Delusions, irrationality and cognitive science

JOHN RUST
Department of Psychology, University of London Institute of Education, 25 Woburn Square, London WC1H 0AA, United Kingdom

ABSTRACT *Studies of irrationality in cognitive psychology have usually looked at areas where humans might be expected to be rational, yet appear not to be. In this paper the other extreme of human irrationality is examined: the delusion as it occurs in psychiatric illness. A parallel is suggested between the delusion as an aberration of cognition and some illusions which result from aberrations within optics. It is argued that, because delusions are found predominantly within certain limited areas of cognitive functioning, they may represent a form of mental aberration which may tell us something about the abstract properties of mind. Possible implications of this model for several areas of cognitive science are discussed.*

Introduction

In a series of studies, Johnson-Laird & Wason (1977) and Kahneman *et al.* (1982) have demonstrated that people frequently fail to choose the optimal solutions in even quite simple problems of syllogistic logic or probability. They suggest that humans are far more irrational in many everyday situations than had previously been assumed. Cohen (1981), however, has argued that this conclusion is not warranted and is based on an inappropriate model of human rationality. He suggests that rationality in humans is much more than the simple ability to apply the computational rules of the syllogism or of calculus and probability theory. In particular, he argues that the grounding of these computational rules lies in a broader human rationality, rather than the other way round—that judgements about what is rational, as with judgements about what is grammatical, should be based on human consensus. It is further suggested that the so-called 'wrong' solutions produced by these psychological studies are only wrong within the limiting framework imposed by the computational models used.

These issues have wider implications within cognitive science, particularly for theories of mind. From the perspective of the symbol-processing models of human cognition (e.g. Fodor, 1987) a person is irrational if they fail to behave logically—if the 'human machine' has failed in some way. Within this framework, computers seem much more rational than humans, and can be used as the standard against which human rationality is judged. Other cognitive scientists have a fundamental disagreement with this view. Dennett (1987), for example, argues that the failure of symbol manipulation systems to deal with issues of intentionality suggests that any

symbolic system will never on its own account for human rationality. If rationality is dependent on intentionality in this way, then irrationality can never be adequately explained solely by computational models, and some external framework, be it sociological, linguistic or ecological, will be required, such as, perhaps, those suggested by Gibson (1966) or Lakoff (1988).

Cohen draws our attention to situations where human consensus has decided that a particular belief may be rational in spite of its failure to meet the demands of computational logic. But so far little consideration has been given to cases where there is human consensus that a particular decision or belief is irrational. In the present paper I wish to consider one form of irrational belief, the delusion, and to explore the possibility that existing data on this type of irrationality may be of help to cognitive scientists in attempting to understand the nature of rationality and of mental processing generally.

The definition of a belief as delusional

A delusion is a firmly held false belief. However, most firmly held beliefs are probably false, so that this definition on its own would be rather too broad. There would be an almost infinite number of ways in which people could be deluded. Fortunately, there seem in practice to be a limited number of belief areas which are easily susceptible to what psychiatrists call delusion. People become deluded that they are Jesus Christ, while they do not usually develop deluded beliefs, about, e.g. being a salesman. Psychiatrists have identified the usual forms of delusion as being:

> (a) persecution; which can be subdivided into delusions of being followed or conspired against (paranoia), being poisoned, being deceived by one's spouse, or of having a disease;
> (b) grandiosity; belief in one's inflated worth, power, knowledge, identity, or special relationship to a deity or famous person;
> (c) being controlled by another person;
> (d) the idea that one's thoughts can be heard or received by others;
> (e) the idea that others are inserting thoughts directly into one's mind;
> (f) reference: the belief that other objects, people or events have unusual and particular significance.

Nearly all of these forms of delusion are found in every culture studied to date. There are also a series of delusional states which seem to be particular to one or only a few cultures. Two of the most interesting of these are Voodoo death: the belief that a sorcerer can cause one's death magically (this case of delusion is unique in that there seems to be some evidence that the belief can directly contribute to the actual death of the sufferer); and Whitico among Cree Eskimos, where the suffereer believes himself to be a cannibalistic ice monster, and sometimes acts accordingly. Some more widespread but rather less common conditions are also described in the psychiatric literature: Capgras's Syndrome, where the sufferer believes that someone close to him has been replaced by an imposter; the Autoscopic Phenomenon, where the person believes his own body is outside himself as though in a mirror—this

double perfectly imitates his every move; De Clerambault's Syndrome, where the sufferer believes a famous person is secretly in love with him; and Cotard's Syndrome, in which the sufferer believes that nothing exists except himself—he feels that time is standing still and that he is immortal.

While in recent history the study of delusions has been the preserve of psychiatry, their existence was recognized in ancient times. In the Old Testament, Saul was said to have been possessed by an evil spirit and 'raved within his house' killing 85 innocent persons whom he believed were in conspiracy with David (reported by Stone & Stone, 1966). More recently in AD 100, Aretaeus defined a human condition he called 'divine mania', and in a nosology of pathological entities written sometime between 1450 and 1650, Schenck & Zacchias describe a condition of fanaticism associated with religious exaltation and prophesying (Mennager *et al.*, 1964). While these older writings usually see the pathology as being one of religiosity, there is a major problem with the definition of any religious beliefs as being delusional: the 'false belief' criterion on its own fails to make a clear distinction between the psychiatric patient and the saint or religious leader! This problem has long been recognized by psychiatrists who generally take a rather pragmatic approach to the definition of delusion for the purposes of psychiatric diagnosis and exclude any religious beliefs, however bizarre, so long as they are supported by others.

The 3rd Edition of the American Psychiatric Association's (APA's) *Diagnostic and Statistical Manual* (DSM–III) states that a delusion is "a false personal belief based upon incorrect inference about external reality and firmly sustained in spite of what almost everybody believes constitutes incontrovertible and obvious proof or evidence to the contrary". While the philosopher may find this unsatisfactory for a variety of reasons (minorities can sometimes be right), it is a functional definition which seems to work for the practising psychiatrist. A major worry for the non-psychiatrist is the fear that such a definition could be abused, as has happened in the case of Martha Mitchell, suspected of paranoid delusions during the early stages of Watergate. Similarly in the Soviet Union until quite recently many political dissidents were diagnosed as deluded, and therefore insane, because they failed to see the obvious advantages of the communist state. However, most psychiatrists do not have to deal with dissenters but with people whose deluded beliefs are preventing them from leading a normal life. For each headline-making false diagnosis of paranoid delusion for a person who actually was being followed by the CIA or KBG, there are many thousands of people destroying their lives with unnecessary, time-consuming and dangerous precautions against an imaginary follower.

One problem with the APA definition is that it is much too broad. For example, an often quoted study by Douglas & Walker (1982) reported the results of a Gallup poll in which they found that 57% of Americans believe in UFOs, 54% in angels, 51% in ESP, 39% in devils, 29% in astrology and 10% in ghosts and witches. Clearly, for research, as opposed to diagnostic purposes, the APA definition is just too pragmatic. A rather more useful definition is given by Oltmanns & Maher (1988) who specify seven criteria for the presence of a delusion:

(1) The balance for and against the belief is such that other people consider it to be completely incredible.
(2) The belief is not shared by others.
(3) The belief is held with firm conviction; the person's statements or behaviours are unresponsive to a presentation of evidence contrary to the belief.
(4) The person is preoccupied with (emotionally committed to) the belief and finds it difficult to avoid thinking or talking about it.
(5) The belief involves personal reference, rather than unconventional religious, scientific or political conviction.
(6) The belief is a source of subjective distress or interferes with the person's occupational or social functioning.
(7) The person does not report subjective efforts to resist the belief (in contrast to patients with obsessional ideas).

Some of these criteria are particular to the concerns of the psychiatrist. For example, criterion (6) may be more about the doctor's obligation to relieve suffering than about the nature of delusion *per se*. However, these criteria do generally differentiate between irrational beliefs and delusional ones which seem to have an added element of insanity. Thus a belief in the existence of 'little green men' on Mars would not count as a delusion as it would not meet criterion (2) or (5). However, if a person claimed to be in telepathic contact with the 'little green men', who were sending him important messages about world peace, then (2) and (5) would be met. (The deluded individual could, of course, still fail to meet criterion (6), but in this case we would probably choose to diverge from the purely functional diagnostic criteria of the psychiatrist and still consider the person deluded.) Criterion (5) is also useful in that it can enable us to differentiate between originators and followers of religious and other occult groups in which deluded beliefs are shared. Thus, the founder of a sect who believes he has received a divine revelation telling him how to save the world may be deluded, but his followers are simply mistaken in believing him. An interesting example of the particular individuality of delusions is reported by Rokeach (1964). He describes the case of three psychiatric patients hospitalised together who all believed they were Christ. Despite frequent contact with each other they all continued to maintain their delusion.

Theories of delusional belief

Delusion as logical error

Within the psychiatric framework, delusions are not illnesses on their own but are seen as symptoms of some underlying disorder, usually schizophrenia or paranoid psychosis. Thus, psychiatric ideas about delusion often go hand in hand with theories of the underlying mental illness. Von Domares (1944) suggested that schizophrenia was a disorder of logic. The deluded patient would argue the syllogism 'Napoleon was exiled and incarcerated. I am incarcerated. Therefore I am Napoleon'. However Williams (1964) tested both schizophrenic and control subjects

and reported that not only did non-deluded subjects also make errors in logical reasoning, but that the pattern of errors made by deluded subjects were the same as for the non-deluded controls. Chapman & Chapman (1988) draw attention to a tendency in normal people as well as schizophrenics to become somewhat illogical when describing their own religious or unusual experiences.

Psychoanalytic theories and wish-fulfilment

Within psychoanalysis, delusions have generally been seen as a form of defence mechanism. Freud's theory of delusion draws on two strands of his general theory, wish-fulfilment and repression. The deluded individual defends himself against an anxiety-provoking reality by believing in an alternative world wherein his subconscious wishes are acted out. However, Freud went much further than this in specifying why delusions are generally restricted to particular aspects of belief. For paranoid delusions, in particular, he defined a specific mechanism, repressed homosexuality, which he believed was involved. There has been much criticism of this particular aspect of his theory, and the evidence he gives to support it is rather weak. Indeed a study by Klein & Horowitz (1949) of 80 paranoid patients found that in most cases there was no evidence of unresolved homosexual conflicts. It seems that Freud's idea mostly arose from a psychoanalytic study he carried out of a 1902 autobiography by Schreber, a German judge who wrote memoirs of his mental illness. Freud (1922) argued that paranoid delusions arose from a broader paranoid process in which homosexual impulses are repressed. As a consequence of this repression the feeling of love is projected onto another individual and returns to the patient as a malevolent external power. As supportive evidence he pointed out that the persecutor is generally someone who had played an important part in the individual's life.

Within psychiatry there are two major classifications of mental disorders: neurotic and psychotic. With a neurotic disorder the relationship of the patient to the illness is much the same as with a physical illness. He sees himself as 'having' the illness and will expect the doctor to suggest a 'cure'. A typical example of a neurotic condition might be a phobia or an anxiety attack. A psychotic illness on the other hand is subversive to the patient's sense of self; his personal identity is altered and the person's fundamental character changes in some way. Delusions are generally seen as being symptomatic of psychosis rather than neurosis but, in spite of this, Freud's formulation of the delusional process is essentially neurotic rather than psychotic, the major source of the neurotic impulse being an unresolved oedipal complex. Later psychoanalysts, on the other hand, have tended to see the distortions of reality found in paranoia as more psychotic in nature, lying on a continuum between normal cognition and the extremely disordered cognition of the schizophrenic. They view the origins of paranoia as developing rather earlier than the oedipal stage, usually in the late oral or early anal stages. However, all psychoanalytic theories of paranoid delusions have in common a belief in unresolved unconscious feelings, associated with guilt and fear, towards parental figures. While empirical support for all of these theories is somewhat lacking, it is to some extent

inevitable that some aspects of early experience will influence the development of delusion proneness in adults. The degree to which we accept that this influence takes the form of repressed sexual urges depends on the extent to which we are willing to accept the detailed case study reports of psychoanalysts as evidence.

In spite of a common scepticism about psychoanalysis among cognitive scientists, there remains something rather compelling about the Freudian idea of delusion as wish-fulfilment. We are all familiar with day-dreams, and are probably familiar with other people who seem to act out their fantasies to such an extent that they bias their judgement of 'reality' (the classical example here might be Malvolio in Shakespeare's *Twelfth Night*). But there are some serious limitations to the explanatory power of wish-fulfilment. The particular danger arises from the tendency of Freudian analysts to use the concept in an all-explanatory manner. While, for example, in a case where a person wrongly believed they were related to the Queen, it is easy to identify an element of wish-fulfilment in the form of fantasy, there are other cases, e.g. delusions of being persecuted, where no obvious wish is being fulfilled. The tendency is to say that, as a delusion is present, some subconscious wish must be being fulfilled. This explains everything and therefore nothing.

Other difficulties with use of wish-fulfilment as an explanation for delusion arise from the former concept's own inherent assumptions. These imply that dealings with reality and dealings with imagination can be distinguished clearly, whereas in actuality humans see reality through their imagination. Further, human beings have the ability to change reality by exercising their imagination, so that there is a concatenation between what is real and what is imagined. It is clear that in delusion we may have an example of persons being deceived by themselves in line with their hopeful imaginations, but none of these concepts have firm enough grounding on their own to count as 'explanations' for each other. Work on reconstructions of crime, on person identification and on memory (Anderson, 1984) shows that people are not able to distinguish easily between what is real and what they may have imagined. Even in science the distinction between reality and imagination is often blurred. Feyerbend's (1975) critique of the hypothetico-deductive account of science (Popper, 1959) suggests that progress in science often comes about as a result of a dogmatic perseverance by scientists, who follow their imaginary theoretical icons in the face of all apparent evidence against them. If wish-fulfilment is to be an explanation for delusion, then we need some way of distinguishing between the wish-fulfilling function in (a) the deluded ideas of the insane, (b) the everyday self-deceptions of the average human and (c) the dogmatic approach to theorising by the practising scientist. Simply to call delusion wish-fulfilment does not help a great deal unless we have a more adequate theory of what this amounts to or of how it might operate. This is sadly lacking.

Delusions as self-deception

Wish-fulfilment is a form of self-deception. In recent years within philosophical psychology there has been an upsurge of interest in this latter area. Might it have something to tell us about the nature of delusion? One problem with the idea of self-

deception for both psychologists and philosophers has traditionally been the paradox of belief (Mele, 1988, p. 121):

> For any *A* and *B*, when *A* deceives *B* into believing that *p*, *A* knows or truly believes that not-*p* while causing *B* to believe that *p*. So when *A* deceives *A* (i.e. himself) into believing that *p*, he knows or truly believes that non-*p* while causing himself to believe that *p*. Thus *A* must simultaneously believe that non-*p* and believe that *p*. But how is this possible?

Mele (1987, 1988) suggests that a way round this paradox is provided if we attribute some of the sources for belief to the motivational system. Motivations can lead us to selectively attend to information as well as affecting our hypothesis formation. Consequently, he says, our beliefs can be out of kilter with our own better judgement; we can deceive ourselves without intending to.

Could a process such as this lead to delusions? It would certainly seem that paranoid persecutory delusions follow a similar track. The sufferer is constantly on the look-out for evidence that people are following him, and consequently is often able to string together an apparently coherent series of real events which support the delusion. A similar mechanism has been suggested by cognitive theorists of depression. Beck *et al.* (1979) and Michenbaum (1977) believe that depression is characterised by an irrational attention to negative information in the environment which continually reinforces the depressive's view of himself. Treatment consists of cognitive therapy, a process whereby rational thoughts are encouraged and negative irrational thoughts discouraged. However, both of these cases do leave questions. In the first instance, suppose the person is actually being followed. In this case we would probably not call the selective attention to information 'irrational', in that it would be eminently sensible to pay more attention to evidence that supports the hypothesis—plenty hangs on it—rather than evidence against it. Similarly, the cognitive theory of depression makes the assumption that depression is always irrational. Yet to sustain the depressive thought that, given the inevitability of death and to avoid future suffering, one's life may just as well be ended now is not obviously irrational, except in that it is rejected by popular consensus as being socially unacceptable.

A general characteristic of the areas in which delusions fall seems to be that there is no universal or indubitable view of reality against which to compare them, and this again presents a problem for self-deception theories of delusion. The deluded individual is assumed by almost everybody to be wrong, but it is not completely inconceivable that they could be right. Many delusions are about religion or beliefs associated with religion, an area in which empirical proof is not seen as relevant. Delusions of grandeur are about self-esteem, and here again there is no objective criteria other than popular consensus which define the 'appropriate' level of self-esteem. True, in their extreme form there are factual errors associated with delusions of grandeur—there was only one Napoleon (a common model for delusions of grandeur)—yet most such delusions are characterised by an extremely elevated sense of self-importance so that the actual characterisation may be irrelevant. Such a belief may be necessary for the successful statesman, but cannot

be empirically justified before the event (although sometimes it can be a self-fulfilling prophesy!).

Delusions and hypnosis

Sutcliffe (1961) argued that hypnosis is nothing more than a delusion, induced in the person by the hypnotist: he carried out a series of experiments to try to support this. For example, he found that subjects who had been hypnotised not to feel pain showed normal psychophysiological responses to pain stimuli even when they reported no feeling of pain. Further evidence of a similarity between false beliefs induced by hypnotism and deluded beliefs was provided in a series of experiments by Kihlstrom (1980, 1985). He asked subjects to memorize a word-list of familiar words and then gave them a hypnotic suggestion of amnesia. Although the hypnotised subjects reported that they could not remember the words, in a word association test they showed the same interference pattern from the learned words as did non-hypnotised controls. It seems that although memory for the words was denied, the memories were encoded, were available in storage and were able to influence the performance on a task.

Sarbin and Coe (1979) and Spanos (1986) go on to argue that hypnosis, like delusion, is a form of self-deception. However, far too little is known about the psychology of self-deception for this to explain much. The most that can safely be said is that all three phenomena (delusion, hypnosis and self-deception) may be related, so that any advance in our psychological understanding of one will almost certainly have implications for the others. Clearly there is much work to be done here.

Attribution theory

Another area of psychological research which may be relevant to the understanding of delusion is Attribution Theory (Kelly & Michela, 1980). The theory suggests that when a person judges the action of himself and others within a social situation he gathers information on various aspects of the situation, the circumstances and the people involved, and uses this information to attribute causal responsibility to either the actor, the target of the action or the context within which the action occurs. Abramson *et al.* (1978) argue that this model can account for differences in mood-state, with depressed individuals erroneously seeing things as out of their personal control or seeing themselves responsible for bad things which happen in the world. This model clearly implies that depression is delusional, and thus amounts to an attribution theory of this delusion. Could attribution theory provide the basis for a general theory of delusion? This seems unlikely as, while delusions are common in severe depression, particularly delusions of responsibility for a bad event, the type of explanation provided does not generalise to other delusional states. With paranoid delusions, for example, it is other people who are responsible for the 'bad' things happening to the subject, rather than the other way round. A possible explanation for this opposite might be that feelings of guilt for the 'bad' event become

intolerable and are therefore projected outside the individual; but if we take this line we are merely recasting the psychoanalytic theory of delusion.

In a further development of attribution theory, Jones & Nisbett (1972) claim to identify an interesting discrepancy between self and other attributions, such that individuals attribute their own actions to situational requirements and the actions of others to their personal dispositions. This phenomenon is described as the 'fundamental attribution error'. Greenwald & Pratkanis (1984) extend this analysis and argue that people perceive themselves as responsible for positive outcomes and deny responsibility for negative outcomes (tending to blame it on situational factors). the converse should also hold: in judging the activities of others there is a bias in favour of seeing the other person as responsible for negative outcomes, and against attributing these to the situation. Can this provide a framework for an attribution theory of delusions? While there may be grounds here for explaining the early stages in the development of paranoia, it seems unlikely that it can be taken much further. True delusions are usually rather more bizarre than would be expected by this theory alone. This type of phenomenon may have more in common with the forms of irrationality identified by Kahneman & Tversky, in that it seems to be an error to which everybody is liable. Delusions, on the other hand, are generally characterised by their extremity.

Anomalous experience

One particular theory of delusion has recently attracted a great deal of attention within psychiatry. Maher (1974) has suggested that delusions arise from anomalous experiences. Anomalous experiences are mental events, such as dreams (especially if they are felt to be prophetic), feelings of *déjà vu*, feelings of special significance, extreme feelings associated with being in love and any similar phenomenon which has a 'mystical' overtone. These experiences seem to be fairly universal. In the construction of the RISC (Rust, 1988, 1989) a psychometric questionnaire which includes some aspects of anomalous experience as symptoms of the schizotypal personality, it was found that many such experiences, e.g. 'feelings that persons or objects are endowed with an inner light', or 'attempts to reach the essence of an object with the mind', are reported by over 25% of individuals.

While most people experience such anomalies from time to time, some people also endow them with special significance. Anomalous experiences tend to have a direct and subversive impact on the motivational system, occasionally leading to religious conversion, divorce, unemployment and other major alterations in lifestyle. A good example is the self report by Bertrand Russell (1967) who writes in his autobiography that, at the age of 29, he went through a five-minute period of 'enlightenment'. In his own words:

> ... the loneliness of the human soul is unendurable: nothing can penetrate it except the highest intensity of the sort of love that religious teachers have preached; whatever does not spring from this motive is harmful, or at best, useless ... At the end of these five minutes I had become a com-

> pletely different person. For a time a sort of mystic illumination possessed me.

Russell concluded that this was a psychotic episode. However, in spite of this belief, Russell reports that the event had an effect on his whole subsequent life, and claims that it was the source of his strong pacifist and humanist beliefs which he continued to hold so firmly 50 years later.

How important are anomalous experiences?

If Maher's idea of the relationship between anomalous experience and delusion is correct then it has implications for the foundations of much of our rational thought. Maher suggests that delusions come about as a result of a rational and systematic attempt to explain the anomalous experience, and argues that the procedure followed by a person after experiencing the anomaly is similar to that of a scientist in attempting to explain a new observation; alternative explanations to the delusional one are examined and then rejected. The scientist who examines possible explanations of phenomena can only do so against a background of scientific knowledge, and it is against this same background that his conclusions will be judged by his colleagues. What, then, is the background against which delusions are judged? If anything, it must be the accepted ground rules provided by folk psychology, the human consensus on the nature of reality which govern our lives.

One element of delusions is their bizarreness—they tend to be considered the prerogative of the insane because they challenge these very fundamentals by which most of us judge the correctness or otherwise of beliefs. Yet Maher suggests that the deluded subject reaches his deluded belief as a consequence of a rational consideration of his anomalous experience. Is it really possible that delusions, the epitome of irrationality, can arise through a rational consideration of the facts? This only becomes plausible if we allow the possibility that some of the strongly held consensual folk psychological beliefs about reality may be insecure, in particular, those beliefs which are based on consensus rather than on fact. An inspection of the areas of belief in which delusions are found suggests that they do indeed fall into this class of beliefs. Here at least, Cohen's (1981) analysis of the role of consensus in deciding rationality seems valid. If someone declares they have been specially chosen by God to save the world, they will be considered by everyone (almost) to be deluded. However a large number of people believe this was not a delusion for at least one person. Thus, people generally do not consider the idea to be *a priori* nonsense, rather they believe it incredible that it could possibly apply to the person they see as being deluded. Interestingly, the anomalous experiences reported by both the accepted and the unaccepted claimants seem to be the same. In politics as well as religion there are many examples of individuals who have turned beliefs about inflated worth or about persecution into self-fulfilling prophesies. A further set of delusions surround the mind/body problem, again an area where consensus rather than objective data supports general beliefs: delusions of subjectivity have much in common with subjective states encouraged by some eastern religions. As a final

example, consider depression. Again there is no external purely objective criterion by which we can judge the usefulness of living.

What is the origin of anomalous experience? Some would probably argue that it is based on a physiological aberration, as, for example, in the well-established relationship between temporal lobe epilepsy and feelings of *déjà vu*. However, given the ubiquity of anomalous experience and its role in religious thought, a purely physiological explanation seems inadequate.

Where do anomalous experiences come from?

Another possibility to be explored here is that anomalous experiences may arise as accidental artefacts of the structure of mind, in much the same way as visual illusions are artefacts of the system of vision. For this theory to be plausible we must assume that all minds have some common mental structure which in turn has some universal properties. There are several theories of the structure of mind being actively explored in cognitive science, ranging from the purely symbolic (e.g. Fodor, 1987), which see human thought as a special case of the universal science of mind, through the intentional approach of Dennett (1987) and the linguistic/ecological models of Lakoff (1988) and Neisser (1988), within which we might expect the nature of mind to vary with the environment, to the supporters of neural network models who see cognition as arising as an emergent property of connectionist parallel-processing systems. Bechtel (1989) has argued that these models are not necessarily contradictory and that there is room for integration within an interfield analysis (Darden & Maull, 1977). Whatever the outcome of these debates, much of the uncertainty about whether minds everywhere have the same structure arises because we can only take examples of functioning cognitive systems from our very limited experience. Apart from ourselves, the only examples we have of these systems are computers and perhaps some higher animals. Computer examples are very important, indeed they are responsible for much of the recent progress in the area, but they are necessarily limited in that they are our own creations. As far as animals are concerned, many have doubted whether they have minds at all, although recent work with chimpanzees (e.g. Savage-Rumbuagh, 1990) indicates that the mental functioning of these animals may be much more similar to our own than has previously been believed.

Another requirement, if a theory of anomalous experience as mental artefact is to be useful, is that the phenomenon should not be reducible to pre-mental levels of explanation. In one sense, of course, an anomalous experience contains 'qualia' and therefore carries the same arguments against reductionism as have been suggested in this literature (Nagel, 1986). But a different aspect of reductionism is important here. It is suggested that something about the nature of mind may be deducible from the artefacts it produces, in much the same way that our understanding of the physical laws of optics have been illuminated by the artefactual properties of the lens (e.g. chromatic aberration) within the visual system. For this parallel to work we need to suggest that the human mind, which has been a product of the natural selection of the species, has evolved as a functional organ, rather as suggested by

James (1890), which has, through its higher level activities, determined its lower level entities through a process of downward causation (Campbell, 1974).

Finally, the theory of anomalous experience as an artefact of mind requires a functional model of the mind. Unfortunately functionalism has come to mean different things for psychologists and philosophers. However, there are common features between some aspects of Jamesian functionalism and some views of teleological functionalism within contemporary philosophy (e.g. Lycan, 1987). James's psychological functionalism is compatible with many examples of functional analysis in biology. Thus to understand the organization of the kidney at the physiological level we need to know its function. The brain is clearly a more abstract organ than the kidney. It processes not body fluids but information, and hence the structure of the brain is particularly fascinating, if elusive.

However, we do not need to consider only the biological products of downward causation; there may well be intermediate entities between the mind and the brain. In the eye, for example, there is a purposively-developed crystalline lens, with the higher order optical properties of the abstract lens, to perfect the function of vision. This optical organ is based on an abstraction. The lens, as it exists within optical physics, is as much a product of downward causation as are the more straightforwardly physiological features of the eye. The laws of optics have consequences for the function of the visual system. The lens of the eye produces aberrations due to these laws (such as arise from differences in the wavelengths of light, or from the focusing properties of the lens), and the eye is known to have mechanisms to make adjustments for these. A parallel can be drawn between these aberrations in the eye and aberrations which occur in the mind in the form of anomalous experiences.

Maher believes that anomalous experiences are familiar to everyone but in most cases they are disregarded. Some people, however, may be unable to disregard them, in which case they may interfere with everyday functioning. In these people they can form the seed of later systematic delusional beliefs. He further suggests that, through this mechanism, anomalous experience may have a direct causal role in schizophrenia. If this is true it suggests a further interesting link between the perceptual and the cognitive functional systems. Anomalous experiences are usually partly cognitive and partly perceptual but, unlike hallucinations, can be purely cognitive. The fact that purely cognitive delusions and perceptual hallucinations (particularly 'hearing voices') both occur in schizophrenia suggests a further link. There are also parallels between the feeling of certainty often found in delusions and the determinacy of visual illusion. Thus the Necker cube is either one way or the other; there is no in-between, and deluded beliefs have a similar either/or nature. This suggests the intriguing possibility that there may be a parallel between delusions and illusions. Illusions are called upon to suggest or support theories of perception and optics, for example, the principles underlying 3-D vision or the rules of perspective. May not delusions have a similar role to play in theorizing about the mind?

The idea that delusions are mental aberrations in this sense receives additional support from studies of the incidence of schizophrenia in the general population.

One problem which has puzzled psychiatric researchers for decades is the very high incidence of this condition. It is known that schizophrenia has a major genetic link. Twin studies, for example, show that where one of a pair of monozygotic twins is a sufferer there is a very high chance that the co-twin will also develop the condition, and this is the case even if the twins have been separated at birth and reared in different families. Schizophrenia is also debilitating reproductively, so that sufferers are less likely to have children than non-sufferers. Given these circumstances we would expect a condition such as this to be eliminated by straightforward natural selection over several thousand years of human evolution. Yet the incidence of schizophrenia today is about eight people per thousand—far more than would be expected in these circumstances. One possible explanation for this is that the condition is carried on a recessive gene (or a series of such genes) which on its own carry some reproductive advantage. An example of this phenomenon is sickle cell anaemia, which is common in malaria-infested areas because the gene responsible, when recessive, endows the holder with an increased resistance to malaria. Suggestions for such a possible advantage for schizophrenia-related genes have ranged from an increased resistance to allergies to an increase in creativity. However, a further possibility may be that the human mind itself is the culprit. As only organisms which have developed vision need to cope with myopia, so only organisms which have developed minds may need to deal with mental aberrations. The possession of a mind may impose the need for new adjustments, not just to the physiology and anatomy of the brain but also to the higher order abstract structure of the mind within it which has been functionally determined.

Conclusion

Thus it is suggested that delusions may arise as aberrations in those parts of the mind where the new faculty of rationality it provides is in conflict with the need of the species to survive. Cognitive facilities such as the definition of the boundaries of the self, the development of self-esteem and ideas of one's 'appropriate' level for this, the need to identify enemies, the need to develop as well as to test theories, the search for a purpose to an individual life, etc. are all affected by, but not determined by, rationality. The possibility for errors at this interface between rationality and survival exists for humans, but not for pre-linguistic animals, and it would be reasonable to expect areas of dysfunction in humans which are unique to the species. The risk of schizophrenia may be one of the penalties which the human species has to carry as a consequence of its rapid and relatively recent acquisition of a whole new mode of evolutionary functioning.

What implications might this model have for research into mental phenomena? For psychiatry it might reinforce the present trend away from the narrow view that only biological explanations can be scientific. Psychiatrists have been rather behind psychologists in this, perhaps because the latter's behaviourism was more immediately vulnerable to one of the more obvious implications of the cognitive science revolution—that if computers can deal with symbols then so presumably can brains. For both, errors can occur in software as well as in hardware. One issue, in

particular, which could do with some more serious attention is the role of the self-concept from a cognitive standpoint. Classical theories of madness used ideas such as 'possession' which have always been rejected by psychiatrists as superstition. Yet computer programs can exist in any computer, so should the human mind invariably be seen only in terms of a one-to-one correspondence with a human brain? Two other information systems we know of, the chromosome and the computer can be corrupted by information-carrying viruses which change the basic instruction set of the host, so why should the same weakness not exist in human cognitive systems? Certainly research into hypnosis suggests that the human mind is open to subversion in this way. Maybe 'possession by devils' does have some explanatory power after all.

In philosophy, the study of delusions may throw some light on issues of epistemology. One aspect of anomalous experience from the observer's point of view is its similarity to veridical knowledge. In Wittgenstein's consideration of epistemological issues published in *On Certainty* (Wittgenstein, 1974) his explorations of this type of knowledge in the context of language games indicates that claims to knowledge through perception may well be related to claims to knowledge through anomalous experience.

The approach to delusions suggested here may also give added support for the usefulness of metaphorical models within linguistics. Lakoff (1988) has argued for the importance of many fundamental and primordial metaphors, particularly of movement, within human cognitive structure. Metaphors associated with suspicion and status are probably equally old and the linguistic analysis of the associated delusional systems may generate further insights into the basis of language.

For concept psychology, there is the suggestion that a detailed analysis of schema in delusional areas may provide a fruitful alternative to the more frequently studied conceptual sets. The study, for example, of suspicion-loaded words and concepts dealing with friends and enemies or words associated with status or role in society, may generate some dynamic examples of concepts in action.

Finally I would like to argue that the psychology of anomalous experiences is worthy of much more study than it receives at present. Motivation is one of the least understood areas of psychological functioning, yet the origin of much of human motivation is associated with either anomalous experiences themselves or experiences phenomenologically related to them, such as, for example, the feelings associated with falling in love, religious conversion or with major career changes. These phenomena tend to have been marginalised by our behaviourist and information-processing forebears, yet through their power to completely alter the course of a person's life they are deserving of more attention.

References

ABRAMSON, L.Y., SELIGMAN, M.E.P. & TEASDALE, J.D. (1978) Learned helplessness in humans: critique and reformulation, *Journal of Abnormal Psychology*, 87, pp. 49–74.

AMERICAN PSYCHIATRIC ASSOCIATION (1987) *The Diagnostic and Statistical Manual of Mental Disorders*, 3rd edn (revised) (Washington, DC, APA).

ANDERSON, R.E. (1984) Did I do it or did I only imagine doing it?, *Journal of Experimental Psychology (General)*, 113, pp. 594–613.

BECHTEL, W. (1989) *Multiple levels of inquiry in cognitive science*, paper presented at the *Domains of Mental Functioning Conference*, University of Bielefield, December 1989.

BECK, A., RUSH, A., SHAW, B. & EMORY, G. (1979) *Cognitive Therapy of Depression* (New York, Guildford Books).

CAMPBELL, D.T. (1974) 'Downward causation' in hierarchically organized biological systems, in: F. AYALA & T. DOBZHANSKY (Eds) *Studies in the Philosophy of Biology* (Berkeley, CA, University of California Press).

CHAPMAN, L.J. & CHAPMAN, J.P. (1988) The genesis of delusions, in: T.F. OLTMANNS & B.A. MAHER (Eds) *Delusional Beliefs* (New York, Wiley).

COHEN, L.J. (1981) Can human irrationality be experimentally demonstrated?, *Behavioural and Brain Sciences*, 4, pp. 317–370.

DARDEN, L. & MAULL, N. (1977) Interfield theories, *Philosophy of Science*, 43, pp. 44–64.

DENNETT, D.C. (1987) *The Intentional Stance* (Cambridge, MA, MIT Press).

DOUGLAS, J.D. & WAKSLER, F.C. (1982) *The Sociology of Deviance: an introduction* (Boston, MA, Little-Brown).

FEYERABEND, P.K. (1975) *Against Method* (London, New Left Books).

FODOR, J.A. (1987) *Psychosemantics: the problem of meaning in philosophy of mind* (Cambridge, MA, MIT Press).

FREUD, S. (1922) Some neurotic mechanisms in jealousy, paranoia and homosexuality, *The Standard Edition of the Complete Psychological Works of Sigmund Freud, Vol 18* (London, Hogarth and the Institute of Psychoanalysis).

GIBSON, J.J. (1966) *The Senses Considered as Conceptual Systems* (Boston, MA, Houghton Mifflin).

GREENWALD, A.G. & PRATKANIS, A.R. (1984) The self, in: R.S. WYER & T.K. SRULL (Eds) *Handbook of Social Cognition*, vol. 3 (Hillsdale, NJ, Earlbaum).

JAMES, WILLIAM (1890) *The Principles of Psychology* (London, Macmillan).

JOHNSON-LAIRD, P.N. & WASON, P.C. (1977) A theoretical analysis of insight into a reasoning task, *Cognitive Psychology*, 1, pp. 134–148.

JONES, E.E. & NISBETT, R.E. (1972) The actor and the observer: divergent perceptions of the causes of behaviour, in: E.E. JONES, D.E. KANOUSE, H.H. KELLY, R.E. NISBETT & B. WERNER (Eds) *Attribution: perceiving the causes of behaviour* (Morristown, NJ, General Learning Press).

KAHNEMAN, D., SLOVIK, P. & TVERSKY, A. (1982) *Judgement Under Uncertainty: heuristics and biases* (New York, Cambridge University Press).

KELLY, H.H. & MICHELA, J.L. (1980) Attribution theory and research, *Annual Review of Psychology*, 31, pp. 457–501.

KIHLSTROM, J.F. (1980) Posthypnotic amnesia for recently learned material: interactions with 'episodic' and 'semantic' memory, *Cognitive Psychology*, 12, pp. 227–251.

KIHLSTROM, J.F. (1985) Hypnosis, *Annual Review of Psychology*, 36, pp. 385–418.

KLEIN, H.R. & HOROWITZ, W.A. (1949) Psychosexual factors in the paranoid phenomena, *American Journal of Psychiatry*, 105.

LAKOFF, G. (1988) *Women, Fire and Dangerous Things* (Chicago, IL, University of Chicago Press).

LYCAN, W.G. (1987) *Consciousness* (Cambridge, MA, MIT/Bradford).

MAHER, B.A. (1974) Delusional thinking and cognitive disorder, in: H. LONDON & R.E. NISBETT (Eds) *Thought and Feeling: cognitive alteration of feeling states* (Chicago, IL, Aldine).

MELE, A. (1987) *Irrationality: an essay on akrasia, self-deception, and self-control* (Oxford, Oxford University Press).

MELE, A., KNIGHT, M. & MCLAUGHLIN, B. (1988) Irrationality examined, *Philosophical Psychology*, 1(2), pp. 201–206.

MENNAGER, K., MAYMAN, M. & PRUYSER, P. (1964) *The Vital Balance* (New York, Viking).

MICHENBAUM, D. (1977) *Cognitive Behavior Modification: an integrative approach* (New York, Plenum).

NAGEL, T. (1986) *The View from Nowhere* (Oxford, Oxford University Press).

NEISSER, U. (1988) Five kinds of self-knowledge, *Philosophical Psychology*, 1(1), pp. 35–60.
OLTMANNS, T.F. & MAHER, B.A. (1988) *Delusional Beliefs* (New York, Wiley).
POPPER, K.R. (1959) *The Logic of Scientific Discovery* (London, Hutchinson).
ROKEACH, M. (1964) *The Three Christs of Ypsilanti* (New York, Knopf).
RUSSELL, B. (1967) *The Autobiography of Bertrand Russell* (London, George Allen & Unwin).
RUST, J. (1988) The Rust Inventory of Schizotypal Cognitions (RISC), *Schizophrenia Bulletin*, 14(2), pp. 317–322.
RUST, J. (1989) *The Handbook of the Rust Inventory of Schizotypal Cognitions (RISC)* (London, The Psychological Corporation).
SARBIN, T.R. & COE, W.C. (1979) Hypnosis and psychopathology: replacing old myths with fresh metaphors, *Journal of Abnormal Psychology*, 88, pp. 506–526.
SAVAGE-RUMGUAGH, E.S. (1990) Language as a cause–effect communication system, *Philosophical Psychology*, 3, pp. 55–76.
SPANOS, N.P. (1986) Hypnotic behaviour: a social psychological interpretation of amnesia, analgesia and 'trance logic', *Behaviourial and Brain Sciences*, 9, pp. 449–522.
STONE, A.A. & STONE, S.S. (1966) *The Abnormal Personality through Literature* (Englewood Cliffs, NJ, Prentice-Hall).
SUTCLIFFE, J.P. (1961) 'Credulous' and 'skeptical' views of hypnotic phenomenia: experiments in aesthesia, hallucination and delusion, *Journal of Abnormal and Social Psychology*, 62, pp. 189–200.
VON DOMARES, E. (1940) The specific laws of logic in schizophrenia, in: J. KASANIN (Ed.) *Language and Thought in Schizophrenia* (Berkeley, CA, University of California Press).
WILLIAMS, E.B. (1964) Deductive reasoning in schizophrenia, *Journal of Abnormal and Social Psychology*, 69, pp. 47–61.
WITTGENSTEIN, L. (1974) *On Certainty*. Edited by G.E.M. ANSCOMBE & G.H. VON WRIGHT (Transl. by D. PAUL & G.E.M. ANSCOMBE) (Oxford, Blackwell).