 'prejudice', 'dogma', 'tradition', 'authority' by means of a centralised, Rationalist and Secularist system of state, collectivist and comprehensive schooling just as much as any Continental illiberal Liberal, though, of course without honestly saying so.

But, and it appears that here we differ, I hold that Conservatism, in the very act of protecting the spontaneous order of society and traditional differences, must protect them against alien usurpations. It is not in favour of 'pluralism' *per se*, for that must mean the favouring of any and every difference, and must logically lead to the break up of the state into communalisms. Hence my reference to marriage laws. Your example of divorce does not go far enough; what about polygamy? Why do we 'discriminate' against Muslims and at least some Hindus? And what about food laws and all the other things that a Muslim must do to be a Muslim,

and likewise Hindus, including the caste system (except that they have all lost caste by crossing 'black water', the sea)? Multiculturalism is the subversion of national and regional culture, just as 'multi-faithery' is the undermining of faith.

Of course, to some extent this is disguised in a Christian country, precisely because Christianity, in fact and logic the only Catholic or World Faith, has alone abolished all 'codes' and can be lived anywhere and by anyone, and alone clearly demarcates a difference between the temporal and the spiritual (in another sense!) and recognises the legitimacy of government for the affairs of this world but not for the next, and certainly not for attempting to realise the next in this. Consequently, it can appear to overlap with, endorse or even entail Liberalism, and Liberalism both has resulted from it and rests upon it, although in the long run it undermines it and thus itself. (I give this some attention at the end of my *Beyond Liberalism*, recently published by Transaction.) But when the followers of Ways which are Codes—sacralised and detailed ways of life—increase in number, something must give, and certainly a Liberal state will be unable to contain the problems of communalism, especially if it is publicly committed to pluralism.

It would have been unfair to expect you to address these problems in your book, though they in fact form the actual political context for the problems with which you deal, but I did wish to raise a warning about 'pluralism' and the need to limit it, especially from a Conservative position.

Furthermore, I do not take Oakeshott as my paradigm of Conservatism, but Edmund Burke. Oakeshott, at best, was a pragmatic, Liberal Conservative, and had little sense of the essence of Conservatism, the maintenance of local and national identity—our traditions and institutions are what we are—nor of the duty of government

to maintain it and them, especially those of religion and the family, the bases of society.

KM-T:

Your extended comments make your criticisms a little clearer but I still think they involve some misunderstanding of the book. On the definition of 'spirituality', you seem to be adopting a very similar line to that of David Carr. This is evident in your comments that it is 'too wide' (i.e. it is not distinctive enough) and does not reflect normal English usage (i.e. it goes against some detectable pre-existing consensus). As you will see from my extensive discussion of that view (in section 2.2 on p.13f, entitled 'Distinctiveness, Consensus and Language') I take it very seriously. However, I think, I deal with it effectively to the point where critics who still wish to adopt it must address my arguments directly and in detail before issuing a summary dismissal.

I find your general comment to the effect that day schools cannot do much about spirituality somewhat puzzling. If that is the case why are you concerned about the subversive effects, of for example, a secular liberal approach to the teaching of Religious Education? So I think my concern that the issue of spirituality is addressed by day schools (though I agree that their contribution may be only small and that spiritual education is a much wider phenomenon) is actually implicit in your own criticism of the blanket promotion of autonomy in day schools. You presumably want to maintain that the blanket promotion of liberal values constitutes the promotion of something with spiritual implications for the child. How could you communicate your conception of harm in this sense to a liberal educationalist without recourse to something like my definition of 'spirituality' i.e. to something which identifies the domain but without building in a particular

view of how it should be developed?

RTA:

Unfortunately, 'spirituality' and 'spiritual' have become fashionable words and I think that it is even more important to be careful about their use. I have no quarrel at all with what you in fact are concerned with. It matches the German (certainly, Max Scheler's) distinction between the '*geistig*' which is peculiar to man and essentially includes an awareness of the 'world', the totality of things and of our place and destiny within it, and the '*seelisch*', ('mental' or 'psychical') which in the case of even the highest animals never rises to include the former. But that, I insist is not the English meaning of the words. They refer to an inner *ascesis*, and hence my contention that it cannot be done in ordinary lessons. Its development requires the intimacy of the retreat and a spiritual director, quietness and solitude, as all traditions acknowledge. Boarding schools could, perhaps do, offer it, just as they can provide confirmation classes. But that day schools cannot provide for its development does not mean that they cannot subvert it, just as they can and do subvert much else which they cannot directly develop or cannot be the primary agents for developing; e.g. good manners. The primary agency for all that matters most in the education of the young is the home and family. It is easier to debauch and develop a distaste for than to promote interest in, whatever it may be: art, manners, self- and other-respect, religion.

One of the great illusions of the modern age, along with and a part of the belief in the efficacy and omni-competence of the state and legislation, is in the power of formal education, i.e. schooling. One does not have to be a Marxist to expect that state colleges and universities training teachers for state schools, will identify educa-

tion with schooling and schooling with state schooling, and peddle a pseudo-philosophy of pseudo-education to justify such arrangements. (Read Josef Peiper's, *Leisure the Basis of Culture*, on 'we need philosophy for . . .': the only answer can be to promote the ideology of 'the state of total work', and insert 'of education' after 'philosophy'.) Conversely, I agree that schools can, and cannot but, do much to affect their pupils' world-and-life-views, especially when they claim to be doing no such thing. What matters most about a school is its tacit dimensions of ethos, atmosphere and example. (See my various articles in the *J. of Phil. of Ed*). That is how I would argue, and have argued, with the dominant 'Liberalism' which, identifies metaphysics (Cosmology and Way) with religion, and regarding the latter as disposable, thinks it can avoid the former as well, and does so precisely in order to impose ('indoctrinate with') its own Secularist Cosmology and Way.

KM-T:

On Conservatism, I don't identify it with the promotion of 'pluralism *per se*'. Chap. 7.3 on Kekesian pluralism and also the discussion of 'minimal interventionism' in sections 7.6-7.8 makes that, I think, very clear. Conservatism in my view nurtures civic pluralism without having any ideological commitment to it as such. Here again my approach is one of attempting to take a concept claimed by the

liberal left and trying to show that it is best promoted by policies normally associated with the Conservative tradition.

As you can imagine, I am not one for political correctness and I have no time for 'multiculturalism' but I think one has to be very careful to identify the 'alien usurpations' that might be rightly opposed by Conservatives. In a discussion of policy on spiritual development to be undertaken at the taxpayer's expense I think it has to be recognised that families have the right to expect that their family traditions, wherever they originate from, will not be undermined by the current nostrums of educational professionals whether they be liberal or Christian (a danger which, incidentally, could be eliminated at a stroke via the introduction of a decentralised system of vouchers). Section 4.2 of my book deals with this issue directly and, again, I think some engagement with the arguments (and those of Rescher against the need for consensus to ensure a stable social order, set out in 7.5) are needed rather than a summary dismissal. I don't think that cultural changes that have foreign origins are for that reason to be opposed. British culture is precisely so rich because it has a very long tradition of openness, both voluntary and sometimes forced, to foreign cultural 'usurpations', for example, of Christianity itself. In fact, it might be argued that it is liberalism itself which is one of the few truly indigenous cultural products of Britain!

RTA:

One last comment and on the last point: I appeal to logic and history. You cannot have lasting agreement on social and political affairs without agreement in fundamental beliefs (though men being what they are, the latter does not entail the former). On some points and for a time, all sorts of coalitions are possible, but not on the whole nature of society and in the longer run. This is especially so when and where sacralised Codes are involved. A neutral state, standing above such differences, is impossible, though again on some issues and for a time it may be possible, as was the Raj in India (but not on suttee). For either it abolishes the Codes by imposing its own laws, or it dissolves society and the state into communalisms. An 'ecumenic empire' (e.g. Rome) could work only because the communities were mostly separated in space (and did not have to cope with the mass migrations that are possible today) and because of the syncretistic polytheism which it and they practised, except for those stubborn Jews and then the Christians, whereby it could incorporate bits of their religion into its own and they could include bits of it, especially the cult of the emperor, into theirs. The supposedly neutral state imposes its own sets of beliefs, syncretistic or Secularist, and tolerates others only insofar as they are ineffective in daily life.

BOOK REVIEWS

J.R. Searle
The Mystery of Consciousness
London, Granta Publications,
1997

This book is a collection of six book reviews: of Francis Crick, *The Astonishing Hypothesis: The Scientific Search for the Soul*

(1994); Gerald Edelman, *Remembered Present* (1988) and *Bright Air, Brilliant Fire* (1992); Roger Penrose, *Shadows of the Mind* (1994); Daniel Dennett, *Consciousness Explained* (1991); David Chalmers, *The Conscious Mind: In Search of a Fundamental Theory* (1996); and Israel Rosenfield, *The*

Strange, Familiar and Forgotten: An Anatomy of Consciousness (1993). Searle clearly sets forth the main theories and lines of argument in each book, and gives fair assessments of their strengths and weakness. As such it constitutes an excellent introduction to contemporary debate regarding the nature of

consciousness and its relation to the brain, and in particular its possible simulation by computers and its explanation in terms of computers. In addition Searle provides a Preface in which he argues that the terms of these debates—'mental', 'physical', 'dualism', 'materialism', 'idealism'—are not as clear as they are assumed to be and that the issues do not have to be posed with them, for example, that we must accept either physical monism or dualism. Searle proposes that consciousness is a natural and biological phenomenon. It involves both qualitative, subjective and 'mental' phenomena and is part of the physical world. He also provides an opening and a closing chapter in which he elaborates his own account, which both underlies and arises from his assessments of the books discussed. And it is that which I shall comment upon.

Against the 'strong' version of Artificial Intelligence (AI), that the mind *is* a computer program, he argues that the formal symbols of the latter are not the semantic, meaningful, contents of the former, and restates his Chinese Room argument in support: that a program using Chinese characters could be validly performed by someone with a complete set of rules but no understanding of the Chinese characters which he manipulates in accordance with those rules. The simulation of a mental states (by a computer) is not a mental state. Furthermore, computational theories of the mind are anti-biological: minds do not matter, for they just happen to be the hardware or 'wetware' that runs the program. They identify consciousness with brains, but, states Searle, brains *cause* consciousness, and so any other system would have to have at least the threshold causal powers of brains. It follows that the 'problem of consciousness' is that of explaining exactly how neuro-biological processes in the brain *cause* our subjective states of consciousness; how exactly these states are *real-*

ised in the brain's structures; and how exactly consciousness *functions* in the overall economy of the brain and therefore in our lives. The mystery will be removed if and when we have an answer to this causal question, and not just a set of correlations between events in the brain and mental states. Searle does not claim to know what sort of theory this might be or whether we can ever formulate it.

It is to Searle's credit that he recognises the third between matter and mind which is missing in nearly all modern philosophy, the fact and distinctiveness of life. Yet he seems to weaken his case in his final comments when he states that a machine could be conscious for the brain is a machine; that an artificial brain is logically possible, as is an artificial heart, and that it would be conscious; and that some brain processes are sufficient for consciousness but not therefore brain tissue. If so, such a mind would not a natural and biological phenomenon, as Searle proposed earlier, but an artificial and inanimate one.

At times, he appears to state his own form of the reductionism which he rightly opposes in such as Dennett, and does so in threeways.

Firstly, he writes as if the causality of brain and mind were all one-way, such that the mind is caused but never a cause, and thus an epiphenomenon.

Secondly, while rejecting mere correlations, he seems to think that there is some ultimate causal explanation of mental states in terms of events and structures in the brain. But if this is held to be really explanatory of *what mental states are*, then mind is once again being reduced to the brain, or, if the two are held to be distinct, we have only another series of correlations which, as Polanyi argued, can explain some mental breakdowns but never the nature and proper functioning of the mind.

And finally, what about the great missing fourth, beyond matter, life and mind, the person

himself who uses and *is not* his body and mind, or, rather, his mental and bodily powers?

R.T. Allen

Collingwood Studies:

Vol. 1, *The Life and Thought of R.G. Collingwood* (1994);
Vol. 2, *Perspectives* (1995);
Vol. 3, *Letters from Iceland, and other essays* (1996);
Vol. 4, *Variations: Themes from the Manuscripts* (1998).

Peter Johnson

The Correspondence of R.G. Collingwood, An Illustrated Guide (1998)

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R.T. Allen