

Epistemological realism in psychology: Kant or won't?

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This paper critically evaluates the implications of the philosophical assumptions of realism, determinism and materialism, as proposed by the philosopher John Anderson, for the development of modern empirical psychology. Because of the logical problems with the alternative views, it is concluded that Andersonian realism, determinism and materialism (specifically functionalism) are the most valid philosophical positions for the foundations of experimental psychology. The implications of these philosophical assumptions for the nature of explanation within psychology, for the position of psychology within the sciences, and for ethical issues within psychology and psychiatry, are discussed. It is concluded: 1) that realism, determinism and materialism provide the only means by which psychology can aspire to provide non-circular explanations of behaviour; 2) that psychology cannot isolate itself from the rest of the biological sciences without its contributions to the analysis of behaviour being superseded by other areas of neuroscience, which may borrow psychological techniques and apply them without reference to the theoretical perspectives of psychology; 3) that the acceptance of realism, determinism and materialism within psychology would accelerate the process by which psychological and psychiatric disorders are recognised as being biological in basis, just as 'somatic' disorders such as diabetes and asthma.

Theory, experimentation and clinical practice in psychology, like other areas of knowledge, are based upon certain philosophical assumptions about the nature of the world. For example, Freudian psychology assumes that behaviour has causes; Rogerian psychology assumes that there is such a thing as freewill; physiological psychology assumes that the mind is intimately associated with the brain. These are 'assumptions' in the sense that it is impossible to prove experimentally that all behaviour is caused, that some behaviour is not caused (and therefore that freewill exists), or that the mind is nothing more than the central nervous system (CNS). However, as philosophical

assumptions that philosophers have debated since the beginning of recorded history, they lie at the bottom of the theoretical superstructures that direct experimentation and explain psychological phenomena. These assumptions are usually tacit and rarely debated, and yet they have an overwhelming influence on the psychological theory, experimentation and practice which they support. If the assumptions are invalid, then the theoretical superstructures which balance on them must also be invalid.

It is the contention of this paper that disagreements regarding philosophical assumptions have factionalised psychology in a way that is uncharacteristic of any other science, and have ultimately led to psychological science (on which all practice is based) being less productive than it would have been otherwise. In physiology, anatomy, pharmacology and biochemistry, there are different theoretical views on specific issues in each discipline, but few of these scientists would seriously challenge the underlying assumption that all biological phenomena are subject to the laws of chemistry and physics. By contrast, psychologists disagree over whether we perceive the world as it really is (as opposed to perceiving a 'representation' of it), whether psychological phenomena always have causes, and whether the mind is something more than the CNS. Thus, psychologists disagree about the very nature of their subject and its relation to other sciences. Physicists have called into question whether physical events in the world always have causes, based on experiments with subatomic particles, but they still assume that these events have the properties of physical phenomena (see Honderich, 1989 for a discussion). However, some psychologists and philosophers believe in freewill as a consequence of the metaphysical nature of mind, and suggest that any step toward integration with biology is a retrograde one (e.g. Rogers, 1961). Others believe that psychological phenomena will ultimately be explicable in terms of biology, e.g. memory will be explained in terms of the changing efficacy of synapses in the CNS (e.g. see Abraham, 1988; Bliss & Collingridge, 1993 for reviews). Do these different kinds of psychologists have anything to say to one another? Is there any resolution of these

philosophical dilemmas in sight? The argument of this paper is that philosophical dilemmas, by their very nature, cannot be resolved by experimental evidence because the acquisition and interpretation of experimental evidence already requires that some assumptions be made. Rather, philosophical arguments must be evaluated on the basis of their logical validity, and some philosophical positions are more valid than others. The Australian philosopher, John Anderson, argued that the most valid philosophical assumptions for psychology are that: 1) we perceive the world as it really is (ie. realism); 2) all phenomena, including those psychological in nature, have causes (ie. determinism); and 3) the mind is nothing more than a function of the CNS (Anderson, 1962). In fact, given assumption 1, to some extent the second and third assumptions follow naturally. In this way, realism logically unravels into a distinctive system of psychology. This paper will attempt to demonstrate that the Andersonian philosophical position is the most parsimonious and valid one for psychology. No attempt will be made to provide an extensive historical account of the development of these ideas within the context of philosophy and psychology, since this is already available to the reader elsewhere (e.g. Maze, 1983; Passmore, 1980). The emphasis here will be on the logical validity of the arguments and their implications for psychology.

1. Perception of the world (realism versus idealism)

The nature of perception and knowledge is one of the oldest problems in philosophy and psychology (see Ayers, 1982 for a review). The two predominant positions have been 'realism' and 'idealism'. Realism argues that we perceive the world as it really is, that cognition is a relation between subject (the perceiver) and object (the perceived), and that the existence of the object does not depend upon the subject perceiving it. By contrast, idealism (originating from 'idea') argues that the world may not be as we perceive it, that the nature of the subject may affect what is perceived as the object, and that, therefore, we can never be absolutely sure that our perceptions of the world are accurate. One of the most famous proponents of idealism was George Berkeley, who argued in his 'Principles of Human Knowledge' (Woolhouse, 1988), that we could not be certain of the existence of any object when we are not perceiving it. Berkeley deduced that one logical consequence of his position was that he might cease to exist when not perceiving himself. However, he was saved by the realisation that God would always perceive him.

Notwithstanding Berkeley's religious beliefs, realists have argued that such extreme idealism inevitably leads to 'solipsism', the view that we cannot be sure of anything, even our own existence or the existence of our own minds (e.g. Anderson, 1962; see Hospers, 1967; Passmore, 1980 for reviews). More prominent in psychology has been the moderate formulations of idealism, which justify their position on the basis of the evidence that perceptions and cognitions can sometimes be flawed. Modern idealists have made extensive use of experimental data from cognitive psychology to make the point that, aside from delusions and

hallucinations, perception and cognition are influenced by context and assumptions, some of which derive from cultural conditioning (e.g. Feyerabend, 1975; see Chalmers, 1988 for a review). One of the most influential idealist philosophers was Immanuel Kant, who made a distinction between the 'noumena', the world as it really is, and the 'phenomena', the world as it appears to us (see Copleston, 1994a; Copleston, 1994b; Hospers, 1967 for reviews). His immensely influential work, 'A Critique of Pure Reason' (1781), argued that we can never get beyond the phenomenal world to perceive the noumenal world because the phenomenal world is partly a function of our own minds, which we must use in order to perceive anything. Kant's ideas, together with those of other philosophers such as John Locke, laid the foundations for what was to later become modern 'representationism', a 'soft' form of idealism in which the independent existence of the world was acknowledged but the objects of perception were held to be 'representations' of the world which the mind generates in response to sensory stimulation by the environment (see Copleston, 1994a; Copleston, 1994b; Hospers, 1967; Passmore, 1980 for reviews). There is a wide variety of specific representationist positions, some of them arguing that the representations are metaphysical in nature (e.g. Kosslyn & Pomerantz, 1977), others arguing that they are physiological (e.g. Gregory, 1974; Gregory, 1978). What they all have in common is the notion that perception is of a 'representation' (ie. the phenomenal world) and that we can never know the world (ie. the noumenal world) directly (Anderson, 1962). This philosophical assumption seemed to account nicely for the fact that sometimes our perceptions of the world do not correspond to the way the world really is (e.g. as in the case of error). Proponents of idealism, including representationism, coined the term, 'naive realism', to reflect their view that realists seemed to naively accept that the objects of perception were really as they seemed (see Hospers, 1967; Passmore, 1980 for reviews). In modern psychology, representationism has had a major impact on cognitive psychology. During the last three decades, many American and British psychologists such as Neisser (1967), Kosslyn and Pomerantz (1977), Pylyshyn (1980) and Gregory (1974; 1978) have incorporated representationism into their psychological theories and experimentation. Many other psychologists have never explicitly identified themselves with representationism but their ideas have been clearly driven by a representationist philosophy (e.g. Navon, 1977; see Watkins, 1990 for a critical review with reference to theories of memory). By contrast, Australian psychology was heavily influenced by John Anderson, the Scottish mathematician and physicist who held the Challis Chair in Philosophy at the University of Sydney. He attracted many talented psychologists and philosophers to his 'empirical philosophy' and many of these academics went on to establish themselves as ardent critics of what they considered to be conceptually flawed 'mentalistic' philosophy and psychology (e.g. Armstrong, 1968; Maze, 1983; Over, 1978; Wenderoth and Latimer, 1978).

Anderson, influenced by the ideas of other realist philosophers like Bertrand Russell (1912), argued for 'critical

realism', a realist philosophy that acknowledged the weaknesses of the realist position while maintaining that any form of idealism, including the fashionable representationism, was logically invalid (Laird, 1920). Anderson and later critical realists argued that any form of experimental psychology based on representationism would be conceptually flawed, resulting in futile experimental investigations and incorrect interpretations of psychological phenomena (Anderson, 1962; Watkins, 1990).

The fundamental Andersonian objection to all idealist philosophy is that it is patently self-contradictory (Anderson, 1962). If the reason for accepting idealism, or its weaker relation, representationism, is that perception is sometimes incorrect, then it is necessary to *know* that a particular perception is incorrect. However, knowing that a perception at time x_1 is incorrect logically requires that another perception, e.g. at time x_2 , is correct. Yet a critical assumption of all idealism is that we can never know that our perceptions are correct because we can never know the world directly. In the case of representationism, we can never get beyond the representations to determine whether they 'correspond' to reality or not; this 'correspondence theory of truth' means that we can never know any perception to be true. Since knowing that a mistake has been made requires knowing that another perception is correct, it follows that for idealism and representationism, it is impossible to ever identify a mistake. Therefore, the idealists' main argument for accepting some form of idealism is logically invalid, given their own assumptions (Anderson, 1962). The critical realists argued instead that only realism could account for differences and errors in perception because only from a realist viewpoint could such aspects of perception be identified in the first place (Laird, 1920; Anderson, 1962). Anderson also pointed out that since representationists claimed that they could only perceive the world through representations, they could not even justify their concept of representation, because this could also be incorrect. In short, the Andersonians believed that any form of idealism or representationism inevitably leads to an infinite regress of skepticism, and ultimately to the solipsistic view that we cannot be certain that we know anything, not even that we exist (Anderson, 1962).

Having criticised the idealists for self-contradiction, the critical realists were now obliged to provide some kind of explanation for all those cases in which perceptions of the one event differ between observers and those cases in which mistakes are made, e.g. hallucinations (Anderson, 1962; Armstrong, 1973; Laird, 1920). If the realist contention is that perception is always of the world itself, then what is the status of objects of hallucinations (Russell, 1912)? Are these objective falsehoods (Moore, 1911)? The 'problem of error' for realism had been recognised long before Anderson, by the pre-Socratic philosophers (see Cornford, 1935; Kirk and Raven, 1963 for reviews), by Moore (1911) and by Russell in his 'Problems of Philosophy' (1912). Russell believed that truth was a matter of 'correspondence' between different perceptions of the world over time rather than correspondence between representations and the world. Thus, if I make a mistake and perceive x when y is the case, the reason I will know that I mistook x for y is as a result of

other perceptions in which I perceive y and not x , ie. the incorrect perception is signified by its lack of correspondence with other perceptions (Russell, 1912). This theory of truth, which like the correspondence theory previously described, is a realist theory, allows that each direct perception is of the world, not of a representation of the world. Russell (1912) went on to develop what became known as the 'multiple relation theory'. He argued that in any act of perception, what is perceived is partially constrained by the fact that an observer can occupy only one spatial location. Thus, it is impossible to see all aspects of a three-dimensional object - some of it must be concealed from view (Anderson, 1962). And yet we perceive or cognise a whole object, not just a fragment of one. Russell (1912) argued that in any perception, we engage in multiple cognitive relations in order to integrate the aspect of an object that we perceive now with past perceptions, e.g. of the other aspects of the object which give it its three-dimensionality. So, from Russell's perspective, in any act of perception, we have to use memory. Although this might first appear to run the risk of plunging Russell back into a representationist account, he avoided this by formulating an unorthodox theory of perception and memory (Laird, 1920). He argued that because light takes a finite amount of time to travel from an object to the retina, even what we consider to be 'perception now' is in fact 'perception of a past event'. Therefore, he argued that the only difference between 'perception now' and memory is the degree of time that has elapsed (see Watkins, 1990 for a review). Since memories can be conceptualized as perceptions or cognitions which arise from the activation of certain brain states (e.g. Bliss & Collingridge, 1993), and 'represent' the world in a purely 'non-cognitive', mathematical sense (e.g. Place, 1970), Russell's idea was that any perception would consist of multiple cognitive relations, ie. the perception of an aspect of an object which presents itself 'now' from the particular spatiotemporal position which I occupy, and cognitive relations with other aspects of the object which I have perceived on previous occasions.

This multiple relation theory was necessary in order to explain error. Russell (1912), and later Anderson (1962), reasoned that if the object of perception was always 'complex' and perception consisted of multiple cognitive relations, this might explain how it is possible for an aspect of one object to be confused with other objects which share that aspect. For example, if I return to an empty house at night concerned about the possibility of an intruder, then I might mistake an overcoat on a hanger at the end of a dimly lit hall for a man. A realist account of this event might be that the aspect of the overcoat that I perceive, e.g. its general shape and colour, is also a property of the supposed intruder. However, because it is in my interest to be alert for intruders, my CNS simultaneously activates memories of burglars, etc., resulting in an erroneous perception (which is then determined to be so from further perceptions, e.g. closer inspection of the coat). This explanation is consistent with realism in the sense that the aspect of the coat that I perceived really existed, my CNS simply 'put it together' with inappropriate memories (Russell, 1912). In the case of illusions such as subjective contours, the realist would offer a similar explanation. My perceptual

systems are 'primed' to detect patterns in the environment rather than unrelated stimuli; therefore, the edges of the contour trigger the activation of brain states associated with the 'missing' parts of the figure.

The Russellian account of error has been criticised by various philosophers (e.g. Armstrong, 1973; Geach, 1957) because a false proposition about the world seems to arise from fragmented cognitions, in some cases with the verb or relation between two objects being perceived independently of any object, and yet in the erroneous perception the relation still seems to have a particular syntax (e.g. Jack loves Jill rather than Jill loves Jack). Russell (1918) had already recognised these problems. Another important point is that in order to emphasise certain aspects of an object (e.g. for motivational reasons), other aspects must be emphasised less or 'ignored'. The psychologist, Joel Michell (personal communication), has argued that the way in which some aspects are emphasised and others are ignored must be conceptualized as a pre-cognitive, physiological process resulting from the neural machinery that gives rise to perception; otherwise, the false perception would be explained in terms of other perceptions which are consciously put together incorrectly and therefore the realist account of error would become totally circular (ie. perceptual error explained in terms of perceptual error). A further assumption is that in any process of knowing something, it is not necessarily the case that the act of knowing is itself known; ie., as in the case of 'automatic driving', I can perceive the road without necessarily being aware that I am perceiving it. This is a necessary caveat for the realist account of error, otherwise it would be difficult to explain why error is not immediately detected (Anderson, 1962; Maze, 1983; Michell, personal communication). In fact, Anderson argued that the notion that we are always aware of our cognitions is illogical because it generates an infinite regress of knowers and knowns (Anderson, 1962; Armstrong, 1968).

Even the most ardent realists have accepted that their account of error is problematic (e.g. Anderson, 1962; Armstrong, 1973; Laird, 1920; Still, 1979). Nonetheless, they maintain that the most extreme examples of error, e.g. drug-induced hallucinations, are unusual circumstances in which the neural machinery responsible for perception has malfunctioned. From a realist viewpoint, these demonstrations do not prove that realism is invalid, they simply show that the CNS processes responsible for perception and cognition, which we can only know through direct perception of the world, have their limitations.

While representationism has been favoured by some cognitive psychologists (e.g. Neisser, 1967; Kosslyn and Pomerantz, 1977; Gregory, 1974; Gregory, 1978), realism has also had its advocates in experimental psychology (Gibson, 1979; Watkins, 1990). For example, J.J. Gibson's 'direct realism' is very close to Andersonian realism in its fundamental principles (Gibson, 1979). Amongst philosophers of mind, 'representational realism' has become a popular position (see Musgrave, 1993 for a review). Representational realism, while recognising the independent existence of the world, argues that we use a system of representations in order to perceive and think about it

(without those representations in any sense 'replacing' the perception of the world or becoming the sole object of cognition themselves). Representational realism is, in many ways, also similar to Andersonian realism.

2. The origin of behaviour (determinism versus freewill)

The question of whether behaviour and psychological events are caused or whether there is such a thing as 'freewill', is another philosophical question which is responsible for much dissension within psychology (see Bolton, 1979 for a discussion). Determinism is the view that all psychological phenomena are caused, either by genetic influences, environmental factors and/or the nature of the self. This is the view adopted by most forms of scientific psychology since any other belief precludes the prediction of psychological phenomena by understanding their causes. The opposing view, that all, or at least some, psychological phenomena do not have causes but are the result of 'freewill', is known simply as the 'freewill position' or 'volitionism' (see Hospers, 1967 for a review). This position has been promoted by some clinical psychologists such as Carl Rogers (1961) and other psychologists of the existentialist school of thought.

Anderson's argument for the acceptance of determinism was partly supported by his argument for realism and was applied to all events in the world, not just psychological ones. That is, if realism is accepted, then all (or at least most) observed events must exist independently of our observing them. Therefore, since we observe that most events have causes, and have, so far, failed to demonstrate that any particular event has no cause, the causal relationship between events must be a real phenomenon in the world (Anderson, 1962; Maze, 1983). A realist has no alternative but to accept this view. In this way, the acceptance of realism 'fixes' one's position on the freewill/determinist issue, and, as we shall see later, also on the mind/body problem, to some extent.

Anderson (1962) was also critical of the concept of freewill because he felt that it was a concept without any clear definition. For example, since many events in the world that we know are known to be caused and we do not know any to be without a cause (although we may not know what the cause is), what does it mean to say that some aspect of behaviour is not caused? Anderson maintained that the notion of an event without a cause was nonsensical because the uncaused event would literally have to randomly appear in time without any connection with any other event (see Honderich, 1989; Hospers, 1967, for a discussion).

The proponents of freewill have often argued that freedom to choose one's behaviour is a quintessential characteristic of being human and allows one to make decisions outside the stream of causality (Sartre, 1956). Existentialist philosophers like John-Paul Sartre believed that, through the property of freewill, we 're-invent' ourselves at every point in time (Sartre, 1956). One of the main arguments used by advocates of the freewill position is that because we do not know the cause of every event in the world, it is logically possible that there are (at least) some events that are uncaused (see Hospers, 1967 for a discussion).

Some have argued a weaker position that, although most events are caused, a minority of events are without cause and therein lies the possibility of freewill (Hospers, 1967). Unfortunately, many of the arguments put forward in favour of freewill deftly slide from being about what is the case, to being about what one would like to be the case. For example, it is argued that if we accept determinism, then people become automatons, pushed this way and that by a plethora of causes (see Hospers, 1967 for a review). However, this is an invalid argument since the issue is what is the case (ie. the nature of reality) rather than what ought to be the case (ie. ethics) (Hospers, 1967). No matter how much we might like to believe in freewill, if we cannot defend it as a logical concept, it must be abandoned (Maze, 1983). Recently, the freewill argument has drawn some support from physics: it has been suggested that the evidence in favour of the unpredictability of subatomic particles is consistent with the existence of random or uncaused behaviour (Honderich, 1989). Much of this is actually a misunderstanding of the nature of the evidence, since lack of evidence that a subatomic event is caused (and therefore evidence that it is unpredictable, ie. Heisenberg's Uncertainty Principle) is not the same as proving that it is uncaused (see Honderich, 1989 for a review).

Many philosophers agree that one of the fatal flaws in most formulations of freewill is that its advocates do not understand the ramifications of the position for which they argue. That is, if we accept that at least some psychological phenomena have no cause, then this must mean that they are not caused by the self either, ie., they bear no relationship to personality but are simply thrust upon humans by some random force (Frankfurt, 1971; see Honderich, 1989; Hospers, 1967 for reviews). Consequently, it is the freewill position, and not determinism, that divorces behaviour and psychological events from the self. If I choose to do x rather than y, then, in addition to genetic influences and environmental factors, the nature of my self must also be a causal event; if it were not, then my behaviour would bear no relation to me. Many determinists argue that what most advocates of freewill really mean by 'freedom to choose' is that the self must have a causal role, and this is actually a form of determinism (Hospers, 1967; Frankfurt, 1971). Determinists have no problem with this resolution of the freewill/determinism debate because the self at any particular point in time is just another cause in the world, partly moulded by genetics and partly by the environment (Anderson, 1962).

3. The nature of mind (materialism versus mentalism)

Perhaps no other philosophical issue has divided psychology to the extent of the nature of mind or the 'mind/body problem' (see Borst, 1982; Blakemore & Greenfield, 1989 for reviews). The view that the mind is something more than the material CNS, something metaphysical, is known as 'mentalism'. The most popular form of mentalism is 'mind/body dualism', the view that the metaphysical mind interacts with the body, including the brain, in a way that has yet to be described (Hospers, 1967). The most famous advocate of mind/body dualism was Rene Descartes, who suggested that the mind

and the body interact via the pineal gland (Popkin, 1966). More recently, the dualist view has been championed by the Nobel Prize-winning neurophysiologist, Sir John Eccles (Eccles, 1989). Today, there are many psychologists who doubt that the nature of mind is entirely materialistic and this view has serious implications for what they consider to be the subject matter of psychology (see Blakemore & Greenfield, 1989 for a review). For example, because dualism accepts that the mind is metaphysical in nature, it follows that physical science (ie. physiological psychology, neurophysiology etc.) has little relevance for the study of psychological phenomena.

Materialism is the view that the mind is no more than the material CNS. One of the most enthusiastic advocates of materialism is the philosopher David Armstrong, himself a student of John Anderson. Armstrong's 'A Materialist Theory of Mind' (1968) is an influential account of materialism and in it he argues that the mind is numerically identical with the CNS; hence, his brand of materialism has become known as the 'identity theory' (see Borst, 1982 for reviews). There are many other forms of materialism and one of them is 'functionalism', the view that the mind is a function of the CNS in the same way that the picture on a TV screen is a function of the electronics inside the TV (e.g. Llinas, 1989; Place, 1982; see Churchland, 1990 for a review). Functionalism (which should not be confused with the term as it is used in anthropology and sociology) is closer to the kind of materialism supported by Anderson, and is similar to the ideas of philosophers such as Gilbert Ryle (Passmore, 1980; Ryle, 1949).

Dualists' and mentalists' principal argument against materialism is that it is self-evident that the qualities of mental experience cannot be the same as, or the result of, electrochemical activity in the CNS. They suggest that the mind simply changes too quickly and its qualities are too rich to be nothing more than neural activity (Eccles, 1989; see Hospers, 1967 for a review; see Smith, 1994 for a critique).

By contrast, the materialists argue that mentalism generally, including dualism, is fundamentally flawed because it cannot answer the most basic questions about its own position (Armstrong, 1968). For example, mentalists insist that the mind is not physical and yet they are unable to describe what it is other than by saying what it is not ie., mental events do not have position in space or dimension (Armstrong, 1968; Hospers, 1967; Borst, 1982). Further, dualists cannot explain how and where the mind and body interact (Armstrong, 1968) (although Eccles has suggested that it happens in the neocortex; Eccles, 1989).

Although Armstrong's (1968) identity theory has been a popular form of materialism, some materialists believe that functionalism solves some conceptual problems which identity theory cannot (e.g. Churchland, 1990). These same problems troubled Anderson and led him to prefer a form of functionalism (Anderson, 1962). As with the freewill/determinist issue, if realism is accepted, then a certain position on the mind/body problem must follow. The realist must accept that mental events are real events in the world, just like causes and any other object of perception. Since in

experiencing a mental event I do not experience electrochemical brain activity, it follows that, for the hard-line realist, mental events *cannot* be identical with CNS states. Rather, realism dictates that mental events must be regarded as real events in the world and the materialist view that is most consistent with realism is functionalism, in which mind is seen as a function of the CNS. This does not mean that realists are committed to accept that the mind is metaphysical, indeed most would suggest that it is totally physical (see Passmore, 1980 for a review). The integration of realism and functionalism simply proposes that mind is the function or behaviour of the CNS in the same way that walking is a function of the physical nature of the legs. This is a materialist view that has been promoted by neuroscientists such as Rodolfo Llinas (1989). The acceptance of functionalist materialism over identity theory also overcomes the accusation of reductionism that is often levelled at materialists. Functionalism means that the mind cannot be reduced to the CNS because this would be to try to reduce function to form and deny the reality of function. For example, it is not possible to reduce walking to the anatomy and physiology of the legs, because walking is one of the functions of the morphological and physiological properties of the legs and the nature of walking cannot be understood without appreciating how the form of the legs gives rise to that (and other) functions. Therefore, both form and function must be studied in order for one to be related to the other as part of the process of explanation, ie. relating cause to effect.

4. Implications of Andersonian philosophy for psychology

The acceptance of realism, determinism and materialism (functionalism) has major implications for the nature of psychology.

Implications of realism

The acceptance of realism means that the concept of any form of psychological representation in perception or cognition must be abandoned (Anderson, 1962; Watkins, 1990); that the objects of perception and cognition must be seen to be in the world itself and that the explanation of the cognitive relations in which we engage lies in neural activity in the CNS (Watkins, 1990). Along these lines, psychologists such as Maze (1978; 1983) have argued that many concepts in psychology are inherently circular and do little more than re-describe the phenomenon to be explained in terms of itself (see Watkins, 1990 for a critique of theories of memory). For example, from an Andersonian viewpoint, concepts such as 'desire' and 'purpose' are teleological and meaningless because anything that is posited as a cause must be independent of what it is proposed to explain. The concept of 'desire' is inferred from behaviour, but has no independent verification and therefore is a sort of 'pseudo-explanation' which has the form: "Why does x occur? Because there is a process which gives rise to x" (Maze, 1983). Similarly, the explanation of subjective contours in terms of Gestaltist 'laws of closure' is entirely circular. Again, the idea that there might be some psychological propensity to 'fill in' missing parts of

an object is based purely on the observation that it happens and is little more than a re-description of the phenomenon to be explained. Anderson (1962) described these kinds of psychological concepts as 'intervening variables', which are really conceptual blind alleys, giving the impression that an explanation has been found (Watkins, 1990). Anderson contrasted these with 'empirical constructs', which are functional 'black boxes', representing some process which is thought to have a causal role but whose content is yet to be discovered. An example of an empirical construct would be the concept of the 'gene', the unit of inheritance. When the concept of the gene was first suggested, it was a function without a structure and its existence was inferred purely on the basis of the observation that some characteristics are inherited. However, Crick, Franklin, Watson and Wilkins filled in the construct and worked out its structure (the 'double helix') so that its existence was confirmed independently of the phenomenon that it was supposed to explain (see Crick, 1988 for a review). From an Andersonian viewpoint, psychology suffers from an excess of circular explanations and empty concepts because often the supposed causes have not been independently verified and no active attempt is being made to verify them (e.g. the concept of 'attitude'; Maze, 1978; Watkins, 1990). What would a non-circular explanation in psychology look like? The long-term potentiation (LTP) explanation of memory is a good example. The phenomenon to be explained is that animals and humans remember. Possible causes, such as altered synaptic function, can be inferred on the basis of this observation; however, they must be independently verified. Independently of demonstrations of the behavioural consequences of memory, LTP - the long-lasting enhancement of synaptic efficacy resulting from increased and co-incident pre- and post-synaptic activity - *has* been verified and there is evidence to suggest that such synaptic changes are related to behavioural demonstrations of memory (see Abraham, 1988; Bliss & Collingridge, 1993 for reviews). The evolution of this explanation of memory is similar to that of the explanation of inheritance in terms of the gene and therefore LTP is an example of an empirical construct in psychology which is being actively filled out. This kind of explanation does not necessarily require that behaviour always be explained in terms of neurophysiology; it simply requires independent verification of the cause in order to avoid circularity. An example of a non-circular, non-physiological explanation of behaviour might be the explanation of multiple personality disorder in terms of the emotional responses to childhood sexual abuse. This is a purely 'psychological explanation' which is non-circular because the proposed cause - the emotional trauma of sexual abuse - can be verified independently of the phenomenon to be explained.

Implications of determinism

The main implication of determinism for psychology is that, in principle, all behaviour and psychological phenomena can be explained. Whether or not the causes of a specific psychological event are identified is another issue.

The acceptance of determinism also has major ethical implications. It means that because every behaviour is

determined, no one is responsible for their actions in the sense that proponents of freewill would have it (e.g. Sartre, 1956). Although, in the formulation of determinism described, the self becomes a causal agent, the nature of the self at any particular time is in turn caused by other events. Thus, whether a Nobel Prize winner or a murderer, no one really has control over their own behaviour. One implication of this might seem to be that no one should be held accountable for their actions. However, this is a complex ethical issue since it may be beneficial to treat people *as if they have freewill* even if they do not, since otherwise the recognition of determinism becomes a causal factor in itself, and one which may have adverse sociological effects (see Mackie, 1978 for discussion).

Implications of materialism (functionalism)

The acceptance of functionalist materialism has far-reaching consequences for psychology. Principally, it means that all behaviour and psychological states must be regarded as a function of the CNS. Therefore, understanding the causes of psychological phenomena, as opposed to merely describing them, must ultimately involve explanation at the neural level; to argue otherwise would be analogous to arguing that it is possible to understand the process of walking without ever studying the anatomy and physiology of the legs (Crick, 1988).

Elsewhere we have argued that acceptance of materialism means that every change in behaviour and psychological state must be produced by a corresponding physiological and biochemical change (e.g. via protein phosphorylation) and that consequently neural plasticity (and synaptic plasticity in particular) must be the rule rather than the exception to CNS function (Baker, 1985; Smith, 1994). It also follows that physiological psychology is not a branch of psychology but a philosophy of psychology that entails that every psychological phenomenon, including those of the social variety, must have a biological basis. From that viewpoint, physiological psychology, and neuroscience generally, are applicable to every aspect of psychological science and practice. Does this mean that all psychologists should become neuroscientists? No. It means that the most successful psychological science will take account of the results of neuroscience as a means of explaining psychological phenomena. In some areas of the study of 'higher' cognitive function (e.g. the study of imagination), the only relevant neuroscience may be that involving brain scanning techniques in humans (e.g. Haxby, Grady, Ungerleider, & Horwitz, 1991; Posner, Petersen, Fox & Raichle, 1988).

One of the most important ethical implications of the acceptance of realism, determinism and functionalist materialism together, is that 'psychiatric' disorders must be regarded as brain disorders in the same way as 'neurological' disorders like Parkinson's disease, Alzheimer's disease and Huntington's disease. Much of the stigma associated with psychiatric illness arises from the suspicion that those afflicted have access to bizarre ideas which bear no relationship to the real world (ie. idealism), that they are somehow responsible for their own misfortune (ie. freewill)

and that their problem exists in a metaphysical world which cannot be adequately scrutinized (ie. mentalism). Thus, everyone feels sympathy for a patient suffering from emphysema, bowel cancer or stroke, but someone suffering from schizophrenia or depression is suspected of being the root of their own problems. And this is despite increasing evidence that such psychiatric problems are caused by specific morphological and neurochemical changes in the brain (see Smith & Darlington, 1996 for a review). One of the most attractive consequences of the acceptance of Andersonian philosophy is that psychological and psychiatric problems like schizophrenia, depression and anxiety disorders must be regarded as no less biological in basis, than diabetes or asthma (Smith, 1994).

Acknowledgements

We thank the referees and the Editor for their helpful comments. We would also like to thank Dr. J. Michell, Assoc. Prof. J. Maze and Dr. T. McMullen of the University of Sydney for their excellent lectures and seminars on Andersonian philosophy.

References

- Abraham, W.C. (1988) Long-term potentiation as a possible associative memory mechanism in the brain. *New Zealand Journal of Psychology*, 17, 49-58.
- Anderson, J. (1962) *Studies in Empirical Philosophy*. Sydney: Angus and Robertson.
- Armstrong, D.M. (1968) *A Materialist Theory of Mind*. London: Routledge and Kegan Paul.
- Armstrong, D.M. (1973) *Belief, Truth and Knowledge*. London: Cambridge University Press.
- Ayers, A.J. (1982) *The Problem of Knowledge*. Middlesex: Penguin.
- Baker, R. (1985) Neuronal mechanisms of adaptation: a viewpoint. In: Keller, E.L. and Zee, D.S., *Adaptive Processes in the Visual and Oculomotor System*, (pp. 419-426), New York: Pergamon.
- Blakemore, C. & Greenfield, S. (Eds.) (1989) *Mindwaves*. Oxford: Basil Blackwell.
- Bliss, T.V.P. and Collingridge, G.L. (1993) A synaptic model of memory: long-term potentiation in the hippocampus. *Nature*, 363, 31-39.
- Bolton, N. (Ed.) (1979) *Philosophical Problems in Psychology*, New York: Methuen.
- Borst, C.V. (Ed.) (1982) *The Mind/Brain Identity Theory*. London: Macmillan Press.
- Chalmers, A.F. (1988) *What is this thing called Science?* St Lucia: University of Queensland Press.
- Churchland, P.M. (1990) *Matter and Consciousness*. Cambridge: MIT Press.
- Copleston, F. (1994a) *A History of Philosophy. Vol. VIII*. New York: Image Books, Doubleday.
- Copleston, F. (1994b) *A History of Philosophy. Vol. VII*. New York: Image Books, Doubleday.
- Cornford, F.M. (1957) *Plato's Theory of Knowledge*. London: Routledge and Kegan Paul.
- Crick, F. (1988) *What mad pursuit. A personal account of scientific discovery*. Middlesex: Penguin.
- Eccles, J.C. (1989) Brain and mind, two or one? In: Blakemore, C. and Greenfield, S. (Eds.) *Mindwaves* (pp. 293-306) Oxford: Basil Blackwell.
- Feyerabend, P. (1975) *Against Method*. London: Verso.
- Frankfurt, H. (1971) Freedom of the will and the concept of a person.

- Journal of Philosophy*, LCXVIII (1), 5-20.
- Geach, P.T. (1957) *Mental Acts*. London: Routledge and Kegan Paul.
- Gibson, J.J. (1979) *The Ecological Approach To Visual Perception*. Boston: Houghton Mifflin.
- Gregory, R.L. (1974) Perceptions as hypotheses. In: Brown, S.C. (Ed.), *Philosophy of Psychology*, (pp. 195-211), London: Macmillan Press.
- Gregory, R.L. (1978) *Eye and Brain: the Psychology of Seeing*. New York: McGraw Hill.
- Haxby, J.V., Grady, C.L., Ungerleider, L.G. and Horwitz, B. (1991) Mapping the functional anatomy of the intact human brain with brain work imaging. *Neuropsychologia*, 29, 539-555.
- Honderich, T. (1989) Mind, brain and self-conscious mind. In: Blakemore, C. and Greenfield, S. (Eds.) *Mindwaves* (pp. 445-460) Oxford: Basil Blackwell.
- Hospers, J. (1967) *An Introduction to Philosophical Analysis*. (2nd Edition) New Jersey: Prentice-Hall.
- Kant, I. (1781) *Critique of Pure Reason*, (translated by J.M.D. Meiklejohn, 1964), New York: Dutton.
- Kirk, G.S. and Raven, J.E. (1963) *The Presocratic Philosophers*. Cambridge: Cambridge University Press.
- Kosslyn, S.M. and Pomerantz, J.R. (1977) Imagery, propositions and the form of internal representation. *Cognitive Psychology*, 9, 52-76.
- Laird, J. (1920) *A Study in Realism*. Cambridge: Cambridge University Press.
- Llinas, R. (1989) 'Mindness' as a functional state of the brain. In: Blakemore, C. and Greenfield, S. (Eds.) *Mindwaves* (pp. 339-360) Oxford: Basil Blackwell.
- Mackie, J.L. (1978) *Ethics. Inventing Right and Wrong*. Middlesex: Penguin.
- Maze, J. (1978) The concept of attitude. In: Sutcliffe, J.P. (Ed.), *Conceptual Analysis and Method in Psychology. Essays in Honour of W.M. O'Neil*. (pp. 3-14) Sydney: Sydney University Press.
- Maze, J. (1983) *The Meaning of Behaviour*. London: George Allen and Unwin.
- Moore, G.E. (1952) *Some Main Problems of Philosophy*. London: George Allen and Unwin.
- Musgrave, A. (1993) *Science, Common-sense and Skepticism*, Cambridge: Cambridge University Press.
- Navon, D. (1977) Forest before trees: the precedence of global features in visual perception. *Cognitive Psychology*, 9, 353-383.
- Neisser, U. (1967) *Cognitive Psychology*. New York: Appleton-Century-Crofts.
- Over, R. (1978) What the physiologist's brain does not let the cat's eye see. In: Sutcliffe, J.P. (Ed.), *Conceptual Analysis and Method in Psychology. Essays in Honour of W.M. O'Neil*. (pp. 118-127) Sydney: Sydney University Press.
- Passmore, J. (1980) *A Hundred Years of Philosophy*. Middlesex: Penguin.
- Place, V.T. (1982) Is consciousness a brain process? In: Borst, C.V. (Ed.) *The Mind/Brain Identity Theory*, (pp. 42-51) London: Macmillan Press.
- Popkin, R.H. (Ed.) (1966) *The Philosophy of the 16th and 17th Centuries*. New York: The Free Press (Macmillan Press).
- Posner, M.I., Petersen, S.E., Fox, P.T. and Raichle, M.E. (1988) Localization of cognitive operations in the human brain. *Science*, 240, 1627-1631.
- Pylyshyn, Z.W. (1980) Computation and cognition: Issues in the Foundation of Cognitive Science. *The Behavioural and Brain Sciences*, 3, 111-169.
- Rogers, C.R. (1961) *On Becoming a Person*. London: Constable.
- Russell, B. (1912) *Problems of Philosophy*. London: Oxford University Press.
- Russell, B. (1918) The philosophy of logical atomism. In: March, R.C. (Ed.) (1966), *Logic and Knowledge*, London: George Allen and Unwin.
- Ryle, G. (1949) *The Concept of Mind*. London: Hutchinson and Co.
- Sartre, J-P. (1956) *Being and Nothingness*. (translated by Hazel Barnes) New York: Philosophical Library.
- Smith, P.F. (1994) The emerging biology of social intervention in the treatment of psychological disorders. *New Zealand Journal of Psychology*, 23, 18-27.
- Smith, P.F. & Darlington, C.L. (1996) The development of psychosis in epilepsy: a re-examination of the kindling hypothesis. *Behavioural Brain Research*, 75, 59-66.
- Still, A. (1979) Perception and representation. In: Bolton, N. (Ed.) *Philosophical Problems in Psychology*, (pp. 135-157) New York: Methuen.
- Watkins, M. (1990) Mediationism and the obfuscation of memory. *American Psychologist*, 45, 328-335.
- Watson, R.I. (1979) *Basic Writings in the History of Psychology*. New York: Oxford University Press.
- Wenderoth, P.W. and Latimer, C. (1978) On the relationship between the psychology of visual perception and the neurophysiology of vision. In: Sutcliffe, J.P. (Ed.), *Conceptual Analysis and Method in Psychology. Essays in Honour of W.M. O'Neil*. (pp. 106-117) Sydney: Sydney University Press.
- Woolhouse, R. (Ed.) (1988) *George Berkeley. Principles of Human Knowledge/Three Dialogues*. (first published 1710/1713). Middlesex: Penguin Books.

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