Journal of Applied Philosophy, Vol. 4, No. 1, 1987

Is Psychology a Cognitive Science?

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ABSTRACT *Since the 1970s there has been a significant paradigm shift in psychology away from behaviourism and towards cognitive psychology. Indeed a recent survey discovered that by 1983 more than half American psychologists were describing their approaches as cognitive. However, while behaviourism has had an identifiable philosophical 'line' in positivism, reductionism and the hypothetico-deductive model, such a framework has been noticeably lacking from cognitive psychology. A view of cognitive psychology based on functionalism and ideas from systems analysis is put forward.*

Within psychology over the last ten years there has been a paradigm shift away from behaviourism and towards cognitive explanations. But this new cognitive psychology is beset by many conceptual problems which are philosophical in nature. As psychologists and philosophers rarely see eye to eye, the synthesis of these two subject areas is always rather fraught. It would be particularly unwise to attempt it without giving some explanations of the point of the exercise to both parties.

From a philosophical perspective, psychology often appears a very odd science. Where the areas of interest of the two disciplines overlap, even the established psychologist frequently makes philosophical errors which would be apparent to the first year philosophy student. The difference between empirical evidence and logical analysis is often confused, and levels of argument are mixed and superficial. Only psychologists might conceive of the idea of an experiment to prove, for example, that all unmarried men are bachelors (one can envisage the problems of sampling being overcome, the survey being carried out, and t-tests being applied to the results). While many psychologists evolve during their careers from the stage of naive empiricism, this is often at the expense of the coherence of their arguments. Indeed it seems not too far off the mark to talk about stages of evolution of the psychologist, from the strict behaviourism of the undergraduate to the philosophical pretensions of the retired professor of psychology. New 'discoveries' and advances by psychologists are often mere replications of the philosophical categories of the ancient Greeks. It has not been so much a process of re-discovering the atom, more of re-inventing Aristotle.

For the psychologist, on the other hand, most philosophy seems like so much hot air. Only empirical issues can be real science, and everything else is probably only latter day introspectionism. Linguistic philosophy, in particular, is seen as circular argumentation, and of no interest to empirical science. The type of insight required to appreciate a philosophical argument is one more traditionally associated with the arts than with the sciences. Because of this the very real impact of a philosophical outlook on scientific theorising is often invisible to the empirical scientist.

This, unfortunately, still seems to apply when the empirical psychologist is carrying out work involving arguments which have been dealt with in depth in recent philosophy, such as the understanding of concepts. Psychologists are not trained to

appreciate philosophical argument, and find that when they refer to philosophical literature much of the material is at too high a level for immediate understanding.

The philosophy of science can be of particular help in understanding many of the problems which psychology faces. Unlike most other sciences, the history of psychology is a history of fads and fancies. Ideas are introduced, usually by metaphor from physics, biology or information theory. They develop and grow, and then die, surviving only as chapters in psychology textbooks. Academic psychological theories are very rarely cumulative. Applied psychology does have a rather better record. Educational and clinical psychology are well established, and industrial and other areas of psychology are becoming increasingly so. But close inspection of what actually happens even in these areas shows that high levels of practical expertise are usually based on cumulative personal experience, while psychological theory fulfils a secondary function of providing psychological and scientific respectability. Within the history of psychology there have been occasions when the most arrant nonsense has been considered scientific, while relatively uncomplicated interpretations of phenomena, which have been clear to everybody other than psychologists, have been rejected as unscientific.

While this necessarily sounds critical of psychology, it is not suggested that the problem is immediately avoidable. The task which psychologists have set themselves is intrinsically extremely difficult and conceptually confused. Much credit is deserved for the many attempts to show that some apparently obvious explanation of everyday phenomena are mistaken. Further, by operationalising many 'common sense' approaches and following them to their consequences, fundamental flaws have been demonstrated in our views of the world. But, to the extent that we can ge guided by history, we need to recognise the limitations and uncertainty of our attempts to formalise our subject matter.

Within the social fabric of academic psychology, the psychological subculture, it has been noticeable that the subject matter which has been acceptable to the status quo has varied widely over the years, and between areas of expertise. During one period, many thousands of pounds may be spent on studies of eyelid conditioning, while language may receive no attention at all. Language had been suspected of introspectionism, but became respectable for a time when treated as 'verbal behaviour' by Skinnerians [1], or 'the second signalling system' by Pavlovians [2]. More recently it is again respectable, but this time within a Chomskyian linguistic system [3]. While other sciences have their paradigm shifts, psychology seems merely to suffer from continual paradigmatic confusion. No doubt some will say that this may have been true of the past, of behaviourism, but is no longer true of modern psychology. But has anything really changed? Within the behaviourist movement at its height, no doubt the same was felt. And what will we feel about our present priorities in 20 years time?

Within the 'paradigm stew' of psychology perhaps it is possible to identify a rather more substantial shift, continuing since the nineteen-fifties, from behaviourist to cognitive theorising. But one problem here is that while behaviourism does have a corresponding philosophical approach in positivism and Popper's view [4] of the scientific process, this has been lacking from cognitive psychology. Cognitive ideas have existed in two major areas of psychology, in personality theory and in information processing analogues. But transfer between these two areas has been rather weak.

The 'information processor' psychologists [5] owe much of their background to applied skills psychology, but also to behaviourism. They have inherited from behaviourism a view of psychology as a science of the objective. And, as with behaviourism, they have come across the problem that their subject matter is classified not in terms of

objective criteria, but in terms of their subjects' perceptions of these criteria. Just as behavourism requires that a particular part of the environment be classified as a stimulus to a subject, so information processing requires a subject to be doing the processing. Information, while it may have objective concomitants, is only information in as much as a subject (whether human, animal or machine) is able to interpret it. The information processing approach has not, any more than behaviourism, come to terms with the subjective element of the cognitive equation. It has advanced, and added to the credibility of psychology as a science, in showing, as with machine intelligence in computer science, that it is not necessary to resolve this issue for progress to be made.

Within cognitive personality theory some of the more extreme proponents of cognitive approaches have known no bounds to their imagination [6]. Much of this can be quite rightly ignored as unscientific, but some attempts have been made to find a philosophical base to such approaches. Having seen classical mechanics overthrown by quantum mechanics, they see everything as now possible. Some psychologists within the counselling movement seem to throw out the scientific method altogether. Some recent 'subject matter', telepathy, universal awareness, the self-actualising tendency, the power of love and of the will, are more reminiscent of alchemy than of a twentieth-century science. We can be misled by the paradigmatic paradigm shift, that from mechanics to quantum theory, into believing that the advance was made by imagination (which knows no limit). But quantum mechanics is very much a science. The same cannot be said of the wilder speculations of the human potential movement, which owe more to metaphysics.

Kuhn [7] and his followers have argued that what is accepted as scientific is very much a matter of tradition, but of tradition working within particular rules and boundaries set by our interpretation. Ideas of science evolve, and as they evolve, subjects, and areas within subjects, shift across this line. Thus one way in which quantum theory has been important is by legitimating probability as a science in its own right, rather than merely human uncertainty about what is determined. This paradigm shift disposed of the traditional idea that science could only be about causality, or approximations thereto. From this evolved ideas of science which concentrated on its ability to predict and control the world. The basic principle that 'every event has a cause', being unprovable and no longer indispensable, had lost its pivotal role.

Within psychology, the alternatives to causality are not random effects, but teleology. Answers to the question 'why?' can be of two major types. The first type, the causal, is that usually associated with the physical world and is often considered to be the essence of a scientific explanation (e.g. the ball went in to the hole because it was hit by the club with a particular force in a particular direction). But a second type of answer can be given in terms of the purpose of the player (e.g. the ball went into the hole because the player intended to hit it into the hole). This second type is a teleological, or purposive, explanation, and is sometimes called future causal because the event which determines the happening (the ball being in the hole) occurs after the caused ball movement at a particular speed and in a particular direction. Human behaviour in particular is more easily classified in terms of purpose, rather than cause. Actions are taken in order that particular future states of affairs will come about. We generally feel that within any science causal explanations are better than teleological ones. Future cause produces particular problems when the aim of the purpose fails to occur. I may walk to the shop because I wish to buy some bread, but if the shop is shut no bread is bought. As a scientific model this produces a paradox in terms of a non-

event causing an event. In fact the classification of events in terms of future causes cannot work within the deterministic and reductionist world favoured by behaviourists. But determinism and reductionism are no longer the ultimate paradigm for physics, so why should they be for psychology? The fact is that it is much easier to predict and control the behaviour of humans if we know their purposes, what they are actually trying to do. In everyday life this is far more important than any hypothesised causes. A science which aims to predict and control should use the conceptual tools which maximise success.

We can classify three types of teleological explanation. In the strongest sense, teleology is about fate. This is the historical form of teleology which we find in early religion. Such and such an event occurs 'in order that the words of the prophet might be fulfilled'. There has been some recent interest in this model because, although a non-starter under determinism, it does have some metaphysical scope under quantum theory if future causes could influence the outcome of 'random' events. However this is unscientific as we have no reason to suppose, other than in our wildest fancies, that such events can occur. At the other extreme there is the minimal involvement of teleology in functionalism. For events to be determined by function requires a subject or at the very lease an identity. Function has to serve some purpose for somebody or something. Nagel [8] has argued that this involvement makes functionalism unscientific, but this is effectively refuted by Ruse [9], who argues that the teleology is only one of classification. Ruse argues that the actual cause of a biologically inherited event, such as size of egg clutch for a particular species of bird, is previous occurrences of similar events in similar circumstances. This can be conveniently classified in terms of the future event, but need imply no future cause as such. There are similarities between this model and that of early cognitive psychologists such as Tolman [10]. It is a state of expectation, or the cognitive map, based on previous occurrences of similar events in the past under similar circumstances, which determines behaviour in a causal manner.

It is argued here that this, apparently reasonable, solution to the problem of teleology is itself metaphysical, and based on an inability to escape from a reductionist and determinist view of science. If science is about prediction and control, then we can argue that the better science is that which produces the better prediction and control. Where two alternative explanations both produce prediction and control, then we tend to favour the simpler of the two. Classifications of most human behaviour in terms of teleology are generally much simpler, and involve fewer intervening steps, than classifications in terms of causes. Classification itself is prior to causality. Only once effects have been identified—a form of classification—can we conceive of their being caused. Teleological classifications of events, while reducible individually to long chains of causal events, have their unity at a different level of explanation. When we generalise across teleological events it is the unity at this level which is generalised. Thus, if two persons hit balls into the same hole, the event will usually have a simple unity teleologically in the form, for example, of the rules of golf. There may well be proper causal explanations for the individual behaviour of the two players, but these will differ widely unless teleological metaphors are employed. At the most absurd, we could only argue that the two players had the same brain states by metaphysical metaphor from the similar intentions of the players. The players' brains were in whatever state brains are in when the attached bodies are playing golf. The unity of the classification here is of the teleological, rather than causal, type. Teleological classification is not necessarily reducible to causal classification. Rather it is an alternative form

of classification, based on a different set of presuppositions. It provides an alternative framework to causal models. We will tend to prefer the model which best is able to predict and control our subject matter, behaviour, and to enhance understanding. For most of psychology it is teleological, cognitive explanations which best meet our requirements.

This might be seen by some as a philosophical legitimation of an intermediate teleological psychology. For the time being, they might say, we will do it this way, but ultimately, when psychology is developed into a proper science, this will no longer be necessary; better causal predictions will then be possible. This intermediate thesis is rather doubtful, as it ignores an important second-order effect of teleological modelling in psychology. Not only are teleological concepts part of our own thinking as observers, they are also part of the thinking of our experimental subjects, our observed. We can no more treat teleological thinking as illogical than we can the other types of thinking involved in everyday language. Wittgenstein [11] has elucidated the characteristics of many concepts of this type. If our subjects base their behaviour on these types of generalisations and these forms of logic, then any explanation of them in other terms is likely to be inadequate. We might say perhaps that even if our subjects are wrong in thinking in this way, that they are making logical errors, the fact that they *do* function in this way must mean that a science of psychology needs to recognise this way of functioning. A science of psychology, if it is to predict, control and understand its subjects' behaviour, needs to recognise teleological and other forms of logic in its subject matter as a reality.

The resistance of psychologists against teleology has not, however, merely been due to lack of insight or understanding. Some aspects of these arguments have been rehearsed many times since the McDougall-versus-Watson debate and the beginnings of psychology [12], and are nothing new. The problem has always been of a 'so what?' nature. The behaviourist may say, "Perhaps you are right, then show me an example of this teleological science, show me how it helps the science of psychology". The fact is that the divisions in question have traditionally been seen as the very ones which separate science from art. We may be better able to predict and control human behaviour in the language of prose and poetry, but where is the science in that?

But, recently, a new element has been introduced into our understanding of teleology in science. This has been the evolution of systems theory as a respectable scientific discipline, firstly in the world of business, and more lately in biology and computer science [13]. Some might claim that systems theory only seems to be scientific in terms of its ability to predict and control the behaviour of organisations, but that it could have these properties and not be science so much as engineering, a framework only meaningful in terms of application. However systems theory also provides a strong basis for 'understanding', that ubiquitous third element which seems to separate engineering from science. If we know the function of a system, such as a factory or a computer program, then in a very strong sense, we understand it. Systems operate in terms of function, rather than in terms of their constituent atoms. A psychology based on systems theory has no need of atoms of behaviour, stimuli and responses. Function itself is a teleological concept, but within systems theory it loses the metaphysical element it has tended to hold with respect to arguments about determinism and free-will. The teleology becomes part of the intrinsic structure of the system. The system serves its particular function because that is the nature of the system which it is.

How do cognitive systems differ from other systems in systems theory? It might be said that cognitive systems have a subject, an 'I'. But while this may be true, it can also be misleading, as this may be a characteristic of many other systems as well. There is no special reason to limit cognitive systems to the self, or end them at the biological barrier of the single organism. Cognitive systems may operate across organisms (e.g. social systems) and within parts of organisms. Further, it could equally be argued that all systems have a subject. A factory, a computer program, or even a simple tool such as a hammer, would be incomplete without some definition of its purpose, and purpose must always be someone's, it cannot operate in abstract. A more important difference between cognitive and other systems may be that cognitive systems have been subject to evolution, presumably on something approximating Darwinian trial and error and survival of the fittest. Somewhat paradoxically therefore, we may not be aware of our cognitive systems, but merely exhibit them. On the other hand we are necessarily aware of non-cognitive systems we devise, such as computer programs.

Cognitive psychology has occasionally been rejected by behaviourists on the basis that it requires a 'mind', and is therefore introspectionist and unscientific. But this is to go along with an idea of mind postulated as something separate from, but existing alongside, matter. If we take the philosophical view that mind and matter are alternative levels of explanation [14], then no such metaphysical problem need arise. The fact that events in the world can be more easily explained, predicted and controlled by postulating a systems model is not itself unscientific. If we choose to call systems models of this type 'minds' then we can be seen as merely adding a label for convenience. Of course the mind, as a concept, is far more profound than this, and it would be unwise here to even begin on the many problems that exist within the philosophy of mind. But for our scientific purposes, we can define the mind as a system to which we attribute properties of teleological generalisation, and on the basis of this attribution are able to understand that system more simply.

The existence which we have attributed to cognitive systems within this philosophical approach is open to misunderstanding and to metaphysical abuse. The existence postulated is of the system itself, not of any projections into reality with which it may be associated. Thus the idea of a ghost has cognitive reality, and it is this idea, this construct system, which determines behaviour. The ghost itself does not exist in any other sense. But to claim non-existence of ghosts may seem to imply that the idea has no effect, which is patently untrue. Ghosts exist in the same sense that theories exist. It is important for psychologists, as scientists, to identify the reality of the idea system separately from the reality of their projections. Belief in astrology, its cognitive networks, and how these affect us, is a legitimate subject for psychological study. Astrology itself is no more psychology than any other crazy idea. One unique aspect of cognitive systems is that they can sometimes create their projections. The reciprocal intelligence systems of the USA and USSR are a creation of paranoid ideas, and it remains a universal hope that the idea of Armageddon will not reify itself. It is of interest that belief in supernatural events is not restricted to non-scientists. Indeed many of the followers of Koestler [15] are, as often as not, hard scientists in every other way. Similarly pure physicists often tend to be rather eccentric in their attitude to religion. This may make some sense. The more reality is treated as objective, the more reifying tension exists at the borderline between subjective and objective. For the objectivist, only that which is real can be treated rationally. Thus intrapsychic problems will either be denied to rational awareness, or reified, projected into reality. Excessive belief in the reality of phenomenon can be as much a defence-mechanism as

a recognition of truth, and may well be a hazard in recognising the complexity of cognitive reality.

In summary, it has been argued here that psychologists have been mistaken in assuming that behaviourism is the only approach which can be scientific. While rejecting the wilder fancies of psychologists in the human potential and associated movements, it is possible to formulate a firm scientific foundation for psychology from functionalism and systems analysis. Such a view is necessary if cognitive psychology is to fulfil its promise. If this approach to cognitive psychology is accepted it will, perhaps, allay the fears of the scientific psychologist that there may be something scientifically improper in abandoning behaviourism. But further, it should bring about a release from the need constantly to re-phrase ideas within behaviouristic metaphors to achieve scientific respectability.

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