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Delusions and attentional bias

Leafhead, Katherine M.

Delusions
and
Attentional Bias

Katharine M. Leafhead

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Abstract

A research method for investigating delusional beliefs is outlined by adopting the delusional belief that one is dead (the Cotard delusion) as a model delusion. Detailed analyses of published case reports of the Cotard delusion demonstrate that the term 'syndrome' as it is currently applied to the belief that one is dead is not helpful in terms of our understanding of the delusion. Four new case studies of the Cotard delusion suggest that preoccupation with belief may play a role in the formation and maintenance of delusions.

Preoccupation with delusional belief was investigated using a variant of the 'emotional' Stroop paradigm, commonly used in investigating anxiety disorders. Three individuals with the Cotard delusion, and diagnosed as suffering from depression, showed attentional biases toward words related to the theme of death. Two of the individuals had no history of anxiety and showed no bias toward words related to generalised anxiety. It was therefore suggested that the locus of attentional biases in delusions may be preoccupation with delusional belief, rather than anxiety *per se*. Consistent with this, a patient with fixed grandiose delusional beliefs, diagnosed with schizophrenia, and not suffering from anxiety, showed attentional bias toward words related to his delusional beliefs. Attentional bias failed to be demonstrated in a group of people with delusions arising in the context of schizophrenia, and reasons for this are discussed. Finally, three groups of individuals, who were free form any form of psychopathology, each showed a trend towards longer colour-naming times towards words related to their respective interests, but none of these were significant.

It is concluded that attentional biases in delusions serve to reinforce delusional beliefs by constantly focusing the individual's attention onto delusion-relevant material. Implications for further research are discussed.

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Tables

Illustrations

Some of the contents from this thesis have appeared in the following publications:

Leafhead, K. M., Young, A. W. & Szulecka, T. K. (1996). Delusions demand attention. Cognitive Neuropsychiatry (1), 5-16.

Young, A. W., Leafhead, K. M. & Szulecka, T. K. (1994). The Capgras and Cotard delusions. Psychopathology (27), 226-231.

Young, A. W. & Leafhead, K. M. (1996). Betwixt life and death: case studies of the Cotard delusion. In P. W. Halligan & J. C. Marshall (Eds.), Methods in Madness: Case Studies in Cognitive Neuropsychiatry. Hove, UK: Erlbaum (UK) Taylor & Francis.

Acknowledgements

For Elita

Chapter One
Research into delusions

"Since time immemorial delusion has been taken as the basic characteristic of madness. To be mad was to be deluded and indeed what constitutes a delusion is one of the basic problems of psychopathology."

Jaspers (1913/1968, p.93)

Definitions and contexts

What is a delusion?

Delusions are generally regarded as false beliefs that are symptomatic of mental illness (Berrios, 1991). The above quote from Jaspers, one of the first people to attempt to define delusion, remains pertinent today; the issue of what is and what is not a delusion is not a simple one.

Jaspers (1913/1968) characterised delusions as judgments whose contents were impossible, which were held with extraordinary conviction and subjective certainty, and which were impervious to contradictory argument. He distinguished between a delusion-like idea (or over-valued idea, for he often used the two terms synonymously) and a primary delusion. A primary delusion, Jaspers argued, differed from a delusion-like idea in three ways. First, it was unmediated by thought; second it was "ununderstandable" (*"unverständlich"*) (Walker, p.101); and third, it indicated a change in personality (Jaspers, 1913/1968). A primary delusion was one that was elementary and psychologically irreducible (i.e., not the result of a disturbance of thinking or of perception or sensation). The disturbance, he argued, was one of symbolic meaning. A delusion-like idea was mediated by thought and was understandable, and was seen to evolve from factors such as guilt and false perceptions. Similarly, the evolution of normal beliefs and over-valued ideas were understandable and resulted from personality and life events. Schneider (1959) also defined a primary delusion as being non-understandable in terms of the

individual's personality or past experiences, and a secondary delusion as being understandable in terms of these two factors.

The central tenet of both the Jasperian and Schneiderian account of delusion is that a delusion is a false belief. This view remains central today. Hence, the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III, 1980), defines delusion as:

"A false personal belief based on incorrect inference about external reality and firmly sustained in spite of what almost everyone else believes and in spite of what constitutes incontrovertible and obvious proof or evidence to the contrary".

While most authors accept the general principle behind this definition (e.g., Hole, Rush & Beck, 1979; Mullen, 1979; Chapman, 1980; Winters & Neale, 1983), some disagree with the entire notion that delusions are false beliefs. Berrios (1991), for example, writes that delusions are not beliefs at all, but "empty speech acts that disguise themselves as beliefs" (p.8). In a historical analysis of delusions, Berrios (1991) notes that until the nineteenth century, delusions, hallucinations and illusions were seen as part of the same entity, and that they only became seen as separate entities as the result of a philosophical divorce between the concepts of belief and knowledge. Knowledge came to refer to scientific certainty and hence became subject to "canons", or rules, while belief became "subjectivised and redefined in probabilistic knowledge and mental attitudes" (Berrios, 1991, p.10). Such changes in the philosophy of knowledge and belief were reflected in the definitions of delusions, hallucinations and illusions. The upshot of such changes meant that delusions could no longer be viewed as forms of knowledge, since their contents did not meet the new scientific canons and so, by default, argues Berrios, delusions became redefined as beliefs. Accordingly, delusions became defined in terms of intellectual pathology, hallucinations in terms of perceptual pathology and illusions as a combination of perception and intellect (Berrios, 1991).

Writing from a philosophical standpoint, Sass (1994) also argues against the idea that delusions are false beliefs. Sass provides an intriguing account of delusions in which he explores parallels between delusional thinking and solipsism. Solipsism is the philosophical doctrine that the self is the only thing that exists, or is the only knowable reality. According to this, the only things that are real are the things which one perceives and feels. In his account, Sass examines the philosophical writings of Wittgenstein and the memoirs of the paranoid schizophrenic Daniel Paul Schreber, entitled *Memoirs of My Mental Illness*. Sass suggests that "Madness... is, to be sure, a self-deceiving condition, but one that is generated from within rationality itself rather than by the loss of rationality" (p.12). He argues that:

> "Schreber does not experience his delusions as being literally true but, rather, as having a certain 'subjectivised' quality - that is, as being in some sense the product of his own consciousness rather than as enjoying an independent or objective existence (as the poor reality-testing formula implies)" (p.8).

Sass goes on to argue that this description of experience is "strikingly reminiscent of the philosophical doctrine of solipsism..." (p.8). A potential problem with Sass' account is that many individuals with delusions act on those delusions; if such people were at some level aware that their beliefs were the product of their own minds and as such were distinct from "objective existence", surely they would not do this? Even if one accepts that acting on a delusion is compatible with solipsism, one of the notable points about delusions is that at least some individuals appear to believe them to be true. Even if Sass were to convince us that Schreber understood the difference between reality and non-reality, it is difficult to conceive, as shall be evident in Chapter Three, that at least some people with delusions do not believe them to be true, particularly when one considers the severity of some delusion-related behaviour, and this is evident even in cases where the individuals themselves understand that others cannot conceive of such beliefs.

Another argument against the notion of delusions as beliefs concerns the definition of the word *belief* as it is applied to delusions. Sims (1991) argues that:

"A delusion is not really a belief in the conceptual or philosophical sense of the word. It is more a notion, assumption, idea, thought, or underlying mental structure of everyday life. It is unnecessarily pompous to state that I have a belief that the chair on which I am sitting will prevent me from falling on the floor; it is an assumption, a thought which barely reaches consciousness. Delusion is an assumption of that order" (p.47).

How are we to reconcile such conflicting views? It may well transpire that for some short-lived, ill-formed delusions the term 'belief' is inappropriate, while, as shall be demonstrated below, there are some well formed and complex delusions for which the term 'belief' appears to be entirely appropriate. Indeed, Roberts (1991) notes that delusions vary greatly "from fleeting, changeable ideas to elaborate and stable systems" (p.19). In essence, therefore, delusions may run along a continuum with fleeting, ill-formed ideas at one end and complex, stable beliefs at the other. Indeed, such beliefs and ideas may also run along a continuum with normal thinking, such that fully formed complex delusional beliefs fall at one end and normal thinking at the other, with fleeting delusional ideas falling somewhere in between the two. Such a viewpoint has emerged in line with the recognition that there is no clear demarcation of delusional beliefs and so-called 'normal beliefs'.

DSM-III (1980) went some way towards clarifying this issue by noting that a belief was delusional if it was "not one ordinarily accepted by other members of the person's culture or subculture" (p.228). This distinction has been taken up by a number of researchers (e.g., Winters & Neale, 1983) and has proved a useful means of helping to distinguish normal from delusional beliefs. For example, there are many people who claim to have had religious visions; those within their religious culture or group will most probably not view them as being deluded.

Similarly, people who claim to have seen UFOs or ghosts may be believed by others who have either had similar experiences themselves or believe such sightings are at least plausible. The relevance of this is that whether such beliefs are viewed as delusional depends in part on just who is doing the viewing.

DSM's (APA, 1980; 1994) distinction between normal and delusional beliefs in terms of content and culture certainly aids our definition of a delusion. However, the problem of distinguishing clearly between a normal and a delusional belief stems not just from the problem of defining a delusion, but from a lack of knowledge regarding the range and formation of normal beliefs. This inevitably means a precise distinction between a normal and a delusional belief remains problematic.

Most modern conceptions of delusions acknowledge that there are many beliefs that may share certain characteristics of delusions, but which are not delusional. This notion is accepted in the recent modification to the definition of delusions in DSM-IV (1994):

> "Delusions are erroneous beliefs that usually involve a
> misinterpretation of perceptions or experiences... The distinction
> between a delusion and a strongly held idea is sometimes difficult to
> make and depends on the degree of conviction with which the belief is
> held despite clear contradictory evidence" (p.275).

Such a definition acknowledges that the boundary between a delusion and a strongly held idea can be somewhat fuzzy. By way of illustration, Walker (1991) notes that we do not typically classify pathological gamblers and people with anorexia as suffering from delusions; we prefer to say they have over-valued, or perhaps self-deceptive ideas. Both groups, however, display implausibility of belief (I'm bound to win next time; I'm horribly fat), hold their respective beliefs with strong conviction and are impervious to counter-argument.

Strauss (1969) drew a distinction between delusional beliefs and self-deception. He considered a belief to be delusional if it was: i) highly implausible;

ii) held with strong conviction; and iii) greatly preoccupied the individual holding it. On the other hand, he viewed a belief that was quite plausible and held with less conviction and a lower degree of preoccupation, to be rather more self-deceptive than delusional. The notions, however, of conviction and preoccupation being 'less' and 'lower' do not seem to seem adequate to *distinguish* delusional beliefs from self-deceptions - nor, indeed, from 'normal' beliefs. The lack of a clear distinction between delusional beliefs and self-deceptions has led authors such as Winters and Neale (1983) to suggest they fall along a continuum; at one end of the spectrum, there are those beliefs that are fairly commonplace (self-deceptions), and at the other are delusional beliefs that fulfil all three of Strauss' criteria. Similarly, in terms of delusional and normal beliefs, DSM-IV's criteria are consistent with the notion of a continuum, with delusions at one end and so-called normal thinking at the other. This may reflect the lack of understanding, noted above, not only of delusional beliefs, but also of normal beliefs.

There are strong echoes of Jaspers' notions of ununderstandability and understandability in DSM-IV's differentiation between a bizarre and a non-bizarre delusion. According to DSM-IV, a delusion is bizarre if it is clearly implausible and does not result from normal life experiences, such as the belief that one is capable of controlling the weather. A non-bizarre delusion, on the other hand, may be plausible and may result from everyday life experiences, such as believing that one is being watched.

Finally, as Jaspers noted, the definition of delusions is further complicated by the fact that even the veracity of a belief is not sufficient to judge whether that belief is delusional; the content of a delusion might be true, but the individual believes it for the wrong reasons. Jaspers noted that the wife of a man suffering from pathological jealousy might indeed be having an affair, but the husband is deluded, because the reasons underlying his belief are wrong. For instance, the wife became disenchanted with the marriage because of her husband's pathological jealousy, and so finally did have an affair.

To summarise, the task of defining delusions is a problematic one. There is, however, a general consensus that delusions are false beliefs, some of which are entirely implausible, others less so. They are usually considered to be held with strong conviction and preoccupation, are impervious to counter-argument and contradictory evidence, and are not shared by one's fellow cultural or religious group or subgroup.

Who suffers from delusions?

A common misconception about delusions is that they arise only in the context of schizophrenia. This is not the case - indeed, while delusions are often associated with schizophrenia, not all people suffering from schizophrenia hold delusional beliefs. Delusional beliefs can be found in various psychological disorders, including manic depressive disorder and affective anxiety disorder. Furthermore, delusions can arise through changes in the central nervous system resulting from alcohol misuse, drug abuse and varying types of organic illness (Winters & Neale, 1983).

Delusions can last for a few days, while others may last for years. Some people suffer from single delusional beliefs; while others may suffer from more than one delusion at once (i.e., hold co-existent beliefs) (e.g., Joseph, 1986); and still others may suffer from one delusion followed by another (i.e., hold sequential delusional beliefs) (e.g., Wright, Young & Hellawell, 1993).

Issues in research

Explanations for delusions

Until relatively recently, much research on delusions was conducted within a psychodynamic framework, according to which delusions are the reflections of unconscious inner states, such as unresolved conflicts or fears or unsatisfied needs, which are then projected onto an external attribution (e.g., Freud, 1917/1950, 1921; Mayer-Gross, Slater & Roth, 1954, all cited by Neale, 1988). This type of

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theory is prey to the same methodological criticism levelled at much of psychoanalytic theory; in order to falsify it, one needs to assess processes deemed to be unconscious. The methods often used for this (e.g., dream analysis and free association) are not generally held to be reliable research procedures (Winters & Neale, 1983).

During the past few years, we have witnessed a growing interest in the study of delusions and much research now focuses on the definition and measurement of delusions (e.g., Garety, 1985; Brett-Jones, Garety & Hemsley, 1987) and on cognitive functioning in people suffering from delusions (e.g., Huq, Garety & Hemsley, 1987). Generally, there are two main types of explanation for delusions. The first views delusions as rational attempts at interpreting abnormal experiences (Maher, 1974), while the second argues that delusional beliefs are the products of abnormal reasoning (Hemsley & Garety, 1986; Garety & Hemsley, 1994).

The notion that delusional beliefs are reflective of an underlying disorder of thinking is not a new one. Von Domarus (1944, cited by Maher, 1988) and Arieti (1955, cited by Maher, 1988) viewed delusions as being the result of faulty syllogistic reasoning (although, like Freud, Arieti believed faulty reasoning was itself the result of the disruption of some inner motivational state). Maher and his colleagues (1974, 1988; Maher & Ross, 1984) argue, however, that people with delusions are merely describing an experience; that delusions are not the result of an underlying disorder of thinking, but rational attempts to interpret perceptually anomalous experiences. Maher dismisses the notion that people with delusions are impervious to contradictory evidence; rather, he argues, the anomalous perceptions distort the available evidence such that, to the individual, it appears as confirmatory rather than contradictory evidence. Hence, for Maher, the perceptual anomaly is central to the delusion and distorts what we might regard as potentially contradictory evidence, and thus renders it confirmatory. In a similar vein, La Russo (1978, cited by Bentall & Kaney, 1989) suggests that the detection of

relevant information is impaired in people with delusions and so inappropriate conclusions are more likely to be drawn which in turn increases the likelihood of delusional thought. It is important to note, however, that most individuals with perceptual impairments do not become deluded. It seems difficult to argue convincingly, therefore, that an abnormality in perceptual processing represents a *sufficient* condition for delusional thinking. Moreover, schizophrenics may perform normally on syllogistic reasoning tasks but this does not rule out the possibility of the existence of an association between errors in reasoning and delusions: In the first place, many schizophrenics are not deluded, and in the second, formal logic forms only a small fraction of the gamut of human thought (Bentall & Kaney, 1989).

Hemsley and Garety (1986) acknowledge that perceptual abnormalities play a role in the formation of delusions but, in contrast to Maher, argue that people with delusional beliefs are abnormal in their ability to evaluate evidence and consider alternative hypotheses. According to this abnormal reasoning hypothesis, delusions may arise from a deficit in the ability to assess evidence according to Bayesian principles. Basically, Bayes theorem shows by how much one should revise one's belief in a particular hypothesis given that new information is received. A number of potential biases can arise in hypothesis evaluation, such as when estimating probabilities and searching for information. Hemsley and Garety (1986) suggest that research undertaken on the formation of normal beliefs in terms of Bayesian theory, the types of judgments made and deviations from optimal Bayesian principles (Fischhoff & Beyth-Marom, 1983), might prove informative in regard to the study of the formation and maintenance of delusions. It is known that so-called 'normals' deviate from optimal Bayesian performance when evaluating existing and new information (Fischhoff & Beyth-Marom, 1983). If people suffering from delusions fail to take account of evidence that contradicts those beliefs, they should therefore show quantitative and/or qualitative differences from the norm. That is to say, they should deviate more, or in a different manner, from

normals, as has been shown to be the case in people with obsessional disorders (Volans, 1976). Consistent with this, Hemsley and his colleagues have demonstrated that people suffering from delusions request less information and express more confidence in their judgments in probabilistic reasoning (Huq *et al.*, 1987).

It can be seen that the abnormal reasoning hypothesis and the perceptual account of delusions are conceptually distinct. As will be discussed below, and in Chapters Four and Five, however, both may offer clues as to the formation and maintenance of delusions, since it is unlikely to be the case that all delusions can be accounted for by a single causal explanation. Hence, Neale (1988), who agrees that Maher's theory provides a neat account of delusions involving physiological sensations and hallucinations, notes that different mechanisms may underlie different types of delusion. Indeed, Maher himself (1974), who was primarily concerned with explaining persecutory delusions, originally pointed out that his theory may not account for all patients or for all types of delusions.

The notion that different causal mechanisms underlie different types of delusion has considerable implications for psychopathological research. In particular, it has implications for the level at which psychopathological research is conducted, which lies at the heart of the continuing controversy surrounding syndrome- versus symptoms-based approaches in research. It is to this controversy that I now turn.

Symptoms and syndromes

The idea of psychiatric syndromes is to find an agreed and reliable way of classifying the phenomena encountered. Psychiatrists therefore tend to look for syndromes that are defined by clusters of co-occurring symptoms. Despite its widespread use in diagnosis, the usefulness of the syndrome concept in psychopathological research has been the subject of much debate in recent years (Bentall, Jackson & Pilgrim, 1988a, b; Wing, 1988; Bentall, 1990, 1992; Costello,

1992). At the heart of this debate are the related issues of reliability and validity. Reliability refers to the consistency with which people are diagnosed using a given system, while validity concerns the usefulness and meaningfulness of diagnostic classification.

In terms of reliability, Bentall (1990) notes that "one psychiatrist's schizophrenic must be another psychiatrist's schizophrenic" (p.25). He argues that in practice this is not the case, although he and his colleagues (Bentall *et al.*, 1988a) acknowledge the advances made to this end in recent years, most notably in the development of the Present State Examination (PSE), a structured interview technique (Wing, Cooper & Sartorius, 1974) and the Diagnostic and Statistical Manual of Mental Disorders (DSM-III, 1980). Bentall *et al.* (1988a) argue that "this reliability may not be all that it appears" (p.306) because if different criteria are designed to identify the same entity, one would expect a high degree of agreement between them in any case.

Bentall *et al.* (1988a) argue that reliability is a necessary, but not sufficient requirement for establishing validity and so even if reliability was to be obtained, further evidence would need to be presented to establish validity. For the concept of a syndrome such as schizophrenia to be valid, Wing (1988) argues that a number of traits should tend to co-occur. Hence, two patients should have some symptoms in common. Bentall (1990) and Costello (1992) argue that this is often not found in practice. Bentall *et al.* (1988a, citing Kendell) add that the reverse should also hold. That is to say, few individuals suffering from a syndrome should display symptoms of other illnesses. Again, he argues that this is often not the case. While acknowledging that the syndrome approach may result in reliable diagnoses, Costello (1992) notes that agreement between different diagnostic tools (i.e., concurrent validity) is low. Costello (1992) argues that if concurrent validity is low, a question arises as to the construct validity of the measurements used. If the construct validity is questionable, then the data obtained from such a measure are necessarily of questionable validity and hence the data on symptoms derived from

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the measure will be inadequate. Furthermore, addressing the issue of categorical or dimensional differences between psychotic and non-psychotic behaviour (e.g., as in the notion of a continuum of beliefs, referred to above) might be an easier task if tackled at the level of symptoms rather than syndromes (Bentall *et al.*, 1988a; Costello, 1992). Such views have led authors such as Costello (1992) and Bentall (Bentall *et al.*, 1988a, b; Bentall, 1990) to propose that research into symptoms is likely to prove more informative to our understanding of mental illness than is research into syndromes.

The decision to undertake syndrome-based or symptom-based research must surely depend largely, however, on what one wants to achieve. Certainly, if one is researching into the value of explanations involving psychological factors, it would seem sensible to direct that research at deficits defined at the same level of generality as the psychological theory employed. However, it is clear that syndromes can often have diagnostic usefulness, and that broadly-based groupings of cases are needed to support certain types of inference. Parenthetically, it is worth noting that psychiatry as a discipline has not ignored the syndrome/symptoms debate within psychopathological research, nor has it denied the clinical heterogeneity of, for example, schizophrenia. Indeed, the increasing number of papers on these issues appearing in psychiatric journals in recent years bears witness to this (e.g., Liddle, 1987; Liddle & Barnes, 1990; Snaith, 1991; Costello, 1992).

Clearly, in conducting research there are many different possible classification systems one might adopt, and, as hinted above, these exist at different levels of generality. For the sake of simplicity, let us imagine there are three levels at which one might investigate delusional beliefs. First, if one's primary overall research interest is in schizophrenia, one may wish to adopt a relatively broad-based strategy and examine the presence or absence of symptom clusters which may include delusions, as well as, say, thought disorder and hallucinations. Here, the disorder under investigation is schizophrenia and the aim is to ascertain whether a

pattern of symptoms emerges for various sub-classifications of schizophrenia. Second, if one is interested in explaining delusional beliefs *per se* one approach might be to examine different types of delusion with a view to establishing whether certain individual features co-occur. Here, it can be seen that the disorder under investigation has switched from being schizophrenia to that of delusions in general, and the aim is to ascertain whether a pattern of features emerges in different types of delusional belief. Third, one might be interested in understanding mechanisms underlying a specific delusional belief, in which case one might examine only those individuals who suffer from that particular delusional belief with tasks sensitive to the hypothesised mechanism (and, of course, one might then attempt to discover whether any such mechanisms are implicated in other delusional beliefs). Here, the specific delusional belief becomes the object of study and the aim is to understand how that particular belief is formed and maintained. In the latter case, the decision is made to attempt to understand in detail a particular, relatively tightly-defined phenomenon. One can then decide to investigate whether one's explanation can be broadened to account for other types of delusion. It is to this approach that I now turn.

Adopting a model delusional belief

In order to investigate how delusions are formed and maintained, an appropriate starting point would seem to be to identify a sort of 'model' delusional belief. Then, one may attempt to establish a common pattern of symptoms, and then try to construct a theory that is able to account for the resulting symptomatology. Such a theory would need to establish causal mechanisms in the formation and maintenance of that delusion. Having done this, one may, as suggested above, attempt to ascertain whether similar mechanisms may be involved in other types of delusion.

The starting point in the present research, therefore, was to identify a model delusion. I chose the Cotard delusion, which is the delusional belief that one is

dead, because it fulfils the generally-agreed definition of delusions, referred to above (p.6). That is to say, it is is a false belief, held with strong conviction and preoccupation, is impervious to counter-argument and contradictory evidence, and it is not shared by people's cultural or religious groups. Furthermore, in terms of bizarreness, it is certainly one of the most implausible of delusional beliefs.

The remainder of this chapter is devoted to outlining current theory regarding the formation of the Cotard delusion, and to relating this to the structuring of the present thesis.

The Cotard delusion

Introduction

In 1882, Jules Cotard, a French psychiatrist, published a number of case reports in which the central feature was what he termed nihilistic delusions (*le délire de négation*). In their milder form, these delusions were characterised by self-deprecation and feelings of despair and in their most extreme form, by a total denial of the self and external world. Over the years, the term 'Cotard syndrome' has become almost synonymous with the most striking feature found in the nihilistic delusions described by Cotard; the belief that one is dead, although, as shall be discussed in Chapter Two, Cotard believed that this symptom occurred in severe forms of *le délire de négation*, and that it did not represent the defining feature. The delusion was first referred to eponymously by Séglas (1897), following a suggestion by his contemporary, Régis.

An approach to research and an explanation

Until very recently, the Cotard delusion was viewed mainly in psychodynamic terms, by which the delusion arises out of a "death-wish inherent in the collective conscious" (Enoch & Trethowan, 1979, p.130). Self-negation, self-punishment and feelings of guilt are all seen as reflections of this death-wish.

Over the past few years, however, an alternative theory of the Cotard delusion has been proposed (e.g., Young, Robertson, Hellawell, de Pauw & Pentland, 1992). Young and his colleagues point to a number of perceptually anomalous experiences in the Cotard delusion. These anomalies involve things appearing unfamiliar and unreal to the individuals, as well as a loss of emotional responsiveness. They suggest that the Cotard delusion is the result of a misinterpretation of those anomalous perceptual experiences (Young *et al.*, 1992; Wright *et al.*, 1993; Young, 1994).

Such experiences might potentially be interpreted in many possible ways and, as Kaney and Bentall (1989) note, this will depend on social and personal factors. In regard to this, it is relevant that the Cotard delusion typically arises in the context of depression. Beck (1967; 1989) argued that depressed individuals commonly have a negative cognitive set. This cognitive set consists of negative views of themselves, the external world, and the future. Central to this is the concept of schemas, which consist of previous negative events. These schemas become automatically activated whenever similar negative events are encountered and influence the way in which these new events are interpreted. Hence, the self, the situation and the future are all perceived as being hopeless. Schema activation is held to be automatic, leading the depressed individual to make arbitrary inferences about causation. For example, if the person to whom you are attracted does not feel the same attraction, it is because you are a fat, ugly, uninteresting failure.

Consistent with Beck's formulation of depression, it has been shown that depressed individuals tend to attribute negative events to internal causes (*It's my fault*) rather than to external causes (*It's someone else's fault*) (Kaney & Bentall, 1989; Candido & Romney, 1990). Wright *et al.* (1993), drawing from this theory, suggest that the individuals' depressed mood contributes to their seeking an internal cause for their perceptual problems, and erroneously concluding that they must be dead. That is to say, they (correctly) attribute their altered perceptual experience as being a change in themselves, but (incorrectly) go on to infer that they are dead.

A problem with this theory does not address the issue of why patients form the specific belief they are dead, rather than say they feel *as if* they are dead, or do not feel human. There would seem to be a quantum leap from seeking an internal cause for their perceptually anomalous experience to concluding they are dead. Why, for example, do patients not claim that they have changed into a non-human form, as happens in patients suffering from metamorphosis - and, indeed, in some of Cotard's original (1882) cases? Alternatively, given the reported perceptual anomalies, why do patients not believe they have, for example, a brain tumour or a visual defect?

These problems notwithstanding, the general theoretical approach of Young and his colleagues has two main advantages. First, it generates readily testable predictions. For example, the delusion of being dead should resolve in parallel with changes in the individual's mood. This indeed appears to be the case (Young *et al.*, 1992) and will be demonstrated further in Chapter Three. Second, the approach can be extended to other delusional beliefs, such as the Capgras delusion, in which people claim that some of their relatives have been replaced by duplicates or impostors (Capgras & Reboul-Lachaux, 1923).

The Capgras delusion shows intriguing parallels to the Cotard delusion; in particular, similar perceptual anomalies are reported by both types of patient. Indeed, the fact that people experiencing the Cotard delusion often report that they must be dead because they 'feel nothing inside' provides a parallel with a widely hypothesised lack of affective reactions in Capgras cases (Anderson, 1988; Ellis & Young, 1990; Lewis, 1987). That is to say, not only do people have a lack of feeling of familiarity for the person or persons they believe are the impostors, but they are usually curiously ambivalent about what has happened to the original.

Similar impairments are seen in both the Cotard and Capgras delusions on neuropsychological tests of the processing of faces (e.g., on the selection of previously-seen from previously-unseen distracter faces in tests of recognition memory) and places (e.g., on recognition memory for unfamiliar buildings and on

the naming of famous landmarks, such as the Eiffel Tower) (Young *et al.*, 1992; Young, Reid, Wright & Hellawell, 1993). Also common to both types of delusion are feelings of derealisation (Christodoulou, 1977; Todd, Dewhurst & Wallis, 1981; Young *et al.*, 1993). The issue of derealisation, and also that of depersonalisation, warrants special mention and shall be addressed below. Finally, both delusions can be produced by similar types of brain injury. In patient WI (Young *et al.*, 1992), for example, the Cotard delusion followed damage to the temporo-parietal areas of the right cerebral hemisphere as well as some bilateral frontal lobe damage. A similar pattern has been associated with the Capgras delusion (Alexander, Stuss & Benson, 1979; Lewis, 1987), and right hemisphere dysfunction (as assessed by neuropsychological tests of face-processing) has been shown even in cases of Capgras delusion without readily demonstrable brain injury (Ellis, de Pauw, Christodoulou, Papageorgiou, Milne & Joseph, 1993). The face processing impairments are held to re-inforce the feeling the patients have of appearing to be strange and unfamiliar. Taking the above evidence into account, Young *et al.* (1992) have therefore suggested that the underlying pathophysiology and neuropsychology of the Cotard and Capgras delusions may be related.

Against this background of similarities between the Cotard and Capgras delusions, there appears to be a key difference. While the Cotard delusion is associated with a depressed mood, the Capgras delusion is associated with a suspicious mood, and is often accompanied by persecutory delusions. Studies have shown that people with persecutory delusions tend to attribute negative events to external rather than internal causes (Kaney & Bentall, 1989; Candido & Romney, 1990). Hence, Young *et al.* (1993) hypothesise that in the Capgras delusion, a suspicious mood and the presence of persecutory delusions cause people to misattribute changes in their own perception to changes in other people, which in turn leads them to infer that these people must be impostors.

Again, the issue of why patients form the specific belief that others are impostors is not addressed by Young and his colleagues. However, the leap from

seeking an external cause for one's perceptual problems to claiming that others are impostors does not appear to be as great as that required when attempting to account for the Cotard delusion in terms of internal attributions of perceptual anomalies.

In both the Capgras and Cotard delusions, therefore, Young and his colleages claim that there are at least two interacting contributory factors; anomalous perceptual experience and disturbed mood. The latter determines a particular interpretation of the former, which results in the specific form of delusion. A prediction which follows from this is that if people who had initially voiced the Cotard delusion change from being depressed to being suspicious, they may shift to the Capgras delusion as an account of their experiences, and *vice-versa*. Consistent with this, there are indeed a number of reports of sequential Capgras and Cotard delusions (Bleeker & Sno, 1983; Enoch & Trethowan, 1991; Förstl, Almeida & Iacoponi, 1991; Joseph, 1986; Kim, 1991; Wright *et al.*, 1993).

The theory that the Capgras and Cotard delusions result from an interaction of contributory factors may help to explain why the two appear to be related. There are, however, a number of problems with Young's theory. First, as noted above, it fails to explain why patients formulate the *specific* beliefs about being dead and others being replaced by impostors. If patients are seeking an explanation for their perceptually anomalous experiences, what makes these particular explanations seem more acceptable to them than other alternatives?

A further problem concerns the causal role of the factors which Young and his colleagues identify. First, might not the perceptually anomalous experiences be *secondary* to the formation of the delusional belief? That is to say, the delusion itself may give rise to the perceptual anomalies and loss of emotional responsiveness, as opposed to arising from the need to explain such anomalous experiences. If this were the case, then a question would arise as to whether the 'misinterpretation' relates to an erroneous attribution of causality, rather than to (secondary) perceptual anomalies. Second, and related to this, might not the depressed and suspicious moods be, in turn, secondary to the perceptually

anomalous experiences? In this case, the attribution would not mood-driven and neither would it arise out of the need to explain strange experiences. Rather, it would be the precursor to such moods and experiences.

Even if these problems can be overcome, a final problem remains. Young's theory does not explain why, having formulated their specific explanatory beliefs, people remain convinced by explanations that seem so patently absurd to everyone around them. Chapters Four, Five, Six and Seven therefore examine a mechanism which may be involved in the maintenance of delusional beliefs, namely attentional bias.

The Cotard delusion, and derealisation and depersonalisation

Depersonalisation appears as a disorder in its own right in DSM-IV (1994), according to which it is characterised by "a feeling of detachment or estrangement from one's self" (p.488), and derealisation is listed as one of several features associated with it. While depersonalisation refers to the perception of one's body or the self as feeling strange and unreal, derealisation relates to the perception of the external world as being strange and unreal (Mayer-Gross, 1935; Nemiah, 1989). Mayer-Gross argued that while there may be good theoretical reasons for viewing the two phenomena as belonging together, in cases where the two appeared together, "either the subjective [i.e., depersonalisation] or the objective [i.e., derealisation] disturbance is usually more emphasised in the patient's description" (p.104). Some authors feel such a distinction is neither valid nor helpful (e.g., Hollander, Fairbanks, Decaria & Liebowitz, 1989), but the report of a case of derealisation without depersonalisation lends suport to the existence. of two phenomena (Krizek, 1989). The principal issue here concerns the status of depersonalisation and derealisation; the question whether they represent distinct categories or fall along a continuum remains the subject of debate. The case of derealisation in the absence of depersonalisation (Krizek, 1989) does not provide direct evidence either for a categorical distinction or against the concept of a

continuum. Furthermore, whether one views Krizek's case as contradicting the notion that derealisation constitutes a feature of depersonalisation (DSM-IV, 1994), would seem to depend on how broad a definition one applies to the term 'depersonalisation'.

In the absence of tighter definitions of depersonalisation and derealisaton, this thesis remains neutral in regard to their respective status. The term 'depersonalisation' is used hereafter to refer to the experience of unreal feelings regarding the self, and 'derealisation' to describe the experience of unreal feelings regarding the environment. That is to say, depersonalisation is used to describe feelings of unreality of the internal world, while derealisation is used to describe those of the external world (cf. Mayer-Gross, 1935; Nemiah, 1989).

Derealisation and depersonalisation are common clinical features of the Cotard delusion (e.g., Joseph & O'Leary, 1986; Young *et al.*, 1992; Wright *et al.*, 1993), although surprisingly little significance has been afforded to them in this context. Indeed, Nuller (1982) has noted that depersonalisation is often underestimated in clinical practice, despite the fact that it is associated with many mental illnesses. In regard to this, it is interesting to note that Mayer-Gross, writing in 1935, noted that "... the diagnostic value of the depersonalisation syndrome seems small. No one can say how far this will continue to be true. Diagnosis in psychiatry is still in a state of flux and our syndrome may one day come to have practical value" (p.103).

What is the relationship between depersonalisation and the Cotard delusion? Speaking in general terms, Mayer-Gross (1935) suggested that "delusional misinterpretation does not, as a rule, creep into the depersonalisation" (p.105). More specifically, Enoch and Trethowan (1979) argue that the Cotard delusion and depersonalisation need to be distinguished from one another. They claim that people suffering from depersonalisation say "I feel *as if* I am dead", while those suffering from the Cotard delusion say "I *am* dead" (p.130). However, evidence is

presented in Chapter Three which questions this clear demarcation and suggests that there is a marked overlap between depersonalisation and the Cotard delusion.

Finally, an interesting link has been made between depersonalisation and feelings of *déjà vu*. First, it has been shown that the *déjà vu* phenomenon is experienced more often by psychiatric patients than by non-psychiatric patients (Richardson & Winokur, 1968, cited by Sno & Linszen, 1990). Second, and of particular interest in relation to the Cotard delusion, is the suggestion that *déjà vu* may be viewed as the positive equivalent of depersonalisation (Nemiah, 1989). Hence, in *déjà vu* one has an inappropriate feeling of familiarity (and one is aware that the feeling is inappropriate) and in depersonalisation one has an inappropriate lack of familiarity (and one need not necessarily be aware that the feeling is inappropriate). It has been proposed (Myers & Grant, 1972) that *jamais vu* (i.e., never seen) represents an extreme degree of depersonalisation, affecting places and situations, whereas depersonalisation itself affects experience of the self (Nemiah, 1989). According to this *jamais vu* may be related more to derealisation than to depersonalisation. Again, the category versus continuum issue is raised here. Nemiah (1989) appears to be arguing that *déjà vu* and depersonalisation form separate, but related, categories (the former positive, the latter negative), whereas Myers and Grant (1972) appear to be suggesing that *jamais vu* falls within a depersonalisation continuum which also includes derealisation and *déjà vu*.

As with the status issue of depersonalisation and derealisation, this thesis remains neutral as to the relationships of *déjà vu* and *jamais vu* to depersonalisation and derealisation. Chapter Three includes a case description of an individual who claimed to have had many experiences of *déjà vu* prior to the onset of the Cotard delusion, and displayed feelings of *jamais vu* during the delusion.

The Cotard delusion and the philosophy of existence

If you tell people you are conducting research into the delusional belief that one is dead, you are typically greeted with incredulity: "How on earth could

anyone think they're dead?". If, on the other hand, you tell people that you are investigating people who believe they are, for example, Jesus Christ, or have recently seen Elvis Presley in the local Co-op, the response tends to be: "Oh, I bet that's interesting", or some such statement. The difference is that people can conceive of someone believing themselves to be Jesus Christ, or believing that they have seen Elvis Presley, but they cannot conceive of someone claiming to be dead. Their incredulity highlights the fact that the Cotard delusion appears to fly in the face of the fundamental philosophy of existence.

The philosophical implications of the Cotard delusion have not gone unnoticed. Enoch and Trethowan (1979) state that "Cotard's syndrome has a complex psychopathology of its own and one which brings us face to face with the very meaning of existence itself" (p.117). As such, it appears to represent a direct contradiction of a very basic argument in philosophy, namely Descartes' *cogito ergo sum*:

> "... while I thus decided to think that everything was false, it followed necessarily that I who thought thus must be something; and observing that this truth: *I think, therefore I am*, was so certain and so evident that all the most extravagant suppositions of the sceptics were not capable of shaking it, I judged that I could accept it without scruple as the first principle of the philosophy I was seeking.

> "Then, examining attentively what I was, and seeing that I could pretend that I had no body and that there was no world or place that I was in, but that I could not, for all that, pretend that I did not exist, and that, on the contrary, from the very fact that I thought of doubting the truth of other things, it followed very evidently and very certainly that I existed; while, on the other hand, if I had only ceased to think, although all the rest of what I had ever imagined had been true, I would have had no reason to believe that I existed".

(Descartes, 1637/1968, p.54)

At first sight, people suffering from the Cotard delusion appear to be saying 'I think, but nevertheless I am not' and hence may appear to contradict Descartes' theory of existence. However, a principal complaint in Cotard sufferers is that they do not have proper *feelings* and claim that their absence of, or alteration in, feelings is evidence that they are dead, or no longer exist. But, Russell (1961) argues that Descartes intended 'cogito' to be interpreted as 'I think and feel', and not just as 'I think':

"'Thinking' is used by Descartes in a very wide sense. A thing that thinks, he says, is one that doubts, understands, conceives, affirms, denies, wills, imagines, and feels".

(Russell, 1961, p.548).

Denying one's own existence thus does not represent a contradiction to the *cogito ergo sum* principle, for if we cease to have normal feelings, we may have no reason to believe we exist. Chapters Two and Three examine this and other symptoms of the Cotard delusion in detail in order to examine the utility of the concept of a Cotard syndrome as applied to Cotard's own original case reports and to more case recent reports of the delusion.

Following from the examination of the utility of a Cotard syndrome, a possible mechanism in the maintenance of the Cotard delusion is identified and this is explored in Chapter Four. In Chapters Five and Six, this mechanism is examined in other types of delusion, and in Chapter Seven the mechanism is explored in subjects who are not suffering from any form of psychopathology.

Chapter Two
The Cotard delusion

"Stating that she was no longer anything, the patient begged for her veins to be opened, her arms and legs to be cut off, and her body to be opened up, so that it could be seen that she had no more blood and that her organs no longer existed."

Case 6, Cotard (1882).

Introduction

In this chapter, the notion of a Cotard 'syndrome' is questioned, and it is suggested that Cotard's, now largely forgotten, original conception of nihilistic delusions best fits the symptoms displayed not just by his original cases, but by other cases reported in the literature. First, the debate surrounding the existence of a Cotard syndrome is outlined. Second, evidence from Cotard's own cases will be presented which demonstrates that the Cotard delusion is not a syndrome in which some symptoms inevitably co-occur, but rather a delusional belief in which severity varies between individuals as well as within individuals during the course of their illness. Finally, an analysis of 17 other published case reports of the Cotard delusion lends further support for this position.

The Cotard syndrome debate

As noted in Chapter One, Cotard (1882) reported a number of cases in which people suffered from negativistic delusions ranging in severity from self-deprecatory ideas to complete denial of the world. Cotard noted, therefore, that the delusions could be partial or total, allowing for a continuum of severity, with individuals falling anywhere in between these two extremes at any time during the course of their illness. For example, people may begin by expressing self-deprecatory notions about being responsible for the suffering of others and express guilt and shame. Later on in the course of their illness, they might voice the belief

that parts of their bodies are rotting away or are no longer there. Some may go on to deny their families, claiming they were never married in the first place and so have no family. Later still, they may claim to be dead and that the world no longer exists or, in a seeming paradox, claim to be immortal and/or even attempt suicide. These seemingly paradoxical features will be commented on in Chapter Three.

The important thing to note here is that the common theme is one of negation. While Cotard allowed, indeed insisted upon, the variability of nihilistic delusions, he viewed as essential the presence of negativism and self-accusatory depressive delusions (self-blame, guilt, shame and/or eternal death or damnation).

In terms of possible causal factors, Cotard believed "the twin sources of nihilistic delusions... [to be]... melancholia with depression or stupor, and melancholia with agitation or anxiety" (Hirsch & Shepherd, 1974, p.355). Anxiety and depression were therefore viewed by Cotard as causal factors rather than symptoms *per se*. Hence he says "... in advanced chronic conditions of this type it is not uncommon for these delusions to outlast the general symptomatology seen at the beginning of the illness and for patients... to show no signs of visible depression or anxious agitation" (Hirsch & Shepherd, 1974, p.355).

In Chapter One, it was noted that over the years, the term 'Cotard syndrome' has become virtually synonymous with the most striking feature found in the nihilistic delusions described by Cotard: The belief that one is dead. Cotard did indeed note that in some cases, everything could seem so unreal that individuals thought they had died (Cotard, 1880, 1882, 1884), but he viewed this belief as an accompanying feature in severe cases, and certainly not as the defining one. Enoch and Trethowan (1979), however, describe Cotard's syndrome as "a rare condition of which the central symptom is a nihilistic delusion which, in its complete form, leads the patient to deny his own existence and that of the external world" (p.117). In Enoch and Trethowan's view, therefore, the more severe the symptoms, the more complete the delusion.

As mentioned in Chapter One, Séglas (1897) was the first to refer to the Cotard syndrome eponymously although, interestingly, he did not consider it to be a syndrome as such, but rather a symptom that could be found in a variety of disorders. Cotard had himself, however, believed that *le délire de négation* was an illness in its own right. This view was opposed as early as 1892, at the Congress of Neurologists at Blois, France, by delegates who regarded the illness as a symptom arising in a number of disorders such as confusional states, schizophrenia, epilepsy and senile and pre-senile conditions (Enoch & Trethowan, 1979).

The delusion of being dead is certainly associated with a variety of psychopathological disorders, including depression (e.g., Enoch & Trethowan, 1979; Campbell, Volow & Cavenar, 1981; Young *et al.*, 1992; Wright *et al.*, 1993), affective disorders (e.g., Joseph, 1986), acute schizophrenia (Campbell *et al.*, 1981; Joseph, 1986) and organic disorders (e.g., Mayer-Gross, 1935; Ey, 1950; Anderson, 1964; Campbell *et al.*, 1981; Joseph, 1986). In particular, the delusion has been associated with fronto-temporal lesions and epilepsy (Drake, 1988), typhoid fever (Campbell *et al.*, 1981) and parietal lobe abnormality (Enoch & Trethowan, 1979). The role of the parietal lobes has been called into question, however, by Joseph and O'Leary (1986), who found the delusion to be associated with cortical atrophy involving the medial frontal lobes, but not the parietal lobes.

It is generally accepted, then, that the Cotard delusion may arise in the context of organic disorder as well as various forms of psychopathology. The debate regarding the status of the delusion, however, remains unresolved; there is disagreement as to whether the Cotard delusion is best regarded as a syndrome, as symptom arising in a number of mental disorders, or a subtype of depression.

As noted above, the term 'Cotard syndrome' has come to be used largely to describe the single delusional belief that one is dead. However, different authors appear to have different conceptions of precisely what is meant by a 'Cotard syndrome'. Joseph and O'Leary (1986), drawing from Cotard (1891), note, and

Enoch and Trethowan (1979) write: "The hallmark of the disorder is the delusion of being dead. Associated features include *le délire d'énormité* (the delusion of enormous body size), delusion of immortality, and intense nihilistic delusions that can expand to negate all of a patient's internal and external world" (p.518). Drake (1988), drawing from Cotard's (1891) description, refers to the syndrome as "an unusual disorder characterised chiefly by the delusion of death, and less frequently involving perceptions of immortality, enormous body size, or non-existence of body parts" (p.36). In both of these descriptions, the belief that one is dead is the principal symptom, which may be associated with other features. Campbell *et al.* (1981) summarise the modern view of the syndrome as being "an extreme form of nihilistic delusion, and most often the delusion is that one has died or does not exist" (p.1377); while Förstl and Beats (1992) write that the term Cotard syndrome "is commonly applied to patients who suffer the nihilistic delusional belief that they are mortally ill or dead" (p.417). In both these descriptions, the 'syndrome' is viewed in terms of a 'nihilistic delusion'.

Friedman and Caplan (1967, cited by Enoch & Trethowan, 1979), do not agree that this type of description is suggestive of a syndrome. Hence, they argue that it "has never been possible to see in which way patients with this syndrome differ from those who manifest what psychiatrists usually call nihilistic delusions - such delusions being by no means uncommon in patients suffering from endogenous depression, as well as occurring in patients with organic brain disease" (p.117). However, Enoch and Trethowan argue that it is justifiable to refer to Cotard's syndrome as a distinct clinical entity "in view of the fact that it may exist in a pure and complete form, and that even when symptomatic of another mental illness, such as endogenous depression, nihilistic delusions usually dominate the clinical picture" (p.117). Such a statement is suggestive of a syndrome varying along a continuum, with a 'pure' form at one end, and a less complete form at another. The notion that the Cotard syndrome varies along a continuum is addressed by Malone and Malone (1993), who describe Cotard's syndrome as "a

rare and uncommonly reported psychosyndrome characterised by a denial by the afflicted person of his own existence. This can vary in severity along a continuum from a belief by the patient that he is losing his powers of intellect and feelings, to the most severe form when he believes that he no longer exists, leading him to deny his own existence and that of the cosmos" (p.53). This view certainly has echoes of Cotard's view that *le délire de négation* varies along a continuum. But, little seems to be achieved by the insistence of a Cotard syndrome as opposed to an extreme manifestation of a nihilistic delusion, and it is noteworthy that Friedman and Caplan's conception of the delusion seems more akin to the delusion that Cotard himself described.

In order to assess the usefulness of the concept of a Cotard syndrome, a detailed analysis of case reports of the delusion is warranted. A simple way of doing this is to ask which features commonly or necessarily co-occur. This is the question that is addressed in the following section.

Cotard's case reports

Introduction

It has already been noted that Cotard allowed for a degree of variability in his cases in terms of symptoms and severity, while noting their common features of the presence of self-deprecatory depressive delusions and negativism. To what extent were these and other features universally present in Cotard's (1882) case reports?

Cotard's first description of nihilistic delusions was presented in a paper read to the Société Médico-Psychologique on 28 June 1880 (Cotard, 1880). In this paper, Cotard described a single case with key features of what would come to be known as Cotard's syndrome. His patient, Mlle. X, denied the existence of God, the devil, and many parts of her body, and said that she no longer needed to eat. Later, she believed that she was eternally damned because of her failings, and that this was justified punishment, but felt that she could no longer die a natural death,

and made repeated suicide attempts. In this report, Cotard (1880) used the phrase *le délire de négation*, but more as a descriptive remark than as a name for the problem.

Analysis of Cotard's case reports

In 1882, Cotard presented an extensive case series, in which he divided his cases into three categories. The first category (cases 1-8) involved the purest form in that the individuals were not suffering from any other kind of delusion. The second category, represented by a single case only (case 9), showed nihilistic delusions as part of a more general debilitating illness. In Cotard's third category (cases 10-11) there were concurrent nihilistic and persecutory delusions. Cotard viewed these as mixed cases, and claimed that individuals with these additional delusions of persecution showed several features that differed from those people with purely nihilistic delusions; for example, they thought of themselves as being possessed rather than damned.

In terms of the putative Cotard syndrome, cases 1-8 from this series are the most important, since these were thought to be relatively pure, and are the ones with which this analysis is concerned. To make the analysis as neutral as possible, all the features and symptoms from Cotard's 1882 case reports were simply listed. This list included any symptoms Cotard mentioned in discussion, as well as those from the case reports themselves. In all, this yielded some 31 symptoms, which are listed in Table 2.1. They are listed under general headings, according to symptom type, which are used in a further, more broad-based analysis (see below). Finally, a word of explanation is warranted in terms of the belief that one's body has changed in some way. Cotard noted a number of symptoms concerning changes in the body, including the belief that one's body is enormous (*le délire d'énormité*), the converse belief that one's body is unusually small, and the belief that parts of the body have been misplaced (i.e., moved to another part of the body). These beliefs are all included as changes in the body.

Table 2.1: List of symptoms noted by Cotard (1882) and their occurrence in his pure cases.

Symptoms	Case Number							
	1	2	3	4	5	6	7	8
General nihilistic delusions								
Negation of others			√	√	√			√
Negation of environment				√	√			
Self-nihilistic delusions								
Negation of self, including denial of whole body	√				√	√	√	√
Belief that one is dead	√							
Immortality/inability to die					√	√		
Self-deprecatory delusions								
Self-accusatory delusions		√	√	√	√	√	√	√
Feelings of guilt	√	√	√			√	√	
Imaginary terrors or fears				√		√		
Belief that one is damned	√				√		√	
Bodily delusions								
Hypochondriacal delusions	√	√				√	√	
Denial of parts of body	√				√	√	√	√
Putrefaction of body parts							√	
Belief that body smells foul		√						
Changes in body parts	√							√
Metamorphosis					√			
Perceptual abnormalities								
Auditory hallucinations			√	√				
Visual hallucinations	√			√				√
Olfactory hallucinations								
Gustatory hallucinations								
Visual illusions								√
Hyperaesthesia								
Anaesthesia								
Behavioural manifestations								
Suicide attempts/thoughts	√		√		√		√	√
Violence	√							√
Refusal to eat		√	√	√	√			√
Retention of urine & faeces	√				√			
Muscular rigidity	√							
Immobility	√	√	√			√		
Mutism		√	√			√		
Repetition of words/phrases	√	√		√	√		√	√
Resistant insanity	√	√	√	√	√			√

Cotard's (1882) reports for his 8 relatively pure cases were examined simply by noting which of these symptoms were mentioned. Each of the individual symptoms noted for Cotard's 8 pure cases is marked in Table 2.1. Note that some of these symptoms did not arise in any of these pure cases; this is usually because the symptoms were noted only in the other cases in Cotard's (1882) report.

As Table 2.1 shows, there is no single symptom that was noted for all 8 of Cotard's (1882) pure cases. The most common symptom, though, was self-accusatory depressive delusions (7/8) cases). Also common was repetition of words or phrases (6/8 cases), which may relate to individuals consistently returning to the theme of their delusions. Resistant insanity was also noted in 6 cases (Cotard used this term to describe a general resistance in his patients to any form of personal care, such as getting out of bed in the mornings, washing and so on, and a resistance to any form of help), but this is perhaps unsurprising as it is largely indexed by the individuals acting on their delusions. Suicidal thoughts or attempts were fairly common (5/8), but violence directed at others was relatively unusual (2/8 cases, both of whom were also suicidal). Feelings of guilt, negation of self, and denial of bodily parts were each also present in more than half the cases.

Strikingly, although variants of the theme that one was damned, lacking a body or non-existent were noted fairly commonly, only 1 of these 8 pure cases voiced the belief that she was herself dead (case 1). Even if all the case histories in Cotard's (1882) report are included, in only one other case did an individual claim to be dead (case 9). Whilst saying that one does not exist is in many ways similar to saying that one is dead, for reasons that will be discussed below, the specific claim "I am dead" would appear to be the explanation most acceptable to individuals about what has happened to them. There will naturally be many different versions of these explanations ("I am dead", "I am damned", "My body has disintegrated", and so on). There is as yet, however, no satisfactory account of *why* the specific belief of being dead appears to be more acceptable than these latter explanations.

For further analysis, the 31 symptoms listed in Table 2.1 were collapsed into broad symptom categories involving six types of delusional belief, and the other two involve perceptual abnormalities and behavioural manifestations respectively. The first category included general nihilistic delusions, such as denial of other people's existence or the existence of the external world. The second category involves self-nihilistic delusions, including the seemingly paradoxical stance of maintaining that one is immortal or unable to die while also voicing the belief that one does not exist. The third grouping, self-deprecatory delusions, includes people who accuse themselves of having been responsible for crimes they did not commit, world-wide accidents or famine; guilt, both generalised and specifically emanating from these supposed wrong-doings; imaginary fears related to the supposed wrong-doings and resulting guilt; and, finally, another self-accusatory, guilt-based delusion - the belief that one is damned. The fourth category is bodily delusions, including hypochondriacal delusions, denial of bodily parts, changes in body parts (such as believing one's head has become hollow), and metamorphosis (believing that one has been transformed into, for example, an animal). A fifth group, perceptual abnormalities, includes gross sensory changes, such as hallucinations and illusions. Finally, in a sixth grouping, all behavioural manifestations noted by Cotard are included. These often seem to derive from individuals acting on their delusions (e.g., refusing to eat, move or defecate on the grounds that they are dead).

Table 2.2 presents a broad analysis, which examines whether people showed at least one symptom within each of these six groupings (i.e., if we consider only whether each individual showed any one of the symptoms belonging to a particular group). As can be seen in Table 2.2, there were 2 symptom groups for which all 8 individuals experienced at least one symptom; these involve self-deprecatory delusions and delusion-related behaviour. Bodily delusions were shown by 6/8 individuals, self-nihilistic delusions by 5/8, and general nihilistic delusions and perceptual abnormalities were each noted in 4/8 cases.

Table 2.2: Symptoms noted for Cotard's (1882) pure cases according to symptom group.

Symptom Group	Case Number							
	1	2	3	4	5	6	7	8
General nihilistic delusions			√	√	√			√
Self-nihilistic delusions	√				√	√	√	√
Self-deprecatory delusions	√	√	√	√	√	√	√	√
Bodily delusions	√	√			√	√	√	√
Perceptual abnormalities	√		√	√				√
Behavioural manifestations	√	√	√	√	√	√	√	√

Discussion of Cotard's case reports

The most striking point to note about Cotard's cases is that no single symptom was displayed by all individuals. As noted above, Cotard believed *le délire de négation* to be an illness in its own right, the essential features being negativistic self-deprecatory delusions. Whilst only 1 individual (case 1) did not expressly accuse herself of having been responsible for some wrong-doing, she nevertheless had feelings of guilt and believed that she was damned. Hence, she still expressed self-deprecatory delusions. The only other feature that was common to all cases was some form of behavioural manifestation This is perhaps not surprising, however, since it simply reflects individuals acting on their own delusional beliefs.

The remaining symptoms - bodily delusions, perceptual abnormalities, general nihilistic delusions and self-nihilistic delusions - were common, but by no means universal in Cotard's case reports. This is in keeping with Cotard's view that these features sometimes accompanied, but were not essential features of, the illness. Two of these symptoms are particularly interesting. First, in view of the syndrome concept, it is noteworthy that self-nihilistic delusions were only noted in 5 of the 8 cases and, of these, only 1 (case 1) believed she was dead (interestingly, this was the only person not to have accused herself expressly of committing some

crime). This is also consistent with Cotard's view that the belief that one is dead arises only in extreme cases of the illness. Second, in terms of general nihilistic delusions, it is interesting that only half of Cotard's cases displayed either negation of others or negation of the environment. This is important when considering the syndrome concept and shall be discussed below.

To summarise, there was no specific symptom shown by every one of Cotard's pure cases, and no universally present symptom complex. It is clear, however, that all of his patients suffered from self-deprecatory delusions, and all showed some form of delusion-related behaviour. This pattern confirms Cotard's original conception of negativistic delusions; *le délire de négation.* It might be argued, however, that Cotard's own case reports are almost bound to concur with his own view of the delusion, since it was largely from these cases that his conception of the delusion was formed.

A question therefore remains as to whether Cotard's original conception of *le délire de négation* fits the symptoms displayed by other people reported in the literature as suffering from the Cotard delusion, or whether such cases are more in keeping with the notion of a syndrome.

Case reports published in English

Introduction

In this section, cases of the Cotard delusion that are available in English are examined in the same manner adopted for the analysis of Cotard's published cases. In order to make as close a comparison to Cotard's case reports as possible, only 'purer' cases of the Cotard delusion are analysed. Cases of sequential Cotard and Capgras delusions (i.e., both held, but held one after the other) are included (Wright *et al.*, 1993; Enoch & Trethowan, 1979, Chapter 8: case 4), but not those in which the Cotard and Capgras delusions co-exist (Joseph, 1986; Terao, Fujino, Egashira & Abe, 1992: case 2) or those in which there are several delusional beliefs (Enoch & Trethowan, 1979, Chapter 9: case 5). Other cases that are omitted are

those for which partial translations have been published by Enoch and Trethowan (1979), but for which it is impossible to ascertain the completeness or incompleteness of the translations (and, in some cases, whether they were published as cases of the Cotard delusion or types of depression) (de Martis, 1956; Ahleid, 1968; Vitello, 1970, all cited in Enoch & Trethowan, 1979). Rather than analyse possibly incomplete case reports, it was deemed preferable to omit them from the analysis. In all, 17 cases were included in the analysis. The identification of each report is shown in Appendix 1.

It is important to remember that the symptoms used in the analysis of Cotard's cases were those noted by Cotard himself. In order to make a fair assessment of any co-occurrence of symptoms in the more modern conception of the delusion, we need to include not only symptoms noted by Cotard, but any additional ones noted by the authors of the respective case reports. Accordingly, the perceptual abnormalities category now includes visual recognition deficits, which involve the inability to recognise once-familiar people and places. In addition, an 'other' category has been included under perceptual abnormalities. Of course, 'other' is not a symptom, but some people may, for example, claim that they cannot see themselves in the mirror, or that they see something other than themselves, such as a death-mask. Similarly, behavioural manifestations now includes an 'other' category; people act on their delusions in many different ways, and even if they do not show the same delusion-related behaviours as noted by Cotard, they may nevertheless show some form of behavioural manifestation. Since such behaviour varies greatly from individual to individual, it was deemed preferable to include those behaviours under the general heading of 'other', rather than to list each type of behaviour separately. Examples of such behaviour include people phoning the police and claiming to have been murdered, insisting that someone should kill them, or, as in the case of Bonnet's patient (Förstl & Beats, 1992), insisting that someone puts her in a coffin. One act of self-harm (case 16)

was classified as 'other', since it was not an attempt at suicide, but an attempt by the gentleman to prove he had no blood in him.

As noted in Chapter One, it has been suggested that the Cotard delusion arises out of a depressive disorder (e.g., Young *et al.*, 1992; Wright *et al.*, 1993). Cotard (1882) believed that depression was one of the joint causes of the delusion and that it need not necessarily present itself as a symptom. Depression has nevertheless been included as a symptom, since it is noted in some case reports as being such. This will enable us to ascertain the extent to which depression is displayed as a symptom. Finally, feelings of depersonalisation, and derealisation and feelings of unreality have been added, since they are often discussed or noted as symptoms in case reports.

Analysis of case reports published in English

Table 2.3 shows that, as with Cotard's case reports, no single symptom was noted for all 17 of these later cases. However, there are two findings that are particularly striking. First, a far larger proportion of people believed they were dead (13/17) compared to Cotard's cases (1/8), while 2 individuals voiced negation of the self, without actually claiming to be dead. Second, a far smaller proportion of people voiced self-accusatory delusions (4/17) or feelings of guilt (2/17) than did Cotard's cases (8/8). Possible reasons for these two findings are examined below.

Turning to the other categories, we can see that nobody voiced nihilistic delusions about the environment or about other people, whereas half of Cotard's patients had voiced one or both of these beliefs. Hypochondriacal delusions were reported in 4/17 cases and denial of body parts in 5/17; while putrefaction of body parts, belief that one's body smells foul, changes in body parts and metamorphosis were noted in only one or two cases. These incidences are all lower to a greater or lesser degree than those reported in Cotard's cases.

Table 2.3: Occurrence of Cotard symptoms in case reports published in English.

Symptoms	Case Number								
	1	2	3	4	5	6	7	8	9
General nihilistic delusions									
Negation of others									
Negation of environment									
Self-nihilistic delusions									
Negation of self, including denial of whole body	√	√	√	√	√	√		√	√
Belief that one is dead	√	√	√	√	√	√			√
Immortality/inability to die					√				
Self-deprecatory delusions									
Self-accusatory delusions					√			√	
Feelings of guilt						√			
Imaginary terrors or fears									
Belief that one is damned									
Bodily delusions									
Hypochondriacal delusions			√				√		
Denial of parts of body		√							√
Putrefaction of body parts		√							
Belief that body smells foul							√		
Changes in body parts		√					√		
Metamorphosis						√			
Perceptual abnormalities									
Auditory hallucinations									√
Visual hallucinations									
Olfactory hallucinations							√		
Gustatory hallucinations									
Visual illusions									
Hyperaesthesia									
Anaesthesia									
Visual recognition deficits									
Other		√	√	√					
Behavioural manifestations									
Suicide attempts/thoughts									√
Violence									√
Refusal to eat									
Retention of urine & faeces									
Muscular rigidity									
Immobility									
Mutism			√						
Repetition of words/phrases									
Resistant insanity			√						
Other	√	√	√	√			√		√
Depression		√			√	√	√	√	√
Depersonalisation									
Derealisation/unreality feelings					√	√			

Table 2.3 Occurrence of Cotard symptoms in case reports published in English (Contd.).

Symptoms	Case Number							
	10	11	12	13	14	15	16	17
General nihilistic delusions								
Negation of others								
Negation of environment								
Self-nihilistic delusions								
Negation of self, including denial of whole body	√	√	√	√		√	√	√
Belief that one is dead	√	√	√	√			√	√
Immortality/inability to die						√		
Self-deprecatory delusions								
Self-accusatory delusions		√				√		
Feelings of guilt						√		
Imaginary terrors or fears								
Belief that one is damned								
Bodily delusions								
Hypochondriacal delusions					√	√		
Denial of parts of body			√		√		√	
Putrefaction of body parts					√			
Belief that body smells foul								
Changes in body parts								
Metamorphosis								
Perceptual abnormalities								
Auditory hallucinations								
Visual hallucinations								
Olfactory hallucinations							√	
Gustatory hallucinations								
Visual illusions								
Hyperaesthesia								
Anaesthesia								
Visual recognition deficits							√	√
Other								
Behavioural manifestations								
Suicide attempts/thoughts		√			√	√	√	
Violence							√	
Refusal to eat			√			√		
Retention of urine & faeces								
Muscular rigidity								
Immobility	√							
Mutism	√					√		
Repetition of words/phrases								
Resistant insanity			√					
Other	√		√				√	
Depression		√	√	√	√	√	√	
Depersonalisation		√						
Derealisation/unreality feelings		√					√	√

In terms of perceptual abnormalities, one individual suffered from auditory hallucinations and one from olfactory hallucinations, while two showed visual recognition deficits, one of whom also had olfactory hallucinations. Three others showed some 'other' perceptual abnormality, and these will be discussed below.

Suicide attempts or thoughts were noted in 5/17 reports; violence in 2; refusal to eat in 2; mutism in 3; some form of resistant behaviour in 2; and some other form of behavioural manifestation in 10 of the reports. Depression was noted in 12 cases; depersonalisation in only 1; and derealisation or feelings of unreality in 5 cases.

Table 2.4: Symptoms noted for case reports published in English, according to symptom group.

Symptom Group	Case Number								
	1	2	3	4	5	6	7	8	9
General nihilistic delusions									
Self-nihilistic delusions	√	√	√	√	√	√		√	√
Self-deprecatory delusions					√	√		√	
Bodily delusions		√	√			√	√		√
Perceptual abnormalities		√	√	√			√		√
Behavioural manifestations	√	√	√	√			√		√
Depression		√			√	√	√	√	√
Depersonalisation									
Derealisation/unreality feelings					√	√			

Table 2.4: Symptoms noted for case reports published in English, according to symptom group (Contd.).

Symptom Group	Case Number							
	10	11	12	13	14	15	16	17
General nihilistic delusions								
Self-nihilistic delusions	√	√	√	√		√	√	√
Self-deprecatory delusions		√				√		
Bodily delusions			√		√	√	√	
Perceptual abnormalities							√	√
Behavioural manifestations	√	√	√		√	√	√	
Depression		√						
Depersonalisation		√						
Derealisation/unreality feelings		√					√	√

Again, in order to broaden the analysis, the symptoms were grouped together according to symptom categories. This analysis is shown in Table 2.4. It has already been noted that none of the individuals voiced general nihilistic delusions, and this will be commented on below. Self-nihilistic delusions of one form or another were reported in 15, and self-deprecatory delusions in 5 of the 17 cases. Some form of bodily delusion was noted in 9/17 cases; perceptual abnormalities in 7/17; and behavioural manifestations in 12/17. Finally, as already noted, depression was noted in 12 cases, depersonalisation in only 1, and derealisation or feelings of unreality in 5/17.

Discussion of case reports

As with the analysis of Cotard's case reports, there was no single symptom that was reported in all 17 of the later cases, and no clear symptom pattern. It is clear, however, that the majority of people (15/17) suffered from self-nihilistic delusions of some form, and that the majority of those (13) believed they were dead. This is clearly far more than the one patient of Cotard's who believed she was dead. One possible explanation for this is that if the delusion is defined by modern authors in terms of the belief that one is dead, cases in which individuals do not show this symptom may be less likely to be reported. Similarly, if, as was noted above, authors view the delusion as a manifestation of what are termed nihilistic delusions by psychiatrists (Friedman & Caplan 1967, cited by Enoch & Trethowan, 1979), and/or the belief that one is dead is not present, then it may be more likely to be written up as an example of depersonalisation or nihilistic delusion than as a case of the Cotard delusion, if, indeed, it is reported at all.

That some form of self-deprecatory delusion was noted in only five cases is perhaps a rather surprising finding, given that Cotard viewed it as an essential feature of the delusion. As suggested for the large number of case reports noting the belief that one is dead, however, it may be the case that, unless they accompany

the belief that one is dead, such beliefs, if they are written up at all, are classified as nihilistic delusions or cases of depersonalisation.

Enoch and Trethowan (1979) argue that denial of the external world (as well as denial of oneself) constitutes the most complete form of the delusion. It is interesting in this respect that in none of the reports was nihilistic delusions about others or the environment mentioned. It was noted earlier, however, that Enoch and Trethowan published partial translations of a number of case reports. In one of these (de Martis, 1956), the woman said that everything around her did not exist. In three of the others, (Ahleid, 1968), delusions arose in the context of an organic impairment. Two of Ahleid's cases (1 & 2) believed they were dead, but did not deny the existence of the external world. In the third case, the person said that his body was dead and his "spirit was waiting to die" (Enoch & Trethowan, 1979, p.119) but, again, he did not have more general nihilistic delusions.

In keeping with their view that the complete syndrome includes a negation of others and the environment, Enoch and Trethowan describe the delusions in Ahleid's cases as representing an "incomplete Cotard syndrome" (p.119). It is important to remember here that Enoch and Trethowan view the Cotard syndrome as falling along a continuum. At one end of this continuum are milder features such as depression, the belief that one is losing one's intellect, and feeling oneself and the external world to be different in some way, and at the other are the extreme features, involving total subjective and objective negation. Joseph (1986), however, also writing in terms of a syndrome, views denial of the external world and/or of others to be common, but not universal, features. This issue will be taken up below.

Turning now to the other symptoms, one or more forms of bodily delusion were noted in around half of the cases. Cotard himself viewed bodily delusions as accompanying features of the delusion and, indeed, most authors regard them as common, but not essential features (e.g., Enoch & Trethowan, 1979; Joseph, 1986; Joseph & O'Leary, 1986; Drake, 1988).

In terms of perceptual abnormalities, seven cases reported the presence of some disturbance. Of the three cases classified as 'other', case 2 alternately denied seeing herself or said she saw a death mask resembling the features she had had when she was alive, case 4 would say "that used to be me" (Drake, 1988, p.37), when shown his reflection in the mirror, and case 3 believed his brain was liquefying and oozing from his left ear, and when shown a mirror, indicated the course that this was taking.

In terms of behavioural manifestations, 12 of the 17 case reports (71%) noted some form of delusion-related behaviour. As was noted in regard to Cotard's cases, however, behavioural manifestations are not surprising since they are largely indicative of individuals simply acting according to their delusional beliefs.

In terms of depersonalisation, it is quite striking that it was noted in only one case (case 11). However, in case 16, the gentleman complained of "feeling nothing inside" (Wright *et al.*, 1993, p.346), which is a common feature in depersonalisation. Similarly, in case 6, the lady complained that she "had strange feelings and did not feel like other people" (Enoch & Trethowan, 1979, p.121). This statement contains hints both of depersonalisation (not feeling like other people) and of derealisation (things feeling strange). Again, the reason for not classifying these symptoms as depersonalisation was to ensure an interpretation-free analysis. Derealisation and/or complaints about things feelings strange and unreal were noted in five cases.

Despite the hints at both depersonalisation and derealisation in the case reports noted above, it is clear that the classifications of depersonalisation and derealisation were relatively rare phenomena in the 17 case reports. This appears to be keeping with Enoch and Trethowan's view that the Cotard delusion should be distinguished from depersonalisation (Enoch and Trethowan do not distinguish between depersonalisation and derealisation). However, as noted already, if the belief that one is dead is not present, any case report may be more likely to be classified as a case of depersonalisation or derealisation than that of the Cotard

delusion. The roles of depersonalisation and derealisation in the Cotard delusion will be addressed below.

Finally, depression was noted in 12 of the 17 cases (nearly 71%) as a symptom. There was one case report (case 4), not classified as depression, but which referred to the person replying "sorrowfully to reassurances that he was still alive" (Drake, 1988, p.37). As noted, Cotard viewed depression and anxiety as the joint causal factors of the delusion, and so argued that they need not necessarily emerge as actual symptoms, and, as noted in Chapter One, it was noted that the delusion typically arises out of depressive illness.

Discussion

The principal issue in both sets of analyses is whether a pattern of symptoms arises from which one could argue that the Cotard delusion represents a syndrome. A further, and related, point of interest is whether the two sets of reports differ in terms of symptomatology and, if so, whether this difference is sufficient to argue that while Cotard's conception of *le délire de négation* best fits the symptoms described by him, the more modern picture of the delusion is best accounted for in terms of a syndrome.

If we compare the two sets of findings, we can see that there are, indeed, some differences in symptomatology. Cotard noted that half of his cases suffered from general nihilistic delusions; while neither negation of other people nor that of the environment were noted in any of the 17 case reports. Self-nihilistic delusions were noted in 5 of Cotard's 8 cases, and a similar proportion (15) was noted in the 17 later case reports. Most striking is the fact that the delusional belief that one is dead was noted in 13 of the 17 cases, as opposed to only one of Cotard's cases. Also noteworthy is the fact that while all of Cotard's patients suffered from self-deprecatory depressive delusions of one form or another, these were only noted in 5 of the subsequent case reports. In terms of bodily delusions, a smaller proportion of the 17 later cases noted the presence of these than did Cotard's reports, and the

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same applies to the presence of perceptual abnormalities and behavioural manifestations.

To sum up, all 8 of the 'pure' cases described by Cotard displayed self-deprecatory delusions, only one believed she was dead, and around half showed some of the symptoms (e.g., self-nihilistic and bodily delusions) which Cotard viewed as accompanying features. This pattern seems to fit perfectly with Cotard's own conception of the delusion. If we look at the symptoms displayed by the 17 later case reports, we can see that the picture becomes rather different. No cases voiced general nihilistic delusions, most voiced self-nihilistic delusions, around three-quarters of whom believed they were dead, and only around a quarter voiced self-deprecatory delusions. Finally, accompanying symptoms were noted in fewer cases overall than were noted in Cotard's case reports.

The first thing we need to establish is whether there are any reasons as to why there were differences in symptomatology between the two sets of reports. In this regard, it is important to remember that Cotard was the first to detail nihilistic delusions, and to accord them a distinct status within the field of psychopathology. Since then, a syndrome has been named after him, but it does not quite tally with the disorder he actually described; most authors now define the Cotard syndrome as being the belief that one is dead. Given this, it becomes easier to understand why there are differences in symptomatology between Cotard's cases and the 17 later case reports. The greater preponderance among these latter cases of the belief that one is dead may be explained in terms of a commonly-held view that this is the defining feature of the Cotard syndrome. Hence, as noted earlier, those cases in which this single belief is not held may be classified as nihilistic delusions rather than the Cotard syndrome, and so those who hold with Friedman and Caplan's view that the delusion is a form of nihilistic delusion, may view it as not uncommon and so not report it. Alternatively, they may, as noted above, report it as a case of depersonalisation or derealisation.

The debate surrounding the status of the Cotard delusion was outlined earlier. How do the findings from the two sets of case reports accord with the notion that the delusion represents a syndrome, a sub-type of depression, or simply part of the disorder commonly labelled by psychiatrists as a nihilistic delusion?

It has already been noted that the notion of a syndrome does not accord with Cotard's own cases, as only one type of symptom (self-deprecatory depressive delusions) was universal; other features did not inevitably co-occur. However, these symptoms are considered to be *accompanying* features of the *syndrome*, and so their presence is not required in order to define that syndrome. What is required in order to define the full-blown syndrome, according to Enoch and Trethowan, is total negation, not merely of the self, but also of other people and of the environment. Viewed from this standpoint, not even Cotard's case 1 represents the full syndrome. We are thus left to conclude either that none of Cotard's case reports represented complete versions of a syndrome named after him, or that the syndrome does not accord with his own cases. Since the former position departs from the stance adopted by Cotard himself, who viewed *nihilistic delusions* as forming an illness in their own right, we are left with the conclusion that the term syndrome in relation to Cotard's own cases is, at best, unhelpful. It is interesting in this respect, as noted above, that Friedman and Caplan (1967) do not consider the Cotard syndrome to be distinct from nihilistic delusions. Indeed, as Enoch and Trethowan note, this is "the view of many, if not the majority of psychiatrists" (p.117). This is an important point, since it affects not only the notion of a syndrome in regard to Cotard's own case reports, but in relation to the seventeen case reports, fifteen of which referred to the delusion as a syndrome.

As with Cotard's case reports, no symptom pattern emerged. There were, however, 13 people who believed they were dead. If, as suggested by Sommer and Petrides (1992), the syndrome is defined in terms of this single belief, then all seventeen individuals should have voiced this belief.

Alternatively, if one is to accept the notion of a Cotard syndrome varying along a continuum along the lines suggested by Enoch and Trethowan, one may adopt the view that all the seventeen cases represent incomplete versions of the syndrome, since no general nihilistic delusions were noted in any of the case reports. Seen in this light, however, one again needs to question the utility of adopting the notion of a syndrome in preference to Cotard's view of *le délire de négation*, or Friedman and Caplan's (1967) view that the delusion forms part of the general disorder of nihilistic delusion.

Having established that the notion of a syndrome is not a helpful one as applied to the Cotard delusion, I turn to the view that the delusion is a sub-type of depression. Although the Cotard delusion is commonly associated with depression (e.g., Cotard, 1882; Enoch & Trethowan, 1979; Young *et al.*, 1992), the precise role of depression has not been clearly delineated. Cotard viewed depression as having a causal role in the formation of the delusion, along with anxiety. (Anxiety is seldom mentioned in reports of the Cotard delusion, except occasionally as a symptom in specific cases. Its role will be addressed in Chapters Three and Four.) Cotard argued that since depression was one of the joint causes of the delusion it need not necessarily emerge as a *symptom*. While it is often noted that the Cotard delusion is associated with depression, its role as a causal factor has only recently been investigated. As noted in Chapter One, Wright *et al.* (1993) have suggested a role for depression in the formation of the Cotard delusion in the type of explanation the person seeks for perceptually anomalous experiences. To re-cap briefly, Wright *et al.* draw from attribution theory, which shows that depressed individuals make internal attributions of negative events. They suggest that the individuals' depressed mood contributes to their seeking an internal cause for their perceptual problems. Feelings of loss of familiarity, depersonalisation and derealisation all serve to reinforce the perceptual anomalies experienced by people suffering from the Cotard delusion.

The first thing that strikes one about this formulation is that perceptual disturbances of the type noted by Young *et al.* (1992) and by Wright *et al.* (1993) were, in fact, only noted in their own case reports (cases 17 and 16 respectively), although some form of visual perception disturbance was noted in cases 2, 3 and 4), and Cotard (1884) also contains a possible case. This raises an important issue; namely that different authors report, or investigate, the sorts of things in which they are interested. This may seem a somewhat needless comment to make, but it is worth stressing for the very obvious reason that if different authors pursue different things, they are bound to reveal different things. Hence, Young and his colleagues investigated face-recognition deficits in people with the Cotard delusion, and found that they did, indeed, display such deficits. It is hardly surprising that authors who have not investigated visual recognition in individuals suffering from the Cotard delusion have not reported face-recognition impairments. Of course, this argument extends to all the symptoms noted both in Cotard's case reports and in the seventeen collected reports. Hence, while Cotard investigated *le délire de négation*, and found that, in line with his predictions, people displayed common features of self-deprecatory delusions, other authors have investigated self-nihilistic delusions, and the belief that one is dead in particular, and found a high preponderance of both types of belief in the cases they report - although it must be stressed that these were by no means universally present. An additional factor may be that authors take as read that certain symptoms are present. For example, in cases 16 (Wright *et al.*, 1993) and 17 (Young *et al.*, 1992), there are strong hints at the presence of depersonalisation, but this was not noted as a symptom. Young certainly views both individuals as suffering from depersonalisation (personal communication) but neither could be noted as such here since depersonalisation was not stated explicitly in the case reports.

One possible reason that Young and his colleagues (Young *et al.*, 1992; Wright *et al.*, 1993) have emerged with a slightly different picture of the delusion from that of other authors is that they have remained somewhat neutral in terms of

the syndrome debate in general and have preferred to use the term 'Cotard delusion' as a convenient shorthand for describing the belief that one is dead They therefore view delusional beliefs such as the Cotard and Capgras delusions as *symptoms* requiring an explanation. To this end, Young and his colleagues have established a possible causal role for depression in the Cotard delusion.

In terms of the status of the Cotard delusion, it must be noted that there is a problem with discussing it as a sub-type of depression; detailed examination of the literature reveals neither who actually suggested it, nor what it was they suggested! A number of authors refer to the view of the delusion as a sub-type of depression; for example, Joseph (1986) and Joseph and O'Leary (1986). Both of these, however, draw from Enoch and Trethowan (1979), who do not state the exponents of this view, making it difficult to accept or to argue against. This notwithstanding, we can at least argue that the existence of depression cannot be seen as a *sufficient* cause for the delusion to emerge, since the vast majority of people who suffer from depression do not voice the belief that they are dead. The work of Young and his colleagues suggests that depression may be a *necessary* condition for the formation of the Cotard delusion, together with a perceptually anomalous experience (Young *et al.*, 1992; Wright *et al.*, 1993). Chapter Three presents four case studies of the delusion that were examined in the light of this theory.

Finally, we are left with viewing the Cotard delusion as a form of nihilistic delusion (Friedman & Caplan, 1967). This certainly seems more in keeping with the position adopted by Cotard himself (1881; 1882). A possible problem with viewing the delusion strictly in terms of *le délire de négation* is that while Cotard viewed the presence of self-deprecatory depressive delusions as essential, they were noted in only 4 of the 17 more recent case reports. However, as noted above, this may reflect the fact they are not typically reported, rather than not being present. That the presence of self-nihilistic delusions was noted in 15 of the 17 cases, however, appears consistent with the notion that the delusion is a form of nihilistic delusion. Also consistent is the fact that other associated features were

present but did not inevitably co-occur. The advantage of viewing the delusion as a type of nihilistic delusion is that one can then examine the delusion on two levels. First, one may examine nihilistic delusions in general and, second, one may examine the specific belief that one is dead in terms of a symptom requiring an explanation, as suggested by Young and his colleagues (Young *et al.*, 1992; Wright *et al.*, 1993).

To conclude, the case reports that were analysed above did not accord with the notion of there being a 'Cotard syndrome'. Furthermore, authors vary in terms of what they regard as constituting the syndrome in the first place. The variations seen in symptomatology between Cotard's 8 pure cases and the collection of 17 later case reports (and also within the 17 later reports) may be due to differences in the types of symptoms examined, or looked for, by different authors. The Cotard delusion would appear to be best regarded, as suggested by Friedman and Caplan (1967), as a type of nihilistic delusion that varies along a continuum in terms of presence and severity of symptoms, rather than as a separate clinical entity; the specific delusional belief that one is dead represents one of these symptoms. This and related symptoms are examined in this thesis and the term 'the Cotard delusion' will be used to describe the delusional belief of being dead. In Chapter Three, four case studies serve to highlight the variability seen between and within individuals suffering from the Cotard delusion and in Chapter Four, a mechanism is suggested which may help to explain why people remained convinced by explanations that seem patently absurd to everyone around them.

Chapter Three
Single cases of the Cotard delusion

"Terrified and restless, the patients begin to experience their feelings as the reality itself and are then inaccessible to reason. Now the world has escaped them. Nothing remains. They are alone in terrible isolation, suspended between infinities. They have to live for ever because time no longer exists. They themselves no longer exist; their body is dead. Only this fake-existence remains as their horrible fate."

Jaspers (1913/1963, p.63)

Introduction

The above quote is Jaspers' description of people suffering from derealisation. It also captures the despair and denial of existence experienced by individuals suffering from the Cotard delusion, and highlights the suggestion (Chapter One) that there is no clear demarcation between derealisation (or depersonalisation) and the Cotard delusion. Indeed, as also noted in Chapter One, derealisation has been viewed as an accompanying feature of the delusion (Christodoulou, 1977; Todd, Dewhurst & Wallis, 1981), and Young *et al.* (1993) have suggested that it is reinforced by feelings of loss of familiarity of once-familiar faces and places (see Chapter Two).

It was suggested at the end of Chapter Two that a possible reason for case reports showing such a variation in symptomatology from those reported originally by Cotard is that different authors look for different things, depending on what it is they aim to achieve. It was further noted that impaired recognition of faces and buildings, viewed by Young and his colleagues as central to understanding the Cotard delusion, were not noted in other case reports. However, this was a fairly recent serendipitous finding, following a complaint by an individual with the Cotard delusion of not being able to recognise familiar people and places. If such

impairments are implicated in the delusion, together with derealisation, and perhaps depersonalisation, then investigation of these particular symptoms in other cases should reveal their existence. In order to establish this, four single cases of the Cotard delusion were investigated; these are described in the present chapter.

In Chapter Two it was demonstrated that the denial of one's own existence is a common, but by no means universal, feature of the Cotard delusion. Indeed, we now have a fairly good picture of the symptoms displayed by people suffering from the Cotard delusion and an indication of the variability among individuals. It has also been noted that individuals show variations in the degree and severity of their delusional beliefs during the course of their illness. However, we have yet to gain any real sense of how such symptoms are felt by the sufferer. That is to say, we have no impression of the subjective experience of someone suffering from Cotard delusion. In this chapter, three brief case descriptions and one detailed report of the Cotard delusion are presented, which illustrate not just the variability between different individuals, but the variability within individuals over the course of their delusions. The fourth case (JK) is reported in far greater detail than the other three reports because she was investigated extensively over a two and a half year period. The report includes a detailed description of JK's experiences, which illustrates the subjectively very real fears and dilemmas faced by people suffering from the Cotard delusion. The case descriptions are followed by the results of a test of recognition memory, a self-report test of depression and anxiety, and a test of magical ideation. Following from the case descriptions and formal test results, the symptoms noted in each case are presented in the same table formats as those in Chapter Two.

Overall, the present chapter serves three main functions. First, the case reports, and subsequent analyses of them, further highlight the variability seen in the Cotard delusion and lend further support to the claim made in Chapter Two that the delusion does not constitute a syndrome. Second, the presence of depression, face processing deficits and feelings of derealisation were specifically noted in order

to assess the claims by Young *et al.* (1992) and Wright *et al.* (1993) that this triad of symptoms plays a contributory role in the formation of the Cotard delusion. To recap briefly, the face processing deficit are held to reinforce the feelings of derealisation experienced by the patients, and the depressed mood determines an internal attribution of these feelings. Third, the cases (particularly that of JK) provide a deeper insight into the Cotard delusion, illustrating just how the symptoms noted in the previous chapters manifest themselves, and underscoring the terrors and traumas experienced by individuals suffering from the delusion. Additionally, the cases themselves highlight the problems inherent in undertaking single case investigations of this type; in particular, that of the individuals' own distresses and distractibility that can sometimes make testing undesirable, despite their willingness to take part.

Four case studies of the Cotard delusion

RB: A case of anxious agitation

Case description

RB is a 61 year old man who initially became depressed and then took an overdose following a bowel resection. He was transferred to a psychiatric ward of a general hospital, where he was initially prescribed fluoxetine, but it was soon realised that his depression was rather worse than first thought and his mood subsequently worsened. He began to say that he had been dead since the previous week. RB had no previous known psychiatric history, but his wife suffers from chronic schizophrenia and has done so for many years. RB had little formal education; he left school at the age of fourteen with no qualifications, and he is only semi-literate.

Delusional beliefs

RB believed that he was dead. He constantly looked at the ward clock and, when asked why, said that he could not understand why the clock was still

working; it should have stopped at the time he died. He became extremely anxious and frustrated at his inability to understand why the clock continued to move on in time. RB reported feeling as though he were not there, and at one time claimed to be "somewhere in between Heaven and Hell".

RB's behaviour was highly reminiscent of Cotard's (1882) description of people suffering from *le délire de négation* who displayed 'anxious agitation'. He was extremely agitated and deeply distressed; he was unable to lie down or sit for very long and paced continually up and down at the side of his bed. Also reminiscent of Cotard's case descriptions was the fact that RB showed muscular rigidity, which appeared to have been a side-effect of his medication.

I visited RB on four occasions. On the first occasion, when he was convinced he was dead, RB was distressed, anxious and extremely restless. I attempted to carry out some formal testing, but he became even more distressed and I decided to end the session after only a few minutes. I attempted to have a general conversation with him, but he had severe difficulty in concentrating. He returned to his bed space in an extremely anxious state, and paced up and down by the side of his bed for well over an hour.

A fortnight later, I visited him again. In the intervening time, he had been placed on a tricyclic anti-depressant and neuroleptic medication, and had improved slightly. He was noticeably better than on the previous occasion, and no longer fully convinced that he was dead, although he still made occasional comments about the clock, and often looked up at it. Because he failed to respond to medication after a lengthy trial and remained distressed, ECT was resorted to, and his depression and delusional beliefs remitted rapidly.

The next time I saw him, about a fortnight after he had been placed on the new treatment régime, RB was about to be discharged. During this session, RB spoke of having had several premonitions of events over the years, including of the deaths of his mother and his two brothers, and of his recent bowel operation. He reported being at work one day when, just after lunch time, he had heard someone,

whom he believed to be his mother, calling out his name. It later transpired that this was the time at which his mother had died. He further reported having sensed his mother the night before her funeral, when she was lying in an open coffin in his house. He said he was asleep and at first thought he was dreaming, but had "realised it was really her", when she touched him. He also said that she was present at his recent operation and had told him that "everything would be fine" and that he "would be alright".

A year after his delusions remitted, RB underwent a closure of colostomy. He has not become deluded since, although he has been seen intermittently for episodes of depression. His wife remains very symptomatic. At the time of writing, however, RB shows no recurrence of any delusional beliefs.

JA: A bodily delusion as an explanation of a painful life event

Case description

JA is a 56 year old woman, of average intelligence, who was admitted to a psychiatric ward via a surgical ward, following a minor operation on her bowel. JA had become depressed following the operation and had attempted suicide by swallowing some bleach. JA had a history of bowel problems and had had a couple of routine operations in the past. She had no prior history of mental illness. She is married and has a son and a daughter, both of whom are now married. Her married life had not been good for some time prior to her admission, and her husband had recently begun an affair with her sister-in-law (her late brother's wife).

Delusional beliefs

When JA was first admitted to the psychiatric ward, she began voicing nihilistic beliefs. These beliefs varied, however, from claiming that she *felt as if* she were dead, to claiming that her body had changed or felt numb. The belief that she felt as though she were dead lasted for a couple of days only. JA was highly

suspicious of the hospital and its staff. In particular, she was convinced that the surgeon who operated on her bowel had partially sewn up her vagina. She was extremely upset by this and insisted that it prevented her from having sexual intercourse with her husband. She claimed that this inability to have intercourse was the reason why he was having an affair with her sister-in-law. She also insisted that the surgeon had inserted a tube linking her vagina to her anal passage.

In order to check that there was no physical reason for her inability to have intercourse, and that there were no other problems with her vaginal or anal passages, an exploratory operation was performed. This confirmed that there were no physical reasons why she could not have sexual intercourse. However, the surgeon did note that part of her anal passage bent slightly to the front and it might be possible that it was this that she could feel and which led her to believe that she had an extra tube linking her vaginal and anal passages.

JA had a number of other bodily delusions. For example, she claimed that her wisdom teeth had gone and that her extremities were dead. She was afraid to eat due to an imagined lump in her throat. She also complained of being dehydrated and "all dried up"; this included her skin, which she believed had no moisture in it. Medical examination, however, revealed no dehydration. At one point, JA said "I have no oxygen". When questioned further about this, she simply said "I have no oxygen. That's all. I just have no oxygen".

JA also believed that she could "smell the stuff that's rotting down below". Like Cotard's patients, she repeated the same phrase over and over again, saying about the surgeon and medical staff: "They've done this to me". This suspiciousness arose while JA was still very depressed and extended to her repeatedly asking why the medical staff and I had "singled me out". After a couple of visits, however, she began to trust me and agreed to take part in some tests. The results of these are presented below.

MB: A chronic case of the Cotard delusion

<u>Case description</u>

MB is a 59 year-old woman with no family history of serious psychiatric illness. She is divorced, with one daughter from the marriage. MB has been a clerical worker in the civil service for most of her adult life.

MB has a thirty year history of mental illness. At the age of 28, she received a diagnosis of phobic anxiety. She made a good recovery after being placed on benzodiazepine, which she continued to take intermittently for the next 25 years. When she was 53 she had another episode of anxiety and was diagnosed as having agoraphobia with panic. She also suffered from hypochondriacal worrying, low mood and depersonalisation. Again, she recovered well.

The current episode began 6 years later, when she experienced feelings of derealisation, and seemingly also of depersonalisation. She was suffering from increased awareness of body functions, about which she was highly anxious. She reported that she could "smell death", which medical and psychology staff felt suggested a differential diagnosis of temporal lobe epilepsy. An EEG revealed no abnormalities.

Eight weeks later, after MB had complained she was unable to feel any emotion, a diagnosis of atypical depression was made. Four months after this, she was described as suffering from a depressive defective state with gross anhedonia, intermittent depersonalisation and derealisation, nihilistic delusions and ideas of reference.

During the present investigation, MB was oriented in person, time and place, and there was no evidence of formal thought disorder and no gross abnormality of speech or language. Her posture was anxious, tense and rigid - she would sit forward in her chair, with her arms around her shoulders, as if giving herself a hug. Her facial expression was also anxious, but unvarying, and her affect was flat.

Following treatment, again with benzodiazepine, MB recovered sufficiently well to move to a psychiatric hostel staffed by nurses, in which she continues to live.

Delusional beliefs

MB reported feelings of depersonalisation and claimed to be dead. She said that she could feel herself when, for example, she touched herself on the arm. However, she also stated "I am not aware that I'm here", and said she was cut off from everything around her. When asked if this was an uncomfortable experience, MB said that she was unable to say because she could not feel anything at all. She said that she felt her own body was "not there at all". She knew where she was, but did not know whether her body was there. MB knew that others could see her body but thought that it "may be someone else". When asked what she thought might have happened to her body, she replied that she had wondered whether her spirit was "something like a disembodied spirit of a ghost".

MB's loss of feeling extended to her emotions. She complained of a total loss of emotional responsiveness, which included everything from the weather to the presence of others. In particular, she said that when she cuddled her granddaughter she did not derive any feelings from her (she informed me of this several times in several visits). She stated continually that she had no thoughts whatsoever, and so could neither think nor feel; hence she had neither sad nor happy thoughts, but instead felt only numbness. MB alluded to a difference between feeling and knowing, but did not know any reason as to why, or on what basis, such a difference might exist.

When asked whether this sort of thing happens to others, she replied "No, just me... I am the only person in the world with this". She added that she did not know what the "this" was, "unless it is supernatural, but I don't know what". Throughout the conversation, MB either sat bolt up right in her seat with her hands held together, continually 'wringing', as though she were washing her hands, or

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she sat stooped forward with each hand clasped over the opposite arm, as though she were hugging herself. Physically, she never looked comfortable or relaxed. There was a seeming paradox in her physical behaviour - she alternated between what Cotard would have described as muscular rigidity on the one hand, and the 'wringing' of hands behaviour on the other. Indeed, her bodily behaviour seemed paradoxical when considering her flat vocal and facial expressions.

MB spoke of her experiences before her admission to hospital. She reported having had some bizarre experiences in the hostel; she said that when she looked in a mirror, the image would shift from one end of the mirror to the other. She claimed to have seen strange lights and coffins in her house. She also reported having had feelings of being pulled across the room and seeing a white cloud across her feet that slowly enveloped her up to her chest. MB said she thought then that she was dying, and even claimed to have seen her own death in the paper.

I visited MB just over a year later at a staffed hostel for people with psychiatric illnesses, to which she had moved some months before. Her condition was exactly the same as in the previous year and she voiced exactly the same experiences. She appeared anxious when discussing her experiences and still showed the same muscular rigidity, interspersed with the characteristic wringing of her hands. She remained highly distractible, being unable to concentrate on any given task for more than a few minutes before returning to speak of her experiences, the accounts of which were exactly the same as in the previous year.

JK: A severe case of the Cotard delusion

Case description

JK (Young, Leafhead & Szulecka, 1994) is a 29-year old woman of average intelligence, who was admitted to hospital five times over a four-year period for episodes of psychotic depression. She responded well to ECT, but developed spells of elated mood following treatment on three occasions. Earlier during the year of the latest episode, a close friend of the family, whom she used to

call "uncle", and referred to as being like a "second father", died and this seemed to have been associated with the beginning of the illness. JK's first episode of depression, experienced a few years before, followed the death of her father from cancer. She was then admitted to hospital where she believed she "died partially" and "never really recovered". She believed that the latest episode was related to an operation she had had on a lymph gland in her neck two or three weeks prior to admission. She insisted that she had been conscious during the operation and had felt everything.

JK reported being a normal, happy child who spent a great deal of time with her father. She was good at reading and spelling at school, but very poor at Maths, for which she was placed in a special class. She reports having been teased a lot by the other children at primary school and not having any real friends. She got on better at her secondary school, where she made friends and was only taunted occasionally. She left school at sixteen with three CSEs.

After leaving school, JK embarked on a couple of Youth Training Schemes and other similar schemes, until settling to work in nursing homes, one of which she remained at for three years on a part-time basis. She enjoyed her work and she felt that she got on well both with her colleagues and with the elderly people. She stopped working when she became ill, some three months prior to her admission.

JK does not have any good friends of her own age, and has never had a long-term boyfriend. She said she was sexually abused by a boyfriend at school, but gave no details. About a year after being discharged from full-time hospital care, she met a young man at the hospital Day Centre who had suffered from depression. She became very fond of him quite quickly, but after a short while he told her he just wanted them to be good friends. JK took this rather philosophically. This may seem surprising given her rather fragile state, but JK was severely lacking in friendships and knew no-one else of her own age, so she was just pleased to have made a friend. They shared their experiences of being ill, and he stood by her when she had a relapse. Apart from the young man, the only

people she reported seeing outside the family were the "uncle", now deceased, and his wife, whom she still sees. JK is very close to her mother and to her brother, aged 41, who, like JK, still lives at home.

Delusional beliefs

When she was most floridly ill, JK claimed that she was dead. At other times, she believed that her brain was dead and that her body was going to explode. At the beginning of her illness, she had very strong feelings of derealisation and depersonalisation. She also had ideas of reference and believed that she was in control of objects and people around her. When the delusion was at its worst, JK tried to cut her wrists with a pair of bathroom scissors, but her mother stopped her.

Like Cotard's patients, JK experienced self-accusatory delusions. She thought that she perpetrated some act for which people were suffering, although she could not specify the nature of the act. She also believed she was responsible for bad weather and accidents world-wide because she could predict their occurrence. JK felt particularly guilty about having claimed social security benefits (to which she was legally fully entitled) on the grounds that she was dead while she was claiming and so had not been entitled to any benefits. She was extremely worried about getting into trouble about this and no amount of re-assurance would convince her that she had done nothing wrong. Other delusions were rather vague. For example, she was particularly worried that she had done things for which her mother would get into trouble, but she could not say what the 'things' were.

JK's mother was also the focus of some general nihilistic delusions. During the time in which she believed she was dead and complained about feelings of derealisation, JK denied the existence of her mother. This belief was, as with some of her self-accusatory delusions, vague and not clearly formed. Later, when she no longer believed she was dead, but thought she may have *been* dead, she voiced beliefs that her mother and brother had changed and were no longer the

people they were before. This is interesting in terms of the postulated relationship between the Cotard and Capgras delusions referred to in Chapters One and Two.

When asked about her visual experience and feelings of derealisation in general, JK stated that although she could see everything - people, objects and her surroundings - "nothing feels real". When the delusion was at its most severe, JK reported feeling very frightened and having strange perceptual experiences. She saw people and objects as outlines or shadows only, while remaining able somehow to perceive their features. At times, JK felt as though she was from another planet, as if she were "someone else who couldn't see me, and as if other people weren't real. I could only see outlines".

JK also had some hallucinatory experiences during the time in which the Cotard delusion was florid. She had visions of her aunt and uncle in Australia and would continually visualise everyone in her family. She said that she "saw" her living uncle cycling around the skies. Like MB, JK also reported standing one day and watching a white cloud appear at her feet and then gradually rise until it enveloped her up to her waist.

JK's unusual experiences were not confined to vision. She believed that she had experienced something highly unusual. She reported feeling frightened, confused and guilty. At times she said that she was not human and even asked her mother if she had really given birth to her; she could not convince herself that she had been born at all. At other times she repeated her belief that she was dead: "I feel as though I have died... I believe I have died... I can't breathe... I have died". On one occasion, JK described herself as consisting of mere fresh air and on another she said that she was "just a voice and if that goes I won't be anything... if my voice goes I will be lost and I won't know where I have gone". She said that if no-one could help her, she wanted to be put out of her misery. It was at this time that she tried to cut her wrists. She said "the television was telling me I was insane" and she felt as though she could control her mother, the garbage van and the men collecting the rubbish, as well as the switches and electrical equipment in

the house. She complained that when she went to bed at night she did not feel comfortable, owing to the fact that her body felt strange. Her subjective experience of eating was similarly unreal; she felt as though she were "just placing food in the atmosphere", rather than into her body.

JK displayed the type of 'resistant insanity' noted by Cotard. She would not eat, get up in the morning, bath, dress, and so on, without being coerced. When asked why she would not do these things, JK explained that she was "scared" to do them. She was similarly scared of urinating and defecating, and would retain urine and faeces until persuaded by her mother to go to the lavatory. Somewhat paradoxically, JK informed me that she had been very constipated and added "I don't know if my bowels work".

Such fears persisted late into the course of her illness, even after she no longer believed she was dead. She reported being frightened to go to sleep at nights for fear she may die during her sleep. She felt that her father and uncle (both deceased) were "willing" her "to join them' and she was continually fighting against doing so. She was "frightened of experiencing death again" and kept saying that she wanted to become "like everybody else". As mentioned above, at the beginning of her illness, JK had denied the existence of her mother. After the Cotard delusion had remitted, JK voiced beliefs that her mother and brother had changed and were no longer the people they were before.

As JK recovered, she was able to talk about what she had felt at the time when she believed she was dead. She claimed her auditory, olfactory and gustatory modalities had all been relatively normal. She said, however, that her vision and her sense of touch had been unusual - "things just didn't feel right". She felt that her body was going to explode and had visualised this happening. These unusual feelings in her visual and tactile modalities remained long after the delusion had remitted.

I was particularly interested to know whether the fact that JK felt and thought at all had struck her as being inconsistent with her belief that she was dead.

I asked her, therefore, whether she could feel her heart beat, whether she could feel hot and cold, and whether she could feel when her bladder was full. She said she could. I suggested that such feelings surely represented evidence that she was not dead, but alive. She said she *could* feel them and she *was* dead and so it clearly did not represent evidence that she was alive. She said she recognised that this was a difficult concept for me to grasp and one which was equally difficult for her to explain, partly because the experience was unique to her and partly because she did not fully understand it herself. I then asked whether she thought I would be able to feel my heart beat, to feel hunger and so on if I were dead. She repeated that her experience was unique to her; no-one else had ever experienced what she was going through. When pressed to give an answer, however, she finally, but very reluctantly, agreed that "*it might* be possible" (for me to feel such things). JK appeared to recognise the inconsistency of someone being dead and yet remaining able to feel and think, and yet could not entertain the possibility of this inconsistency in regard to her. JK became extremely upset after this conversation, possibly because it had presented a challenge to her delusional belief system. Indeed, JK suffered a minor relapse after this conversation; a poignant reminder of the sensitivity and fragility of people undergoing challenge to their delusional beliefs.

When JK's mental state settled again, she related having had some strange experiences long before the onset of her illness. She told me about having gone "into a trance" and walking in front of a car when she was at primary school. She also told me that the television had always irritated her and that she never watched anything all the way through. She said she had often felt that she had seen a programme before, even though it had never been previously shown on the television (or at the cinema) and she knew that she could not possibly have seen it. This was such a regular occurrence that when she was younger her father used to say that she "must have been here before" and that she "must have lived before". It

cannot now be known whether her father actually believed this or whether he was joking with her, but it is certain that JK took him seriously.

When JK began to recover from her other delusional beliefs, and stopped having "strange experiences", she seemed to be aware of a distinction between reality and delusion. This distinction became rather blurred, however, when she discussed how she perceived and interpreted her experiences while under the Cotard delusion and how she viewed them once she had stopped believing she was dead. JK showed only superficial appreciation of the fact that when she was floridly ill she had been, in fact, deluded.

In a conversation about death and what it means to be dead, JK appeared to hold contradictory views. She said that "when you're dead, you're dead - that's it", but when questioned again about possible bodily sensations after death, she now said, without reluctance, that because it had happened to her it must be possible to feel one's heart beat. Such views reinforced the impression that her understanding of having been deluded was not complete. When pressed further, it transpired that she was in a dilemma: "I want to understand what's happened, but I'm scared of what the truth is. Either none of this has happened and I am mad or all of it has happened and I did die. Either way I can't win. I don't want to know which one it is. I'm scared of finding out".

JK's condition stabilised from this point and she started to attend the Day Centre at the hospital. She was now receiving greatly reduced medication, with a view to complete cessation, and was markedly more alert than at any other time I had seen her in the past. She was very keen to say how much better she felt. She was beginning to take a pride in her appearance, and had embarked on a diet (having gained several stones in weight owing to the medication). For the first time in the two years in which I had been seeing her, JK was eager to talk about pleasant events that had been happening in her life. It was then she met the young man who subsequently became her friend. When she told me about him, her face lit up, she reddened, went all coy and then gave a huge grin.

This period of stability lasted for around six months, after which she began to believe that she was invisible. She later said about this that she knew that people could see her despite her invisibility and that she could not understand why they were able to do so. She became very frustrated by this and began head-banging first thing in the mornings. It finally became too much for her and she took an overdose. Her mother found her the next morning in bed and she was rushed to hospital where she remained in the intensive care unit for four days. After this she settled down again and continued to attend the Day Centre, which she very much enjoyed, and to see her 'boyfriend' who had stood by her during her delusion about being invisible.

I asked JK to tell me what she remembered about having been ill. She referred to her belief that she had seen cars being squashed and related this belief to a car crash that she had been in along with her mother and brother. Nobody was hurt, apart from a few bruises, but she thinks this was why she believed she could see cars being squashed. When questioned about her prior beliefs she said she realised it had been "the illness", and said "It was just me that changed".

She talked about the surgery on the gland in her neck and said that she had been worried about having the operation. At that time, she felt as though she was turning inside out, that her body was exploding and she was "being torn apart, limb from limb". She said the operation had had nothing to do with her illness, which contradicted her view while she was ill when she insisted that the operation was a significant factor in her illness. She now felt her failure to obtain an 'O' Level in Human Biology was a major factor in the onset of her illness since she had been particularly upset by it. During her illness, JK had informed me that she had been conscious during the operation and had felt everything. She had become very distressed when talking about it at the time. During this later discussion, however, when asked whether she could remember anything about the operation or whether she had felt anything during it, she replied that the last thing she had remembered

was being put to sleep and the next she knew was waking up in a hospital bed after the operation.

I asked JK about her views on death, God and a possible afterlife. She said she believes in God and prays every night. I asked her if she prayed on the night she took the overdose and she said she did. When asked if she believed she would die from the overdose she replied that she did not think she would and added "I must have known I'd come round". Paradoxically, she added that she has a great fear of dying; "I am terrified of it", she said.

I then asked her about her views on what happens when you die. These views had altered radically from when we discussed them some eighteen months previously. She now held the sorts of views which many people hold. She said she believes in Heaven, where she believes she will "meet Dad again", although she was not sure about the existence of Hell. She also believed reincarnation was possible but was not sure what form it would take. I asked her about what people might look like once they were in Heaven and she replied that she was not sure, but suspected they would look just as they did before they died.

I questioned her about her father's death and she said that she believed her problems all stemmed from her inability to accept that he had died. She said that she now accepted he was dead and that she would not see him again, except when she gets to Heaven herself. She said she continued to dream about him all the time.

When asked about whether she could make predictions about events, she said she could. These predictions, however, turned out to be the sorts of predictions made by people every day. For example, she referred to her prediction that the collieries would close. Many people in Britain predicted the same. She also referred to her ability to predict the ending of a television programme or film even if she had not seen it before. Many people can do this also. The only difference seems to be that what JK believes is a fairly unusual thing to be able to do, most of us accept as predictions that are part of everyday life. When asked about more fantastic predictions, however, she laughed. Without reminding her

that when she was ill she had informed me that she could predict (and control) the weather, I asked her if she felt this was something she could do. She laughed and said "Oh blimey no, I couldn't do something like *that*'!".

At no point during the discussion, did JK refer to having believed that she was dead or that her mother and brother had changed in some way and were not the people they used to be. Whether she had genuinely forgotten these beliefs or whether this was simply part of the sort of 'conspiracy of silence' that often takes place in the families of those who are mentally ill is open to question. Also, it is not uncommon for people with the Cotard delusion to deny that they ever held the belief that they were dead (e.g., Maack & Mullen, 1983; Malone & Malone, 1992).

Even at the height of her illness, when JK's delusional beliefs were most florid, she was able to discuss matters not related to her delusions quite normally and relatively cheerfully. When discussing her delusional beliefs, however, she became visibly anxious and highly distressed, sometimes being unable to stop herself from crying. However, even during the times in which she was feeling the utmost despair, JK was always willing to talk to me, and to take part in testing.

Formal testing

Introduction

Three tests were administered: The Warrington Recognition Memory Test (RMT) (Warrington, 1984); the Hospital Anxiety and Depression (HAD) scale (Zigmond & Snaith, 1983); and the Magical Ideation Scale (MIS) (Eckblad & Chapman, 1983).

In the RMT, fifty faces are presented serially, each for three seconds. The subject is asked to make a judgment as to whether or not each face is pleasant (in order to facilitate encoding). Immediately following presentation, each face is presented again alongside a previously unseen distracter face. The task is to identify which of the two faces was the one originally seen. The procedure for the words subtest is the same. Fifty words are presented to which the testee has to

respond "pleasant" or "unpleasant". Immediately following presentation, each of the words is re-presented, alongside a previously unseen distracter word. The testee's task is again to identify which word was seen previously.

The HAD scale is a self-report scale of anxiety and depression, consisting of a series of statements about how you have felt over the past week and a choice of four responses. Subjects are asked to select which of the four choices most closely corresponds with how they have felt over the past week.

In the MIS, thirty statements are presented, to which the testee has to respond "true" or "false". Statements include: "I have had the momentary feeling that I might not be human" and "I think I could learn to read others' minds if I wanted to".

Table 3.1 shows the status of each patient's delusional belief at the time each test was administered. In addition, some general points need to be made concerning the testing of RB, MB and JK. Due to RB's distressed state on the first visit (when he was fully convinced that he was dead), it was impossible to complete any tests. On the second visit, a week later, he was still unable to concentrate on anything and was extremely distressed and anxious. After a further week, when RB was no longer fully convinced that he was dead, he was able to take part in testing. However, as noted above, RB is only semi-literate, so in the recognition memory test for words (reported below), the words were read out aloud to him. As such, it is difficult to gauge how much weight can be given to his score. Owing to his distress on previous visits, and the fact that he became tired and distractible after the recognition memory test, the Hospital Anxiety and Depression (HAD) scale (Zigmond & Snaith, 1993) and Magical Ideation Scale (Eckblad & Chapman, 1983) were not presented to RB until the day of his discharge from hospital, by which time, of course, his condition had improved. MB felt unable to complete the HAD scale because, as noted earlier, she said she felt neither happiness nor sadness, displeasure nor pleasure. Hence, no scores are presented for her on this test. Finally, JK was tested three times over a period of two years. At the time of Test

1, JK believed she was dead and also voiced some rather vague doubts about the existence of her mother. By Test 2, JK was no longer convinced that she was dead, but thought she may have *been* dead. It was at this time she believed her mother and brother were no longer the people they had been. By the third testing session (18 months later), JK was no longer deluded, and stated that it was all "just in my mind". It must be stressed that the second time on which JK was given the MIS, she responded "yes" to all questions, so little weight can be given to her score.

Table 3.1: Status of delusional beliefs at the time of testing.

RB

RMT:	No longer fully convinced he was dead
HAD:	No longer deluded
MIS:	No longer deluded

JA

All tests:	Felt 'as if' she were dead

MB

RMT:	Believed she was dead
HAD:	Not completed
MIS:	Believed she was dead

JK

Test 1

All tests:	Believed she was dead and questioned her mother's existence

Test 2

All tests:	No longer fully convinced she was dead, but believed her mother and brother had changed in some way

Test 3

All tests:	No longer deluded

Warrington Recognition Memory Test (Warrington, 1984)

The results for the RMT for all 4 cases are presented in Table 3.2. The Table shows their raw scores for the numbers of faces and words they identified correctly, together with the published percentile scores for Warrington's (1984) age-matched controls. Also for the purposes of comparison, mean scores for a group of patients (n=134) with right hemisphere lesions and a group (n=145) with left hemisphere lesions (reported by Warrington, 1984) are also shown in the Table.

Table 3.2: Scores for RB, JA, MB and JK on the Warrington Recognition Memory Test for words and faces.

	FACES		WORDS	
	Accuracy (/50)	Percentile	Accuracy (/50)	Percentile
RB	36	5th	39	25th
JA	39	25th	42	50th
MB	37	10th	39	25th
JK: Test 1	35	5th	45	25th
JK: Test 2	30	5th	41	10th
JK: Test 3	38	5th	44	25th
Right hemisphere lesions:				
	39.7		44.6	
Left hemisphere lesions:				
	41.8		39.9	

As Table 3.2 shows, impairments in recognition memory for faces were found in all four cases. For RB and JK, the impairment was severe; it was were less so for MB; while for JA it was moderate. However, all four scored lower than the mean score for patients with right hemisphere lesions. Turning to the recognition memory for words scores, the Table shows that all four individuals

identified correctly more words than they did faces; indeed, JA's scores were normal. The other three participants, however, showed a moderate degree of impairment. MB and RB both scored at the 25th percentile; indeed, their scores were as poor as those for patients with left hemisphere lesions. JK also scored at the 25th percentile on Test sessions 1 and 3, and her score dropped to the 10th percentile in Test session 2. The important point to note here, however, is that in all cases, the face memory impairment was disproportionate to that shown for words. This is particularly notable in RB's case, who, given his literacy problems, might have been expected to recognise fewer words than faces.

Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983)

Again, before examining the results, some points need to be made concerning testing. First, owing to his distress and distractibility on previous visits, RB was not able to complete the HAD scale until the day he was discharged from hospital, by which time, of course, his condition had improved. No results are reported for MB since, as noted above, she could not do the test. Finally, JK was tested on the same occasions as the RMT was given.

Table 3.3: Scores for RB, JA, MB and JK on the Hospital Anxiety and Depression (HAD) Scale.

	Anxiety	Depression
RB	3	2
JA	13	11
MB	-	-
JK Test 1	15	17
JK Test 2	14	14
JK Test 3	6	6
Published cut-off score	10	10

Table 3.3 shows the results for the 3 cases, together with the published cut-off scores for both anxiety and depression (Zigmond & Snaith, 1983). As can be seen in the Table, RB showed no signs of depression or anxiety; but it must be borne in mind that he did not complete the test until the day upon which he was discharged, by which time he was better. JA, on the other hand, showed a moderate-severe level of anxiety and a moderate level of depression. JK's scores varied from the first 2 sessions, to the third. On Test 1 (when JK believed she was dead), she scored 15 for anxiety and 17 for depression. Similarly, on the second test session (when she no longer believed she was dead, but though she may have been dead), her scores were 14 for both anxiety and depression. By the third session (18 months later), JK was no longer deluded and her scores for both anxiety and depression had dropped markedly to 6 for both subscales.

Magical Ideation Scale (Eckblad & Chapman, 1983)

The results of the MIS are presented in Table 3.4. As with the HAD scale, the MIS was not given to RB until the day of his discharge from hospital, after his delusions had remitted. Despite this, he scored 10, which is well above the control score of less than 3 (Eckblad & Chapman, 1983). It was during this test that he spoke of his premonitions (noted above). Even though RB was no longer

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Table 3.4: Scores for RB, JA, MB and JK on the Magical Ideation Scale.

	MIS score
RB	10
JA	3
MB	4
JK Test 1	17
JK Test 2	23
JK Test 3	6
Published control mean	<3

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delusional, therefore, he still held some bizarre beliefs. In particular, he agreed with the statements: "If reincarnation were true, it would explain some unusual experiences I have had" and "I have wondered whether the spirits of the dead can influence the living".

Unlike RB, JA appeared to have few bizarre beliefs other than those which she specifically complained about, scoring only 3. Similarly, MB scored only 4, indicating that she had no bizarre beliefs, save that she was dead. JK, on the other hand, scored very highly on the first and second testing sessions. On Test 1, she scored 17/30 agreeing with statements such as "I have had the momentary feeling that I might not be human" and "I think I could learn to read others' minds if I wanted to". This is far higher than the average score of under 3. It is important to note, however, that JK did not score 30/30. That is to say, she was not simply going along with any idea put to her, but was considering the relevance of each statement to her. Of particular interest is that she agreed with the statement "I have had the momentary feeling that someone's place has been taken by a look-alike", which is noteworthy when considering the strange feelings she was expressing at the time concerning the existence of her mother. On the second test session, JK simply responded "agree" to all the questions. This resulted in a score of 23, because there are only 7 statements in the scale to which a response of "disagree" indicates magical ideation. Unlike her performance on Test 1, when she clearly considered each statement carefully, JK was highly distracted and simply responded "agree" to each statement that was put to her. As noted above, it was around the time of the second testing session that JK was worrying over whether she *had* been dead and also over the feeling she had that her mother and brother were no longer the people they once were. Finally, as with her anxiety and depression, JK's Magical Ideation score was much reduced by the third session. It is interesting, however, that she still scored 6, which is double that of Eckblad and Chapman's (1983) controls. In particular, JK agreed with having had the

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momentary feeling that she might not be human and that reincarnation might explain some unusual experiences she had had.

Discussion of formal testing

These findings are in keeping with other findings of face recognition impairments in cases of the Cotard delusion (Young, *et al.*, 1992; Wright, *et al.*, 1993; Young *et al.*, 1993). In particular, it was noted in Chapter One that in WI (Young et al., 1992), the Cotard delusion followed damage to right temporo-parietal areas, as well as some bilateral frontal lobe damage. It is regrettable that WI's recognition memory for words could not be reported (this was because, as often happens in such cases, the RMT subtests had to be administered at very different times), since a lowered score for WI on words may have helped with the interpretation of RB and MB's scores here. This notwithstanding, it may be said, albeit tentatively, that RB and MB's scores on the RMT are consistent with studies showing face processing impairments in the Cotard delusion (e.g., Young et al., 1992).

The results of the RMT reported here lend support to Young *et al.*'s (1992) suggestion that face recognition impairments are implicated in the Cotard delusion. Additionally, JK's belief that her mother and brother had changed and were no longer the people they once were is consistent with Young *et al.*'s (1992) claim that the underlying pathophysiology and neuropsychology of the Cotard and Capgras delusions may be related. Further evidence of face-processing deficits in the Cotard and Capgras delusion, and for the relationship between the two delusions, have been reported by Young *et al.* (1994).

Analysis of case studies

The symptoms displayed by the four individuals suffering from the Cotard delusion were analysed in the same way as were the case reports studied in Chapter Two. As can be seen from Table 3.5, only JK negated the existence of others. She also negated herself, believed she was dead and yet believed she was immortal, as did MB. RB simply stated that he was dead, while JA negated her own existence, and felt as though she was dead for a couple of days. Only JK voiced self accusatory delusions and feelings of guilt, and suffered from imagined fears. JK also claimed that parts of her body did not exist, and suffered from hypochondriacal delusions. JA also voiced hypochondriacal delusions, and believed that parts of had changed in some way or were rotting away and emanating offensive odours. Neither RB nor MB voiced any such beliefs, although MB had suffered from hypochondriacal worrying. JA voiced visual, olfactory and gustatory hallucinations, and JK and RB voiced both auditory and visual hallucinations, while MB voiced only visual ones.

In terms of behavioural symptoms, JK, RB and JA had all attempted suicide at some point during their illness, JK refused to eat, and both she and JA retained urine and faeces. RB, JA and MB displayed the muscular rigidity which Cotard (1882) spoke of, while JK showed resistant insanity, and RB, JA and MB the repetition of words and phrases characteristic of Cotard's cases.

What is particularly noticeable about Table 3.5 is that all 4 individuals showed impaired face processing, and all voiced feelings of depersonalisation, while 3 (JK, RB and MB) voiced feelings of derealisation and/or feelings of unreality. Finally, all 4 individuals showed depression as a symptom.

As in Chapter Four, the symptoms were again placed into broad symptom groupings in order to establish whether an overall pattern emerged. These groupings are shown in Table 3.6. As can be seen, all voiced self-nihilistic delusions of one form or another; all showed perceptual abnormalities, behavioural manifestations, feelings of depersonalisation, and depression. Three also voiced

Table 3.5 Symptoms noted in the four single cases of the Cotard delusion.

Symptoms	RB	JA	MB	JK
General nihilistic delusions Negation of others				√
Negation of environment				
Self-nihilistic delusions Negation of self, including denial of whole body		√	√	√
Belief that one is dead	√		√	√
Immortality/inability to die			√	√
Self-deprecatory delusions Self-accusatory delusions				√
Feelings of guilt				√
Imaginary terrors or fears				√
Belief that one is damned				
Bodily delusions Hypochondriacal delusions		√		√
Denial of parts of body				√
Putrefaction of body parts		√		
Belief that body smells foul		√		
Changes in body parts		√		
Metamorphosis				
Perceptual abnormalities Auditory hallucinations	√			√
Visual hallucinations	√	√	√	√
Olfactory hallucinations		√	√	
Gustatory hallucinations		√		
Visual illusions		√		
Hyperaesthesia				
Anaesthesia				
Visual processing deficits	√	√	√	√
Behavioural manifestations				
Suicide attempts/thoughts	√	√		√
Violence				
Refusal to eat				√
Retention of urine & faeces		√		√
Muscular rigidity	√	√	√	
Immobility				
Mutism				
Repetition of words/phrases	√	√	√	
Resistant insanity				√
Other				
Depersonalisation	√	√	√	√
Derealisation/unreality	√		√	√
Depression	√	√	√	√

feelings of derealisation. Finally, general nihilistic delusions and self-deprecatory delusions were only voiced by JK, while bodily delusions were voiced by both her and JA.

Table 3.6: Symptoms noted for the four cases according to symptom group.

	Case Number			
Symptom Group	RB	JA	MB	JK
General nihilistic delusions				√
Self-nihilistic delusions	√	√	√	√
Self-deprecatory delusions				√
Bodily delusions		√		√
Perceptual abnormalities	√	√	√	√
Behavioural manifestations	√	√	√	√
Depersonalisation	√	√	√	√
Derealisation/unreality	√		√	√
Depression	√	√	√	√

Discussion

The four individuals shared a number of symptoms; they all suffered from depression, and from depersonalisation. In addition, all four displayed impaired recognition memory for faces, as measured by the RMT. In this sense, then, the individuals showed great similarity. However, by examining the symptoms and subjective experiences of the four individuals in greater depth, it is clear that there are as many differences as there are similarities.

First of all, in terms of the putative Cotard syndrome, only JK comes close to representing a textbook case; she not only had self-nihilistic delusions, including the belief that she was dead, but she denied the existence of others. Furthermore, unlike the other three individuals, she had self-accusatory delusions, feelings of guilt and imaginary terrors. This cannot be overlooked when examining the concept of a Cotard syndrome. Of particular interest is the fact that JK's symptoms varied during the course of her illness, such that she did not display all the symptoms listed at the same time The symptoms displayed by RB, JA and MB, on

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the other hand, were far less variable: RB simply improved with treatment; while JA and MB's symptoms, although showing slight improvement over time, were relatively constant.

Only JK voiced self-accusatory delusions, and these differed from those voiced by Cotard's patients (who in turn differed from one another). One of her guilt-based delusions was fixed firmly in the twentieth century in a Department of Social Security benefit office. The theme of JK's delusion, however, was in keeping with the theme of all Cotard's patients, that is, negation. That the contents of delusions change with time is reflected in today's schizophrenic who believes that there are secret messages for him on the radio or television, or that he is Elvis Presley, rather than Napoleon.

Bodily delusions were voiced by nine of Cotard's patients. Both JK and JA voiced bodily delusions, but there were differences in the form that these symptoms took and the severity with which they were displayed. While both believed that their bodies had changed in some way, there were clear differences in the specificity of these changes. JK simply stated that her brain was dead and that eating was like "placing food into the atmosphere". JA, on the other hand, was very specific about her beliefs (e.g., her body was rotting, and dehydrated, that her wisdom teeth were gone, her extremities were dead and she had no oxygen). One of Cotard's patients believed that her heart had been displaced and her throat contracted; another believed that she had a contagious disease; another that she had no body. Basically, neither individual held the same belief in terms of specific content, but both shared a common negativistic and hypochondriacal theme. This was also true of Cotard's cases reported in Chapter Two. MB did not have bodily delusions as such during the present investigation (although she had a history of hypochondriacal worrying), but she did report a heightened awareness of bodily functions and thought her body might be someone else's, or that she was the disembodied spirit of a ghost. It is interesting in this regard that MB alluded to a difference between feeling and knowing, albeit without knowing what that difference might be. As noted in

Chapter Two, Descartes' *cogito ergo sum* incorporates both thinking and feeling - MB's thoughts encapsulate nicely the divorce of the two leading to denial of one's existence.

In terms of perceptual abnormalities, these were evident in all four cases (and had been displayed by seven of Cotard's patients). All four individuals reported here suffered from visual hallucinations; with both JK and JA believing that they had seen white clouds enveloping them, RB believing that he saw his mother after her death, and MB believing she had seen lights and had read a report of her own death in a newspaper. MB also had a visual illusion in which her image shifted in the mirror. Finally, all four displayed face processing deficits that are commented on in depth below.

In terms of behavioural manifestations, RB, JA and MB corresponded closely to Cotard's description of what he termed *muscular rigidity*; with all three individuals showing stiff and rigid postures. Indeed, even though JK did not display quite such a rigid posture, she would sit somewhat motionless during interview and, when she did move, she lacked the fluidity of normal movement. Only JK displayed the resistant insanity referred to by Cotard, while both she and JA would often retain urine and faeces.

In regard to other behavioural manifestations whereby individuals act on their delusions, JK, RB and JA attempted suicide, while MB did not. None of the four displayed aggression towards others, although JK and JA voiced suspiciousness about others. As referred to in Chapter Two, six of Cotard's patients displayed suspiciousness; three believed their food had been poisoned and the other three that they were being persecuted in some way. Furthermore, JK voiced the specific belief that her mother and brother were no longer the people they had been. This type of belief was noted by Cotard (1882); for example, case 4 argued that her daughter was a devil in disguise, while also denying the existence of her family, case 8 denied the existence of her family, and case 5 believed that the people around her were only shadows. The latter is interesting in regard to the

perceptual disturbances reported by JK - specifically, her complaint of seeing people and objects as outlines or shadows.

In terms of precipitating factors in the Cotard delusion, it was noted above that, prior to JK's illness, a family friend had died and, some time beforehand her father had died. JA had not suffered from a bereavement as such, but had, in her eyes, effectively lost her husband - to another woman (her late brother's wife). Neither RB nor MB had suffered any such recent losses (although the death of his mother clearly still bothered RB; while MB was divorced some years before, although she never mentioned this). It is interesting, however, that while there seemed to be no obvious precipitating factor for MB, RB had had an operation on his bowel - as, indeed, had JA. Similarly, JK had had an operation on her lymph gland, which she believed was related to her (second) illness, and during which she maintains she was fully conscious and had felt everything. Whether such factors are in some way causal to the onset of the Cotard delusion is, of course, not something that is easily demonstrable. It is interesting, however, to note that in Cotard's (1892) paper, *le délire de négation* followed the deaths of someone close in cases 6 and 7. It also followed bereavement in at least 6 recent cases. For example, Enoch and Trethowan's (1979) patient described as case 1 became deluded after her husband and a close friend died within 6 weeks of each other, and de Martis' patient (translation in Enoch & Trethowan, 1979) became deluded following the death of her father. Similarly, Maack and Mullen's (1983) patient, Mr B, became deluded shortly after the death of his mother and said he felt he was "exploding with grief that wouldn't come out" (p.652). It would be interesting to ascertain whether the Cotard delusion *typically* follows loss (either through bereavement or marital disharmony) and/or some form of surgical procedure.

Of particular interest are the feelings of depersonalisation voiced by all four individuals. As noted in Chapter One, it has been suggested that depersonalisation affects experience of the self (Nemiah, 1989), whereas *jamais vu* represents a severe degree of depersonalisation, which affects places and situations (Myers &

Grant, 1972). It was further suggested that *déjà vu* is the positive equivalent of depersonalisation (Nemiah, 1989). As noted, in Chapter One, *déjà vu* experiences are more common in psychiatric patients than non-psychiatric patients (Richardson & Winokur, 1967, cited by Sno & Linszen, 1990). This is particularly relevant to JK, who had experienced feelings of *déjà vu* for many years, especially with regard to her having "seen" television programmes before, which resulted in her avoidance of the television. During her illness, she experienced feelings of *jamais vu*, as well as of depersonalisation. RB, on the other hand, did not claim to have had *déjà vu* experiences, but believed that he had had several premonitions in his life (of the deaths of his mother and brother, and of his operation). In contrast, neither JA nor MB reported feelings of *déjà vu*, and nor did they claim to have had premonitions. Furthermore, and in contrast to RB and JK, they held few bizarre beliefs, as assessed by the Magical Ideation Scale (Eckblad & Chapman, 1983), on which high scores have also been found for people with other types of delusion (Kaney & Bentall, 1989). However, MB had marked feelings of unreality and, like RB, JA and JK, displayed impaired face-processing on the Warrington RMT. Hence, while only two of the four individuals reported having had feelings of *déjà vu* or of experiencing premonitions, all four had impaired recognition memory for faces, and three (JK, RB and MB) complained of feelings of unreality. Again, this fits more closely with the notion of *le délire de négation*; while there was a common pattern in the symptomatology of the four cases (in terms of depersonalisation and face recognition memory), there were differences in the degree and severity of those symptoms, particularly in the manifestations of feelings of unreality (i.e., *déjà vu*, etc.). Finally, the presence of premonitions in the Cotard delusion has not been reported hitherto. It is entirely possible that they are of minimal relevance; however, the relationship between premonitions and the triad of depersonalisation, *déjà vu* and *jamais vu* warrants further exploration. Unfortunately, this is beyond the remit of this thesis.

The cases described above, and especially JK, show obvious similarities to Cotard's patients. In terms of a Cotard *syndrome*, JK would represent a textbook case, and MB and came close to this. So, too, did JA, save, of course, for the fact that she did not actually say that she was dead; only that she felt *as if* she was dead. RB, on the other hand, while believing he was dead, showed few related symptoms, so therefore showed only part of the syndrome. Hence, believing oneself to be dead cannot be seen simply as a symptom found in the most severe cases; while RB was convinced that he was dead, his associated symptoms were far less severe than those of JK and, in contrast, JA's associated symptoms were far more severe than those of RB, and yet she did not actually claim to be dead. Such variations are far more in keeping with Cotard's own conception of the delusion than with the concept of a Cotard syndrome.

It was noted both in Chapter One and in Chapter Two that Young and his colleagues (Young *et al.*, 1992; Wright *et al.*, 1993, Young, 1994) have suggested a clear role for depersonalisation and/or derealisation, feelings of unreality, face processing deficits (which serve to reinforce the feelings of derealisation and unreality), and, finally for depression. Also noted was the fact that in only 2 of the 17 reports were face processing deficits noted; both of these were Young's case reports (Young *et al.*, 1992; Wright *et al.*, 1993). It was suggested that the fact such deficits were not noted in other case reports, may be simply because they had not been investigated. The results from the four cases analysed here are consistent with this view. The presence of impaired recognition memory for faces in the four individuals, taken with the feelings of depersonalisation and unreality, lends support to Young's theory.

It is important to note that Young *et al.* (1992) and Wright *et al.* (1993) do not suggest that abnormal feelings, depersonalisation and derealisation are in themselves *sufficient* cause for the Cotard delusion to emerge. Face processing impairments and feelings of depersonalisation and/or derealisation are experienced by many people who do not conclude that they are dead. The key is the interaction

with depression that, as noted in Chapters One and Two, Wright *et al.* (1993) suggest leads people to seek an internal cause for their altered perceptual experience. Although the attribution of these changes is correctly internalised, the consequences of them are exaggerated. (That both RB and JK scored highly on the MIS is consistent with this, since it demonstrates that patients may be more willing to entertain bizarre hypotheses that other people would dismiss.) This, in turn, leads people to conclude erroneously they must be dead. All four individuals showed problems in face recognition memory and voiced feelings of depersonalisation. JA suffered from depression and from feelings of depersonalisation, but did not complain of feelings of derealisation or unreality, and neither did she voice the specific belief that she was dead; rather that she felt *as though* she were dead. The other three cases all suffered from depression, from feelings of depersonalisation and from feelings of derealisation, and they all voiced the belief that they were dead. The key difference seems to be that while these 3 suffered from feelings of derealisation, JA did not. This seems to fit neatly with Wright *et al.*'s (1993) hypothesis.

This pattern of symptoms raises an interesting question in terms of the notion of a Cotard syndrome. In particular, it raises the possibility that other individuals with the Cotard delusion might show the same symptomatology were they to be investigated using the same (or similar) method adopted here, and by Young and his colleagues. If it emerged that all (or the majority, at least) people with the Cotard delusion demonstrated the specific combination of depression, depersonalisation, feelings of derealisation, and face-recognition impairments, this *would* create a syndrome. This issue will be addressed further in Chapter Eight.

To summarise, the disturbances in familiarity common to all four individuals appear consistent with the view that the face processing impairments seen in people suffering from the Cotard delusion may heighten feelings of unreality and so contribute to the maintenance of that delusion.

Taken together, such findings suggest that the most appropriate agenda for research into the Cotard delusion should involve specifying the roles of contributory factors in the Cotard delusion, rather than an attempt to find a single cause of the delusion. In this regard, the hypothesis that the Cotard delusion (and, as noted in Chapter One, the Capgras delusion) results from an interaction of impairments has much to commend it in terms of explaining why the delusion may arise, and yet, as noted in Chapter One, it seems to fall short of a complete account. In particular, it does not account for why people remain convinced by explanations that seem so patently absurd to everyone around them. Even the MIS findings, while suggestive that the individuals are willing to entertain bizarre hypotheses, do not seem sufficient in this respect. To this end, Chapter Four examines a possible mechanism in the maintenance of the Cotard delusion.

Chapter Four
Attentional bias in the Cotard delusion

Introduction

In Chapter One it was noted that a useful strategy to adopt when conducting research in psychopathology is to look in detail at how particular individuals develop specific delusions. One then can attempt to ascertain whether similar mechanisms are involved in other types of delusion. An example of this type of strategy is the work undertaken by Young and his colleagues in formulating their theory that the Cotard delusion results from an interaction of impairments and extending this theory to account for the Capgras delusion (Young *et al.*, 1992; Young *et al.*, 1993) (see Chapters One and Two). Evidence supporting this position was presented in Chapter Three.

While this theory has much to commend it, however, it still seems to fall short of a complete account. In particular, it does not explain why people remain convinced by explanations that seem so patently absurd to everyone around them. In this respect, there appeared to be a potential parallel between delusions and an aspect of anxiety disorders. Specifically, as noted in Chapters Two and Three, some individuals experiencing the Cotard delusion are preoccupied by their thoughts of their own demise. A question arises here as to whether this delusion-related preoccupation might be a contributory factor in maintaining delusional beliefs. A useful way to examine this seemed to be to investigate attentional bias. A common means of investigating attentional bias in anxiety disorders is the so-called 'emotional' Stroop paradigm. It was decided, therefore to investigate attentional biases in three individuals suffering from the Cotard deluson, using a variation of the Stroop paradigm. Before detailing the study, however, research into attentional biases in psychopathological disorders is outlined.

Attentional bias in psychopathological disorders

Introduction

It is now well-established that people suffering from a wide range of anxiety disorders show attentional biases towards stimuli related to their concerns. So, for example, anxious subjects display an attentional bias towards threat-related stimuli (e.g., Mathews & MacLeod, 1986) and depressed individuals recall more affectively negative words than they do neutral words (Williams, Watts, MacLeod & Mathews, 1988). In an attempt to avoid possibly confounding results stemming from the effect that the presentation of threat-related stimuli may have on anxious subjects, MacLeod, Mathews and Tata (1986) used a visual probe technique, whereby subjects made neutral responses to neutral stimuli. They still found that anxious individuals direct their attention to, but non-anxious controls avert attention from, threat-related stimuli.

The Stroop colour-naming paradigm

A common means of investigating attentional biases is a modified Stroop paradigm (Stroop, 1935), in which subjects are asked to colour-name lists of words. It is almost 60 years since Stroop (1935) published what is now regarded as a "landmark article on attention and interference" (MacLeod, 1991, p.163). It is doubtful whether he then realised the impact that his compound-stimuli task, which yields one of the most robust findings in psychology, was to have, not just on cognitive psychology, but also within the clinical field.

In the standard Stroop paradigm (Stroop, 1935), subjects are required to name the colour in which a word with an incompatible colour-name is printed. Hence, they are presented with, for example, the word *blue* printed in the colour green and instructed to name the colour in which the word is printed, while ignoring the word itself (hence, the correct response to the example would be *green*). When compared to a control task, in which, for example, a row of XXXs is printed in a coloured ink, participants take longer to name the colour in which the

incompatible colour word is printed. This, then, is the basic Stoop interference effect. Interference constitutes the difference in times taken to colour-name the control stimuli (e.g., rows of XXXs or colour patches) and the incongruent-colour words. The latter take longer to name; hence there is *interference* from the to-be-ignored, incongruent stimulus features.

If, however, participants are required to <u>read</u> the word *blue* when it is printed in green there is little decrease in performance relative to naming the colour *green* when it is printed in black (Stroop, 1935). That is to say, there is little interference from the irrelevant colour when the task is simply to read the word. This property is known as asymmetry: the word interferes with the task of naming the colour, but the colour does not interfere nearly as much with the task of reading the word.

There are two main theories of the interference effect found in the Stroop paradigm. The first, which has been cited since the days of pre-Stroop-type effects (see MacLeod & Dunbar, 1988), is the automaticity hypothesis, and the second is the relative speed of processing account (e.g., Dyer, 1973; Morton & Chambers, 1973; see also MacLeod & Dunbar, 1988; MacLeod, 1991).

The automaticity hypothesis (e.g., Posner & Snyder, 1975) holds that a given process is automatic if it is processed rapidly and independent of attention or strategy. Furthermore, a process is either automatic, or it is not, that is to say, there is no in-between (e.g., Posner & Snyder, 1975). It will therefore be referred to here as the strong automaticity account. According to this view, interference may be caused by automatic processes, but not by those requiring attentional control. This view is consistent with Stroop asymmetry whereby reading the wording is regarded as automatic while naming the colour is not considered so.

There have, however, been criticisms of this view, based on the 'dilution' effect (Kahneman & Chajczyk, 1983). If participants are presented with a colour word placed underneath a colour patch, this serves to reduce the impact of the original word. Hence, attention may be split with the addition of another word on

the screen. The result of this is reduced interference to naming the colour patch; that is to say, the interference effect is diluted. This dilution effect does not accord with the notion that reading is an automatic process, since, if a process is automatic, the degree of interference should be unaffected by divided attention.

This finding led Kahneman & Chajczyk (1983) to argue, not for the all-or-none automaticity account, but rather for a modified version, whereby processes are not necessarily *either* automatic *or* not. Following from this, and as a response to the apparent dichotomous reasoning involved in Kahneman and Chajczyk's argument, MacLeod and Dunbar (1988) argue for a 'continuum of automaticity' (CofA). According to this view, processes are not *either* automatic *or* controlled, but rather fall along a continuum of automaticity, with highly automatic processes at one end, and processes having low-degree automaticity at the other.

Rather than viewing automaticity as the crucial factor, the relative speed of processing account proposes that speed is the critical factor in Stroop. The relative speed view holds that colour naming and word reading are carried out in parallel, and interference occurs because reading is the faster process and can interfere with colour-naming (the slower process). A slower process, however, cannot interfere with a faster one. This account is consistent with Stroop asymmetry.

MacLeod and Dunbar (1988), however, criticise the relative speed account on the following grounds: It has been found that the slower process can affect the faster one. Dunbar and MacLeod (1984) found that when they rotated colour words, responses were much slower than for normally-oriented words. Despite this, however, incongruent words continued to interfere with colour naming, and to the same magnitude as with normal words. Clearly, such a finding does not accord with the relative speed account.

Another problem with the relative speed account concerns the predictions made by it. The relative speed view predicts that if the traditionally slower task (colour-naming) is practised until it becomes equally as fast as the initially faster task (word reading), then one would expect each dimension to begin to interfere

with each other to approximately the same degree. Eventually, with increased practice of the initially slower process, one would expect to see the original interference effect reversed, so that the colour in which a word is printed interferes with the reading of the colour-word, but not vice-versa. It is known, however, that when both colour naming and word reading are practised separately, the ratio of response times for the two tasks remains constant (Brown, 1915, cited by MacLeod & Dunbar, 1988). Hence, Brown argued that a theory based on differential practice (which is encompassed in the relative speed theory) was not sufficient. It is worth noting, however, that while this may well transpire to be the case, which is most likely, the evidence presented by Brown is itself insufficient. It is surely not surprising that the ratio of response times for the two tasks remained constant: Individuals practice reading for years, but they do not commonly spend large amounts of time colour-naming. It could be argued that Brown's results simply inform us that a few sessions of practising colour naming (particularly when continuing to practise word reading) cannot overturn the rapidity resulting from a life-time of reading words.

According to the predictions made by the continuum of automaticity approach, interference should be manipulable through practice. Practice in one of the dimensions should result in its becoming more automatic than before practice. Furthermore, there is no reason why the slower dimension cannot interfere with its faster counterpart provided the slower dimension has reached a sufficient degree of automaticity (MacLeod & Dunbar, 1988).

Another aspect of the Stroop task is *facilitation*. Just as incongruent words interfere with the task of colour-naming, so congruent words *facilitate* colour-naming (Dalrymple-Alford & Budayr, 1966, cited by MacLeod & Dunbar, 1988). Facilitation effects are not as frequent as interference effects, the possible reasons for which will be outlined below. The relative speed and continuum of automaticity accounts of the Stroop effect make different predictions both about interference and facilitation effects.

According to the relative speed theory, the faster dimension aids the process of the slower dimension when their words are congruent. Thus, the relative speed view predicts facilitation will only be obtained where there is interference. The continuum of automaticity view predicts that increased automaticity should result in a greater tendency for both interference and facilitation of the other dimension. As with the relative speed view, the continuum view predicts that facilitation can only occur when there is interference. It further argues, however, that a process may need to obtain a higher degree of automaticity in order for it to facilitate than for it to interfere.

MacLeod and Dunbar (1988) put these predictions to the test by constructing compound stimuli which did not impinge on the reading process. They presented subjects with a number of different shapes and gave them each a name which was that of a colour. The subjects were then trained to name the shapes with the colour-names. They found that after a brief period of practice, incongruent colours interfered with shape-naming and congruent colours facilitated it. The shapes, on the other hand, irrespective of congruity, did not affect colour-naming. Increased training resulted in symmetrical interference, but facilitation was seen only in shape-naming (i.e., from congruent colour-names). After yet further training (a total of twenty days), the asymmetry seen at the beginning was completely reversed so that the shapes interfered with colour-naming, but colour did not interfere with shape-naming.

These findings run counter to the strong automaticity account since that claims asymmetry of interference is due simply to word reading being automatic and colour naming not being so. The strong automaticity view cannot explain why, if, as is claimed, colour-naming is *not* an automatic process, it is able to interfere with and facilitate shape-naming.

Turning to the relative speed account, it would predict equal interference in the two tasks, which clearly was not the case since the original asymmetry was reversed. The relative speed argument regarding the standard Stroop test centres on

the notion that word-reading is faster than, and thereby interferes with (and facilitates), colour-naming. MacLeod and Dunbar (1988), however, have shown that, by controlling the amount of practice in a given task, the initially less-practised process can eventually, through practice, become fast enough to *reverse* the original asymmetry. Furthermore, MacLeod and Dunbar did not obtain *any* facilitation effects for colour-naming, which also argues against the relative speed account since that predicts facilitation effects should be equal to interference effects; that is to say, greater interference should lead to greater facilitation.

These data are consistent with MacLeod and Dunbar's (1988) continuum of automaticity account. At the outset, colour-naming was more automatic than was shape-naming but this pattern was eventually reversed. This reversal is readily accommodated by the CofA account, since it assumes not just that some processes are 'more' automatic than are others, but that they may *become* more automatic than others; that is, they may move further up the automaticity scale. It is worth noting that this view incorporates the differential practice hypothesis referred to above as, indeed, does the relative speed view. The difference between the two positions is that while the relative speed view holds that differential practice effects are a function of the speed of processing (which, as we have seen, they cannot be), the continuum of automaticity account holds that they are a function of the automaticity of processing. Furthermore, it appears to indicate that with practice a seemingly 'non-automatic' process can ultimately obtain a high degree of automaticity.

The continuum of automaticity account also accommodates the fact that there were no facilitation effects for colour-naming. As referred to above, the CofA view predicts that facilitation can only occur when there is interference and that a process may need to obtain a higher degree of automaticity in order for it to facilitate than for it to interfere. Dunbar and MacLeod (1984) argue that this reasoning also helps to explain why facilitation effects are far less frequent than interference effects.

Finally, it is worth mentioning a parallel distributed processing (PDP) model (Cohen, Dunbar & McClelland, 1990). Cohen *et al.* propose a PDP account

of the notions underpinning the CofA account. Their PDP model used the type of framework developed by McClelland (1979), and Rumelhart, Hinton and McClelland (1986). Cohen *et al.* (1990) attempted to provide a model which could demonstrate increased automaticity with practice, and provide an account of the relationship between automaticity and selective attention.

In Cohen *et al.*'s (1990) PDP model, the Stroop interference and speed of processing effects are a function of the strength of processing differences. Rather than postulating either speed or automaticity as fundamental in processing, Cohen *et al.* (1990) propose that *strength* is the basic factor. According to this account, automaticity is viewed as a function of each pathway's relative strength. Cohen *et al.* propose a unidirectional, bottom-up, system of interconnected modules, within which are basic processing units. Processing occurs via a spread of activation along connections between and within modules through pathways that have different strengths. Any given task may utilise a pathway that consists of any number of units within any number of modules. The strength of a pathway is contingent upon its group of connections and, in turn, processing speed and processing accuracy are contingent upon pathway selection. The asymmetry between facilitation and interference in Stroop is accounted for by arguing that the processing units are non-linear.

Attentional bias in psychopathological disorders, using the 'emotional' Stroop paradigm

Extending the basic Stroop paradigm, Klein (1964) showed that colour naming tasks are affected by the meaning of the words used. He found that degree of interference was a function of the degree of meaningfulness of the irrelevant word, with more meaningful words causing greater interference. While this effect was far stronger with colour-related words, Klein (1964) also found that interference could be obtained with non-colour words. It is this basic finding that underlies the research into the emotional Stroop. Indeed, Klein borrowed the term

attensive power from Titchener (Klein, 1964) to describe the capacity of a word to produce arousal. He proposed that attensive power is a function of a word's meaningfulness, and suggested that various types of words could be "assessed for their evocative power" (Klein, 1964, p.587), such as familiar and unfamiliar words, well-learned and poorly-learned words and, of particular interest here, affect-laden words.

Since Klein's seminal paper, research adopting the use of affect-laden words in studying the Stroop effect has abounded, and the Stroop effect is now used to examine the processing of affective material in groups of individuals suffering from a variety of emotional and affective disorders, such as depression and anxiety. This paradigm is known as the emotional Stroop.

As referred to above, it is well known that people suffering from psychopathological disorders show attentional bias towards material related to their concerns. In the 'emotional Stroop' paradigm, subjects are asked to name the colours in which words are printed whilst ignoring the meanings of the words themselves. It has been shown that individuals suffering from a variety of anxiety disorders take longer to colour-name affectively salient words than they do affectively non-salient or neutral words (e.g., Mathews & MacLeod, 1985; Williams *et al.*, 1988). For example, Watts, McKenna, Sharrock and Trezise (1986) found that arachnaphobics take longer to colour-name words related to spiders than those either of the standard colour-word Stroop (e.g., the word *red* printed in the colour blue) or of a more generally threatening nature. The effect has also been found for people who had recently attempted suicide (Williams & Broadbent, 1986) and individuals high in trait anxiety (Richards & Millwood, 1989).

Such studies have been interpreted as indicating that anxiety states are associated with a processing bias towards threat-related material arising from the activation of danger schemata (MacLeod & Mathews, 1988).

Attentional bias in anxiety and depression

As referred to earlier, there are a great number of studies that have used the emotional Stroop paradigm in the study of anxiety disorders. However, where it has been most widely used is in the attempt to understand the respective contributions of trait and state anxiety in attentional bias.

Mathews and MacLeod (1985) found that anxious subjects were slower on colour-naming words related to physical threat and social threat, as well as control words, relative to control subjects. More importantly, the anxious subjects were especially slow on the threat-related words. In addition, anxious subjects who expressed worries about their health were slower to colour-name physical words related to their individual concerns (e.g., *cancer, injury*). This effect was not found for social threat-related words. Hence there was some indication that for the physical threat words, the effect was related to conscious cognitive content. In an attempt to ascertain whether the interference effects found were due to the fact that danger-related words were being encoded better by the anxious subjects, Mathews and MacLeod (1985) conducted a recognition memory task for words. They found no difference in recognition memory between anxious and control subjects, nor did they find any interaction with valence or stimulus type. So, while there was some evidence to suggest that the effect for physical threat words may have been due to conscious cognitive content, there was no evidence to suggest that anxious subjects were selectively encoding the content of threat-related words to the degree that this might facilitate recognition memory.

Mathews and MacLeod (1985) argued that these findings support their hypothesis that generalised anxiety states are associated with a processing bias towards threat-related material arising from the activation of danger schemata. They conclude that the degree of interference is a function of the current level of anxiety but that the material that is selectively processed is determined by the individual content of danger schemata. While the fact that anxious subjects were slower to colour-name all words can be explained by current mood state, or state anxiety, this

cannot explain the differences within anxious subjects on physical as opposed to social threat words.

MacLeod and Mathews (1988) noted that the majority of this type of research used healthy individuals as controls, who may differ in both state *and* trait emotion. They therefore set out to attempt to clarify the influence of trait and state anxiety respectively on the attentional response to threat. They tested a group of subjects with high trait anxiety and another group with low trait anxiety three months before an important examination (i.e., when state anxiety is low) and again just one week beforehand (i.e., when state anxiety is relatively high). The high trait group displayed an attentional shift towards material of a generally threatening nature on both occasions. The low trait group displayed no shift in attention at all. With regard to material specifically related to the examination, the high trait group again displayed attentional bias towards the threat-stimuli, but this time the nearer to the examination the greater the degree of attentional bias. The low trait group, however, showed the opposite pattern, with examination proximity being associated with increased avoidance of examination-related threatening material.

These results suggest that attentional bias towards words of a *generally* threatening nature is associated with *trait* anxiety since the pattern of results for the generally threatening material was not affected by the increase in *state anxiety* caused by the nearing of the examination. The results further suggest that the attentional response to *specific*-threat stimuli (i.e., an examination), cannot be attributable solely to trait anxiety. This is indicated by the fact that although increased *state* anxiety led to increases in the attentional patterns of both high- and low-trait subjects, these increases were in opposite directions. It is important to note that these results were obtained *despite* the fact that increases in *state* anxiety from the first test session to the second increased equally for the two groups. The only difference, therefore, was the *effect* this increase had on the attentional patterns of the two groups.

These conclusions led MacLeod and Mathews (1988) to propose that neither trait nor state anxiety on their own could account for the attentional response to material relevant to current stress. Rather, they postulated the existence of an "interactive function" (p.666) involving both state *and* trait anxiety. Hence, the prediction of mood congruency effects may be possible only when trait and state emotions are considered as part of this interactive function.

As with people suffering from anxiety, depressed individuals have been found to display attentional bias towards affectively salient material. Furthermore, they display enhanced recall of material of a negative affect (Williams *et al.*, 1988). Depressed individuals have also been found to make abnormal attributions. In particular, they make attributions for negative events that are internal, global and stable (Brewin, 1988).

There has been some debate, however, as to whether selective attention to threat is associated with depression, as it is with anxiety (see Williams *et al.*'s, 1988, review). Gotlib and McCann (1984) found that depressed students took longer to colour-name words of a depressed content than words of either neutral or manic content, relative to non-depressed subjects. They then attempted to ascertain whether task performance was contingent upon transient mood differences between depressed and non-depressed subjects or upon more stable information processing differences. Adopting a mood manipulation procedure, they found no effects for task performance and therefore concluded that performance on the emotional Stroop task could not be explained solely in terms of transient mood. That is to say, the fact that depressed subjects were slower on depressed words relative both to controls and to neutral or manic-related words, was more likely to be the result of differences in cognitive processing, or construct accessibility, than of differences in affect, or transient mood disturbances, between depressed and non-depressed subjects. They concluded that their results support Beck's (1967, 1976) cognitive model of depression and its postulated operation of negative schemata in depression. Important here is Gotlib and McCann's argument that interference

effects found in depressed subjects for negative material reflect stable cognitive biases or, to use their terminology, stable biases in construct accessibility. Gotlib later replicated these findings with clinically depressed subjects (Gotlib & Cane, 1987).

Support for Gotlib's position came from a study conducted by Williams and Nulty (1986). They obtained more striking results when group allocation was made on the basis of depression levels obtained one year previously than when allocation was made on the basis of current Beck Depression Inventory (BDI) scores. They therefore concurred that depressed subjects' slower performance on negative stimuli reflects stable cognitive biases as opposed to temporary mood states in depressed subjects. However, Williams and Nulty caution that the interference need not be the result of depression itself, but perhaps some other correlate, such as anxiety. They note that Mathews and MacLeod (1986), as referred to earlier, found that anxious subjects display significant interference from threat-related material and, in particular, that those with worries about health displayed greater interference with words related to physical threat (e.g., *cancer*, *injury*, *mutilated*) than for words related to social threat (e.g., *pathetic*, *foolish*, *failure*). Their anxious group differed from their control group not just on trait anxiety, but also on depression. Their partial correlations showed that the greatest proportion of the interference variance was due to state anxiety. Williams and Nulty (1986) argue that this, together with their findings, indicates that both stability and degree of disturbance may depend on an interaction between the type of emotional state (e.g., depression versus anxiety) and the type of words used in the Stroop. However, as Williams and Nulty note, this needs to be shown in an experiment rather than simply inferred from different experiments.

Williams *et al.* (1988) conducted a review of the literature and concluded that attentional bias towards threat-related material is associated with anxiety, but not with depression. Needless to say, this contradicts Gotlib and McCann's (1984) findings. Hill and Knowles (1991) noted two factors about the Gotlib studies.

First, they did not assess anxiety. This is an important point since it has often been found that depression and anxiety may not only exist together, but may alter together; that is, they may also covary (Stravrakaki & Vargo, 1986, cited by Hill & Knowles, 1991). This means that Gotlib and McCann's findings might have been due to anxiety in their depressed subjects and not simply to depression. Second, Gotlib and McCann used adjectives that were descriptive of depressed or manic states. It is not clear that these words should be thought of as threatening. If so, then since Williams *et al.*'s (1988) claim is that selective attention in anxious subjects is towards *threat*, Gotlib and McCann's findings might not be contradictory to Williams *et al.*'s position that attentional bias to threat is not found in depression, only anxiety. It should be noted that the term 'threat', when applied to depressed words are those which are perceived as being threatening to self-esteem (e.g., *failure*), rather than words which are descriptive of depressed mood (i.e., *sad*).

Hill and Knowles (1991) used the following groups of words: Threatening nouns concerned with self esteem and related to depression, generally emotionally negative words, and generally emotionally positive words. The latter two groups of words were included to ensure that any resulting effect would be due to threatening content as opposed to emotionality. In case they found the same interference effect as Gotlib and McCann (1984) they took a measure of anxiety from both depressed and non-depressed individuals to check whether such an effect was due to anxiety as opposed to depression.

Hill and Knowles' results failed to confirm those of Gotlib and McCann; they found no evidence for a differentially larger Stroop effect in depressed subjects for the threat-related words. They argue that the reason for the different results stems from differences in the words used in the two studies. Specifically, Gotlib and McCann used words which could be viewed as being descriptive both of self and current mood state and it was this that caused the effect. If the stimuli used are neither self-referent nor self-descriptive, *including* threat-related words, then a

differential effect will not be found. However, one should obtain slower times on all types of words owing to the depressed mood.

Hill and Knowles conclude that if Gotlib and McCann's (1984) and Gotlib and Cane's (1987) findings are interpreted in terms of selective attention, then the fact that no effect was found for threat-related stimuli in their study concurs with Williams *et al.*'s (1988) proposal that selective attention to threat is associated with anxiety, but not depression.

As we have seen, the interference effects displayed by people suffering from anxiety have been interpreted in a number of different, but conceptually similar ways. For example, Mathews and MacLeod (1985) argue that the effect is due to differences in danger schemata, while Gotlib and colleagues (Gotlib & McCann, 1984; Gotlib & Cane, 1987) view it in terms of emotional construct accessibility. Mathews (1990) notes that the underlying assumption behind such explanations is that the effects are specific to negative or threat-related words which coincide with the current content of individuals' concerns. However, Martin, Williams and Clark (1991) showed that anxious individuals showed an effect both for negative (threatening) *and* positive words compared both to neutral words and normal subjects. Hence, they argue that interference effects are a function of the emotionality of words used, and as such can be obtained with any words that are emotionally salient to the individual concerned, irrespective of valence. Martin *et al.* (1991) argue that previous studies have confounded emotionality and threat-value, since the neutral words differed from the critical words on both factors. That is to say they have both lower emotionality and threat-value.

Mathews and Klug (1993) noted that (at least) some of the words used by Martin *et al.* (1991) appear to describe states that were the direct opposite of the words used to describe anxiety states. There are two explanations possible here: First, it is possible that such positive words may have automatically primed their negative counterparts (Small & Robins, 1988). Second, the positive words are processed by anxious subjects to a degree that leads them to think of the words in

terms of a state in which they would like to be (e.g., carefree) but are not, or may never attain. In both cases, it is possible that anxious individuals actually perceive certain positive words as threatening.

Mathews and Klug (1993) therefore tested people suffering from anxiety and normals using four sets of emotional words: Positive-related, negative-related, positive-unrelated and negative-unrelated. The results showed that neither valence nor general emotionality were important predictors of interference, but that stimuli related to the concerns of the anxious participants did predict interference, irrespective of whether those stimuli were of negative or positive valence. The results appear to support Martin *et al.*'s (1991) claim that positive words can result in equivalent interference as do negative (threatening) words. Mathews and Klug argue that this suggests interference effects have rather more to do with the individual's emotional concerns than simply being due to threat. They suggest that the equivocal results using threatening and positive stimuli to date (e.g., Richards & Millwood, 1989; Martin *et al.*, 1991) may be the result of a lack of attention to the semantic associations of the non-threatening words used. They suggest their results may indicate that where interference has been obtained using positive words, it may have been due to the perceived semantic connections with threat or concerns.

In a recent review, Williams, Mathews and MacLeod (1996) concluded that relatedness to concerns is necessary, but probably not *sufficient* for emotional Stroop interference effects to arise. They go on to suggest that in clinical populations, schema-relevance and negativity of stimuli are the important factors in determining the extent to which bias will be demonstrated.

Attentional bias in delusions

It was noted above that depressed individuals show abnormalities in attributional style (Brewin, 1988) and this is paralleled in deluded individuals. For example, Kaney and Bentall (1989) found that deluded individuals tend to make attributions that are grossly external, global and stable for negative events, and

internal, global and stable for positive events, relative to normals. Such an attributional style may be indicative of abnormal basic information processing.

Similarly, and also referred to earlier, it has been shown that depressed individuals display attentional bias towards material related to their concerns (Brewin, 1988), and that this has been shown many times with the emotional Stroop paradigm (e.g., Gotlib & McCann, 1984; Williams & Broadbent, 1986).

The parallels between depressed and deluded individuals were noted by Bentall and Kaney, who were the first to use the emotional Stroop paradigm with people suffering from delusions (Bentall & Kaney, 1989). They compared depressed individuals with people suffering from delusions of a paranoid content. They found that the latter showed a processing bias towards paranoid-related words.

Bentall and Kaney's study was the first to adopt use of the emotional Stroop paradigm to reveal attentional bias in deluded individuals similar to that found in anxious and depressed individuals. Although the study examined people with persecutory delusions only, it shows that abnormalities in cognitive processing may play a major role in delusions. That is not to argue necessarily for a causal relationship, but rather one whereby an attentional bias towards material related to the delusion leads to preferential encoding of such material and so serves to support and maintain an already-formed delusion. In addition to this is the apparent relationship with depression in terms of attributional style. Both depressed and deluded individuals display abnormal attributional styles, with both making global and stable attributions for negative events. While people with persecutory delusions make external attributions for negative events, however, depressed individuals make internal attributions, thus indicating related, although not identical, forms of cognitive organisation.

Attentional bias in a case of the Cotard delusion

Introduction

Three factors noted above are particularly relevant for the purposes of investigating the Cotard delusion. The first is the suggestion by Mathews and Klug (1993) that interference effects may have more to do with individual concerns than with threat. Second, and in keeping with this, is the finding that people suffering from depression tend to show attentional bias towards material related to their concerns (Brewin, 1988). The third pertinent factor is the suggestion that attentional biases towards delusion-salient material serve to maintain an already-formed delusional belief (Bentall & Kaney, 1989). It has already been noted that the Cotard delusion arises in the context of a depressive disorder. Furthermore, individuals suffering from the Cotard delusion appear to be preoccupied with thoughts of their own death. Given these factors, it seemed reasonable to expect that a person suffering from the Cotard delusion might demonstrate attentional bias towards words related to the theme of death. In order to test this, attentional bias was investigated in JK (described in detail in Chapter Three).

Investigation

A variant of the Stroop task was prepared involving words related to the Cotard delusion (which JK held), words related to the Capgras delusion (which JK had partially expressed), and words related to possible contributory moods of depression, suspiciousness and anxiety. In addition, by repeated testing of JK, it was possible to monitor how changes in her attentional biases related to changes in her delusional beliefs.

Method

Matched sets of 5 words were constructed. Words in the test sets related to themes of death, depression, duplicates, suspiciousness, and anxiety. In addition, two sets of neutral control words were prepared. Words were matched as far as

possible across these sets for length (number of letters) and for frequency (Hofland & Johansson, 1986). The lists are given in Appendix 2.

The rationale for inclusion of each of these sets of words was as follows:

i) <u>Death-related words</u>: The 5 death-related words were used because JK had experienced the delusion of being dead (the Cotard delusion). These words were chosen to represent the generic theme of death, rather than being words used by JK herself. This was in order to match the death-related words with the other word lists, which were also drawn up without regard to whether JK had used such words to describe her delusions.

ii) <u>Depression-related words</u>: A set of 5 words related to a general theme of depression was included, because of the relationship of depression to the Cotard delusion.

iii) <u>Words related to duplicates</u>: A set of 5 words related to duplicates was included, in view of the hypothesised relationship between the Cotard and Capgras delusions. Also, as noted above, JK had partially expressed the Capgras delusion.

iv) <u>Suspiciousness-related words</u>: A set of 5 words related to suspiciousness was used, because of the association of suspiciousness with the Capgras delusion.

v) <u>Anxiety-related words</u>: A set of 5 words related to the general theme of anxiety was included, to investigate whether attentional biases involving generalised anxiety are contributory in delusions.

vi) <u>Neutral words A and B</u>: Two sets of 5 neutral words were prepared, for comparison to the test sets of words on colour-naming times.

Once provisional sets of words had been selected, they were presented to 10 independent raters who were asked to allocate each word to one of these 6 categories (i.e., to the five test groups or a neutral group). Words for which at least 8 of the 10 raters agreed with my own assignment were retained, and others were

discarded and replaced until this criterion was met. The words shown in Appendix 2 are the final agreed sets.

The resulting sets of words were presented on white A4 cards. On each card, fifty words were printed in 12-point lower case Helvetica font, with each of these words appearing in one of five different colours of ink. For any card, all words came from one of the sets (i.e., each of the 5 words in a set was used 10 times on the appropriate card for that set). Each card showed ten rows of five words coloured in blue, green, brown, grey or red. The words and colours were arranged in a pseudo-random order, with each of the 5 words in the set used appearing twice in each of the 5 colours.

JK's task was to name the colour in which each of the 50 words on each card was printed, working from left to right and top to bottom. She was instructed to ignore the meanings of the words and to concentrate on naming the colours as quickly and accurately as possible. JK was also given a practice list before the actual test, consisting of a different set of neutral words, to ensure that she was able to name the colours accurately. The test and neutral lists were then presented in a pseudo-random order, ensuring that JK finished on a neutral list. The time taken to colour-name all the words on each card was measured with a stop-watch.

JK was tested on three separate occasions over a period of two years. These were on the same occasions on which she completed the HAD scale (see Chapter Three). To recap briefly, on Test 1, JK was fully convinced that she was dead, and had high self-rated scores on the HAD scale for both depression and anxiety. By Test 2, she was not longer convinced that she was dead, but believed she may have *been* dead, and although her subjective depression level had dropped to within normal limits, her anxiety score was still raised. It was during this time that JK voiced beliefs that her mother and brother had changed in some way. Finally, by Test 3, JK's delusions had all resolved, and both depression and anxiety scores were normal.

For purposes of comparison, the same variant of the Stroop task was given to 10 healthy controls (6 female and 4 males) who were matched for approximate age (mean age=26.6, sd=3.06; range 20-30). Eight of the subjects were educated to 'O' level standard and two (males, aged 23 and 29) had no formal qualifications.

Results

The measure of interest was the time needed to name the colours of each set of words. Before considering these colour-naming times, however, it is important to look at error rates. Errors can involve either reading a word instead of naming its colour (task switching error) or naming the colour incorrectly (colour-naming error). Task switching errors were very rare; they never involved more than a single word, and were immediately self-corrected. JK did this twice, once on the anxiety word list, and once on her first test with the death-related words. One control subject also switched to reading a word on two occasions; one with the anxiety word list and one with neutral list A. The other type of error involves naming the colour incorrectly. These errors were somewhat more common and are presented in Table 4.1. The Table shows that JK's error rate was in keeping with the control mean for all lists, and confirms that her colour-naming times were not affected by trading speed against accuracy. It should be noted, however, that JK made 3 errors on the Neutral B list in Test 2. This additional neutral list had been presented for the first time to JK in Test 2. Although the list consisted of concrete nouns, it is possible that JK may have interpreted two of these (*watch* and *telephone*) as slightly sinister during this test, since this was the time during which she voiced beliefs that her mother and brother had changed. It is important to note, however, that since these errors were made on a neutral list, any slowing in colour-naming this list would go against the hypothesis, rather than in favour of it. It was therefore included in the subsequent analyses.

Table 4.1: Numbers of errors made by controls and by JK in colour-naming word lists.

| Word List | Controls | | JK | | |
	Mean	SD	Test 1	Test 2	Test 3
Death	0.60	0.84	1		1
Depression	0.30	0.48		1	
Duplicates	0.70	0.67	1		2
Suspicion	0.50	0.71			1
Anxiety	0.60	1.26		1	
Neutral A	0.70	0.95	1		
Neutral B	0.90	0.74		3	

Having established that the data are not contaminated by speed-accuracy trade-offs, colour-naming times were examined in two ways; first by comparing JK's performance to control subjects, and second by comparing her own naming times across test and neutral lists.

First, then, the comparison to controls. Means and standard deviations for the naming times for each list by control subjects are shown in Table 4.2, together with the times taken by JK on each of her three testing sessions. As can been seen from Table 4.2, JK was slower than the controls for all lists. This slowing was clearly evident even with the neutral lists and therefore seemed to reflect a general

Table 4.2: Mean times (in seconds) taken by controls and the times taken by JK to colour-name word lists.

| Word List | Controls | | JK | | |
	Mean	SD	Test 1	Test 2	Test 3
Death	35.60	4.17	79	60	60
Depression	34.90	4.95	65	64	58
Duplicates	32.40	5.34	75	72	65
Suspicion	33.60	4.38	65	56	58
Anxiety	33.30	3.27	55	55	57
Neutral A	35.80	4.37	62	58	54
Neutral B	33.80	4.87	-	62	64

rather than a specific effect of her illness. In fact, generalised slowing of colour-naming times even for neutral lists is commonly observed in psychopathological studies using the emotional Stroop paradigm (Bentall & Kaney, 1989; Kinderman, 1994). More important than JK's overall slowness, however, is that, as Table 4.2 shows, her overall pattern of results across conditions was different. Whereas the controls showed little variation in their colour-naming times of each list (confirming that the lists were well matched), JK's performance was relatively unstable, with markedly long reaction times to some lists in some testing sessions.

Viewing JK's performances in relation to the performance of the controls is not very informative - it simply tells us that her performance was slower and more variable than that of the controls. A more useful strategy seemed to be to undertake a comparison of JK's colour-naming times of the test lists in relation to her own times for the neutral lists. Hence, her colour-naming times for the test lists were assessed by comparing them with her colour-naming times for the neutral lists. This allowed examination of any effects over and above any general slowness or variability in JK's performance.

In order to do this, an index of each test list's interference with colour-naming in each test session was derived by using the mean and standard deviation of JK's responses to the neutral conditions as her own baseline; z-score differences were then calculated between the length of time JK took to colour-name words in the test conditions and that taken in the neutral conditions. These results are shown in Figure 4.1. That is to say, this Figure shows by how many standard deviations JK's colour-naming times for each of the test lists in each session were above or below her naming times for the neutral lists. Since the standard deviation of JK's colour-naming times for the neutral lists must be considered an estimate of the true value, t values were used to test whether JK's colour-naming times for each of the test lists were significantly longer than for the neutral lists. One-tailed probabilities were used because the object of interest was whether JK would be slower to colour-name critical lists than neutral lists.

As shown in Figure 4.1, in the first testing session, JK took longer to colour-name both the death-related word list [$t=4.75$ (df=4), $p<0.01$] and the duplicates word list [$t=3.75$ (df=4), $p<0.01$]. In the second testing session, her response times for the death-related and neutral words did not differ significantly, but she was still reliably slower for the words related to duplicates [$t=3.00$ (df=4), $p<0.05$]. By the third testing session, JK was no longer significantly slower for any of the test lists relative to her neutral baseline. At no time during the course of her illness was JK significantly slower to colour-name the lists of words related to more general themes of depression, suspiciousness or anxiety.

Figure 4.1: z-score differences between JK's times to colour-name words in test and neutral lists.
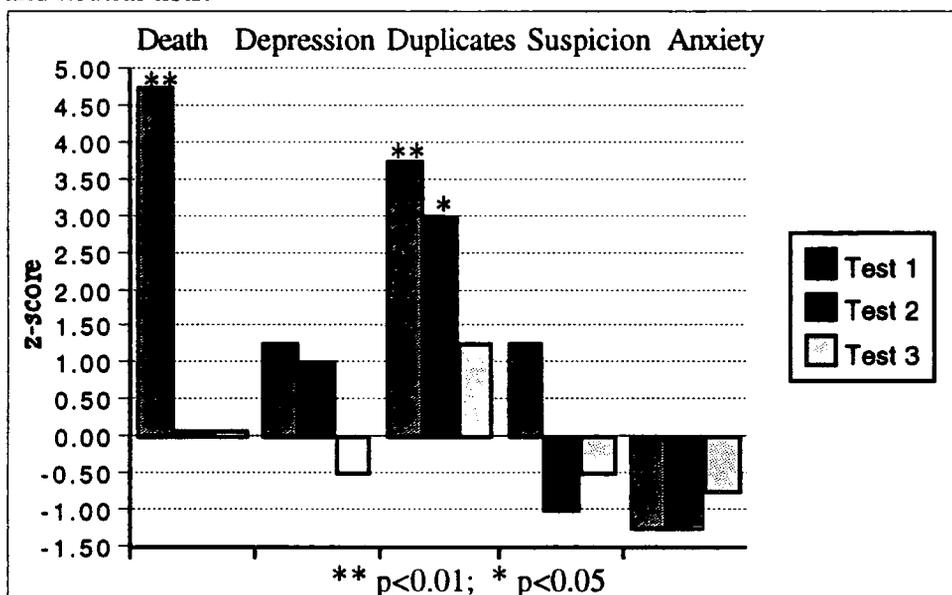
Discussion

The results show a clear and striking relation between JK's delusional beliefs and her colour-naming times for delusion-related words. When fully convinced she had died (in the first testing session), her time to colour-name death-related words was significantly longer than her time to name the colours of neutral

words. When JK was no longer convinced she had died (in the second and third test sessions), her time to colour-name death-related words did not differ significantly from her time to name the colours of neutral words. Similarly, when JK had strange beliefs that members of her family were not who they seemed (in the first and second test sessions), her time to colour-name words relating to the theme of duplicates was longer than her time to name the colours of neutral words, and when her beliefs returned to normal (in the third test session) this difference also disappeared.

These attentional biases were to some extent specific to the content of JK's delusions. In contrast to the striking interference from words that were directly related to her delusions, her slight slowing in the first testing session for words related to general themes of depression and suspiciousness did not reach statistical significance. Similarly, at no point was there any interference from words related to general themes related to anxiety.

The fact that JK showed attentional biases toward words related to death and words related to duplicates appears to be consistent with the postulated relationship between the Cotard and Capgras delusions (Young *et al.*, 1992; Young *et al.*, 1994), and the finding that these attentional biases receded in parallel with the delusions is consistent with findings that attentional biases are significantly reduced when people with anxiety disorders respond to treatment (Watts *et al.*, 1986; Mattia, Heimberg & Hope, 1993).

As noted above, this is not the first time that the Stroop paradigm has been used to examine content-specific attentional biases in delusions. Bentall and Kaney (1989) showed that people suffering from persecutory delusions showed attentional bias on the Stroop task toward words related to morbid suspiciousness (*spy, persecute*, and so on). They pointed out that such findings lend further support to previous studies showing that cognitive abnormalities are implicated in delusions (Kaney & Bentall, 1989; Huq, Garety & Hemsley, 1988). Bentall and Kaney (1989) interpreted their findings as indicating that the attentional bias toward

delusion-salient material shown by people suffering from delusions leads to preferential encoding of such material, which in turn serves to maintain an already-formulated delusion. The results presented above appear to be consistent with this explanation.

Replication of attentional bias in further cases of the Cotard delusion

Introduction

The results presented above relate to a single case of the Cotard delusion. Before any firm conclusions can be made, therefore, it is important to ensure that the results are not peculiar to JK, but extend to other cases of the Cotard delusion. To this end, two other individuals suffering from the Cotard delusion were tested. They are presented separately from JK because, unlike JK, they were tested only once each. The control data reported are those used in the JK study (see p.102).

Investigation

JA and MB, described in Chapter Three, were tested using the same variant of the Stroop paradigm as was used with JK. As noted above, complete sets of data were successfully obtained once only for both JA and MB and so, unlike the JK study, the monitoring of potential changes in bias over time was not possible. No data are presented for RB, also described in Chapter Three, because he was not tested in view of his poor literacy skills.

Method

To enable direct comparison to the JK study, the same sets of 5 test words were presented to both MB and JA. Hence, these related to themes of death, depression, duplicates, suspiciousness and anxiety (see Appendix 3 for the words, and above for the rationale for the use of the words and rating procedure for classification of the words).

In the JK study, only two sets of neutral words were presented. In this replication, in order to obtain a stronger baseline measurement with which to compare the colour-naming times of the test-lists, each test-list was matched according to frequency of use (Hofland & Johansson, 1986) and approximate length with a set of neutral words.

All neutral words were presented to 8 independent raters, together with the test words, in order to establish that the words I had chosen to be neutral were perceived as such by others. The test lists were included so that the raters were not simply presented with the choice of saying whether or not a given word was neutral. Raters had the opportunity of allocating the words to a category named 'Other' if they felt a given word fitted neither the neutral nor test categories. Hence, the raters' task was to assign each word to one of seven categories (death-related, depression-related, duplicates-related, suspiciousness-related, anxiety-related, neutral, or other). All raters agreed with my assignment of the neutral words. These are shown in Appendix 3.

The word lists were presented in the same manner as described above, i.e., in a pseudo-random order. This time, however, each test list had a matched neutral list. The test and neutral lists were therefore also presented in a pseudo-random order, again ensuring that both JA and MB finished on a neutral list.

Results

As with the JK study, the measure of interest was the time taken to colour-name each set of words. Again, however, a brief examination of error rates is warranted. In Table 4.3, the errors made by JA and MB are compared with those made by the same controls tested in the JK study. As can be seen from the Table, the errors made by both JA and MB are in keeping with those made by the controls. Hence, again, there does not appear to be any trade-off of speed against accuracy.

The colour-naming times of JA and MB are presented in Table 4.4. As with JK's colour-naming times, it can be seen that their respective performances over

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<u>Table 4.3</u>: Numbers of errors made by controls and by JA and MB in colour-naming word lists.

Word List	Controls		JA	MB
	Mean	SD		
Death	0.60	0.84		1
Depression	0.30	0.48		
Duplicates	0.70	0.67		
Suspicion	0.50	0.71		
Anxiety	0.60	1.26	2	1
Neutral A	0.70	0.95		
Neutral B	0.90	0.74	1	

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different lists were variable. These data were then examined by comparing their individual naming times across test and neutral lists, as was done with JK's colour-naming times. That is to say, the mean and standard deviation of JA and MB's respective colour-naming times for the neutral lists were used to derive an interference index for both of them. z-scores were then calculated between the length of time each took to colour-name words on each of the test lists and their respective mean colour-naming times for the neutral lists. Although the matched neutral lists yield a firmer estimate of baseline performance, it should still be considered an estimate of the true value of the standard deviation. Therefore, t tests were still used to examine whether the times taken by each individual to colour-name the test lists were significantly longer than for their respective neutral mean scores.

<u>Table 4.4</u>: Times (in seconds) taken by JA and MB to colour-name word lists.

Test List	JA	MB	Neutral List	JA	MB
Death-related	54	64	Death-related	49	46
Depression	52	52	Depression	45	47
Duplicates	41	47	Duplicates	48	53
Suspiciousness	44	46	Suspiciousness	51	43
Anxiety	49	63	Anxiety	44	48

The results for JA are shown in Figure 4.2 and for MB in Figure 4.3. As can be seen, JA took significantly longer to colour-name the death-related words [t=2.13 (df=4), p<0.05]. MB also was significantly slower to colour-name death-related words [t=3.75 (df=4), p<0.01]. In addition, MB was reliably slower to colour-name words pertaining to generalised anxiety [t=3.75 (df=4), p<0.01]. This latter finding is in keeping with the fact that MB was suffering from generalised anxiety. Both individuals, particularly JA, appeared to be slower on words related to the general theme of depression, but neither of these results reached significance [t=2.13 (df=4), p>0.05]. Neither individual was slower to colour-name the words related to duplicates. Indeed, JA was significantly faster to colour-name these words, relative to her neutral baseline [t=2.13 (df=4), p<0.05], for which there is no obvious explanation. Finally, neither JA nor MB showed any slowing on words related to generalised suspiciousness.

Discussion

As with the results found for JK, there is a clear relationship between the delusional beliefs of both JA and MB and their respective colour-naming times for delusion-related words. Both individuals showed attentional bias towards their own delusional beliefs, but not towards words related to the Capgras delusion (i.e., the duplicates words). Unlike JK, however, neither JA nor MB ever voiced Capgras-type ideas about anyone, so one would not expect them to show attentional bias towards these words. In terms of the possible contribution of mood states in attentional biases in delusions, JA showed no bias towards related to the moods of suspiciousness or anxiety. Although she appeared to be slower to colour-name words relating to the general theme of depression, this was not significant. MB, on the other hand, while showing no attentional bias towards word related to depression or suspiciousness, clearly showed it towards words pertaining to the general theme of anxiety. This is consistent with the fact that she was suffering from generalised anxiety.

Figure 4.2: z-score differences between JA's times to colour-name words in test and neutral lists.
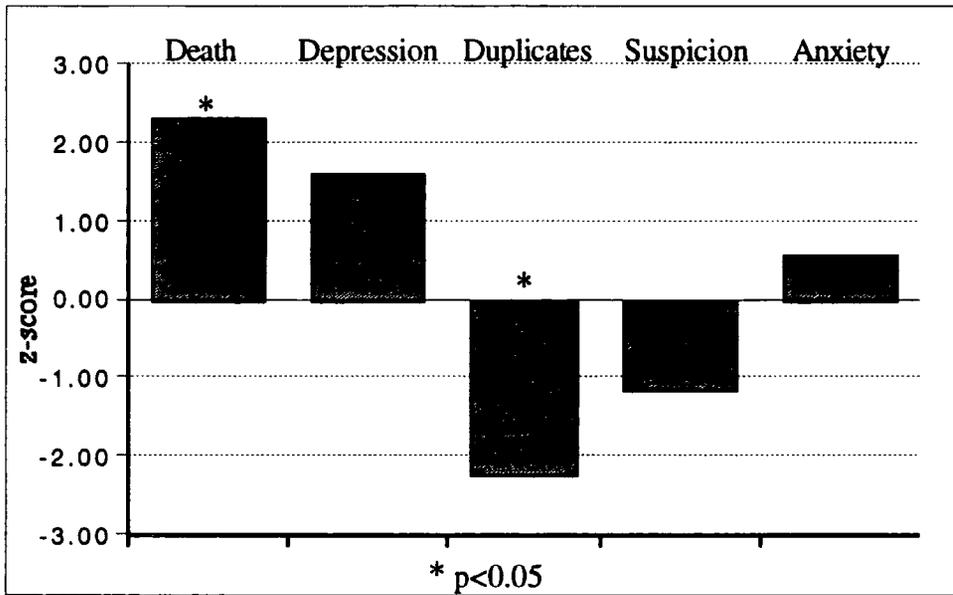
Figure 4.3: z-score differences between MB's times to colour-name words in test and neutral lists.
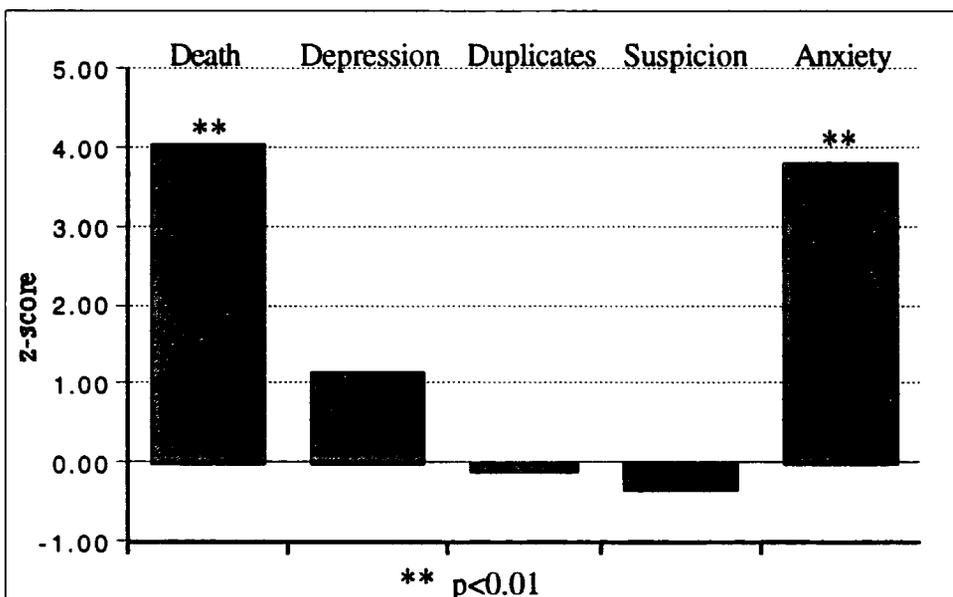
These results confirm that attentional bias in the Cotard delusion is not peculiar to JK, and are consistent with the notion that attentional biases in delusions serve to reinforce delusion beliefs.

Discussion

These findings of attentional biases in the Cotard delusion are consistent with the notion that attentional biases serve to reinforce and maintain delusional beliefs by constantly focusing the person's attention onto any relevant information. However, as shall be discussed below, an alternative explanation might be that attnetional biases in delusions are epiphenomenal.

All three individuals showed interference effects only for words related to their delusional beliefs and, in the case of MB who was suffering from anxiety, for words related to generalised anxiety. By testing JK over time, it has been demonstrated that her attentional bias was only displayed during the time in which she suffered from her delusional beliefs. In other words, her attentional bias resolved in parallel with her delusional beliefs. This is in keeping with the suggestion made earlier that people appear to be preoccupied with their delusional beliefs.

These findings raise the issue of specificity in attentional biases. Martin *et al.*, (1991) have claimed that the principal cognitive impairment in anxiety disorders may be "the presence of a set of beliefs which leads individuals to perceive erroneously certain predominantly non-threatening stimuli as threatening" (Martin *et al.*, 1991, p.158). They argue that people suffering from anxiety disorders should thus show selective processing for stimuli that are salient to their specific beliefs, but not for stimuli that are representative of general threat. It was noted above that it might be argued that attentional biases are epiphenomenal. If this were the case, it would appear to be inconsistent with Martin *et al.'s* point concerning beliefs and the perception of non-threatening material as threatening. Furthermore, it would appear to be inconsistent with the interpretation of many studies of attentional bias

in depression. For example, as noted earlier, Gotlib and McCann (1984) concluded that the fact that depressed patients were slower to colour-name depressed words was more likely to be attributable to differences in cognitive processing than differences in mood between depressed and non-depressed subjects. Furthermore, they note that this formulation is consistent with Beck's (1967,1976) cognitive model of depression, and the operation of negative schemata in depression. Given this, it seems to make little parsimonious sense to postulate a function (in terms of selective processing of salient material) for attentional bias in some forms of psychopathology, but argue that it is epiphenomenal to other forms. Hence, the fact the all three individuals showed selective processing in the current study has been taken as support for Bentall and Kaney's (1989) suggestion that attentional bias in delusions serves the function of maintaining delusional beliefs.

A questions arises, however, as to whether attentional bias in delusions is a function of *preoccupation* with delusional belief or of *anxiety* induced by the words themselves. Hence, it might be argued that words related to death are viewed as threatening by people suffering from the Cotard delusion. Similarly, attentional bias towards words related to duplicates (as shown by JK) may be due to the fact that people suffering from the Capgras delusion view such words as threatening. An alternative argument, proposed by Mathews and Klug (1993) and noted earlier is that attentional biases are due to individuals' emotional concerns. This suggestion is not inconsistent with notion that attentional biases in delusions are a function of preoccupation, although a problem then arises as to the relationship between emotionality and preoccupation.

The relationship between attentional bias and preoccupation is precisely that held to exist between attentional bias and anxiety. Hence, it is suggested that attentional bias is a function of anxiety, so that a state of anxiety leads an individual to focus their attention onto material which is salient to the content or theme of that anxiety. The explanation offered in this thesis is that it is not anxiety *per se* which leads to the focusing of attention onto salient material; rather, the act of being

preoccupied with the ones concerns and interests leads one to focus one's attention onto material which is salient with those concerns.

In Chapter Five, the role of threat and anxiety is investigated by looking at attentional bias in a grandiose delusion, and in Chapter Seven, evidence from healthy subjects is presented which suggests that attentional bias may be a function of individual concerns rather than of threat or anxiety *per se*. Hence, whereas in the anxiety literature it is suggested that attentional bias is a function of anxiety, so that a state of anxiety leads an individual to focus their attention on material which is salient to the content or theme or their anxiety.

Chapter Five
Attentional bias in a grandiose delusion

Introduction

In Chapter One, it was proposed that a useful method of conducting psychopathological research was to examine a specific phenomenon in detail and then investigate whether any resulting explanation can account for other types of phenomenon. In Chapter Four it was shown that attentional bias towards delusion-salient material may be a mechanism for maintaining delusional beliefs. A question now arises as to whether attentional bias can be demonstrated in other types of delusional belief. In this Chapter, therefore, attentional bias towards delusion-salient material is investigated in an individual (SD) who held the grandiose delusional belief that he was both a rock star and Russian chess grandmaster. The reason for investigating this particular gentleman was that while he held delusional beliefs, he was neither depressed nor anxious. His delusional system and mood state therefore stood in marked contrast to the negativistic delusions and depressed moods of the three cases investigated in Chapter Four.

It was noted in Chapter Four that the attentional biases shown by the three individuals suffering from the Cotard delusion might be potentially interpreted in two ways. First, such biases may be due to anxiety and, second, they may be a function of preoccupation with delusional beliefs. If attentional bias can be demonstrated in someone with a grandiose delusional belief, it may help to separate the possible contributions of attention to delusion-related material due to preoccupation with such material from biases due to anxiety over its contents. The rationale behind this is that one would not be expected to be particularly *anxious* about a grandiose belief, yet it could still be very preoccupying.

Investigation

Case description

SD (Baddeley, Thornton, Chua & McKenna, 1996) is a 31 year old man of above average intelligence and with a ten year history of schizophrenia. At the age of 23, after a two year period of lethargy and moodiness, SD began to believe that he was going to be tortured sexually and castrated. He was admitted to hospital three times over the following two years, but recovered after treatment. He then attended college for a time, but was unable to keep up with the course. Soon after leaving college, SD began again to suffer from delusions. He also displayed a number of negative features, including lack of volition. His recovery was slow, but eventually he improved sufficiently well to move into a hostel for people with psychiatric illnesses. He has remained there now for nearly four years. He now holds two concurrent delusional beliefs: he believes he is a guitar-playing rock star as well as a Russian chess grandmaster.

SD does not play the guitar and, although he is good at chess, he is not of grandmaster class, and neither does he have any connections with Russia or speak the language. When confronted with these clear inconsistencies, SD says he believes that doctors have somehow removed his memories of his guitar and chess playing, possibly through hypnosis. Hence, he believes that although he does speak Russian, he has been hypnotised to forget that he can do so. SD further claims to have flashback-type memories of his life as a rock star chess player. In all other ways he appears normal and can talk about his symptoms in a coherent and seemingly logical fashion.

Formal testing revealed superior verbal skills, and normal face-processing skills. SD scored 50/50 on the Warrington RMT for words, and 49/50 for faces. HAD scores confirmed that he was not suffering from anxiety (7/21), but that his depression score of 12/21 was slightly raised (10 being the cut-off score for clinically significant depression). SD showed no other signs of depression and had not reported feeling depressed.

Method

To enable direct comparison to the study presented in Chapter Four, the same sets of 5 words were presented to SD as had been given to the three individuals suffering from the Cotard delusion. These related, therefore, to the themes of death, depression, duplicates, suspiciousness and anxiety. The full list of words used is shown in Appendix 4. The rationale for use of each of these sets of words, and the predictions made as to SD's performance on each of the sets was as follows:

i) Death-related words: The same set of 5 death-related words was selected because if, as argued in Chapter Four, attentional bias in delusions is specific to the content of those delusions, someone who is not suffering from the Cotard delusion (or any form of nihilistic delusion) should not show attentional bias towards death-related words (unless, perhaps, one has recently suffered a bereavement, which SD had not).

ii) Depression-related words: Again, the same set of 5 words related to the general theme of depression was included to enable direct comparison with the 3 individuals suffering from the Cotard delusion, and to establish that attentional bias in delusions is not due to generalised depression.

iii) Words related to duplicates: The same set of 5 words related to duplicates was included, as with the death-related words, in order to test the claim the attentional bias in delusions is specific to the delusional belief. SD should not, therefore, show attentional bias to words related to duplicates, because he did not voice any Capgras-type beliefs.

iv) Suspiciousness-related words: The same set of 5 words was included to enable comparison with the 3 cases in Chapter Four. SD showed no signs of suspiciousness and it was therefore predicted that he would not show attentional bias towards words related to suspiciousness.

v) <u>Anxiety-related words</u>: A set of 5 words related to the general theme of anxiety was included, to investigate whether attentional bias toward generalised anxiety plays a contributory role in delusions. If, as suggested in Chapter Four, it does not, then SD should not show attentional bias towards words related to generalised anxiety.

The five test lists had all been rated for the previous study, as described in Chapter Four. As with the study of attentional bias in JA and MB, each test-list was matched according to approximate length (i.e., number of letters) and frequency of use (Hofland & Johansson, 1986), with a set of neutral words. Again, this was in order to obtain a stronger baseline measurement with which to compare the colour-naming times of the test-lists. Again, these neutral words had been rated independently for their neutrality for the study described in Chapter Four.

In addition to these five test sets and their matched neutral lists, SD was presented with a set of five words pertaining to his delusional beliefs that he was both a rock star and a Russian chess grandmaster. These words were drawn up by agreement between SD's consultant psychiatrist and the author as being salient to SD's delusional beliefs. They were also matched with a set of neutral words, the neutrality of which was agreed by 7/7 independent raters using the same rating procedure as for the other neutral words (see Appendix 4 for word lists).

As with the study detailed in Chapter Four, each word list was presented on a white A4 card and printed in 12-point lower case Helvetica font. Each word appeared in one of five different colours of ink (green, grey, blue, brown, red). Again, there was one card for each set of words (i.e., one card containing all the death-related words, one containing all the depression-related words, and so on) and each of the 5 words for a given set appeared 10 times on its respective card. The words and colours were presented in a pseudo-random order, with each of the 5 words in the set appearing twice in each of the 5 colours.

SD was instructed to name the colour in which each of the 50 words on each card was printed. He named these from left to right and from top to bottom. He was asked to name the colours as quickly and accurately as possible and to ignore the meaning of the words. Before the start of the test, SD was given a practice list using a novel set of neutral words to ensure he was able to name the colours accurately and to enable him to become familiar the requirements of the task. The test and neutral lists were then presented in a pseudo-random order, ensuring that SD finished on a neutral list. A stop-watch was used to measure the times taken to colour-name all the words on each card, and errors were noted.

Results

As in the previous two studies of attentional bias in the Cotard delusion (Chapter Four), the principal interest was the length of time taken to colour-name each of the word-lists, and a second measure of interest was errors. SD made only two colour-naming errors (one on a neutral list the other on the death-related words), both of which he corrected immediately, and at no point did he switch to reading the word instead of naming the colour. Since errors were so low, and in keeping with those of the controls reported in Chapter Four, in the previous study, they shall not be examined further.

It was established in Chapter Four that comparing the colour-naming times of people suffering from delusions with those of controls does not allow us to examine effects over and above any general slowing or variability in individuals' own performances across the different list. In this study, therefore, no such comparison was made and SD's colour-naming times for each of the word lists are simply presented in Table 5.1. As with the colour-naming times of the cases reported in Chapter Four, SD's colour-naming times were variable.

SD's colour-naming times for the test lists were then examined in relation to his own colour-naming times for neutral lists. As explained in Chapter Four, this involved comparing SD's colour-naming times for the test lists to his colour-

Table 5.1: Mean times (seconds) taken by SD to colour-name word lists.

Test List	SD	Neutral List	SD
Grandeur	56	Grandeur	41
Death-related	33	Death-related	36
Depression	40	Depression	42
Duplicates	34	Duplicates	30
Suspiciousness	45	Suspiciousness	42
Anxiety	41	Anxiety	44

naming times for the neutral lists. The mean and standard deviation of SD's colour-naming times for the neutral lists were taken in order to derive an interference index of his performance. z-score differences were then calculated between the time SD took to colour-name words on each of the test lists and his mean colour-naming times for the neutral lists. Hence, the number of standard deviations that his colour-naming times for each of the test lists were above of below his colour-naming times for the neutral lists were calculated. As in Chapter Four, t-values were used to test whether the times taken by SD to colour-name each of the test lists were significantly longer than for his neutral mean score.

The results for SD are shown in Figure 5.1. Parenthetically, it is interesting to note that SD is slow in relation to the control data reported in Chapter 4 (see p.103). As can be seen from the Figure, SD was significantly slower to colour-name words related to his delusions [t=2.78 (df=4), p<0.03]. He was not slower to colour-name either of the other two sets of delusion-related words (i.e., the death- and duplicates-related words), nor was he significantly faster on them. Finally, he was not significantly slower on words related to more general themes of depression, suspiciousness or anxiety.

Figure 5.1: z-score differences between SD's times to colour-name words in test and neutral lists.

Death Depression Duplicates Suspicion Anxiety Grandeur

z-score axis: 3.20, 2.80, 2.40, 2.00, 1.60, 1.20, 0.80, 0.40, 0.00, -0.40, -0.80, -1.20

* p<0.025
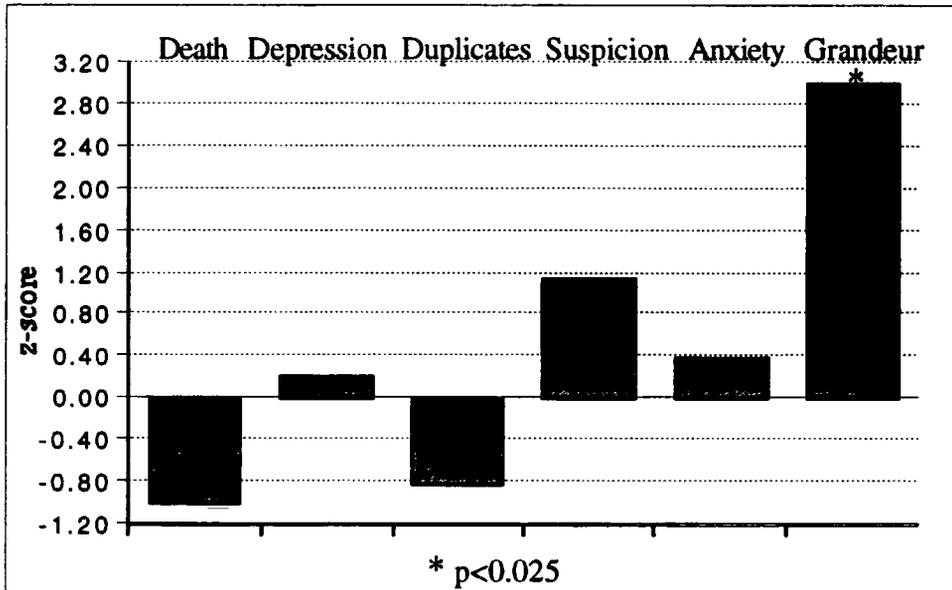
Discussion

The results show a clear relationship between SD's delusional beliefs and his colour-naming time for delusion-related words. He showed attentional bias (as reflected in slowed response times) towards words related to his own delusional belief but not towards words related to delusional beliefs held by other people. Hence, SD showed attentional bias towards words related to his own grandiose delusions, but not towards those related to other people's delusions concerning death (i.e., to the Cotard delusion) or duplicates (i.e., to the Capgras delusion).

In terms of the possible contribution of mood states in attentional biases in delusions, SD showed no bias towards words relating to depression, suspiciousness or generalised anxiety. These results are consistent with those of JK and JA (see Chapter Four). They contrast, however, with the results of MB, who *was* suffering from anxiety (and had a long history of anxiety disorder) and who *did* show attentional bias towards words related to generalised anxiety.

The specificity of attentional bias shown by SD towards his delusional beliefs is in keeping with the results presented in Chapter Four. Taken together with those results, these data strongly suggest that attentional biases are specific to the contents of delusional beliefs, and are consistent with Bentall and Kaney's (1989) hypothesis that such biases act as a reinforcement mechanism in maintaining delusional beliefs.

The principal impetus for the present study was an attempt to separate the possible contributions in attentional bias of preoccupation with delusional beliefs and anxiety over the contents of words used. The fact that SD did not suffer from anxiety - either generalised or specific to his grandiose delusional beliefs - is inconsistent with an explanation of attentional biases in delusions in terms of anxiety. His results are, however, consistent with the notion that attentional biases in delusions are a function of preoccupation with delusional beliefs. In turn, such an explanation is in keeping with Mathews and Klug's (1993) claim that attentional biases are due to individuals' concerns. Furthermore, an explanation of attentional bias in terms of preoccupation with delusional beliefs is able to account not only for the findings presented in this chapter and in Chapter Four, but also those of previous studies of attentional biases in delusions (e.g., Bentall & Kaney, 1989; Kinderman, 1994).

Underlying this line of reasoning is the idea that believing one is a rock star chess grandmaster is not as anxiety-provoking as, say, thinking that one is dead. However, it could still be argued that the attentional bias shown by SD toward his delusion-related stimuli might nevertheless be related indirectly to anxiety. Such an argument would be based on the suggestion that grandiose delusions represent attempts by people to enhance low self esteem (Roberts, 1992). Hence, words relating to grandiose delusions could at some level be perceived as threatening.

It is also possible to argue in regard to grandiose delusions, as in anxiety disorders, for an emotionality hypothesis (Martin *et al.*, 1991) because the grandiose words may be viewed as provoking an emotional response in the

individual insofar as they represent a state of being to which the person will never aspire, and it is this emotionality that underlies the resulting attentional bias. However, the simpler preoccupation hypothesis is better able to account for the fact that people remain so convinced by their false beliefs. Of course, it has to be recognised that preoccupation and emotionality may be difficult constructs to disentangle, but the results here suggest that attentional biases do not arise from anxiety in any direct way.

It is important to note that attentional bias is not in itself a pathological construct. It is a mechanism we all have - we attend to the sorts of things that are salient or of interest to us. What appears to happen in the case of people who are suffering from delusions is that their attentional bias becomes exaggerated; the bias itself serves to accumulate evidence that will reinforce a delusional belief, and this process spirals out of control. This strengthens the person's belief in the delusion, making it almost a self-fulfilling prophecy. Moreover, the constant accumulation of subjectively pertinent positive evidence following from biased attention will make it much more difficult for the individual to break free from this cycle.

To summarise, the suggestion made here is that attentional bias is a function, not of anxiety and nor of threat or emotionality *per se*, but of preoccupation with delusional beliefs. To this end, Bentall and Kaney's (1989) hypothesis may be extended to argue that preoccupation with delusional beliefs results in the preferential encoding of delusion-salient material and this in turn serves to maintain such beliefs. This theory requires a more rigorous test, however, since a question of replicability still arises; thus far, attentional biases have been demonstrated in three people suffering from the Cotard delusion and in one person with grandiose delusions. A further test, is required to establish whether attentional biases will be found, not only in single investigations, but in a group study.

Chapter Six
Attentional bias in schizophrenic delusions

Introduction

As noted in Chapter Five, if attentional biases serve to maintain delusional beliefs, it should be possible to demonstrate this with other types of delusion. Such bias has been demonstrated thus far in three cases of the Cotard delusion and in an individual with a grandiose delusion. In addition, Bentall and Kaney (1989) demonstrated attentional bias in a group of people suffering from persecutory delusions.

Two points of interest arise from these findings. First, will attentional bias be found in groups of people suffering from other types of delusions? All these delusions in which attentional bias has been found thus far have a common element; they are all relatively stable and focused. A second point of interest, therefore, is whether attentional biases will be demonstrable in a group of people suffering from delusions of more complex character; i.e., where each person not only has a different delusional belief from the other people, but may have several apparently unconnected delusions, and where the delusional beliefs need not be maintained consistently across time. One group of people in which these questions can be addressed is those suffering from acute phases of chronic schizophrenia.

Investigation
Method

The subjects were 8 in- and out-patients suffering from an acute exacerbation of chronic schizophrenia, and diagnosed according to DSM-III-R as suffering from chronic schizophrenia. As Table 6.1 shows, 2 people (S1 and S3) showed no formal thought disorder and neither were they suffering from hallucinations; S2 was suffering from thought disorder; S4 suffered both from formal thought disorder and hallucinations; and S5-8 suffered from hallucinations

only. All patients were tested once during a 48-hour drug-free period prior to commencing a drug-trial.

<u>Table 6.1:</u> Presence of thought disorder and/or hallucinations.

Symptom	S1	S2	S3	S4	S5	S6	S7	S8
Thought disorder		√		√				
Hallucination				√	√	√	√	√

A variant of the Stroop task was prepared which included the 2 mood-related words lists shown previously (i.e., anxiety-related and depression-related words). In addition, lists of words related to each patient's own personal delusions were compiled. The full lists of words used for each participant are shown in Appendix 5. The rationale for use of each of these sets of words was as follows:

i) <u>Personal delusion words:</u> Each participant was presented with a tailor-made test list, comprising 5 words that were pertinent to his or her own delusional beliefs. The words were those which had been used by the individual when discussing his or her delusions at initial interview.

ii) <u>Other delusion words:</u> Each person was presented with a set of 5 words relating to another patient's delusions. Wherever possible, the list presented was simply the list prepared for the previously tested patient's delusional beliefs. Where this was not possible (owing usually to the fact that a word in the previously tested patient's list had some meaning for the present individual), they were given a list prepared for those initially included in the study, but who were either colour-blind or who could not complete the study or refused to do so on the day of testing. The reason for testing people using lists of words related to other people's delusional beliefs was to ascertain whether the specificity of attentional bias seen in Chapter Four would be demonstrated by people suffering from schizophrenic delusions. The first participant to take part

in the study was given the list of words related to duplicates, presented in the studies described in Chapters Four and Five.

iii) <u>Depression-related words:</u> A set of 5 words related to the theme of depression was presented to investigate the possible role of depression in any resulting biases shown by people suffering from schizophrenia. The list had one change from that used in Chapters Four and Five; the word *failure* was replaced with the word *miserable* because the consultant psychiatrist and I felt that the word *failure* may hold rather specific connotations for many people suffering from schizophrenia and hence would not reflect properly the notion of generalised depression.

iv) <u>Anxiety-related words:</u> Each person was presented with the same set of 5 words related to the theme of anxiety as was used in the studies described in Chapters Four and Five. As with those studies, this was to ascertain whether generalised anxiety plays a role in attentional bias in delusions.

The set of words related to anxiety had been rated for the previous studies and so was not rated again. Although there was one change to the depression-related words, it was felt that few would argue the word *miserable* did not relate to depression and so the list was not rated again. Words for inclusion in each personal delusion list were drawn up with agreement by the responsible psychiatrist and the author as being salient to each patient's delusional beliefs. As in the studies of attentional biases described in the two preceding Chapters, each test list was matched according to approximate length (number of letters) and frequency of use (Hofland & Johansson, 1986), with a set of neutral words. Again, this was in order to obtain a stronger baseline measurement with which to compare the times taken to colour-name the test-lists. In the previous studies, all neutral words were rated as such by independent raters. In the present study, this was not feasible for two reasons. The first was the time factor; patients had to be tested within 48 hours

of being admitted to the study and there was not time to gain the agreement of 10 independent raters as to the neutrality of the words. Second, and more fundamentally, words deemed to be neutral by independent raters may not have been deemed neutral by the patients or by their psychiatrist. Thus, the neutral words were drawn up by the responsible psychiatrist and the author as being not just neutral to ourselves, but neutral to each person concerned.

Finally, everyone was given the HAD scale (Zigmond & Snaith, 1983) on the same day they performed the Stroop task.

Results

Errors

As noted in the two preceding chapters, there are two types of error. The first involves naming a colour incorrectly (i.e., a colour-naming error), and the second involves reading the word instead of naming the colour in which it is printed (i.e., a task-switching error). The colour-naming errors are shown in Table 6.2a and the task-switching errors in Table 6.2b. The colour-naming errors were low, and in keeping with those made by the controls reported in Chapter Four (see Chapter Four, p.17).

Colour-naming times

The means and standard deviations of colour-naming times for both test and neutral word lists are shown in Table 6.3, together with the mean differences in colour-naming times between each test list and its matched neutral list. As the Table shows, the mean colour-naming time for words related to individuals' own personal delusions is far longer (25 seconds) than that for their matched neutral word lists. However, it can also be seen that the standard deviation for the personal delusion words is also far higher than that for its matched neutral lists; this was due to one individual (S2) taking 240 seconds to colour-name words related to his delusion. Turning to the words related to other people's delusional beliefs, the

mean colour-naming time for the test lists is some 5½ seconds *faster* than for the matched neutral lists. The colour-naming times for both the depressed and anxiety test lists are rather longer than for their matched neutral lists. Although the standard deviation for the depressed neutral words is rather lower than for all other lists, the remaining standard deviations are more in keeping with those for the other word lists, save the personal delusion list.

Table 6.2a: Colour-naming errors made by the schizophrenia group (n=8).

Word lists Test Lists	S1	S2	S3	S4	S5	S6	S7	S8	Mean	Sd
Personal		1							0.13	0.35
Other		1		1					0.25	0.46
Depressed				1					0.13	0.35
Anxiety		1	1						0.25	0.46
Neutral Lists										
Neutral Personal										
Neutral Other					1				0.13	0.35
Neutral Depressed			1					1	0.25	0.46
Neutral Anxiety			1	3					0.50	1.07

Table 6.2b: Task-switching errors made by the schizophrenia group (n=8).

Word lists Test Lists	S1	S2	S3	S4	S5	S6	S7	S8	Mean	Sd
Personal				2					0.25	0.71
Other		1							0.13	0.35
Depressed			3						0.38	1.06
Anxiety				1					0.13	0.35
Neutral Lists									-	-
Neutral Personal									-	-
Neutral Other			1						0.13	0.35
Neutral Depressed									-	-
Neutral Anxiety									-	-

Table 6.3: Means and standard deviations for colour-naming times in test and neutral word lists.

Word List	Mean (secs)	Sd
Personal Delusion	70.75	69.50
Neutral Personal	45.75	15.13
Difference	25.00	
Other Delusion	48.88	14.81
Neutral Other	54.50	18.28
Difference	-5.62	
Depression	50.88	15.34
Neutral Depression	43.75	9.59
Difference	7.13	
Anxiety	56.00	18.51
Neutral Anxiety	50.25	18.47
Difference	5.75	

A two-factor analysis of variance (ANOVA) with repeated measures was calculated; in addition to revealing any main effect of list type (i.e., test or neutral list) or word list (i.e., personal delusion, other delusion, and so on), the ANOVA would reveal any significant interaction between the two factors. The ANOVA showed no main effect of list type [$F(1,7)=2.34$, $p>0.05$] or of word list [$F(3,21)=.59$, $p>0.05$], and neither was there an interaction between the two [$F(3,21)=1.44$, $p>0.05$].

It was noted above that the standard deviation for the naming times on the words related to personal delusions was extremely high, owing to S2 taking a particularly long time to colour-name his delusion-related list. One person taking a far longer time to colour-name words related to his delusion than that taken by other people take to colour-name theirs is not, of course, grounds for excluding him from the analyses. However, it is interesting to note that with S2 removed from the analyses, the ANOVA became significant for list type [$F(1,6)=20.62$, $p<0.005$], but not for word list [$F(3,18)=1.03$, $p>0.05$], and the interaction failed to reach significance [$F(3,18)=2.98$, $p>0.05$]. Planned *t*-tests with alpha correction to avoid inflated Type 1 error rates were calculated between test and neutral lists. For

each individual comparison, alpha was set at 0.005. None of the tests were significant (see Appendix 6 for the individual results).

Hospital Anxiety and Depression (HAD) scores

As noted above, everyone was given the HAD scale. Individual scores are shown in Table 6.4, together with the means and standard deviations. As the Table shows, the mean score for anxiety was 9.00, which is borderline (the cut-off score being 10), and the mean score for depression was 5.38, which is within normal limits. However, it is clear from the Table that subject 1 was significantly anxious, and that all the other subjects had a score of 6 or higher. With regard to the depression scores, again, one individual (S5) scored significantly higher than the others, and three had scores of six or more. The remaining four subjects had very low levels of depression.

Table 6.4: HAD scores for the schizophrenia group.

HAD Scale	S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	Mean	S d
Anxiety	17	6	10	8	9	7	7	8	9.00	3.46
Depression	8	7	2	2	16	1	1	6	5.38	5.13

Correlational analyses of HAD scores and colour-naming interference indices

Pearson's r correlations (see Appendix 7) revealed that neither anxiety nor depression correlated with the interference indices of any of the Stroop lists [r=.71 (df=2), p>0.05].

Discussion

The two-factor ANOVA failed to reveal a significant effect of list type or word list, and nor did it show any interaction. With S2 excluded from the analyses (and the standard deviation correspondingly reduced), there was a significant effect of list type, but planned comparisons revealed there to be no significant differences between any of the test lists and their paired neutral lists.

It is clear, therefore, that a group study examining Stroop interference in a group of people suffering from the same disorder (i.e., an acute exacerbation of chronic schizophrenia) but holding different delusional beliefs, failed to demonstrate consistent attentional bias. Although the colour-naming times for words related to personal delusions were longer than for matched neutrals on average (with the inclusion of S2), the individual times varied markedly; indeed the variation was greater than that observed when comparing naming times across word lists between the three cases of the Cotard delusion and the controls shown in Chapter Four. Some of the individuals suffering from schizophrenia did, therefore, show an interference effect for personal delusion words, but others equally clearly did not. An interesting point to note in this regard is the different approach adopted by individuals during testing. Some of the participants became quite distressed when colour-naming words related to their own delusional beliefs, while others made comments, or even laughed. Some visibly slowed, and two stopped briefly when colour-naming words related to their own delusions; others, however, noticeably quickened. Interestingly, five of the group commented afterwards that, while they could see a pattern, or theme, to the words related to their own delusions and to those related to depression and anxiety, they were unable to find the theme in regard to the neutral words.

A question arises concerning the heterogeneity of the group - and, indeed of schizophrenia in general. There has been much debate concerning the utility of the term schizophrenia, with some authors (e.g., Bentall *et al.*, 1988a, 1988b; Bentall, 1990) arguing against the entire concept that schizophrenia represents a distinct

disease. Liddle and his colleagues (Liddle, 1987; Liddle, Barnes, Morris & Haque, 1989; Liddle & Barnes, 1990) have argued that although schizophrenia is clinically heterogeneous, three syndromes may be identified in chronic schizophrenia; psychomotor poverty, disorganisation and reality distortion. The disorganisation syndrome includes thought disorder, while reality distortion includes delusions and hallucinations. Two individuals in the present study suffered from thought disorder, while five suffered from hallucinations. Of course, all participants were suffering from delusions, but the fact that two of them were suffering from thought disorder underlies the fact that people classified as suffering from one syndrome (e.g., reality distortion) often display symptoms classifiable in terms of another syndrome (e.g., disorganisation). The heterogeneity of the schizophrenic group in the present study must therefore be acknowledged.

As noted in Chapter Four, attentional biases using the Stroop paradigm have been found in groups of people suffering from anxiety (e.g., Mathews & MacLeod, 1986), depression (e.g., Williams *et al.*, 1988), and phobias (e.g., Watts *et al.*, 1986), as well as in individuals who had recently attempted suicide (Williams & Broadbent, 1986). Furthermore, Bentall and Kaney (1989) were the first to demonstrate attentional biases towards paranoid-related words in a group of people suffering from paranoid delusions. All groups in these studies were tightly-defined. It seems plausible to conclude, therefore, that the reason attentional biases were not demonstrated in the present study was due to the heterogeneity of the schizophrenic group.

Related to the question of heterogeneity is the issue of fixity of delusional belief. Bentall and Kaney's (1989) group all had fixed paranoid delusions with a definite theme, as did the individuals described in Chapters Four and Five. The delusional beliefs in the present schizophrenic group did not all have such strong themes and it is possible, therefore, that some of the delusions were not so fixed or fully-formed as those of the participants in Bentall and Kaney's study or those of the individuals described in Chapters Four and Five. This notion links back

directly to the work of Sass (1994; see Chapter One), who adopts the concept of the variability in fixity of delusional beliefs in arguing that Schreber, for example, recognised that his delusions were not objectively real but the product of his own consciousness.

What is clear is that the Stroop paradigm can demonstrate attentional biases in single cases of relatively circumscribed delusional beliefs (e.g., the Cotard delusion, as shown in Chapter Four, and a grandiose delusion, as shown in Chapter Five), and in groups of people suffering from the same delusions (e.g., Bentall & Kaney, 1989). It appears to break down, however, when a paradigm is adopted whereby words related to specific delusional beliefs are presented to a group of people suffering from differing and quite likely multiple delusional beliefs, that may not be as fixed as those held by the individuals described in Chapters Three and Four, or those reported in Bentall and Kaney's (1989) study.

It was noted in Chapter One that the level at which one undertakes research depends largely upon what it is one wants to achieve. To recap briefly, it was noted that one may be interested in understanding a tightly defined phenomenon, and then in examining the resulting hypotheses to see if they are able to account for other types of phenomenology. In this thesis, the Cotard delusion has been studied, and a variant of the Stroop paradigm adopted in order to understand the mechanism by which such people remain so convinced by an explanation of their experiences that seems so absurd to those around them; i.e., that they are dead.

In terms of the locus of attentional bias, the results from the present study are not informative. In Chapter Seven, therefore, this question is addressed by examining attentional biases in healthy subjects, free from any form of psychopathology.

Chapter Seven
Attentional bias in normals

Introduction

Attentional bias has been demonstrated in four people suffering from the Cotard delusion (Chapter Four), and in a single case of a grandiose delusion (Chapter Five). These findings were consistent with previous studies of attentional biases in patients suffering from a range of psychopathological disorders (e.g., Mathews & MacLeod, 1985; Williams *et al.*, 1988; Bentall & Kaney, 1989). In the preceding Chapter, however, attentional bias failed to be demonstrated significantly in a group of eight individuals suffering from schizophrenia, and it was suggested that the delusions held by schizophrenic patients were less fixed and therefore less preoccupying than those held by the individuals reported in Chapters Three to Five. It was suggested that lack of attentional bias may also indicate limitations of the Stroop paradigm adopted thus far when attempting to tap into mechanisms in broader groupings of patients and/or psychopathological disorders.

It was suggested in Chapter Five that attentional biases may not be a function of anxiety *per se*, as suggested in previous studies of attentional biases in psychopathological disorders (e.g., Mathews & MacLeod, 1985; MacLeod & Mathews, 1988), but rather of preoccupation with delusional belief. It was further suggested that this preoccupation might act as a reinforcement mechanism for the delusional belief. In order to test this hypothesis, two factors need to be investigated. First, anxiety needs to be manipulated in the same study and second, anxiety caused by the content of the words used in the Stroop paradigm needs to be separated from preoccupation. Both of these factors are examined in the present Chapter, by studying attentional bias in the normal population.

Attentional bias in undergraduate students

Introduction

It was decided to test a group of second-year undergraduate students who were all living in university college accommodation because both factors noted above could be tested. That is to say, lists of words could be compiled which would have common meaning to all students and anxiety could be manipulated by presenting the Stroop task on two different occasions during the academic year; once during the Lent term, some 3 months prior to the end-of-year examinations and again during the end of the Summer term, within two weeks of examinations. These test sessions were timed on the basis that it was reasonable to expect students to have higher levels of anxiety immediately prior to, than 3 months before, examinations.

Method

The subjects were all second-year undergraduate students (5 male, 4 female) at Cambridge university, with a mean age of 21.78 (sd=1.86, range 20-26). No control group was used in this study as subjects acted as their own controls, the comparison being between two testing sessions; the first in the Lent term (between 2 and 3 months before the end-of-year examinations) and the second toward the end of the Summer term (between 5 to 14 days before the examinations).

Two sets of words, each paired with a set of neutral words matched for frequency of use (Hofland & Johansson, 1986) and approximate length were prepared specially for this study. In addition the same lists of words used in Chapter Six pertaining to generalised depression and generalised anxiety were presented, together with their matched neutral lists. The full lists of words used are shown in Appendix 8. The rationale for use of each of these sets of words was as follows:

    i) <u>Exam-related words</u>: A set of 5 words related to examinations was prepared, to ascertain whether students would take longer to colour-

name such words in the Summer term (within two weeks of the end-of-year examinations, when anxiety levels might be expected to be relatively high) than they would during the Lent term (some 3 months before examinations, when anxiety levels might be expected to be lower). The list of words was rated by 2 Cambridge graduates and 4 Cambridge post-graduate students.

ii) <u>College-related words</u>: A set of 5 words related to Cambridge colleges was included, because Cambridge is a college-based university and *the college* (irrespective of which particular one) is an integral part of university life for Cambridge university students. The list of words was compiled following advice from the 6 post-graduate students who rated the examination-related words.

iii) <u>Depression-related words</u>: The same set of 5 words related to the general theme of depression used in Chapter Six, rather than that used in Chapters Four and Five, was included to see whether naming-times of depression-related words correlate with self-reported levels of depression (as measured by the HAD scale). The reason for using the same list as that used in Chapter Six was that the word *failure* was included in the present study in the exam-related word list. Hence the word *miserable* was used instead of *failure* in the depression-related words.

iv) <u>Anxiety-related words</u>: Again, the same set of 5 words related to the general theme of anxiety used in the previous studies was included. This time, testing took place on two occasions - once during the lent term (in which there are no examinations) and again in the summer term, two weeks before examinations. If anxiety plays a critical role in attentional biases, students might be expected to take longer to colour-name words related to anxiety on the second test session (which is very

close to the examinations) as one would expect anxiety levels to be raised immediately prior to examinations, relative to the lent term.

The five test lists had all been rated for the previous study as described in Chapter Four. Each test-list was matched according to approximate length (e.g., number of letters) and frequency of use (Hofland & Johansson, 1986), with a set of neutral words. Both the depression- and anxiety-related words were rated for the previous studies and so were not rated again. All other words were rated by the 6 Cambridge post-graduate students referred to above.

As with the previous studies, each word list was presented on a white A4 card and printed in 12-point lower case Helvetica font. Each word appeared in one of five different colours of ink (green, grey, blue, brown, red). Again, there was one card for each set of words (i.e., one card containing all the death-related words, one containing all the depression-related words, and so on) and each of the 5 words for a given set appeared 10 times on its respective card. The words and colours were presented in a pseudo-random order, with each of the 5 words in the set appearing twice in each of the 5 colours.

All subjects were instructed to name the colour in which each of the 50 words on each card was printed, naming from left to right and from top to bottom. Subjects were asked to name the colours as quickly and accurately as possible and to ignore the meaning of the words. Before the start of the test, each subject was given a practice list using a novel set of neutral words to ensure they were able to name the colours accurately and to enable them to become familiar the requirements of the task. The test and neutral lists were then presented in a pseudo-random order, ensuring each neutral list was presented either immediately before or immediately after its matching test list. A stop-watch was used to measure the times taken to colour-name all the words on each card, and errors were noted.

Finally, all subjects completed the HAD scale at both testing sessions in order to obtain measurement of anxiety and depression for both Lent and Summer, and to enable measurement of any changes in mood between the two terms.

Results

Errors

As in the studies described previously, subjects' errors are examined before presenting mean colour-naming times. Three subjects each made one task-switching error (i.e., reading the word instead of naming the colour in which it was printed): S3 read the word *rod* on the neutral-depression word list in the Summer; S4 read the word *nervous* on the anxiety word list, also in the Summer term; and S9 read the word castle on the neutral-anxious word list in the Lent term. Interestingly, three students also made a type of error not made by subjects in the previous study, by stating the colour of the word twice. These were not colour-naming errors as such; subjects repeated the beginning of a line after hesitating on the second word of that line. S3 made 3 such repetition errors on the neutral-depressed list in the Summer term (the same list in which he made the task-switching error); S5 made 1 repetition error on the neutral-college list in the Summer term; and, finally, S7 made 2 repetition errors on the neutral-student list in the Summer.

Most students made some colour-naming errors in both the Lent term and the Summer term, as shown in Tables 7.1a and b. These were in keeping with those made by the control subjects reported in Chapter Four. Table 7.2 shows the means and standard deviations for the total number of errors for test and neutral lists made in the Lent and Summer terms. As can be seen, although error rates are low for both terms, the mean number of errors for the test lists in the Summer is nearly double that of the Lent term, and more than double for the neutral word lists.

Table 7.1a: Colour-naming errors made by students in the Lent term

Word lists Test Lists	S1	S2	S3	S4	S5	S6	S7	S8	S9	Mean	Sd
Exams		2		1					1	0.44	0.73
College					2		1			0.33	0.71
Depressed			1	2	3		1			0.78	1.09
Anxiety		1	1	1		2				0.56	0.73
Neutral Lists											
Neutral Exams		1					1			0.22	0.44
Neutral College	2	1			1	1				0.56	0.73
Neutral Depression										0	0
Neutral Anxiety		1	1	3	1					0.67	1.00

Table 7.1b: Colour-naming errors made by students in the Summer term

Word lists Test Lists	S1	S2	S3	S4	S5	S6	S7	S8	S9	Mean	Sd
Exams		1		2	1	2				0.67	0.87
College				2	5	3	2		2	1.56	1.74
Depressed		1	2	2	1	1				0.78	0.83
Anxiety			1	1		1			1	0.63	0.53
Neutral Lists											
Neutral Exams			1		1	1				0.33	0.50
Neutral College		2		1	4	1	1			1.00	1.32
Neutral Depression		2		4	2	1		1		1.11	1.36
Neutral Anxiety			1	2	2	1	1	2	1	1.11	0.78

Table 7.2: Mean colour-naming errors made by students in the Lent and Summer terms.

	Lent		Summer	
Lists	*Mean*	*Sd*	*Mean*	*Sd*
Test lists	0.53	0.19	0.91	0.52
Neutral lists	0.36	0.43	0.89	0.43

A three-factor ANOVA with repeated measures revealed a significant effect of term [$F_{(1,8)}=6.67$, $p<0.05$], but there was no significant effect of list type [$F_{(1,8)}=0.30$, $p>0.05$], nor of word list [$F_{(3,24)}=1.26$, $p>0.05$]. There were no interactions between term and word type [$F_{(1,8)}=0.73$, $p>0.05$], term and word list [$F_{(3,24)}=1.18$, $p>0.05$], and list type and word list [$F_{(3,24)}=1.29$, $p>0.05$]. However, there was a significant interaction of term x list type x word list [$F_{(3,24)}=4.03$, $p<0.02$].

Planned comparisons with alpha correction to avoid inflated Type 1 error rates were calculated. For each individual comparison, alpha was set at 0.005. There were no significant differences between any of the test lists and their matched neutral lists in either Lent or Summer (see Appendix 9 for the planned comparisons).

Colour-naming times

The mean colour-naming times and standard deviations for all word lists for the Lent and Summer terms are shown in Table 7.3. As the Table shows, there was a mean difference of only 1 second between the time taken to colour-name words related to exams and to colour-name matched neutral words in the Lent term, which extended to over 2.5 seconds by the Summer term. In the Lent term, the mean colour-naming time for words related to college life was 4 seconds longer than that for the matched neutral words, although the standard deviation was also slightly higher. This difference was maintained in the Summer term and this time standard deviation was similar. Colour-naming times for words related to generalised depression were similar to their matched neutral words, and there was no apparent difference between Lent and Summer terms.

A three-factor ANOVA with repeated measures revealed no significant effect for term [$F_{(1,8)}=0.59$, $p>0.05$], but did reveal a significant effect for list type [$F_{(1,8)}=8.89$, $p<0.02$] and for word list [$F_{(3,24)}=3.34$, $p<0.05$], together with an interaction between these two factors [$F_{(3,24)}=4.55$, $p<0.02$]. There was no

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Table 7.3: Mean colour-naming times (secs) of students in the Lent and Summer

terms.

Word List	Lent		Summer	
	Mean	*Sd*	*Mean*	*Sd*
Exams	32.11	5.75	33.44	7.25
Neutral Exams	31.11	5.64	30.78	8.32
Difference	1.00		2.66	
College	34.11	7.36	33.67	6.22
Neutral College	30.44	4.95	29.67	6.40
Difference	3.67		4.00	
Depression	34.44	8.23	33.89	7.82
Neutral Depression	33.78	8.60	33.11	6.77
Difference	0.66		0.78	
Anxiety	33.67	6.52	30.67	5.94
Neutral Anxiety	33.22	6.22	30.44	6.17
Difference	0.45		0.23	

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interaction of term x list type [$F(1,8)=0.820$, $p>0.05$] or of term x word list

[$F(3,24)=1.41$, $p>0.05$] and nor was there a three-way interaction of term x list

type x word list [$F(3,24)=2.24$, $p>0.05$].

Planned *t*-tests with alpha correction to avoid inflate Type 1 error rates were

calculated. For each individual comparison, alpha was set at 0.005. There was no

significant differences between any of the test lists and their matched neutral lists

(see Appendix 10 for the results). The fact that the ANOVA revealed effects of

word list and list type, but the planned comparisons revealed no sigificant effects

may reflect the fact that students took slightly longer to colour-name all test lists

than they did to colour-name the neutral lists. However, it is worth noting that the

power to detect a true medium sized difference in the planned comparisons was

only 17%. Given this, it is worth examining the mean differences from the planned

comparisons. (see Appendix 10). The mean difference between the college word

list and its matched neutral in Lent was 3.67 (sd 4.153). With an effect size of 1.1

(i.e., the standard deviation) and an alpha of 0.005, the power to detect a true

significant difference was 32.2%. Similarly, on the same lists in the Summer,

(mean 4.00; sd 3.61), the power to detect a true significant difference was 51.9%. Hence there is a 31.2% (Lent term) and 51.9% (Summer term) chance, respectively, that there were significant differences between the college and the neutral list. It was noted earlier that the largest apparent differences between test and neutral colour-naming times occured for the college rated words in both Lent (3.67) and Summer (4.00). Given this, it may be said that there was a non-significant trend for students to take longer to colour-name the college list than its matched neutral.

Hospital Anxiety and Depression (HAD) scores

The students' HAD scores are shown in Table 7.4. The maximum possible scores on anxiety and depression are 21, and the published cut-offs are 10 for anxiety and 10 for depression; scores of 8-10 are considered to fall in a borderline range (Zigmond & Snaith, 1983). In terms of anxiety, Ss1, 5 and 7 had borderline scores in the Lent term, rising to significant levels in the Summer; S2 had a relatively high score in Lent, also rising to a significant level in the Summer; S9 had

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Table 7.4: Student HAD scores.

Subject	HAD Anxiety		HAD Depression	
	Lent	Summer	Lent	Summer
S1	9	12	2	2
S2	7	13	3	6
S3	2	1	1	4
S4	5	7	1	3
S5	10	14	1	2
S6	3	4	0	0
S7	4	13	1	5
S8	7	9	4	4
S9	17	10	10	3
Mean	7.11	9.22	2.56	3.22
Sd	4.57	4.47	3.05	1.79

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a significant anxiety level in the Lent, which dropped to a borderline level in the Summer; Ss 4 and 6 showed relatively low levels of anxiety in both terms; S8's scores hovered around the borderline mark for both terms; and, finally, S3 had very low anxiety scores in both terms. The student's measures of depression were all relatively low, save for S9 who was borderline depressed in the Lent term only.

It can be seen from the Table that the mean score for anxiety is 2 points higher in the Summer, but this difference is not significant [$t=1.41$ (df=8), $p>0.05$]. There was no difference in the mean depression scores between the two terms [$t=0.62$ (df=8), $p>0.05$].

Correlational analyses of HAD scores and colour-naming interference indices

Two-tailed Pearson's r correlations (see Appendix 11) revealed that neither anxiety nor depression correlated with the interference indices of any of the Stroop lists.

Discussion

The intention of the present study was to manipulate anxiety in second-year undergraduate students, by administering the Stroop task some three months before end-of-year examinations and then again within two weeks of those examinations. The Stroop lists were specially designed in an attempt to separate anxiety (by inclusion of the exam- and anxiety-related word lists) from preoccupation (by inclusion of the list of words related to college life, which is integral to Cambridge undergraduates).

The three-way ANOVA revealed a significant effect for list type and for word list, together with a significant interaction between the two. There were no significant effects for term. Planned comparisons failed to reveal a significant difference between any individual list and its matched neutral list. It was suggested that the ANOVA may have simply reflected that the students took slightly longer to colour-name test lists than neutral lists for all conditions. However, it was also

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noted that the power to detect the effect size of the college and neutral lists in both Lent and Summer was 32.3% and 51.9% respectively. Given the apparent differences between these lists in both terms, it was concluded that there was a non-significant trend for students to take longer to colour-name words related to college life than the matched neutrals. However, it is also possible that the difference revealed in the ANOVA simply reflected the fact that students took slightly longer to colour-name all test lists than they did to colour-name the matched neutral lists. Nonetheless, it is clear that the largest differences in colour-naming times were found with the college-related words.

Turning to colour-naming errors, although these were low, the total number was significantly greater in Summer than in Lent. This may reflect the non-significant trend toward increased levels of anxiety in the Summer term.

The aim of manipulating anxiety by administering Stroop around three months before examinations and then again a fortnight before examinations does not appear to have been successful. Indeed, it is possible that including words related to examinations and college-life may have confounded anxiety and preoccupation. Although there was a trend toward increased anxiety levels immediately before the examinations, this was not significant.

It is clear, however, that the students did not take significantly longer to colour-name any of the test lists in comparison to the neutral lists, as measured by the planned comparisons. The ANOVA may have reflected the general slowing in colour-namng times of neutral words. Alternatively, given the power of the planned comparisons to reveal significant differences, the ANOVA result may have reflected the trend toward longer colour-naming times for the college-related words. This would tend to support the suggestion that attentional biases may have more to do with preoccupation than anxiety per se, and underscore the fact that attentional bias is not a pathological construct. What is clear, however, is that these results contrast with those showing marked attentional bias in chapters Four and Five

If people with low-trait anxiety tend to avert their attention from threat-related stimuli (e.g., MacLeod & Mathews, 1988), this might explain why the students did not show attentional biases towards word related to examinations. It is perhaps unfortunate that measures of trait anxiety were not taken, since in consequence direct comparison to MacLeod and Mathews' (1988) study cannot be made.

The fact that the students showed only a non-significant trend to take longer on college-related words, together with the possibility that the results may have been confounded by anxiety means no conclusions can be made regarding the preoccupation-anxiety issue in attentional bias. It was therefore decided to test people who share a common interest but who are not suffering from anxiety, and who are not about to undergo a stressful experience, such as an examination.

Attentional bias in motor-cycle enthusiasts

Introduction

Motor-cycle enthusiasts were tested in order to ascertain whether people who share a keen interest in a particular hobby, and who were free from anxiety, would demonstrate attentional biases towards words related to that interest. If so, it would represent support for the suggestion advanced on the basis of SD's results (Chapter Five) that the locus of attentional bias is not anxiety *per se*, but rather preoccupation.

Method

The subjects were 8 motor-cycle enthusiasts (6 male; 2 female) with a mean age of 27 (sd=3.30; range 21-31). These were matched with a group of control subjects according to sex and age (mean age=26.50, sd=4.75; range 19-32) who had no particular interest in bikes (which was confirmed at the end of the test session). A set of words consisting of the names of five motor-bikes, paired with a set of neutral words matched for approximate length was prepared specially for

this study. Since the names of motor bikes do not appear in Hofland and Johansson's (1986) tables of word frequencies, they were matched with neutral words of a relatively high frequency (since the names of bikes are of high frequency use for bikers), and these words were matched according to approximate length. In addition, the same lists of words used in the above study pertaining to generalised depression and generalised anxiety were presented, together with their matched neutral lists. The full lists of words used are shown in Appendix 12. The rationale for use of each of these sets of words was as follows:

i) <u>Bike-related words</u>: A set of 5 words consisting of the models of motor-bikes was prepared, to ascertain whether motor-bike enthusiasts (hereafter referred to as 'bikers') would take longer to colour-name words related to their interest than they would compared both to matched neutral words and to controls' colour-naming times of the bike-related word list.

ii) <u>Depression-related words</u>: The same set of 5 words related to the general theme of depression used in the above study was included to see whether naming-times of depression-related words correlate with self-reported levels of depression (as measured by the HAD scale).

iii) <u>Anxiety-related words</u>: The same set of 5 words related to the general theme of anxiety used in the previous studies was included, again this was to enable correlational analyses between the colour-naming-times of anxiety-related words and self-reported levels of a anxiety (as measured by the HAD scale).

The anxiety and depression word-lists were both rated for the previous studies. The bike-related word list was shown to two bikers, along with the neutral words, and they showed 100% agreement as to the category of each word. The presentation of word lists and procedure for administering the test were exactly the same as detailed in the previous study.

Finally, all subjects completed the HAD scale, in order to obtain measurements of anxiety and depression, and to see whether either mood correlated with colour-naming times.

Results

<u>Errors</u>

Only one control subject (S3) made a task-switching error, reading the word *garden* on the neutral bikes list, and there were no repetition errors, such as those made by the students in the previous study. The number of colour-naming errors made by the bikers and controls, shown in Tables 7.5a and 7.5b respectively, were

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<u>Table 7.5a:</u> Colour-naming errors made by bikers

Word lists Test Lists	S1	S2	S3	S4	S5	S6	S7	S8	Mean	Sd
Bikes	1	2	2		2		1	2	1.25	0.89
Depressed	1	1	1		2	1	2	1	1.12	0.64
Anxiety		1	1		1	1	2	3	1.12	0.99
Neutral Lists										
Neutral Bikes		2	1		1		2	2	1.00	0.93
Neutral Depression	1	1	1	1	1	1	1	2	1.12	0.35
Neutral Anxiety	1	1	2		1	1	2		1.12	0.64

<u>Table 7.5b:</u> Colour-naming errors made by controls

Word lists Test Lists	S1	S2	S3	S4	S5	S6	S7	S8	Mean	Sd
Bikes	2		1	2	1	1	1		1.00	0.76
Depressed	1	2	1	3	0	1	1	2	1.38	0.92
Anxiety	1	1	1		1	2	1	2	1.12	0.64
Neutral Lists										
Neutral Bikes	2	2	1	1		1	2	2	1.38	0.74
Neutral Depression	2	1	1	2		2	1	3	1.50	0.93
Neutral Anxiety	1		2	2	1		2	1	1.12	0.83

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similar, and in keeping with those made by the control subjects reported in Chapter Four and the students reported above. The means and standard deviations for the total number of errors both for test and neutral lists made by bikers and students is shown in Table 7.6. As the Table shows, the results are similar both for bikers and controls, and for test and neutral lists.

Table 7.6: Mean colour-naming errors made by bikers and controls

	Bikers		Controls	
Lists	*Mean*	*Sd*	*Mean*	*Sd*
Test lists	1.17	0.67	1.17	0.31
Neutral lists	1.08	0.50	1.33	0.53

A three-way ANOVA confirmed that there was no effect of group [F(1,7)=0.30, p>0.05], of list type [F(1,7)=0.52, p>0.05], or of word list [F(2,14)=0.64, p>0.05], and nor were there any interactions between these three factors: group x list type [F(1,7)=2.27, p>0.05], group x word list [F(2,14)=0.39, p>0.05], list type x word list [F(2,14)=0.04, p>0.05], and group x list type x word list [F(2,14)=0.37, p>0.05].

Colour-naming times

The mean colour-naming times and standard deviations for all word lists for bikers and controls are shown in Table 7.7. The first thing to note is that the mean colour-naming time for bikers on the bike-related word list is longer than that for the neutral list, although the standard deviation is a little higher than for the neutral list. The time taken by bikers on the bike list is also longer than that taken by the controls. The controls took around 2 seconds longer to colour-name the anxiety word list than its matched neutral list, although, again, the standard deviation is rather higher for the anxiety list than for the neutral list. The colour-naming times for all other lists for bikers and controls were similar.

Table 7.7: Mean colour-naming times (secs) of bikers and controls.

Word List	Bikers		Control	
	Mean	Sd	Mean	Sd
Bikes	37.25	7.09	34.00	6.05
Neutral Bikes	33.75	6.20	34.75	5.50
Difference	3.50		-0.75	
Depression	33.25	6.54	33.00	5.26
Neutral Depression	34.62	5.07	34.62	7.80
Difference	-1.37		-1.62	
Anxiety	33.75	7.34	35.25	6.71
Neutral Anxiety	32.62	5.04	33.38	5.29
Difference	1.13		1.87	

A three-factor ANOVA failed to reveal any significant effect of group [$F_{(1,7)}=.00$, $p>0.05$], of list type [$F_{(1,7)}=0.55$, $p>0.05$], or of word list [$F_{(2,14)}=1.37$, $p>0.05$]. It also showed there were no interactions between the three factors: group x list type [$F_{(1,7)}=2.28$, $p>0.05$], group x word list [$F_{(2,14)}=1.58$, $p>0.05$], list type x word list [$F_{(2,14)}=2.60$, $p>0.05$], or group x list type x word list [$F_{(2,14)}=1.21$, $p>0.05$].

Hospital Anxiety and Depression (HAD) scores

HAD scores for bikers and controls are shown in Table 7.8. As noted above, the published cut-off scores are 10 for anxiety and 10 for depression, with scores of 8-10 being borderline (Zigmond & Snaith, 1983). The anxiety scores for one biker (S8) and one control (S6) were borderline, and one biker (S8) had a borderline level of depression. All other scores for anxiety and depression were within normal limits. As can be seen from the Table, there were no differences between the bikers and controls for either anxiety [$t=0.15$ (df=7), $p>0.05$] or depression [$t=0.52$ (df=7), $p>0.05$].

Correlational analyses of HAD scores and colour-naming interference indices

Two-tailed Pearson's *r* correlations (see Appendix 13) revealed that neither anxiety nor depression correlated with the interference indices of any of the Stroop lists for the bikers. For the controls, however, HAD anxiety was negatively correlated with the interference index for depression-related words [$r=-.76$ (df=2), $p<0.05$]. There were no other significant correlations for the control data.

Table 7.8: HAD scores for bikers and controls.

	HAD Anxiety		HAD Depression	
Subject	*Bikers*	*Controls*	*Bikers*	*Controls*
S1	6	1	4	2
S2	4	5	3	6
S3	2	2	7	4
S4	0	2	2	0
S5	1	3	3	2
S6	2	9	0	5
S7	3	2	1	3
S8	8	0	10	2
Mean	3.25	3.00	3.75	3.00
Sd	2.66	2.83	3.28	1.93

Discussion

The aim of the present study was to ascertain whether attentional biases could be demonstrated in a group of subjects who share common interest but who do not suffer from any form of psychopathology, and who are not about to undergo a stressful event such as an examination. The mean colour-naming times (see Table 7.7) indicated the largest difference to be for the bikers between the words related to bikes and its matched neutral. A three-way ANOVA, however, failed to reveal any significant effects.

In the following study, a group of individuals with a high degree of commitment to a common interest, rowing, was selected in an attempt to ensure a

high degree of preoccupation in that interest, and in order to establish whether attentional biases can be demonstrated in the normal population.

Attentional bias in rowers

Introduction

In order to establish whether people in the normal population show attentional biases towards stimuli related to their individual *interests* (i.e., not to their individual concerns and worries), a group of rowers was given a version of the Stroop test. Cambridge rowers were selected for study because they show a high degree of commitment to their sport (for example, by having to get up very early in the mornings for rowing practice; having to maintain certain body-weights; striving to make it to the next level of boat; striving for Cambridge 'blues', i.e., medals awarded to those rowing for the University, and so on). For comparison, a control group of University students who were non-rowers, matched for age and education, was also tested.

Method

The subjects were a group of 12 Cambridge rowers (9 male and 3 female) with a mean age of 22.58 (sd 3.50; range 19-28), and 12 non-rowing controls matched for sex and age (mean age=23.33, sd=3.92; range 19-29).

A set of words, paired with a set of neutral words matched for frequency of use (Hofland & Johansson, 1986) and approximate length, was prepared for the study. The full lists of words used are shown in Appendix 14. The rationale for use of each of these sets of words was as follows:

    i)   Rowing-related words: A set of 5 words consisting of words related to rowing was presented, to ascertain whether rowers would take longer to colour-name words related to this interest than they would compared both to matched neutral words and to controls' colour-naming times of the rowing-related word list.

ii) <u>Depression-related words</u>: The same set of 5 words related to the general theme of depression used in the above study was included to see whether naming-times of depression-related words correlate with self-reported levels of depression (as measured by the HAD scale).

iii) <u>Anxiety-related words</u>: The same set of 5 words related to the general theme of anxiety used in the previous studies was included, again this was to enable correlational analyses between the colour-naming-times of anxiety-related words and self-reported levels of a anxiety (as measured by the HAD scale).

The anxiety and depression word-lists were both rated for the previous studies. The words for the rowing-related word lists were selected following consultation with two Cambridge post-graduate rowers. The presentation of word lists and procedure for administering the test were exactly the same as detailed in the previous studies.

Finally, as with the previous studies, all subjects completed the HAD scale, in order to obtain measurements of anxiety and depression, and to see whether either mood correlated with colour-naming times.

Results

<u>Errors</u>

One rower (S7) made 3 task-switching errors, reading the last 3 words on the neutral rower word list (*dozen, review and bonus*). There were no other task-switching errors (for either group), and nor were there any repetition errors.

Tables 7.9a and 7.9b show the number of colour-naming errors made by the rowers and controls, respectively. As the Tables show, error rates were similar in the 2 groups. Parenthetically, the numbers of errors made by both groups appear slightly lower than those made by groups in the previous studies. The means and standard deviations for the total number of errors both for test and

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Table 7.9a: Colour-naming errors made by rowers

Word lists Test Lists	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	Mean	Sd
Rowing	1		2	1		2	1	1	2			2	1.00	0.85
Depressed	1	2	1		1							1	0.50	0.67
Anxiety	1	1		1	1		1	1					0.50	0.52
Neutral Lists														
Neut Rowing		1	1	2			1	1				1	0.58	0.67
Neut Depression	1	1	1	1		1	1		1	1	1	2	0.92	0.51
Neut Anxiety	2	1	1	1	1	3	1	1	1			1	1.08	0.79

Table 7.9b: Colour-naming errors made by controls

Word lists Test Lists	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	Mean	Sd
Rowing		1	1	1	1	1	2		1	2	1	2	1.08	0.67
Depressed		1		1	1	1		2	1	2	2		0.92	0.79
Anxiety			1	1	1	1		1		1	1	2	0.75	0.62
Neutral Lists														
Neut Rowing	1				1	2	2			2	1	1	0.83	0.83
Neut Depression	1			1	2	1	1	1	1	1		2	0.92	0.67
Neut Anxiety	1	1	1	1	1			2		1	1	1	0.83	0.58

Table 7.10: Mean colour-naming errors made by rowers and controls

	Rowers		Controls	
Lists	*Mean*	*Sd*	*Mean*	*Sd*
Test lists	0.67	0.35	0.92	0.43
Neutral lists	0.86	0.39	0.86	0.39

neutral lists made by rowers and students are shown in Table 7.10. Again, the results are similar for test and neutral lists for both rowers and students.

A three-factor ANOVA confirmed that there was no effect of group [$F(1,11)=0.69$, $p>0.05$], of list type [$F(1,11)=0.71$, $p>0.05$], or of word list [$F(2,22)=0.13$, $p>0.05$]. There was, however, a significant interaction between list type and word list [$F(2,22)=4.09$, $p<0.05$]. There were no other significant interactions: group x list type [$F(1,11)=1.60$, $p>0.05$], group x word list [$F(2,22)=0.29$, $p>0.05$], and group x list type x word list [$F(2,22)=0.86$, $p>0.05$].

Planned comparison with alpha correction to avoid inflated Type 1 error rates were calculated. For each individual comparison, alpha was set at 0.005. There were no significant differences in the number of errors made within or between the two groups on any of the word lists (see Appendix 15 for the results). The interaction between list type and word list may reflect the fact that the rowers made more errors on the rowing words than on the matched neutrals, but less on the depression- and anxiety-related words than their respective matched neutrals, although, overall, they made more errors on the neutral lists. The controls also made more errors on the rowing-related words than their matched neutral lists, but made similar numbers of errors between depression- and anxiety-related words and their matched neutrals. However, it must be stressed, that the numbers of errors were low.

Colour-naming times

Table 7.11 shows the mean colour-naming times and standard deviations for rowers and controls for each word list. For the rowing-related word lists, the mean naming time for rowers is nearly 3 seconds longer than that for the matched neutral words, although so is the standard deviation. Similarly, the rowers are longer on the rowing-related words than are controls (although, again, the standard

deviation is longer for rowers than for the controls). The mean colour-naming times for controls are similar between the rowing and matched neutral words, as are the standard deviations. The colour-naming times for all other lists for rowers and controls were similar, although it is noteworthy that the rowers were slightly slower to colour-name all word lists than are the controls.

Table 7.11 Mean colour-naming times (secs) of rowers and controls.

Word List	Rowers		Control	
	Mean	*Sd*	*Mean*	*Sd*
Rowing	34.17	8.42	29.17	5.59
Neutral Rowing	31.25	5.58	29.67	5.82
Difference	2.92		-0.50	
Depression	31.58	7.02	30.33	5.65
Neutral Depression	31.67	6.36	30.08	6.08
Difference	0.17		0.25	
Anxiety	31.58	6.19	29.67	6.89
Neutral Anxiety	31.67	7.40	29.08	5.21
Difference	-0.09		0.59	

A three-factor ANOVA failed to reveal any significant effect of group [$F(1,11)=1.24$, $p>0.05$], or list type [$F(1,11)=2.38$, $p>0.05$], or of word list [$F(2,22)=0.26$, $p>0.05$]. Similarly, none of the interactions reached significance: group x list type [$F(1,11)=2.94$, $p>0.05$], group x word list [$F(2,22)=2.76$, $p>0.05$], list type x word list [$F(2,22)=0.74$, $p>0.05$], and group x list type x word list [$F(2,22)=2.85$, $p>0.05$].

Hospital Anxiety and Depression (HAD) scores

Table 7.12 shows the HAD scores for rowers and controls. None of the rowers were significantly anxious, but 2 of them (Ss 5 and 9) showed borderline levels of anxiety. In contrast, 3 of controls (Ss 1, 6 & 10) were significantly anxious, while another 3 (Ss 2, 3 and 7) had borderline scores. The anxiety scores for the remaining 6 controls were within normal limits. *t*-tests showed that the controls were significantly more anxious than the rowers [$t=3.21$ (df=11), $p<0.01$]

Table 7.12: HAD scores for rowers and controls.

Subject	HAD Anxiety		HAD Depression	
	Rowers	*Controls*	*Rowers*	*Controls*
S1	5	13	4	5
S2	3	8	1	2
S3	3	9	0	4
S4	5	6	2	1
S5	8	7	5	0
S6	5	14	1	4
S7	3	9	2	1
S8	6	6	5	0
S9	8	7	0	1
S10	4	11	0	6
S11	6	5	4	2
S12	3	6	1	3
Mean	4.92	8.42	2.08	1.93
Sd	1.83	2.91	2.42	1.98

but that there was no significant difference for depression [$t=.35$ (df=11), $p>0.05$].

Correlational analyses of HAD scores and colour-naming interference indices

Two-tailed Pearson's r correlations (see Appendix 16) revealed than neither anxiety nor depression correlated with the interference indices of any of the Stroop lists for the rowers or for the controls.

Discussion

The present study was designed to establish whether attentional biases in normal subjects sharing a common interest but free from any form of psychopathology could be demonstrated. To this end, a group of highly committed rowers was tested, and a slightly increased sample was used than that for the biker study. The means appeared to indicate that rowers were slower to colour-name words related to rowing than the matched neutral but, again, a three-way ANOVA failed to reveal any significant effects.

It is possible that the results were confounded by the fact that the controls were significantly more anxious than the rowers; indeed, three of the controls were significantly anxious according to published norms (Zigmond & Snaith, 1983). Even if this were the case, however, there is no reason to suggest that this would have the effect of masking any differences in the rower's colour-naming times between the rowing-related word list and its matched neutral.

Discussion

The rationale for testing attentional biases in normals was that if such biases could be demonstrated in people free from anxiety, but sharing a common interest, then the notion that biases are due to anxiety would become less tenable. In the student study, a three-way ANOVA revealed a significant effect of list type and word list, together with an interaction between these two factors. There was no effect of term, and neither were there any interactions between term and the other two factors. Planned comparisons failed to reveal any significant differences between individual test lists and their matched neutral lists. The study with the motor-cycle enthusiasts was designed to establish the locus of attentional bias by removing the presence of anxiety. However, a three-way ANOVA showed that there were no significant effects. In the rower study group sizes were increased to twelve. Again, the ANOVA failed to reveal any significant effects.

It is worth noting that in all three studies, the means for colour-naming interest-related lists (i.e., college, bikes and rowing, respectively) appeared larger than for their matched neutral lists, while other lists appeared similar. Taken together, it may be argued that there is a slight *trend* for normals to show bias towards words related to their interests. What is clear, however, is that they do not show significant attentional bias and therefore stand in contrast to the patients studies in chapters Four and Five.

In Chapter Eight, the implications of this study for the findings detailed in Chapters Four to Six are discussed.

Chapter Eight
General Discussion

The aim of this thesis was to understand more fully delusions, using the Cotard delusion as an initial model. In particular, I sought to find reasons why patients suffering from the Cotard delusion remain convinced that they are dead, despite what appears to everyone else as incontrovertible evidence to the contrary. A thorough examination of the symptoms noted in Cotard's original case reports, as well as seventeen case reports published subsequently in the English literature revealed marked differences not just between patients, but within individual patients during the course of their illnesses. These findings were consistent with the suggestion made in Chapter Two that the term 'syndrome' as applied to the Cotard delusion was at present unhelpful. So, too, were the analyses of symptoms shown by the four cases of the Cotard delusion presented in Chapter Three - at least in terms of the Cotard syndrome as it is currently regarded in the literature. It was suggested that, were people suffering from the Cotard delusion to be investigated using a similar method to that adopted in this thesis, they may show the same pattern of symptoms displayed by the individuals in the present study; depression, depersonalisation, derealisation, and face-recognition impairments. If this were found to be the case, there would be good grounds for arguing for the existence of a syndrome based on the resulting co-occurence of symptoms.

The subjective experiences reported in Chapter Three, particularly those of JK, highlighted the very real misery and fears experienced by patients suffering from the Cotard delusion. Anecdotally, the deep depression which the patients feel while they are suffering from the delusion really struck me. After I had finished testing RB on the last testing session, I walked to the lift foyer and pressed the button to call the lift. While I was waiting for the lift, RB came running out of the ward toward me, sporting a huge grin. "I can go home! I can go home!", he exclaimed. He reached out for my hand and shook it vigorously while profusely

expressing his gratitude (although I had no say in his being discharged). He ran back into the ward and, as I got into the lift, it struck me that it was the first time I had ever seen him smile. A similar incident happened with JK, who, when she believed she was dead, appeared to be the most traumatised of all the patients I saw. When I visited her after the delusion had remitted, she told me about meeting the young man at the day centre to which she had started to attend. Her face beamed while she was telling me about him, and I realised then that I had never seen her smile before. To this day, I have never seen either JA or MB smile.

Most striking was the patients' continual struggle to make sense of what they were experiencing. This, and the analyses of the symptoms displayed by the four patients, provided support for the theory of Young and his colleagues (Young *et al.*, 1992; Wright *et al.*, 1993; Young, 1994) that the Cotard delusion arises out of an interaction between perceptually anomalous experiences (feelings of unreality, derealisation, depersonalisation and a lack of feeling of familiarity) and depression. It was noted, however, that while this theory was able to account for why patients initially form the belief that they were dead, it fell short of a complete theory in that it failed to provide a reason as to why patients remain convinced by their explanations. To this end, there appeared to be a potential parallel between delusions, or at least the Cotard delusion, and an aspect of anxiety disorders; namely, preoccupation with their concerns. A question then arose as to whether this preoccupation with delusional belief might be a contributory factor in maintaining that belief. With this in mind it was decided to adopt a variant of the emotional Stroop paradigm, which is a common means of investigating anxiety disorders, and which shows that people suffering from anxiety disorders demonstrate attentional biases towards stimuli related to their concerns.

Attentional bias was first investigated in patient JK. It was found that comparing her colour-naming times with those of control subjects was not a useful strategy, because it merely showed that her colour-naming times were not only far slower than the controls', but also showed far greater variation across the different

test lists. It was therefore decided to use JK as her own control by comparing her colour-naming times to the test lists against the mean time taken by her to colour-name neutral words; z-scores were therefore calculated, reflecting by how many standard deviations above or below the neutral colour-naming times were JK's responses to each of the test lists. These analyses showed that on the first testing session, when JK was fully convinced she was dead, she was significantly slower to colour-name words related to death than she was to colour-name neutral words. This effect disappeared for the second and third testing sessions, when she no longer believed that she was dead. JK also showed attentional biases towards words related to duplicates on test sessions one and two, during which times she believed that her mother and brother had changed in some way. As with her attentional bias towards death-related words, the bias toward words related to duplicates disappeared when she no longer held these beliefs (i.e., by the third testing session). Attentional biases were then investigated in patients JA and MB, both of whom were suffering from the Cotard delusion. Again, both patients were significantly slower to colour-name words related to death. MB also took significantly longer to colour-name words related to anxiety, which was consistent with the fact that she was suffering from generalised anxiety.

As noted, the rationale for adopting a variant of the emotional Stroop paradigm was the potential parallel between anxiety disorders and delusions in terms of preoccupation with individual concerns. It was suggested that the locus of the attentional bias displayed by the patients suffering from the Cotard delusion was preoccupation with that delusional belief, rather than anxiety *per se*. However, although only one of the three patients suffered from anxiety, it was not possible to conclude that preoccupation, rather than anxiety, was the locus of these attentional biases.

The decision to investigate attentional bias in a patient suffering from grandiose delusions was twofold. First, it was noted in Chapter One that the research approach to be adopted in this thesis was to attempt to identify a possible

mechanism underlying a specific delusional belief (in this case, the Cotard delusion) and, having identified such a mechanism, to broaden the analysis in order to establish whether the mechanism is able to account for other types of delusional belief. Replication of attentional bias in someone suffering from a different type of delusion would help to establish whether attentional bias acted as a reinforcing mechanism for the delusional belief. Second, and arising from this, if it could be demonstrated the attentional bias contributes to the maintenance of a grandiose delusional belief, it would support the hypothesis that the locus of attentional bias in delusions is preoccupation with that belief, rather than anxiety *per se*. The rationale behind this was based on the assumption that one would not obviously be anxious about a grandiose belief, but it could nevertheless be very preoccupying. Consistent with this hypothesis, SD did indeed show attentional bias towards words related to his delusional beliefs.

Attentional biases had thus far been demonstrated in individual patients suffering from delusions that were focused, consistent and well-formed. It was therefore decided to ascertain whether biases could be demonstrated in a group study of patients suffering from more complex delusions, where each patient may have several seemingly unconnected delusional beliefs. To this end, a group of patients diagnosed as suffering from an acute phase of chronic schizophrenia was tested. A two-way analysis of variance revealed no main effect of list type, nor of word list, and nor was there an interaction between the two. It was noted that the standard deviation was extremely high, owing to S2 taking an extrememly long time to colour-name words related to his own delusional beliefs. With S2 removed from the analysis, the ANOVA became significant for list type, but not for word list, and there was still no interaction between the two. Planned comparisons revealed no significant differences between any of the test lists and their matched neutral lists. It was noted that there was great variability between patients, such that some individuals did show attentional biases toward words related to their own delusional beliefs, while others, equally clearly, did not.

It was proposed that the failure to demonstrate attentional biases towards patients' own delusions in a group of patients suffering from schizophrenia was due in part to the clinical heterogeneity of schizophrenia (see, e.g., Bentall *et al.*, 1988a, 1988b; Liddle, 1987; Liddle *et al.*, 1989) and, related to this, that some of the delusional beliefs were not as fully-formed or fixed as those of the individuals reported in Chapters Four and Five, or of those reported in Bentall and Kaney's (1989) study. Whether either or both of these explanations are able to explain the results, it is clear that the delusional Stroop paradigm broke down when word lists were tailor-made for patients suffering from delusions in the context of schizophrenia. It may be possible for future studies to test only those patients who suffer from reality distortion, suggested by Liddle and his colleagues (see, e.g., Liddle, 1987; Liddle *et al.*, 1989) to be one of three identifiable syndromes within schizophrenia and, within those, only those suffering from delusions and not hallucinations.

Having failed to demonstrate consistent attentional biases in schizophrenic delusions, it was decided to adopt an alternative strategy in the attempt to establish whether preoccupation with delusional beliefs forms the locus of attentional bias. To this end, three groups of people who were free from psychopathological disorder were tested. In the first of these studies, two factors were investigated; anxiety and the shared experience of college life in Cambridge. An attempt was made to manipulate anxiety by testing second-year undergraduate students three months before and a week before their end-of-year examinations. A three-way ANOVA with repeated measures revealed significant effects of word type and word list, together with a significant interaction between these two, but no effect of term. Planned comparisons failed to reveal any significant differences between any of the test lists and their respective neutral lists. It was suggested that there were two possible interpretations here. First, the ANOVA may have reflected the fact that the students took slightly longer to colour-name all test lists than their respective neutral. Second, given the effect size of the college-related words and the level at

which alpha was set, the power of the test to reveal a significant difference was discussed, and the mean difference between college and neutral words for both Lent and Summer was noted.

Having suggested that anxiety and interest may have been confounded in the students study, it was decided to investigate attentional biases in a group of people who shared a common interest, but who were not suffering from anxiety, and who were not about to undergo a stressful or anxiety-provoking event such as an examination. To this end, a group of motor-cycle enthusiasts was tested, together with a group of control subjects. Again, the means indicated a difference between the bikes and neutral lists, but a three-way ANOVA revealed no significant effects. A group of rowers was then tested. Yet again, the means indicated a difference between the rowing list and its matched neutral lists, and again a three-way ANOVA failed to reveal any significant effects. Taken together, the three studies with normals, appeared to show a trend towards longer colour-naming times for related to people's interests. However, none of the results reached significance.

These latter three studies were originally conducted in order to establish the validity of the suggestion made earlier that the attentional biases shown by the three people suffering from the Cotard delusion and the individual with the grandiose delusions were due to preoccupation with their beliefs rather than with anxiety *per se*. That there were no significant results in the three studies (with the exception of the student ANOVA) means no firm conclusions can be made. Clearly the results cannot be said to support the preoccupation hypothesis, since they were not significant. However, there did appear to be a trend, in the sense that in all three studies the largest differences in colour-naming times were found in the interest-related word lists. Hence, they cannot be said to argue against the preoccupation hypothesis - or, indeed, in favour of the anxiety hypothesis.

Several factors might be considered in conducting future studies. An obvious factor is sample size. One can only speculate as to whether the apparent trend toward longer colour-naming times for interest-related words might have

reached significance given much-increased samples. A further manipulation concerns all studies reported. The Stroop was presented on A4 cards, which raises the possibility that there is a 'build-up' effect of the all the words on a single list being semantically related, which may lead to artificially longer colour-naming times. Ideally, the Stroop task should have been conducted on a computer, which would have enable words to be presented singly. It was for reasons of practicality (namely lack of portable computer equipment) that patients were tested using cards. Patients suffering from the Cotard delusion can sometimes be treated very quickly (with ECT and/or lithium) and need to be tested as soon as possible (the first testing session usually took place within 48 hours of notification of the patient's delusion). Since the patients tested in Chapter Four were located in very different parts of the country, it was not feasible to arrange for the transportion of bulky computer equipment in the short time available. Future studies should test patients on colour-screens, with words presented individually to enable measurement of single words. In addition, presentation of all words should be presented randomly, rather than semantically-related words appearing one after another. This would preclude the possibility of 'build-up', i.e., increased attentional bias over the course of a card consisting entirely of, say, death-related words. Second, it enables assessment of whether the effect found in patients were due to all words, or just one or two (e.g., *death*, but not *undertaker*).

In future studies, in addition to presented the Stroop task, a visual search task could be administered in which the same words presented for the Stroop could be presented for reading only. The order in which subjects perform the tasks would need to be counterbalanced to ensure that the task presented first was not having a priming effect on the second. Another possible task might be an auditory shadowing task. This would help to establish that attentional bias is not context-dependent (i.e., occurs only in Stroop).

To return to the issue of investigating delusions, it was suggested in Chapter Four that attentional biases in delusions serve to reinforce those delusional

beliefs by constantly focusing the attention of patients onto any information that they perceive as being relevant to their beliefs. This fits in with the suggestion that the Cotard delusion (and also the Capgras delusion) is a reflection of patients' misinterpretations of perceptually abnormal experiences (e.g., Young *et al.*, 1992; Wright *et al.*, 1993). Support for this hypothesis was presented in the analyses of the four single cases of the Cotard delusion presented in Chapter Three.

The subjective experiences of people suffering from the Cotard delusion, also reported in Chapter Three, provide a number of illustrations of the way in which misinterpretation of perceptual anomalies and attentional bias may interact to reinforce the belief that one is dead. Take, for example, RB's preoccupation with the clock. He looked at the clock continually and frequently pointed out that it should not be moving. Rather than accepting this as evidence that he must be alive, RB insisted that the clock should not be moving in time *because* he was dead. Equally striking was the interaction between MB's perceptually abnormal experiences and her belief that she was dead. She continually insisted that she had no emotions; she felt neither sadness nor happiness, and felt cut off from the world. Her feelings of depersonalisation and derealisation were taken by MB as evidence that she was dead; she could not possibly be alive if she had no feelings. If, as noted in Chapter One, Descartes' *cogito ergo sum* is taken to mean "I think *and feel* therefore I am", MB appeared to deny her existence because she no longer felt anything; she appeared to be saying "I do not feel, therefore I am not".

JK also took her feelings of derealisation and depersonalisation as evidence that she was dead, and referred to them constantly. Furthermore, JK was for a time extremely preoccupied with the belief that she was responsible for world-wide disasters. She interpreted her delusional beliefs that she had predicted bad weather and catastrophes world-wide as evidence that she had been responsible for their occurrence. This, in turn, served to reinforce her extreme feelings of guilt. While it may be argued that such feelings and beliefs can be interpreted, in psychodynamic terms, as reflecting a death-wish (e.g., Enoch & Trethowan, 1979), such an

explanation cannot account for why the beliefs themselves (i.e., predicting, and then believing oneself to be responsible for, catastrophes) first arise.

Also of interest in terms of subjective experience and objective data, are JK's feelings of *déjà vu*. *Déjà vu* represents a type of perceptually anomalous experience in the same way as its suggested negative counterpart, depersonalisation (Myers & Grant, 1972). Support for the theory of Young and his colleagues (e.g., Young *et al.*, 1992; Wright *et al.*, 1993) that anomalous perceptual experiences, face memory impairment and depression interact, to lead to the particular belief that one is dead, was presented in Chapter Three. It was also noted that the Cotard delusion is associated with right hemisphere damage affecting the temporo-parietal regions, as well as bilateral frontal damage.

It is interesting, therefore, that feelings of derealisation, depersonalisation and *déjà vu* experiences are more common in some patients with temporal lobe epilepsy than they are in normals (Walsh, 1987). Walsh argues that with temporal lobe disturbances there is a "fresh interpretation of current experience" (p186). In attempting to explain this phenomenon, Simpson (1969) argued that to make a decision regarding the familiarity of an object or situation, a comparison needs to be made between the current sensory input and the memory of one's past experience. Simpson suggested that when this comparison produces a coincidental familiarity response, the present sensory input will appear to the individual as familiar. This could happen even if the individual had had no similar experience in his life. This hypothesis is also able to account for the experience of *jamais vu*, in which case the comparison between stored memory and current sensory input produces an inappropriate lack of familiarity, when the individual had had the same experience before.

To summarise, there is an established link between the temporal lobes and both inappropriate feelings of familiarity and inappropriate feelings of a lack of familiarity. It is noteworthy in this respect that Drake (1988) reported three cases of the Cotard delusion in the context of temporal lobe epilepsy. Noting Joseph's

(1986) case report of a patient with coexistent Cotard and Capgras delusions, Drake (1988) suggested that the two delusions represent "an ultimate manifestation of the unreality and depersonalisation characteristic of nondominant temporal lobe lesions" (p.39).

Not only do such findings provide support for Young's (Young *et al.*, 1992; Wright *et al.*, 1993) theory of the formation of the Cotard delusion, they also provide a direct link between his theory and patients' own subjective experiences, such as those reported in Chapter Three. Hence, all patients suffered from perceptually anomalous experiences, had impaired recognition memory for faces (as measured by the RMT), and suffered from depression. Central to such perceptually anomalous experiences are inappropriate feelings of unfamiliarity and, in the case of JK, inappropriate feelings of familiarity.

That patients are preoccupied with their delusional beliefs has already been noted. Attentional biases are a reflection of this preoccupation that reinforce the interpretations individuals have placed on their perceptually anomalous experiences. This reinforcing mechanism operates by constantly focusing patients' attention on any information that they perceive as being relevant to, and interpret as consistent with, their delusional beliefs.

To summarise, the depressed mood demonstrated in people suffering from the Cotard delusion leads them to seek an internal attribution for alterations in their perceptual experience. Having correctly interpreted this change in perceptual experience as a change in themselves, patients go on to infer that they are dead. They then seek out further information that, according to them, confirms this interpretation. Of course, it must be stressed that the seeking of confirmatory evidence is not in itself a pathological behaviour pattern; confirmation bias is widely prevalent in human reasoning (see, e.g., Wason, 1960). However, patients' preoccupation with searching for seemingly confirmatory evidence reinforces their initial interpretation, and they are then caught in a vicious cycle from which it is difficult to break free. Hence the success of treatments such as lithium and ECT

(electro-convulsive therapy) that relieve the depressed mood and, in turn, relieve the need to seek an internal attribution for the altered perception.

The issues addressed in this thesis point to a number of areas that further research might address. First, a question arises as to whether perceptual anomalies pre-date the depressed mood and, if so, by how much. This would be difficult to ascertain, of course, since patients are referred for treatment after they have become depressed or even after they have formed the delusion. A longitudinal study of the Cotard delusion (such as that undertaken with patient JK) might, however, address the issue of how long such perceptual difficulties persist after the Cotard delusion has remitted. In terms of attentional biases in delusions, more research is needed to ascertain whether they may be demonstrated in other types of delusion and, if so, whether the argument that such biases act as a reinforcing mechanism for delusional beliefs is able to account for the maintenance of those delusions. Furthermore, it remains to be established whether attentional bias can be demonstrated in the normal population. If it can, it needs to be demonstrated whether there are any quantitative differences in attentional biases between normals and patients with psychopathological disorders. This could involve a simple measurement of how much longer it takes to colour-name test lists than neutral lists.

Finally, I return to Cotard and his description of *le délire de négation*. As we have seen, Cotard's original conception of *le délire de négation* accords better with the cases described in Chapters Two and Three than does the commonly-held view of a Cotard *syndrome*. What is particularly striking is that many of the points made in the present thesis, and those made by Young and his colleagues (Young *et al.*, 1992, Wright *et al.* 1993, Young *et al.*, 1994), were made by Cotard, either explicitly or implicitly. For example, Cotard (1884) referred to a loss of visual imagery in some of his patients - a deficit often associated with visual recognition deficits (e.g., Charcot & Bernard, 1883; Young & van de Wal, 1996). He believed this to be significant in the formation of the delusion. Hence, he suggested the delusion was the result of a misinterpretation of the altered perceputal experience and

that, given this, the delusions were not without logic. Cotard (1884) also noted that one of his patients (case 4) not only believed she was dead, but believed her daughter was the devil in disguise. She also failed to recognise her family, although, as Cotard implies, this may have been because she ceased to believe in their existence. Nevertheless, the linking of the two types of delusion is clear, and it becomes even more clear in what is best described as an early version of the attribution hypothesis: At the end of his (1882) report, Cotard tables an impressive list of contrasts and parallels between the delusion of negation and that of persecution. He concludes that in delusions of negation 'Le malade s'accuse lui-même', whereas in delusions of persecution 'Le malade s'en prend au monde extérieur'. It is incredible to think that, more than a century later, Cotard's insights are finally being recognised as fundamental to our understanding of such delusions.

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APPENDIX 1

Case reports analysed in Chapter Two.

Case Number	Reference
1	Campbell, Volow and Cavenar (1981).
2	Drake (1988) (Case 1)
3	" " (Case 2)
4	" " (Case 3)
5	Enoch and Trethowan (1979) (Case 1)
6	" " " (Case 2)
7	" " " (Case 3)
8	" " " (Case 4)
9	" " " (Case 5)
10	Förstl and Beats (1992 (translation of Bonnet, 1788)
11	Joseph and O'Leary (1986)
12	Kearns (1987)
13	Malone and Malone (1992)
14	Sommer and Petrides (1992)
15	Terao, Fujino, Egashira and Abe (1992)
16	Wright, Young and Hellawell (1993)
17	Young, Robertson, Hellawell, de Pauw and Pentland (1992)

APPENDIX 2

Word lists used in JK's Stroop task (Chapter Four)

1. *Death-related words*: coffin, died, funeral, grave, undertaker.
   Mean frequency = 32.60, SD = 43.33; Mean length = 6.40, SD = 2.30.

2. *Depression-related words*: defeat, depressed, failure, hopeless, sad.
   Mean frequency = 35.80, SD = 31.40; Mean length = 6.60, SD = 2.30.

3. *Word related to duplicates*: copy, double, duplicate, impostors, substitute.
   Mean frequency = 29.00, SD = 31.01; Mean length = 7.60, SD = 2.51.

4. *Suspiciousness-related words*: deceit, follow, spy, stare, suspicious.
   Mean frequency = 29.20, SD = 45.81; Mean length = 5.40, SD = 2.79.

5. *Anxiety-related words*: anxious, nervous, stress, tense, worried.
   Mean frequency = 39.00, SD = 17.79; Mean length = 6.40, SD = 0.89.

6. *Neutral words A*: anchor, basement, details, magazine, sell.
   Mean frequency = 35.60, SD = 31.17; Mean length = 6.60, SD = 1.67.

7. *Neutral words B*: jacket, jeans, telephone, walkman, watch.
   Mean frequency = 41.00, SD = 32.99; Mean length = 6.40, SD = 1.67.

APPENDIX 3

Word lists used for MB & JA's Stroop task (Chapter Four)

1a. *Death-related words*: coffin, died, funeral, grave, undertaker.
Mean frequency = 32.60, SD = 43.33; Mean length = 6.40, SD = 2.30.

1b. *Neutral-death words*: amble, bud, foundation, gather, standard.
Mean frequency = 32.60, SD = 42.49; Mean length = 6.40, SD = 2.70.

2a. *Depression-related words*: defeat, depressed, failure, hopeless, sad.
Mean frequency = 35.80, SD = 31.40; Mean length = 6.60, SD = 2.30.

2b. *Neutral-depression words*: anchor, basement, details, magazine, sell.
Mean frequency = 35.60, SD = 31.17; Mean length = 6.60, SD = 1.67.

3a. *Words related to duplicates*: copy, double, duplicate, impostors, substitute.
Mean frequency = 29.00, SD = 31.01; Mean length = 7.60, SD = 2.51.

3b. *Neutral-duplicates words*: allow, component, henceforth, tray, waterfall.
Mean frequency = 29.60, SD = 30.05; Mean length = 7.40, SD = 2.70.

4a. *Suspiciousness-related words*: deceit, follow, spy, stare, suspicious.
Mean frequency = 29.20, SD = 45.81; Mean length = 5.40, SD = 2.79.

4b. *Neutral-suspiciousness words*: alignment, central, launch, paints, ply.
Mean frequency = 29.40, SD = 49.07; Mean length = 6.20, SD = 2.17.

5a. *Anxiety-related words*: anxious, nervous, stress, tense, worried.
Mean frequency = 39.00, SD = 17.79; Mean length = 6.40, SD = 0.89.

5b. *Neutral -anxiety words*: adult, castle, doorway, feather, library.
Mean frequency = 38.20, SD = 19.70; Mean length = 6.40, SD = 0.89.

Word lists used for SD's Stroop task (Chapter Five)

1a. *Death-related words*: coffin, died, funeral, grave, undertaker.
Mean frequency = 32.60, SD = 43.33; Mean length = 6.40, SD = 2.30.

1b. *Neutral-death words*: amble, bud, foundation, gather, standard.
Mean frequency = 32.60, SD = 42.49; Mean length = 6.40, SD = 2.70.

2a. *Depression-related words*: defeat, depressed, failure, hopeless, sad.
Mean frequency = 35.80, SD = 31.40; Mean length = 6.60, SD = 2.30.

2b. *Neutral-depression words*: anchor, basement, details, magazine, sell.
Mean frequency = 35.60, SD = 31.17; Mean length = 6.60, SD = 1.67.

3a. *Words related to duplicates*: copy, double, duplicate, impostors, substitute.
Mean frequency = 29.00, SD = 31.01; Mean length = 7.60, SD = 2.51.

3b. *Neutral-duplicates words*: allow, component, henceforth, tray, waterfall.
Mean frequency = 29.60, SD = 30.05; Mean length = 7.40, SD = 2.70.

4a. *Suspiciousness-related words*: deceit, follow, spy, stare, suspicious.
Mean frequency = 29.20, SD = 45.81; Mean length = 5.40, SD = 2.79.

4b. *Neutral-suspiciousness words*: alignment, central, launch, paints, ply, .
Mean frequency = 29.40, SD = 49.07; Mean length = 6.20, SD = 2.17.

5a. *Anxiety-related words*: anxious, nervous, stress, tense, worried.
Mean frequency = 39.00, SD = 17.79; Mean length = 6.40, SD = 0.89.

5b. *Neutral-anxiety words*: adult, castle, doorway, feather, library.
Mean frequency = 38.20, SD = 19.70; Mean length = 6.40, SD = 0.89.

6a. *Grandiose delusion words*: chess, guitar, hypnosis, mother, russian.
Mean frequency = 82.60, SD = 126.58; Mean length = 6.40, SD = 1.14

6b. *Neutral-grandiose words*: chalet, decimal, fully, recipe, therefore.
Mean frequency = 83.20, SD = 127.82; Mean length = 6.60, SD = 1.52.

APPENDIX 5

Word lists used for the schizophrenia Stroop task (Chapter Six)

Word lists presented to all patients

1a. *Depression-related words*: defeat, depressed, hopeless, miserable, sad.
Mean frequency = 22.20, SD = 14.29; Mean length = 7.00, SD = 2.55.

1b. *Neutral-depression words*: casually, introduce, paints, rod, similarly.
Mean frequency = 22.20, SD = 14.29; Mean length = 7.00, SD = 2.55.

2a. *Anxiety-related words*: anxious, nervous, stress, tense, worried.
Mean frequency = 39.00, SD = 17.79; Mean length = 6.40, SD = 0.89.

2b. *Neutral-anxiety words*: adult, castle, doorway, feather, library.
Mean frequency = 38.20, SD = 19.70; Mean length = 6.40, SD = 0.89.

Individual word lists

S1. *Personal delusion words*: exercise, face, inflammation*, mirror, sun.
Mean frequency = 139.75, SD = 179.73; Mean length = 6.60, SD = 3.58.
Neutral-personal words: alphabetical, article, build, oven, upon.
Mean frequency = 139.25, SD = 179.28; Mean length = 6.60, SD = 3.21.

Other delusion words: compensation, fluid, milk, tuberculosis, whipround.
Mean frequency = 32.50, SD = 46.75; Mean length = 8.40, SD = 3.78.
Neutral-other words: handkerchief, localisation, pole, sideboard, trees.
Mean frequency = 32.50, SD = 45.01; Mean length = 8.20, SD = 3.56.

S2. *Personal delusion words*: adopted, celt, conspiracy, jewish, sister.
Mean frequency = 39.40, SD = 33.09; Mean length = 6.60, SD = 2.19.
Neutral-personal words: auditorium, bean, joined, levels, setting.
Mean frequency = 39.40, SD = 33.09; Mean length = 6.60, SD = 2.19.

Other delusion words: exercise, face, inflammation, mirror, sun.
Mean frequency = 139.75, SD = 179.73; Mean length = 6.60, SD = 3.58.
Neutral-other words: alphabetical, article, build, oven, upon.
Mean frequency = 139.25, SD = 179.28; Mean length = 6.60, SD = 3.21.

Word lists used for the schizophrenia Stroop task (Contd.)

Individual word lists (Contd.)

S3. *Personal delusion words*: benefit, bully, fraud, informer, victimise.
Mean frequency = 15.40, SD = 25.58; Mean length = 6.80, SD = 1.79.
Neutral-personal words: afterward, pasture, portable, solid, tally.
Mean frequency = 15.40, SD = 25.58; Mean length = 6.80, SD = 1.79.

Other delusion words: adopted, celt, conspiracy, jewish, sister.
Mean frequency = 39.40, SD = 33.09; Mean length = 6.60, SD = 2.19.
Neutral-other words: auditorium, bean, joined, levels, setting.
Mean frequency = 39.40, SD = 33.09; Mean length = 6.60, SD = 2.19.

S4. *Personal delusion words*: death, eye, pictures, shoulder, thief.
Mean frequency = 96.60, SD = 82.75; Mean length = 5.80, SD = 2.17.
Neutral-personal words: afternoon, dale, equally, shown, wood.
Mean frequency = 96.60, SD = 83.75; Mean length = 5.80, SD = 2.17.

Other delusion words: bed, flashes, heart, man, sleep.
Mean frequency = 304.00, SD = 436.52; Mean length = 4.60, SD = 1.67.
Neutral-other words: ball, cab, paper, various, where, .
Mean frequency = 300.60, SD = 416.86; Mean length = 4.80, SD = 1.48.

S5. *Personal delusion words*: abusive, follow, kim, swearing, telepathy.
Mean frequency = 24.00, SD = 48.65; Mean length = 7.20, SD = 2.77.
Neutral-personal words: diagonal, afterward, pebble, shrubbery, tea.
Mean frequency = 24.00, SD = 48.65; Mean length = 7.20, SD = 2.77.

Other delusion words: head, hollow, nerves, spiders, wood.
Mean frequency = 101.20, SD = 172.79; Mean length = 5.40, SD = 1.34.
Neutral-other words: breeze, cartoon, hill, peel, rather.
Mean frequency = 101.00, SD = 170.10; Mean length = 5.40, SD = 1.34.

Word lists used for the schizophrenia Stroop task (Contd.)
Individual word lists (Contd.)

S6. *Personal delusion words*: affair, control, hem, implant, pull.
    Mean frequency = 56.00, SD = 81.80; Mean length = 5.40, SD = 1.82.
    Neutral-personal words: cake, hop, lettuce, market, precise.
    Mean frequency = 56.00, SD =82.29 ; Mean length = 5.40, SD = 1.82.

    Other delusion words: abusive, follow, kim, swearing, telepathy.
    Mean frequency = 24.00, SD = 48.65; Mean length = 7.20, SD = 2.77.
    Neutral-other words: diagonal, afterward, pebble, shrubbery, tea.
    Mean frequency = 24.00, SD = 48.65; Mean length = 7.20, SD = 2.77.

S7. *Personal delusion words*: birds, face, mirror, punishment, scabs*.
    Mean frequency = 132.25, SD = 185.13; Mean length = 6.00, SD = 2.35.
    Neutral-personal words: agriculture, avenue, broom, page, upon.
    Mean frequency = 132.50, SD = 184.18; Mean length = 6.20, SD = 2.77.

    Other delusion words: affair, control, hem, implant, pull.
    Mean frequency = 56.00, SD = 81.80; Mean length = 5.40, SD = 1.82.
    Neutral-other words: cake, hop, lettuce, market, precise.
    Mean frequency = 56.00, SD =82.29 ; Mean length = 5.40, SD = 1.82.

S8. *Personal delusion words*: devil, healing, heaven, pray, singing.
    Mean frequency = 22.20, SD = 11.86; Mean length = 5.80, SD = 1.30.
    Neutral-personal words: badge, cattle, circuit, fellows, nets.
    Mean frequency = 22.40, SD = 11.59; Mean length = 5.80, SD = 1.30.

    Other delusion words: birds, face, mirror, punishment, scabs*.
    Mean frequency = 132.25, SD = 185.13; Mean length = 6.00, SD = 2.35.
    Neutral-other words: agriculture, avenue, broom, page, upon.
    Mean frequency = 132.50, SD = 184.18; Mean length = 6.20, SD = 2.77.

* denotes word did not appear in LOB Corpus. Word-matching approximated in such cases.

APPENDIX 6

Planned comparisons between colour-naming times on test and neutral lists in the schizophrenia Stroop task (Chapter Six)

1. Personal delusion x neutral: $t=1.03$
2. Other delusion x neutral: $t=2.66$
3. Depression x neutral: $t=1.43$
4. Anxiety x neutral: $t=2.75$

Critical value of t (df=6) with alpha set at 0.005 = 5.95

Correlations between HAD scores and the colour-naming interference indices for the schizophrenia Stroop task (Chapter Six)

Word list	HAD Anxiety	HAD Depression
Personal delusion	-0.360	0.078
Other personal	0.427	0.288
Depression	-0.324	-0.073
Anxiety	0.072	0.322

Critical value of *r* at the 5% level (df=2) =.7067

APPENDIX 8

Word lists used for the student Stroop task (Chapter Seven)

1a. *Exam-related words:* exams, paper, question, results, revision.
Mean frequency = 136.40, SD = 119.41; Mean length = 6.60, SD = 1.52.

1b. *Neutral-exam words:* atlas, component, probably, story, street.
Mean frequency = 137.60, SD = 118.96; Mean length = 6.60, SD = 1.82.

2a. *College-related words:* bedder, college, fellow, pigeonhole, porters.
Mean frequency = 68.33, SD = 70.95; Mean length = 7.20, SD = 1.64.

2b. *Neutral-college words:* aggregated, centre, groves, indicate, ornate.
Mean frequency = 68.33, SD = 69.96; Mean length = 7.40, SD = 1.67.

3a. *Depression-related words:* defeat, depressed, hopeless, miserable, sad.
Mean frequency = 22.20, SD = 14.29; Mean length = 7.00, SD = 2.55.

3b. *Neutral-depression words:* casually, introduce, paints, rod, similarly.
Mean frequency = 22.20, SD = 14.29; Mean length = 7.00, SD = 2.55.

4a. *Anxiety-related words:* anxious, nervous, stress, tense, worried.
Mean frequency = 39.00, SD = 17.79; Mean length = 6.40, SD = 0.89.

4b. *Neutral-anxiety words:* adult, castle, doorway, feather, library.
Mean frequency = 38.20, SD = 19.70; Mean length = 6.40, SD = 0.89.

APPENDIX 9

Planned comparisons between errors on test and neutral lists in the student Stroop task (Chapter Seven)

1. Lent test lists x Lent neutral lists: t=1.17
2. Summer test lists x Lent neutral lists: t=0.00
3. Lent test lists x Summer test lists: t=2.13
4. Lent neural lists x Summer neutral lists: t=2.20
5. Lent x Summer (all errors): t=2.74

Critical value of t (df=8) with alpha set at 0.005 = 5.04

APPENDIX 10

Planned comparisons between colour-naming on test and neutral lists in the student Stroop task (Chapter Seven)

Lent	t	Mean	Sd
1. Exam x neutral:	t=2.00	1.00	1.50
2. College x neutral:	t=2.65	3.67	4.15
3. Depression x neutral:	t=0.24	2.56	5.88
4. Anxiety x neutral:	t=0.51	0.44	2.60

Summer			
1. Exam x neutral:	t=1.57	2.67	5.10
2. College x neutral:	t=3.33	4.00	3.61
3. Depression x neutral:	t=0.56	0.78	4.15
4. Anxiety x neutral:	t=0.24	0.22	2.73

Critical value of t (df=8) with alpha set at 0.005 = 5.04

Correlations between HAD scores and the colour-naming interference indices for the student Stroop task (Chapter Seven)

Word List	HAD Anxiety		HAD Depression	
	Lent	*Summer*	*Lent*	*Summer*
Exams	.310	.027	.355	-.280
College	-.136	-.181	.409	.415
Depression	.022	-.114	.100	-.006
Anxiety	-.204	-.382	.399	.352

Critical value of r at the 5% level (df=7) = .6664

APPENDIX 12

Words used in the biker Stroop task (Chapter Seven)

1a. *Bikes-related words*: harley, honda, kawasaki, suzuki, yamaha.
   Mean frequency - Not applicable; Mean length = 6.20, SD = 1.10.

1b. *Neutral-bikes words*: alphabet, editor, garden, ideally, pedal.
   Mean frequency - Not applicable; Mean length = 6.40, SD = 1.14.

2a. *Depression-related words*: defeat, depressed, hopeless, miserable, sad.
   Mean frequency = 22.20, SD = 14.29; Mean length = 7.00, SD = 2.55.

2b. *Neutral-depression words*: casually, introduce, paints, rod, similarly.
   Mean frequency = 22.20, SD = 14.29; Mean length = 7.00, SD = 2.55.

3a. *Anxiety-related words*: anxious, nervous, stress, tense, worried.
   Mean frequency = 39.00, SD = 17.79; Mean length = 6.40, SD = 0.89.

3b. *Neutral-anxiety words*: adult, castle, doorway, feather, library.
   Mean frequency = 38.20, SD = 19.70; Mean length = 6.40, SD = 0.89.

Correlations between HAD scores and the colour-naming interference indices for the biker Stroop task (Chapter Seven)

	HAD Anxiety		HAD Depression	
Word List	*Bikers*	*Controls*	*Bikers*	*Controls*
Bikes	-.462	.475	-.115	.498
Depression	.345	-.758	.224	-.615
Anxiety	-.140	.149	.396	.393

Critical value of r at the 5% level (df=6) = .7067

APPENDIX 14

Word lists used in the rower Stroop task (Chapter Seven)

1a. *Rowing-related words*: blade, catch, finish, rating, stroke.
Mean frequency = 26.20, SD = 17.11; Mean length = 5.60, SD = 0.55.

1b. *Neutral-rowing words*: bonus, cereal, dozen, review, summit.
Mean frequency = 26.20, SD = 17.31; Mean length = 5.60, SD = 0.55.

2a. *Depression-related words*: defeat, depressed, hopeless, miserable, sad.
Mean frequency = 22.20, SD = 14.29; Mean length = 7.00, SD = 2.55.

2b. *Neutral-depression words*: casually, introduce, paints, rod, similarly.
Mean frequency = 22.20, SD = 14.29; Mean length = 7.00, SD = 2.55.

3a. *Anxiety-related words*: anxious, nervous, stress, tense, worried.
Mean frequency = 39.00, SD = 17.79; Mean length = 6.40, SD = 0.89.

3b. *Neutral-anxiety words*: adult, castle, doorway, feather, library.
Mean frequency = 38.20, SD = 19.70; Mean length = 6.40, SD = 0.89.

Planned comparisons between errors on the test and neutral lists for the rower Stroop task (Chapter Seven)

1. Rowers
a) Rowing vs neutral rowing: $t=1.449$
b) Depression vs neutral depression: $t=1.820$
c) Anxiety vs neutral anxiety: $t=2.244$

2. Controls
a) Rowing vs neutral rowing: $t-=1.149$
b) Depression vs neutral depression: $t=0.000$
c) Anxiety vs neutral anxiety: $t=0.000$

Critical value of t (df=11) with alpha set at 0.005 = 4.43

Planned comparisons between errors on the test and neutral lists for the rower Stroop task (Chapter Seven)

Rowers versus controls
a) Rowing: $t=0.226$
b) Neutral rowing: $t=1.076$
c) Depression: $t=1.387$
d) Neutral depression: $t=0.000$
e) Anxiety: $t=1.067$
f) Neutral anxiety: $t=0.833$

Critical value of t (df=22) with alpha set at 0.005 = 3.79

Correlations between HAD scores and the colour-naming interference indices for the rower Stroop task (Chapter Seven)

Word List	HAD Anxiety		HAD Depression	
	Rowers	*Controls*	*Rowers*	*Controls*
Rowers	-.119	-.461	-.396	-.040
Depression	-.300	-.586	.429	-.489
Anxiety	.438	-.483	.274	-.554

Critical value of *r* at the 5% level (df=9) = .6021