

**THE NATURE OF DELUSION AND
DELUSION-LIKE BELIEF**

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Thesis submitted to Cardiff University in fulfilment of the requirements
for the degree of Doctor of Philosophy

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DECLARATION

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SUMMARY

Delusions have been defined as false beliefs different from those that almost everyone believes. However, studies suggest that beliefs (including delusions) comprise a continuum where content does not distinguish psychosis.

Despite the explicit characterisation of delusions as (false) beliefs, most research has focused on delusions while neglecting non-clinical beliefs. To address this, the first formal study of key features of belief was conducted. A large public survey (n=1000) confirmed that most regarded beliefs as relatively stable personal convictions, capable of influencing thoughts and/or behaviour. These participants then completed the Cardiff Beliefs Questionnaire (CBQ), a newly developed measure designed to investigate the prevalence of different types of belief (delusion-like [bizarre and non-bizarre], paranormal, religious, and societal/cultural). Results showed that 38% of participants strongly endorsed one or more delusion-like belief(s) (DLB), with 91% reporting at least one 'weak', 'moderate' or 'strong' DLB. Moreover, 26% strongly endorsed at least one bizarre DLB. Levels of DLB endorsement were not distinguishable from those of paranormal and religious beliefs (P&RB). These findings support a continuum account but present difficulties for existing clinical definitions of delusion.

The CBQ also investigates anomalous experiences (AE), given their proposed causal role in delusion formation. AE and anomalous beliefs (DLB and P&RB) were associated in this sample, but the relationship was not found for all individuals, suggesting that having AE is neither necessary nor sufficient for holding anomalous beliefs.

Finally, belief consistency and coherence were explored across and within different belief types. DLBs appeared less stable than other belief types, emphasising the importance of functional characteristics in distinguishing clinically relevant beliefs. In addition, while seemingly contradictory beliefs were reported by some, results generally supported coherence between DLB and P&RB. Collectively, these findings complement those of traditional clinical studies, while demonstrating the value of non-clinical investigations in elucidating the nature of delusions.

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CHAPTER 1

BELIEF AND DELUSION

1.1 INTRODUCTION

“For those who believe, no proof is necessary. For those who don't believe, no proof is possible” [Stuart Chase]

Individuals hold many different beliefs ranging from simple causal beliefs that act as explanations for the events of our everyday lives, to more complex social beliefs (e.g., religious or paranormal ideas) that often play a key role in identity formation. According to Damasio (2000, p.326), the main purpose of belief is to provide meaning and certainty “about matters that have to do with the idea we hold of ourselves”. Beliefs may be powerful because as social constructs they provide for a shared meaning of the world. Indeed some people have been willing to die and to kill for beliefs. Moreover, as the quote by Chase above suggests, beliefs can provide comfort, or elicit derision or (in the case of delusions) distress for both the individual and their family and friends.

Although Fodor (1981, p.93) claimed that many “theories in the cognitive sciences are largely about the belief organisms have”, the formal study of beliefs has received comparatively little interest within mainstream psychology, and even fewer attempts have been made to link research between interested clinical and theoretical disciplines such as psychiatry and philosophy. However, the recent study of delusions, when viewed through a cognitive neuropsychological approach (cognitive neuropsychiatry), has begun to offer a productive framework for understanding normal beliefs (Coltheart et al., 2007; Garety & Hemsley, 1994; Halligan & David, 2001; Langdon & Coltheart, 2000). For many within psychiatry, delusions are

considered to be pathological forms, or products, of belief processes (e.g., Bentall et al., 2001; Davies et al., 2001; Freeman, Garety & Kuipers, 2001; Langdon & Coltheart, 2000; Oltmanns & Maher, 1988; van Os, 2003). Furthermore, the link between beliefs and the study of delusions has been reinforced by the growing evidence of a continuum of beliefs where only a minority are of clinical relevance or provide for significant morbidity or disability (Blackwood et al., 2001; Claridge, 1994; Crow, Done & Sacker, 1995; Johns & van Os, 2001; Rutten et al., 2008; Strauss, 1969; van Os et al., 2009). The fact that more people in the general population report beliefs that resemble delusions in both content, factor structure, demographic and risk factor associations than the clinical population (van Os et al., 2009) suggests that the investigation of these non-clinical samples provides a rich and relatively untapped vein for future research.

In pursuing a number of these research questions related to the nature of belief and its pathology, this thesis assumes that most clinical delusions are beliefs and that beliefs are best understood from a dimensional or continuum approach (notwithstanding the understandable clinical requirement of categorical diagnostic boundaries). Given these framework assumptions, the main research questions explored in this thesis focus on four linked themes: (1) understanding and refining the characteristic features of the term 'belief' held by the general public; (2) establishing the prevalence of different types of beliefs (including delusion-like beliefs) and anomalous experiences (including hallucination-like experiences) in the general population; (3) exploring the relationship between beliefs and experiences; and finally (4) examining the neglected area relating to the consistency and coherence of delusion-like and other beliefs. (See Figure 1.1 for a road map of the main thesis research questions and cross links.)

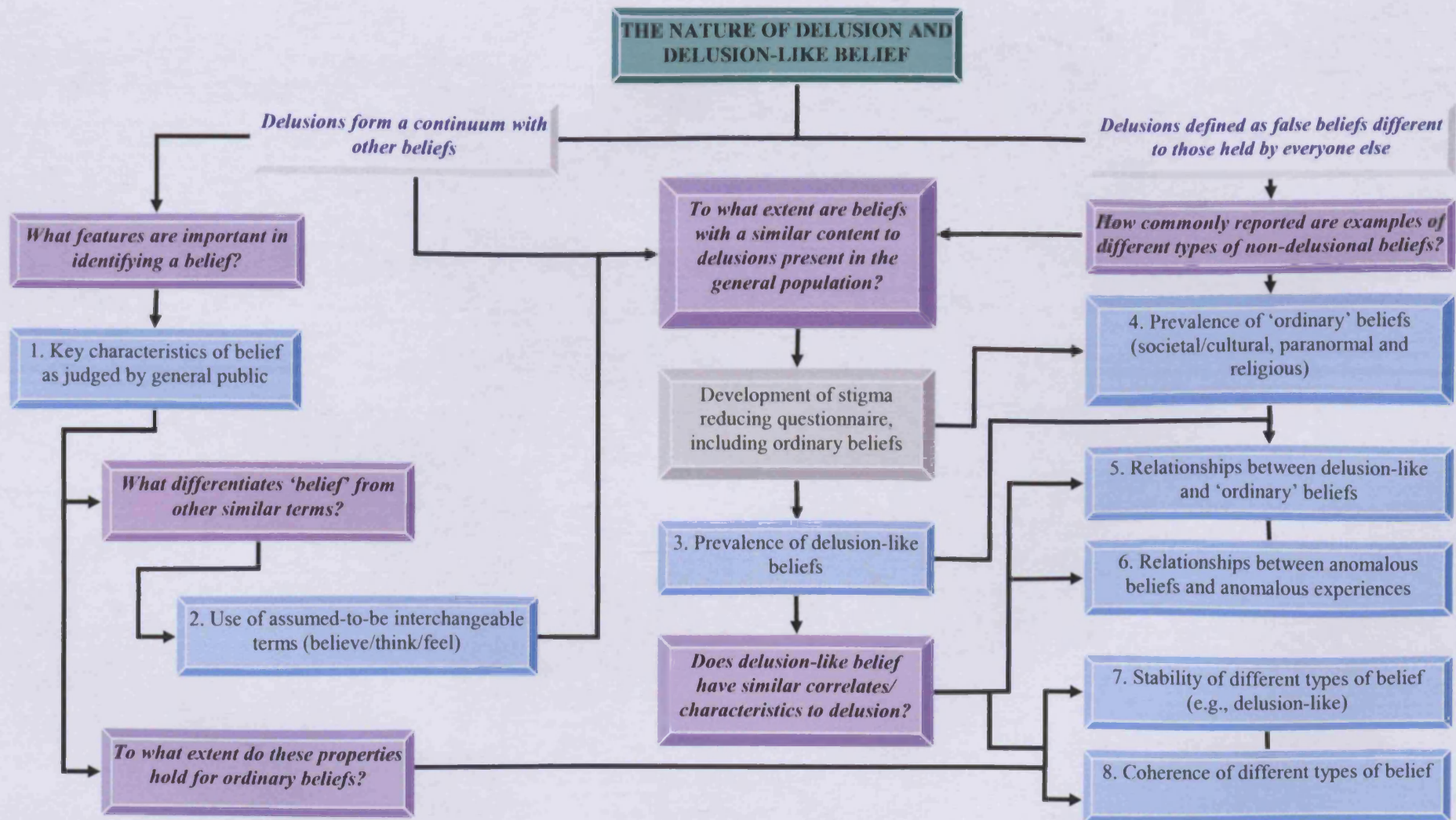


Figure 1.1. Main research questions (purple boxes), related studies (blue boxes) and inter-connections (arrows), following from two influential accounts of delusions (white boxes: the continuum account [left] and DSM definition [right]). The thesis discusses the studies in the order indicated here.

This first chapter will describe the background behind and need to address these areas, beginning with a review of current philosophical ideas defining 'belief'. The second section will link belief and delusions, considering the psychiatric conceptualisation of delusion as a form of belief and outlining the importance of the continuum approach for investigating delusional beliefs.

1.2 WHAT IS MEANT BY A BELIEF?

Investigations of belief have been carried out in multiple subject areas, in particular within philosophy, psychology and psychiatry. Given the distinct motives driving each area of research, different aspects of the concept have been debated within each discipline. Within philosophy, a primary focus has been on identifying the defining characteristics of belief. Within psychology, work has begun to address the cognitive systems underlying belief (i.e., identifying those features that are necessary and/or sufficient for belief formation and its maintenance), as well as investigating the influence of belief on other cognitive processes. Finally, psychiatry has mainly focused on categorising and diagnosing pathological beliefs and investigating the prognostic outcome associated with these.

1.2.1 Philosophical concepts of belief

Despite the term 'belief' being used frequently and without apparent misunderstanding in everyday life, "*there is no philosophical consensus about just what a belief actually is*" (McKay & Dennett, 2009). In 1739, the Scottish philosopher and advocate of empiricism David Hume stated that belief '*has never yet been explain'd by any philosopher*' and over a quarter of a millennium later an agreed definition for this term remains elusive.

Nevertheless, several attempts have been made to explain belief. The following criteria are those that commonly feature in discussions and definitions of belief (e.g., Borg, 2001; Campbell, 1967; Oxford English Dictionary; Price, 1934; Stephens & Graham, 2004; Williams, 1970):

Beliefs should: (1) be coherent, (a) within themselves and (b) as part of a wider web of beliefs; (2) be supported by subjectively sufficient evidence (i.e., the holder has confidence about the belief's truth, while objective agreement is not necessary); (3) have an impact on (a) action and (b) emotion under relevant circumstances

Criterion (3) holds to some degree for all beliefs but fluctuates with the strength and significance of the belief, being particularly relevant for strong, personally significant beliefs.

Each criterion is briefly considered and elaborated below.

(1a) Beliefs should be coherent within themselves

This first criterion appears reasonably straightforward. An elementary precondition is that a belief should be meaningful to the person holding it. Consequently, a belief should not be self-contradictory (e.g., 'I believe tapirs are bald with stripy fur', 'I believe my red pencil is green', or even 'I believe I don't have beliefs'). Without internal coherence, it would be difficult for a proposition to be consistent with other beliefs, or to have an effect on a person's actions or emotions, or provide an adequate explanation for relevant events.

(1b) Beliefs should be coherent as part of a larger web of beliefs

The key element for this criterion is coherence with and between other beliefs held by the same individual, as has been highlighted in several philosophical and psychological debates concerning the relationships and cross-influence between beliefs (Festinger, 1956; Quine & Ullian 1970; Thagard 2000). Two main philosophical views dominate: atomism and holism. Atomists, such as Price (1969), argue that beliefs comprise separate entities (corresponding perhaps to an encapsulated cognitive representation in memory). In contrast, holists (e.g., Davidson, 1984) argue that beliefs can only be understood in terms of their relations with other beliefs. This distinction is illustrated by comparing the belief 'mules are stubborn' held by one person who believes that a mule is a cross between a horse and a donkey, and another who mistakenly believes that mules are a species in their own right. Atomists consider the two people to hold the same belief, whereas holists would say these were different beliefs.

The argument that a belief must fit with the other beliefs held by an individual has also been strongly made by Quine and Ullian (1970). They argue that new beliefs must cohere with existing beliefs held by the individual, or else older beliefs need to change to accommodate these. In this way, all beliefs held by a person constitute a coherent 'web of beliefs' - the need for consistency creating a situation whereby beliefs with similar content to those already held are more likely to be endorsed by the individual. This proposal links well with Festinger's (1957) ideas from cognitive dissonance theory, which suggests individuals tend to seek consistency between cognitions. Festinger suggests that negative feelings occur when a person holds contradictory views simultaneously, and thus he/she is motivated to alter these views and/or provide justification or resolution for this discrepancy. Evidence for this type

of process is suggested in that people often seem to filter evidence in a way compatible with their previous beliefs. This is seen (in extreme form) in the subjective validation effect, where people ignore clear and unambiguous evidence that would contradict prior beliefs (Marks, 2006).

However, whilst this criterion receives support from both the philosophical and psychological literature, there appears to be little by way of formal evidence to substantiate the criterion explicitly. One aim of this thesis is to provide an initial evaluation of this criterion, looking at the extent to which beliefs held by healthy individuals cohere together (see Chapter 7).

(2) Beliefs should be supported by subjectively sufficient evidence that provides for the truth of the proposition

‘Belief’ implies that the holder has a degree of conviction in the truth of a proposition. Furthermore, this criterion highlights one of the basic distinctions between belief and knowledge. According to Kant, belief lies between opinion and certain knowledge (see Figure 1.2). Kant characterised belief as judging an idea to be true using reasons (evidence) that are objectively insufficient but subjectively sufficient. Whilst philosophers have been the major contributors to such debates, this distinction has had implications for psychiatry. Spitzer (1990) suggested patients with delusions often use the word ‘know’ rather than ‘believe’ when talking about their delusion (although this has not been formally empirically confirmed). This criterion, alongside the inclusion of (3b), provides a distinction between beliefs and knowledge, with (3b) emphasising the more personal and emotional characteristics of beliefs.

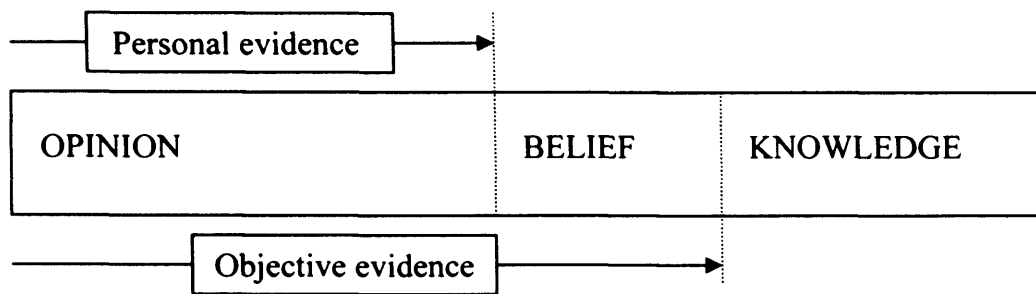


Figure 1.2. Kant’s distinction between opinion, belief and knowledge.

The dotted lines indicate where a sufficient level of evidence is reached and where a new term becomes appropriate.

In everyday use, people sometimes use the term ‘belief’ when, according to Kant, they really mean knowledge. Even within philosophical arguments, ‘beliefs’ such as ‘I am eating a tomato’ or ‘There are less than 10 planets in our solar system’ (Schwitzgebel, 2006) are used as illustrative examples. Indeed, one could argue using Kant’s distinction that all knowledge could be described as a belief, although one would be choosing a ‘weaker’ term than would be necessary. However, describing beliefs as equivalent to knowledge would be inappropriate when there is insufficient objective evidence. Indeed, portraying sufficient subjective evidence as sufficient objective evidence may in some cases suggest a lack of insight into the beliefs of others in one’s community. On the other hand, the concept of ‘sufficient objective evidence’ is obviously difficult to determine, and depends upon culture, context, and the individual. The transition between belief and knowledge may vary from person to person, and may even require different amounts of evidence to support ‘knowledge’. This, together with the fact that both terms are sometimes used interchangeably with more affective terms (such as feel), makes it even harder to distinguish these concepts in colloquial use.

(3a) Beliefs have an impact on behaviour

If someone were to profess a strong belief (e.g., that whales were fish), it would be expected that when circumstances arise that elicit that belief (e.g., if asked to classify whales into their vertebrate type), the individual would act appropriately on that belief. As such, if a belief did not appear to elicit appropriate actions, this could rightly be questioned as a belief (see section 1.3). Indeed, interpretationist or dispositionalist philosophers would argue that to say that someone believes something is to say that someone is disposed to behave in certain ways under certain conditions (e.g., Dennett, 1987). However, given that individuals may hold several beliefs relevant to a particular context (each with the potential to influence behaviour), it is not easy to disentangle the effects of a single belief on action and emotion.

In addition to their impact on other cognitive processes, beliefs can influence physical wellbeing, e.g., by affecting adherence to medication (Horne, 2006). Studies looking at the power of a placebo (a physical substance or procedure presented as having physical properties which in fact, it does not have; see Kirsch, 2006) demonstrate that patients' beliefs have a substantial effect on the outcome of treatment. For example, without explicit knowledge of (or belief in) having received morphine, the effectiveness of the painkiller is dramatically reduced (Benedetti et al., 2003). In contrast, believing that you will get better can be sufficient to cure symptoms. For example, Wolf (1950) gave a pregnant woman suffering from nausea and vomiting a drug designed to induce those very symptoms, but told her it would alleviate these; 20 minutes later the symptoms had stopped. Even subconscious cues can have an influence (e.g., feeling better just by going to the doctor) as with other conditioned responses. Goebel et al. (2002) gave 18 healthy men an immunosuppressive drug along with an unusual drink several times over three days.

Five days later, when they were given a dummy capsule and the same drink, they again experienced reduced function of the immune system, whereas a control group who took dummy pills throughout showed no such effects.

(3b) Beliefs have an impact on emotion

The word ‘belief’ originates from the Aryan word ‘lubh’, which meant ‘to like or hold dear’ (OED, 1989), suggesting an enduring link to an emotional component. There is increasing support for the notion that beliefs are connected and indeed derive their distinct nature from their relationship to emotions, both in the formation of the belief and also as a consequence of holding a particular belief. Beliefs often have emotional consequences; indeed, cognitive behavioural therapy first addresses dysfunctional beliefs held by individuals to alter or mitigate the emotions they feel as a result of holding these. On the other hand, “Emotions can awaken, intrude into, and shape beliefs, by creating them, by amplifying or altering them, and by making them resistant to change” (Frijda et al., 2000, p. 5). As such, the relationship between beliefs and emotions is complex, with a change in one capable of altering the other, which can then feed back into the former again, and so on.

1.3 VALIDITY OF THE CONCEPT

While the above criteria are commonly and widely endorsed in the published literature, there remain problems with a more precise operational definition of belief, given its multidimensional nature. In addition, the nature of belief remains controversial on the grounds that the validity of our folk or common sense usage (i.e., whether a belief exists in a manner that can be adequately characterised by our

commonly used statements of the form 'I believe X') has yet to be established. Thus, even if a formal conceptual definition were philosophically agreed, it is not clear whether such an operational definition would have ecological validity in terms of the general public's everyday usage of belief.

Four main philosophical standpoints have been described regarding the degree to which the everyday usage of the term 'belief' resembles what is considered to be the more formal understanding of belief (Baker, 1987):

(1) Our common sense understanding of belief is valid for scientific study

Some philosophers of mind (e.g., Dretske, 1988; Fodor, 1975; Millikan, 1993) argue for a representational approach ('mental sentence theory'), which claims that each belief exists as a coherent mental representation in mind, similar to the propositional content of the belief itself, although there remains disagreement as to the exact nature of these representations.

(2) Our common sense understanding of belief is not completely valid but is close enough that we can use it to gain some notion about what constitutes a belief

Stich (1983) suggests that while there will probably prove to be a relationship between current and future conceptualisations of belief, at present our ideas are impeded by a lack of knowledge, particularly regarding the neurological basis of belief.

(3) Our common sense view of belief is incorrect, but there are advantages to be gained by viewing animals or machines as having and holding beliefs

This view, commonly held by interpretationists (e.g., Davidson, 1984; Dennett, 1987, 1999), focuses on patterns of observable behaviour. For example, Dennett believes that beliefs are not reducible to the neural level. However, by taking what he refers to as ‘the intentional stance’ (i.e., by attributing beliefs to a person, and assuming he/she will act in a rational manner), we are able to produce a convenient explanation for their behaviour.

(4) Our common understanding of belief as a mental representation in mind is invalid

This view is shared by those who endorse dispositional or eliminativist approaches (e.g., Churchland, 1981). Similar to the interpretationists, dispositional views assert that if someone holds a belief, then they have one or more behavioural dispositions concerning it. Dispositionalists hold that the internal structure of mind is not important in determining whether a person holds beliefs. They argue against representational accounts by suggesting that it is improbable that there are representations in the mind for every belief statement. Marcus (1990) illustrates this using the example of implicit beliefs (e.g., few people would doubt that cats have fewer than five legs, or fewer than six, or seven, and so on). However, there have also been challenges to the dispositional account as most individuals’ behaviour is very dependent on context (e.g., denying certain religious beliefs in a climate of persecution). However, some liberal dispositionalists, such as Schwitzgebel (2002), include private mental episodes as dispositions.

Philosophers taking a stronger eliminativist approach, such as Churchland (1981), claim that 'beliefs' (as commonly used) exist only as a product of 'folk psychology'. They suggest that new scientific advances will in time produce better neuroscientific theory and that the old concept of belief will be discarded, similarly to previous outdated folk psychological ideas. Ramsay (2007) gives the example of our abandonment of once widespread beliefs that demonic possession caused mental illness, an idea which now has no place in psychiatric discussions.

Whilst several formal or academic philosophical stances suggest that the study of beliefs (as commonly understood) may not be valid at a conceptual or neural level, this is not to say that research in this area is unproductive. Indeed, one does not need to make any assumptions regarding the underlying structure of belief when embracing beliefs at the 'folk psychological' level. By doing so, this debate can be taken further by examining the folk or protoscientific understanding of belief, and establishing the characteristics that people associate with this concept.

In addition to these more formal philosophical investigations, most of us frequently use the word 'belief' in everyday life. In this manner, we all implicitly claim to have some understanding of the term 'belief', and the way in which we both use and interpret use of the term. Indeed, most researchers take for granted that people share or adopt a common usage of the term 'belief', despite a lack of empirical evidence for this assumption (there are no studies that explicitly probe the everyday use of the term). Given the difficulties described above with formal definition of belief (e.g., subjectivity when distinguishing between belief and knowledge), this assumption may be questioned. Knowledge of how people interpret the term 'belief'

when they encounter this in questionnaire-based studies or how they use the term in everyday life may help interpret their reports of beliefs. Consequentially, Chapter 3 describes a study designed to assess the general public's concept of belief, and indeed, whether there is a common social understanding. Furthermore, given that the term 'belief' is often used synonymously with other terms in everyday use, a related study examines whether the term 'belief' is considered equivalent to certain other common terms (such as think, feel) used interchangeably by some assessment measures.

1.4 CONTENT-SPECIFIC BELIEFS

1.4.1 Assessment of specific beliefs

In contrast to the more conceptual investigations of belief conducted by philosophers, psychological and psychiatric studies of beliefs have tended for the most part to focus on specific content beliefs (e.g., political, paranormal, delusional or religious beliefs). Within psychology, a useful distinction is drawn between declarative and non-declarative memory (e.g., Squire, 2004), a distinction that can be extended to beliefs (reliant on memory of past experiences and events). Declarative beliefs comprise those beliefs that one is aware of and can communicate, while non-declarative beliefs encompass those propositions or actions that one may not be explicitly aware of but that could be consistently attributed to oneself – as would stem from the philosophical dispositionalist or interpretationist approaches. Therefore it follows that there are at least three empirical routes for investigating beliefs: (1) Study people's actions and attribute beliefs on the basis that these provide plausible reasons for the observed actions, communications and/or emotions; (2) Ask participants to

identify/describe their beliefs; and finally, (3) given that the above approaches are not mutually exclusive, combine methods (1) and (2).

In the case of route (1) it is clear that the actions resulting from holding a belief may well vary considerably between individuals, depending on other beliefs and context, as indicated by Chisholm [1957]), This makes it difficult (if not dangerous), to discern a one-to-one relationship between the beliefs held and an individual's subsequent actions (as would be required by method (1)). One cannot assess the impact of a belief in isolation from the other beliefs, or from the desires, emotions and context of the person at that moment in time. Indeed, interpretationist philosophers Davidson (1984) and Dennett (1987) suggest that multiple, and potentially contradictory, belief attributions may explain a participant's behaviour, and so from their perspective there is no single 'correct' belief to be attributed. Secondly, not all beliefs have obvious behavioural consequences (e.g., 'I believe there are werewolves in a faraway land'). Those that have very little impact on the life of a person are unlikely to be revealed without direct questioning. Thus the most reliable and straightforward method remains the second as it has the obvious advantages of being quick and easy to interpret. By using this approach, studies avoid difficulties associated with coding or interpreting actions or accounting for different aspects of a situation.

Indeed, Campbell (1967) proposed that the only sufficient condition for determining the occurrence of a belief was when a *'proposition is mentally asserted or judged by [a person] to be true'* (p. 217). Nevertheless his work highlights a major limitation of the second method, in that he explicitly distinguishes between forming a private view ('judgement') and publicly asserting one ('statement'). It is clear that the

'statement' of belief in a proposition may not always represent the underlying 'judgement' of that proposition. For example, a religious person may choose not to reveal their true beliefs at certain times for fear of stigmatisation, discrimination or persecution. Furthermore, "Deception (including lying)...is a ubiquitous form of social behaviour that all people, at some time, engage in" (Bass & Halligan, 2007, p.81).

1.4.2 Working definition of 'belief'

Notwithstanding the above qualifications and considerations, the working definition for 'belief' adopted in this thesis will be as follows;

A belief describes a proposition that a person consciously endorses as being true, and can be communicated either verbally or in writing, assuming no reason not to truthfully make such a statement

It is worth noting that this definition is given with particular reference to consciously mediated declarative beliefs and is not expected to provide an all-encompassing definition of implicit beliefs. For example, one conclusion following from this working definition would be that both language and memory are necessary to "hold" a belief. This could be potentially problematic if the definition was intended to be generic, as it would not allow animals or pre-linguistic children to hold beliefs.

Given that, as noted above, people are capable of misleading others as to their mental state, the caveat (*assuming no reason not to truthfully make such a statement*) is essential when evaluating the statements they make regarding their mental judgements. However, questioning seems the most practical and effective method to

discover what beliefs people hold. Furthermore, this approach (examining the beliefs reported by an individual) does not contravene the views of the interpretationists or dispositionalists, but rather allows the assessment of beliefs by examining their most interpretable form of output – that of a verbal declaration. In studies in health and social sciences, this is the approach that has generally been taken, with much work carried out by directly asking people about paranormal (e.g., Taylor, 2003), religious (e.g., Magyar-Russell et al., 2008) and health beliefs (e.g., Harvey & Lawson, 2009). These methods have also been utilised in investigations of beliefs in psychiatry.

1.5 DELUSIONAL BELIEFS

1.5.1 Importance of delusion

Most applied belief research concerns forms of what might be generically described as anomalous beliefs. These would include delusions, which are relatively well-represented within the literature, due in main part to their clinical consequences (both for the individual and for society). Delusions constitute the major criterion for psychosis or, as Jaspers (1963, p. 93) claimed, *'the basic characteristic of madness'*. They are particularly important when assessing schizophrenia, where the presence of bizarre delusions is considered sufficiently significant to fulfil one of the necessary criteria for diagnosis. Certainly delusions are a common feature of schizophrenia spectrum disorders, with one study finding that over 60 percent of patients with schizophrenia or schizoaffective disorders reported some form of delusion over a 7- to 8-year period (Harrow et al., 1995).

Researchers typically investigate the conviction, preoccupation and distress associated with delusions, but little is known about the degree to which much of the

same belief content or dimensions are shared in the ‘normal’ (i.e., non-clinical) population (see section 1.3). Nevertheless, as discussed below in section 1.6, delusions may be considered one extreme on a distribution of all beliefs. Therefore comparisons between ‘normal’ beliefs and delusions suggest a productive avenue of investigation. First though, it is important to review the extent to which it is appropriate to describe delusions as beliefs at all.

1.5.2 Are delusions a form of belief?

In general, there appears to be considerable support (albeit disputed evidence) for the assumption that delusions are best understood as the result of abnormal belief processes (e.g., Bentall et al., 2001; Freeman et al., 2001; Oltmanns & Maher, 1988). Indeed, this assumption is frequently made without question or evidence (and as such could be considered a belief), by following the formal DSM-IV criteria. As Chapter 2 will demonstrate, these attempts to explain delusions typically use the construct of belief explicitly, and the growing continuum approach for psychotic symptoms (see section 1.6) within psychiatry implicitly assumes normal equivalents of delusions in the non-clinical population (Bentall, 2003).

However, several authors have questioned the definition of delusion in terms of a deviant form of belief. Spitzer (1990) comments that patients tend to state that they ‘know’ their delusions rather than ‘believe’ in them and suggests that to consider delusions as a subset or type of belief may therefore be unhelpful. However, this does not in itself suggest the lack of a belief (one might choose to use alternative vocabulary if asked to describe one’s beliefs, but that is not to say that one does not hold this as a belief). As discussed earlier with regard to the distinction between belief and knowledge, to ‘know’ something suggests objective and subjective evidence,

whereas to 'believe' implies only subjective, thus suggesting that (while choosing a stronger term than may be appropriate) these statements would still fulfil the proposed criteria for belief. Indeed, a statement that, e.g., 'My wife has been replaced by an impostor' would seem strong evidence for attributing a belief with this content to the individual concerned. Moreover, recent studies have found that the level of conviction with which delusions are held can fluctuate under questioning (Myin-Germeys et al., 2001), unlike those that might be expected for 'knowledge' (implying a more consistent level of confidence). Instead it seems plausible that the conviction of a delusion may be similar to that of other strongly held non-clinical beliefs.

Others have suggested delusions do not have sufficient conviction to qualify as a belief (e.g., Sass, 1994). They note that patients often maintain a detachment from their delusions, seeming to express these ideas 'as if' they were true (Young, 1999). However, these concerns presuppose that all beliefs must reach a prescribed level of conviction, which may not be appropriate. Investigations of the conviction with which a range of non-clinical beliefs are held would be useful to clarify this point.

Berrios (1991, p.12) takes an even stronger position by claiming that clinical delusions are not beliefs but rather '*empty speech acts*', given that patients are often unable coherently to discuss the implications of their delusions. In addition, patients do not always show appropriate emotional responses for their delusions (Sass, 1994). For example, instead of being distraught about his wife having been replaced, a patient with Capgras syndrome '*specifically expressed thankfulness that she had located a substitute*' (Alexander et al., 1979, p.335). However, Stone and Young (1997) argue that even patients like that reported by Alexander and colleagues often retain some understanding of the bizarreness of the belief. Thus this is not an 'empty

speech act' in that patients recognise some of the impact of their delusion and the likely reactions it will evoke.

Nevertheless, Currie (2000) notes that delusions often *'fail to engage behaviour'* (p.174), and suggests these are more akin to 'imaginings' that patients mistake for beliefs (although, again this could be true of non-clinical beliefs). Indeed, other authors have also argued that action resulting from delusional beliefs is rare (Anderson & Trethowan, 1973; Merskey, 1980; Slater & Roth, 1969). However, this is not true for all cases. Taylor (1985) found associations between delusions and violent offending, and one review reported this in 18% of cases of delusional misidentification (Förstl et al., 1991). Moreover, Buchanan and Wessely (2004) found that half of their sample of patients with delusions reported having acted on these beliefs at least once. Furthermore, other subtler safety behaviours may be performed, to prevent the need for more overt actions in response to the delusional belief (Freeman, Garety et al., 2001). Indeed, (as discussed above when describing methodologies suitable for investigating beliefs) establishing a one-to-one correspondence between a belief and its consequential action is fraught with difficulties even in non-clinical cases. As such, whilst some patients with delusions are clearly not just voicing an 'empty speech act' and appear to have considerable insight, in others it is harder to determine the degree to which their delusion impacts onto their actions or emotions.

Indeed, several critics of the claim that delusions constitute a form of belief acknowledge that some delusions seem best described as the result of dysfunctional belief processes (Currie, 2000; Sass, 1994; Young, 1999). Even Jaspers (1963), who described 'delusion proper' to be so distinct from ordinary phenomena as to be *'psychologically irreducible'* (1963, p. 96), acknowledged another set of beliefs,

delusion-like ideas, which he regarded as emerging ‘understandably *from preceding affects*’ (p. 96). Indeed, it is easier to see that delusions that seem to be extremes of normal cognitions (e.g., pathological jealousy) can be described as beliefs than those delusions that have bizarre content. These differences have led some authors (e.g., Mullen, 2003) to advocate more than one kind of delusion. Mullen suggests some delusions may be best regarded as distinct from normal belief, whereas others would be better viewed as comprising part of a continuum with normal beliefs.

This distinction has also been highlighted with regard to the delusion’s compatibility with the prior or co-existing beliefs held by the individual, tying in with the philosophical debate regarding atomism versus holism discussed earlier. Quine and Ullian (1970) proposed that all beliefs cohere to form a ‘web of beliefs’. This implies that individuals should not be able to consciously hold (i.e., be aware of) contradictory beliefs. However, Stone and Young (1997) point out that some patients have fairly circumscribed delusions, particularly those with bizarre beliefs such as Cotard or Capgras (where the very bizarreness of the belief suggests contradictory beliefs may be held). Indeed, Bisiach (1988) describes a case where a patient with unilateral neglect insisted that his left arm was the examiner’s, even though this led him to the conclusion that the examiner must have three arms. Whilst some of these patients do form further delusions (e.g., one patient with Cotard delusion [‘I am dead’] developed the belief that he was in hell as a result of the heat during a visit to South Africa: Young et al., 1992), for others their delusion seems relatively encapsulated.

These perspectives on the nature of delusion also have an impact on cognitive views of modularity. Fodor (1983) suggested that belief formation was not a modular process, similar to other cognitive processes. He considered that beliefs need access to

all information to be reliable, meaning that informational encapsulation was not an option. Thus, taking a holist's perspective, one might predict that holding a bizarre belief (e.g., Cotard) should impact onto the other beliefs held by an individual. However, some monothematic delusions are reported as highly circumscribed or encapsulated and some others seemingly '*coexist with beliefs they contradict*' (Currie & Jureidini, 2001, p.160). Indeed, Jones (2003) argues that delusion formation does therefore show some of the properties of a modular system, suggesting this is fast and informationally encapsulated.

However, others have suggested that monothematic delusions largely arise from anomalous perceptual experiences (e.g., Stone & Young, 1997). This is not a new idea – Kraepelin suggested this almost a century ago – but this hypothesis was recently developed further and brought to prominence by Maher (1988). Maher proposed that delusions arose as a result of attempting to account for anomalous experiences (AE). For example, in the case of Capgras (the belief that someone, usually a close friend or relative, has been replaced by an impostor), the delusion is thought to result from a loss of the expected feeling of familiarity when perceiving a known face (Ellis & Young, 1990). If an individual was receiving frequent perceptual information that was consistent with this hypothesis, then this perceptual input may override the bias associated with coherence from other beliefs.

Indeed, Stone and Young (1997) note that belief formation is already subject to certain biases, so this is not a perfect system even in healthy individuals. Thus, given we are already aware of the fallibility of the system, the focus should be on whether biases are the same for patients with delusions as for healthy individuals. Indeed, whilst inherently plausible, the extent to which belief coherence takes place in

healthy individuals is not known, and as such it is premature to claim any difference in the beliefs of patients with delusions from normal belief processes.

Given that both beliefs and delusions can be defined in a multitude of ways, it is not surprising that comparisons between these two concepts are problematic. This is exacerbated by applying a strict definition of belief to a range of reported delusions, without any consideration that belief, as used by most individuals, can cover a spectrum of conviction, stability and influence. Indeed, to examine the manner in which individuals report delusions and determine whether or not these are beliefs seems to necessitate investigating how people describe their beliefs. This issue will be considered further in Chapter 3.

Although there are outstanding questions regarding the similarity of formation processes for 'normal' beliefs and a minority of delusions (those that appear to be relatively circumscribed), the evidence seems on balance to suggest it is appropriate to view delusions as a form of belief. Therefore throughout this thesis and following most authors (Davies et al., 2001; Langdon & Coltheart, 2000; van Os, 2003) and the official DSM definition (APA, 2000), delusions will be considered as one form of anomalous beliefs.

Consequently, the main research agenda remains to determine and/or elaborate the various factors that may cause a belief to be considered delusional. One approach that can be used to help determine the distinctions between delusions and other beliefs is by looking at psychiatric symptoms and/or syndromes as extremes on a continuum rather than categorically different from 'normal' beliefs and experiences. This continuum approach is discussed below.

1.6 THE CONTINUUM HYPOTHESIS

1.6.1 Continuum of Psychosis

Schizophrenia remains the most common form of psychotic illness, affecting 1% of the population (Andreasen, 1999). The standard compartmentalisation of schizophrenia, as with most illnesses (DSM), implies that the illness is categorically delineated. Recent evidence from large non-clinical samples, however, suggested that the disorder is not easily and/or consistently distinguishable from schizotypal and schizoid personality disorders (Siever, Kalus, & Keefe, 1993) and similarly overlaps with bipolar disorders (Craddock & Owen, 2007). These shared characteristics have led several researchers to question the conceptualisation of schizophrenia as a discrete illness entity (Claridge, 1994; Crow et al., 1995; Johns & van Os, 2001; McGovern & Turkington, 2001; Strauss, 1969). Indeed, although this approach has only relatively recently gained ground in psychiatry, it has been widely applied throughout medicine. Rose (1992) recognised that virtually all pathophysiological factors examined were continuously distributed throughout the population, and as a result advocated prevention strategies that target the population as a whole, an idea that remains influential (Manuel et al., 2006).

Evidence in support of the argument for a spectrum of schizophrenic disorders comes from findings suggesting that certain common cognitive deficits (e.g., deficits in attention, abstract reasoning, cognitive inhibition, verbal working memory, recognition memory, and general intellectual functioning) and neural differences (e.g., the total volume of the left dominant posterior superior temporal gyrus [STG] relating to delusion scores and grey matter reduction in the left posterior STG relating to inverse thought disorder scores) exist in individuals with schizotypal personality disorder to a moderate extent but in schizophrenia to a greater extent (Cadenhead et

al., 1999; Menon et al., 1995; Shenton et al., 1992). Further research has focused on similarities between the known correlates of clinical symptoms, and those of their subclinical counterparts.

A. Similar correlates for subclinical and clinical symptoms

a. Demographics

One assumption of the continuum account is that subclinical psychotic symptoms should associate with known correlates of clinical symptoms (e.g., demographics). Indeed, positive subclinical symptoms (i.e., symptoms people do not usually experience: delusions, hallucinations and thought disorder) have been found to be associated with negative subclinical symptoms (i.e., the lack of normal traits: e.g., flat affect or avolition) (van Os et al., 2000) and both have also been associated with depressive symptoms (Stefanis et al., 2002), thus reflecting the dimensions found within schizophrenia. In addition, a recent large meta-analysis revealed that demographic factors relating to schizophrenia (e.g., males, unmarried, unemployed, ethnic minorities) also relate to subclinical symptoms, with the exception of age, where the results are difficult to interpret (van Os et al., 2009). Moreover, the meta-analysis also found that other known risk factors, such as urbanicity, trauma and cannabis use, were associated with higher levels of subclinical psychosis (Henquet et al., 2005; Krabbendam & van Os, 2005; Read et al., 2005).

As might be expected following a continuum account, measures of clinical and subclinical experiences have different degrees of association with demographic variables (van Os et al., 2000) and also different increased risks for developing the full-blown clinical disorder (Hanssen et al., 2005). Furthermore, van Os et al. (2001)

have demonstrated that the levels of psychotic experiences observed in the general population can predict the prevalence of disorder. Utilising the association between psychotic disorder and urbanicity, they used five samples grouped by degree of urbanicity to show that as the rate of psychotic disorder increases with urbanicity, the levels of reported psychotic experiences also increased in a dose-response manner.

b. Genetics

Another way of looking at the relationship between clinical and subclinical symptoms is by examining the genetic risk factors. Several studies of twins in the general population strongly support genetic links, implying that both genetic and environmental factors play roles in the presentation of psychotic symptoms (Kendler & Hewitt, 1992; Linney et al., 2003; MacDonald et al., 2001). In terms of cognitive deficits, children of patients with schizophrenia are often found to have impaired verbal memory and deficits with other cognitive tasks (Owens & Johnstone, 2006). Furthermore, a recent meta-analysis by Sitskoorn et al. (2004) showed that first-degree relatives of patients with psychotic disorders had minor difficulties with verbal memory, executive functioning and to some degree with attention.

Similar results have been found for positive symptoms. Kendler et al. (1993) found that psychosis phenotypes (clinical and subclinical expression) tended to cluster in families. In the general population, Hanssen et al. (2006) used both self-report and interview measures to assess positive and negative subclinical psychosis within families, and found familial clustering for both dimensions. Similarly, the types of symptoms reported by patients often predict the expression of subclinical experiences in their relatives (Fanous et al., 2001), and the positive symptom scores of relatives of patients with psychotic disorders typically relate to their genetic risk (Vollema et al., 2002).

B. The presence of similar beliefs and experiences in non-clinical populations

Clinical psychosis remains comparatively rare, with one recent study estimating lifetime prevalence of broadly defined psychosis at 3.48% (Perälä et al., 2007). By comparison, the continuum account suggests that “the core symptoms of psychosis, delusions and hallucinations, are much more prevalent in the general populations than their clinical counterparts” (Krabbendam et al., 2004, p.411). This hypothesis is particularly interesting given the lack of a definitive demarcation in diagnosis, e.g., determining where schizotypal disorder becomes schizophrenia. To avoid these limitations inherent in diagnosing syndromes, some researchers adopt a cognitive neuropsychiatric perspective, which focuses on symptoms rather than medically or psychiatrically labelled syndromes.

The difficulties with drawing absolute boundary distinctions apply to all fields of clinical practice, however. Even when addressing a single symptom, diagnosis remains a dichotomous choice, while the presenting symptom exists to varying degrees across the population. Indeed, this is independent of the presentation of the illness, and holds whether symptoms are predominantly physical (e.g., obesity) or predominantly psychological, e.g., autism spectrum disorders (Newschaffer et al., 2007).

Indeed, whilst the definition of a delusion in DSM-IV-TR (APA, 2000) supports a clear categorical distinction, ‘*A false belief based on incorrect inference about external reality*’, the glossary now states that ‘*delusional conviction occurs on a continuum and can sometimes be inferred from an individual’s behaviour*’ (p. 821). In fact, even Jaspers, whose work is often cited as support for the distinction between normal beliefs and delusions, appeared to consider at least a subset of delusions as continuous in some ways, suggesting that a ‘*jealous man can develop into a man with*

delusion-like jealousy' and *'a suspicious person into someone with delusion-like ideas of persecution'* (p. 640). Moreover, despite the historical dominance of categorisation, criticisms of this approach are not new - Bleuler (1911) made similar arguments against assuming categorical divisions between 'healthy' and 'ill' individuals.

As such, a growing number of researchers agree that individual psychiatric symptoms (including beliefs) lie on a continuum where only a small number located at some (arbitrarily defined but clinically agreed) extreme endpoint become clinically relevant (i.e., delusions) and where much of the distribution is not necessarily associated with any significant disability (Johns & van Os, 2001; McGovern & Turkington, 2001; Rutten et al., 2008; Strauss, 1969; van Os et al., 2009). It is worth noting that such a continuum is not simply due to variation within a single factor (e.g., conviction, as suggested by the DSM description). People may differ in terms of the frequency, intensity and number of symptoms they present as they vary over the continua. Moreover, research has indicated that the conviction with which a delusional belief is held fluctuates over time and between contexts (Myin-Germeys et al., 2001). As Claridge (1997) points out, however, two people may have the same psychotic symptoms but one may require care and the other may not, as they may use a different coping strategy; for example, non-patients may be more likely to perceive hallucinated voices as predominantly positive (Honig et al., 1998).

Strong evidence in favour of the continuum hypothesis comes from general population studies, which estimate lifetime prevalence for delusions at around 15% (Rutten et al., 2008, p. 53) and an average annual prevalence rate of 5% (van Os et al., 2009). The consistent finding that many non-clinical participants endorse questions relating to both delusions and hallucinations implies that "experiencing symptoms of psychosis such as delusions and hallucinations is not inevitably associated with the

presence of disorder” (van Os et al., 2009, p. 1). Clearly other factors, such as intrusiveness, psychopathological co-morbidities, illness behaviour, societal tolerance, coping and distress, play a significant role in the clinical relevance of delusional beliefs, and this continuum approach underpins much of modern cognitive therapy for psychosis (Johns & van Os, 2001).

To date, most of the single-symptom studies have focused on hallucinatory experiences (e.g., Johns et al., 2002; van Os et al., 2000). Nonetheless, as delusions are often assumed to be a critical aspect of psychosis and a pathological form of belief (Davies et al., 2001; Langdon & Coltheart, 2000; van Os, 2003), research has begun to open up this rich vein of study by examining “delusional ideation” or what might be best described as “delusion-like beliefs” in the non-clinical population (e.g., Lincoln, 2007; Peters, Joseph & Garety, 1999; Peters et al., 2004; Verdoux et al., 1998). These studies provide compelling evidence that delusion-like beliefs (i.e., beliefs that have a similar content to delusions but are not associated with the significant behavioural and/or psychological consequences found with delusions) are more commonly present in non-clinical populations than previously expected.

1.6.2 Areas for further research

Despite a growing number of studies investigating delusions and/or delusional ideation in non-clinical samples, there are still problems obtaining a reliable estimate of the degree to which such ideas are present in the general population (Henderson, 1996). These difficulties include: (1) the range of terms used when constructing questions to address delusional-type beliefs and (2) the range and types of beliefs covered by existing measures (i.e., targeting only strictly defined delusions [where attempts are made to determine plausibility, drug/alcohol abuse, distress, etc.] versus

including all beliefs with a similar content to delusions). Moreover, many of these reports have focused on predominantly non-bizarre delusions and those commonly found in schizophrenia. Indeed, non-clinical analogues of monothematic and typically circumscribed delusions may present in non-clinical populations, given that cases of Capgras in people without psychiatric diagnoses have been reported (see Coltheart et al., 2007). Investigations of those delusions more commonly associated with neuropsychiatric problems enable a more accurate comparison of these delusion types.

Chapter 4 describes the development of a new measure, the Cardiff Beliefs Questionnaire (CBQ). The CBQ includes a wider range of beliefs and experiences than previously included, allowing comparisons between results for different types of belief (i.e., it is possible to establish the similarities and differences between delusion-like and both normal societal/cultural beliefs and other anomalous beliefs). Furthermore, it also includes a range of bizarre delusion-like beliefs, which have not previously been thoroughly investigated in non-clinical populations.

The prevalence of delusion-like beliefs in a large general population sample using reports on this new measure will be discussed in Chapter 5. Moreover, in addition to items addressing psychotic-like experiences, the Cardiff Beliefs Questionnaire (CBQ) includes questions on a range of beliefs and experiences with no explicit psychiatric background. Establishing the prevalence of these 'ordinary' beliefs and experiences provides a benchmark from which to interpret the levels of endorsement of psychotic-like items. It also provides an indication of the degree of encapsulation or cross-relationships between beliefs. Furthermore, as the CBQ includes a wider range of beliefs than other measures (which focus on psychotic or psychotic-like symptoms), this provides an opportunity to investigate the relationships between different belief types.

1.6.3 Implications of the continuum approach

Studies reporting a continuum of symptoms have significant implications for established psychiatric definitions (DSM-IV), which treat delusions as qualitatively distinct from those beliefs ordinarily held by members of a person's culture, despite little evidence of the likelihood of similar beliefs being held by society. Most clinicians are not in a position to know whether such beliefs are 'normally' accepted, other than by direct benchmarking with their own peer group. This is not necessarily a reliable strategy as studies show poor inter-rater reliability among psychiatrists for ratings of bizarre beliefs (Flaum et al., 1991; Junginger et al., 1992). High levels of delusions reported by non-clinical samples suggest that this assumption may be invalid.

Furthermore, this APA criterion (delusion is a belief not '*ordinarily accepted by other members of the person's culture or subculture (e.g. it is not an article of religious faith)*') raises questions for distinguishing between paranormal beliefs and delusion-like ideas. Both have been associated with placing too much significance on coincidences (Brugger & Mohr, 2008; Emrich, 1992), and those who report paranormal experiences have higher than usual levels of psychiatric symptoms (McCreery & Claridge, 1995) and vice versa (Eckblad & Chapman, 1983). Paranormal beliefs may form part of the continuum alongside delusional beliefs. Indeed, Brugger and Mohr (2008, p. 1291) claim that "*Paranormal ways of experiencing and reasoning seem predestined to link abnormal to normal ways, and their study may thus be ideally suited to bridge major gaps between (neuro)psychology and cognitive neuropsychiatry*". A major research theme in the current thesis concerns the relationships between different types of beliefs.

This theme will be explored and elaborated in Chapter 7, which addresses the often cited but underspecified proposal for a ‘web of beliefs’ (Quine & Ullian, 1970), where individual beliefs cohere together. Whilst intuitively plausible, there has been no empirical evaluation of these ideas. The CBQ, however, includes five pairs of beliefs designed to investigate the presence of dissonance between beliefs, allowing belief coherence to be explored further.

Overall, it is clear that there is now substantial evidence to support a continuum model of psychosis. One noteworthy consequence of assuming a continuum of belief is the implication that a range of presumably more socially acceptable (and therefore less stigmatising) beliefs exist, which can still provide us with insight into the nature of delusional beliefs. Moreover, by combining this approach with a cognitive neuropsychiatric approach (focusing on a single symptom), one can carry out detailed investigations of the ‘normal’ (i.e., non-clinical) population, thus linking in with a normative model that could inform the clinical presentation.

Indeed, central to many cognitive neuropsychiatric accounts of delusions (e.g., Ellis & Young, 1990; Maher, 1988) is the proposal that anomalous perceptual experiences (attributable to discernable and quantifiable neuropsychological impairments) provide the key causal trigger for monothematic delusions. Assuming a continuum explanation of psychotic symptoms, then a productive line of research would be to evaluate the relationships between anomalous beliefs (AB) and anomalous experiences (AE) in a general population sample, and see if these in turn reveal associations or dissociations that may inform our models. This is another key strand of research addressed in this thesis, and these ideas will be explored in greater detail in Chapter 2.

Thus this approach not only opens up a new vein of research into the conceptualisation of psychosis, but also overcomes some of the practical limitations inherent in psychiatric studies, as investigations of subclinical experiences and beliefs are not fraught with the range of difficulties (e.g., concerns over the effects of anti-psychotic medication, for example, lack of motivation: Lewander, 1994) associated with investigating patients.

1.7 AIMS OF THE THESIS

Thus far this chapter has outlined the background to research on belief and delusions, as well as identifying the continuum and cognitive neuropsychiatric approaches that will be used to develop and evaluate the research studies in this thesis. The research questions and thesis structure are described briefly below.

CHAPTER 2: Delusions: History, Concept and Theory

The second chapter sets out the current research and theory on delusions. This summarises the difficulties in defining delusion and places this process within a historical context to demonstrate how the present conceptualisations developed. In addition, it describes existing studies investigating the cognitive biases and correlates related to holding delusions, and their influence in developing models of delusion formation and maintenance.

CHAPTER 3: Characteristic Features of Belief

This chapter addresses some of the assumptions regarding the use of the term ‘belief’ by members of the general population, given that these impact onto a wide research area (including religious, paranormal and psychiatric studies). These include:

The understanding of the term ‘belief’ in the general population. Delusions are assumed to be a form of belief, despite lack of knowledge about the characteristics necessary for belief. This chapter aims to provide an indication of the general public’s understanding of belief.

A comparison of belief with ‘interchangeable’ terms (such as ‘feel’ and ‘think’). As well as establishing the defining characteristics of a belief, it is interesting to note how belief is typically distinguished from other cognitions. The terms ‘think’ and ‘feel’ are focused on in particular as they are commonly used in place of ‘belief’ on measures of delusion and delusional ideation.

CHAPTER 4: Development of the Cardiff Beliefs Questionnaire (CBQ)

Chapter 4 describes the development and validation of a new measure, the Cardiff Beliefs Questionnaire (CBQ). The CBQ includes a wider range of beliefs and experiences than previous measures of delusions or delusion-like beliefs, in particular, a range of bizarre delusion-like beliefs (previously neglected in non-clinical studies).

In addition, the CBQ includes questions on a range of beliefs and experiences with no psychiatric background.

CHAPTER 5: Prevalence of Delusion-Like and Other Belief Types in the General Population

This chapter describes findings relating to the prevalence of delusion-like beliefs and the other belief types measured by the CBQ, as reported by members of the general population. In addition, the relationships between belief types are explored. Research questions include:

The prevalence of delusion-like beliefs in the general population. By avoiding clinical language and including a range of non-clinical beliefs, it was predicted that any effects of stigma would be reduced and the general public would be more willing to be open in their responses, with the prediction that this would lead to increased prevalence levels.

The prevalence of bizarre delusion-like beliefs in the general population. By investigating bizarre beliefs, it is possible to compare the prevalence of both bizarre and non-bizarre delusion-like beliefs. The expectation was that both would be present in the general population, but bizarre beliefs would be reported to a lesser extent than the non-bizarre beliefs.

The prevalence in the general population of individual beliefs with different themes (e.g., paranormal), and comparisons with delusion-like beliefs. DSM-IV considers that delusions should not be commonly endorsed by other members of a person's culture, using this criterion to distinguish these from other belief types, such as religious or paranormal. Given previous findings of association between delusion-like and paranormal beliefs (e.g., Lawrence & Peters, 2004), a similar relationship was expected. Furthermore, it was predicted that these belief types would not be distinguishable on the basis of the prevalence of individual beliefs of these types.

CHAPTER 6: Anomalous Experience: Prevalence and Relationship to Beliefs

Chapter 6 reports the prevalence of hallucination-like and paranormal experiences in the general population. As the CBQ includes some experience questions alongside those addressing beliefs, the relationships between anomalous beliefs (AB) and anomalous experiences (AE) in non-clinical participants could also be explored. This chapter describes these investigations of the associations and/or dissociations between beliefs and experiences, and their implications for models of delusion formation (e.g., Ellis & Young, 1990; Maher, 1988). The main research questions comprise:

The prevalence of anomalous experiences (AE) in the general population. In a similar manner to the delusion-like beliefs in Chapter 5, AE were expected to be commonly found in the general population, as indicated in previous studies (e.g., Ohayon, 2000).

The co-occurrence and content association between AE and beliefs, at both the group and individual levels. Despite AE having been hypothesised as a predictor of AB in cognitive models of delusion formation, few studies have empirically evaluated the nature of the relationship between delusions and AE, and some of the findings have been mixed. This chapter addresses both the degree of the association and dissociation between overall anomalous experience and belief groups, and also investigates the relationships between specific AEs and ABs (given the one-to-one correspondence predicted by some models). It was expected that, while AE and AB would be related, this would not be true for every individual (i.e., this would not be a necessary condition).

CHAPTER 7: Belief Consistency and Coherence: Exploring the “Web of Beliefs”

Chapter 7 focuses on Quine and Ullian’s (1970) suggestion of a web of belief. The CBQ addresses a wide range of beliefs, including five pairs of beliefs designed to

investigate dissonance between beliefs. The degrees of coherence and inconsistency between beliefs are explored in detail here. The research questions addressed include:

The extent to which belief dissonance (i.e., holding two contradictory beliefs) occurs.

Given that theory suggests that beliefs should be coherent, it is expected that only a small minority of participants should hold inconsistent beliefs.

The extent to which coherence influences the beliefs held by an individual. Intuitively, it seems likely that if an individual holds one belief of a particular type (e.g., religious), this should increase the likelihood of that person holding another belief of that type. Furthermore, this would tie in to the philosophical coherence arguments.

The stability of different types of belief over time. Beliefs are generally assumed to be relatively stable, especially in the case of delusions. However, less is known about delusion-like beliefs and (given these are held in the general population and therefore most do not have psychiatric implications) it seems plausible that these are not as influential generally as some other beliefs (e.g., religious beliefs), and as such are more likely to be discarded.

CHAPTER 8: Conclusions

Finally, Chapter 8 summarises the findings of the thesis, and outlines how these build on and feed back into the research area. Suggestions for ways to move forward are discussed.

The following chapter will provide a more detailed overview of the literature on delusional beliefs and demonstrate the way in which characterisations of delusions have developed to form current conceptualisations and how these have informed current models of delusion formation.

CHAPTER 2

DELUSIONS: HISTORY, CONCEPT AND THEORY

2.1 BACKGROUND

Delusions are often considered one of the central features of a mental illness (Jaspers, 1963; Peters, 2001). The presence and type of a delusional belief has a significant impact on diagnosis, treatment and most importantly, the quality of life and active functional engagement of the patient. As a belief that can have debilitating effects, it is essential to understand the clinical characteristics of delusions and their similarities to 'normal' beliefs before investigating beliefs in the following chapters. This chapter provides some background on the history behind, and current classifications of, delusions, as well some of the current competing cognitive accounts: (1) The chapter begins by considering the history of delusions and the reasons for focusing on symptoms rather than medical syndromes, (2) the following sections consider the challenging issues surrounding the definition of delusion and (3) finally, the chapter concludes with a discussion of current attempts to explain delusion employing psychological and cognitive neuropsychiatric models.

2.2 HISTORY OF THE CONCEPT OF DELUSION

The first recorded use of the term 'delusion' was c.1420, when it was used to mean an 'act of misleading someone'. It was not recorded as implying or indicating mental illness until 1552 (Online Etymology Dictionary). Since then, ideas surrounding delusions and mental illness have developed considerably. It is helpful to consider how the current conceptualisation of delusion emerged, given the prominent

role that delusions continue to play in the diagnosis of schizophrenia. Psychiatry has generally focused on identifying syndromes rather than symptoms, a trend that began with the influential ideas of Emil Kraepelin, who played a central role in the development of modern psychiatry. In 1887 Kraepelin (1856-1926) produced the second edition of his *Textbook of Psychiatry*, a book that would transform the clinical domain. In it, he argued for a discrete number of psychiatric diagnoses, each with a typical pattern of symptoms, relating to different types of brain pathologies. These included a disorder marked by inappropriate affect, stereotyped behaviours, distractibility, hallucinations and/or delusions, combined with a general deterioration in cognition, which he named 'dementia praecox' (meaning senility of the young).

The first major revision to dementia praecox was made by the Swiss psychiatrist Eugen Bleuler (1857-1939). He preferred the term 'schizophrenia' (meaning split mind), arguing that 'dementia praecox' was inappropriate as this illness did not always result in mental deterioration and onset was not always in young patients. In choosing this name, Bleuler suggested that the illness was characterised by a separation in the personality, cognitions, memories and perception of affected individuals. He proposed four key symptoms (known as the four 'As'): (1) loosening of associations; (2) ambivalence with regard to their emotions and attitudes; (3) autism; and (4) inappropriate affect. Bleuler was influenced by Freud's ideas that unconscious forces played a role in mental illness. He argued that delusions and hallucinations were the results of psychological reactions to the illness rather than being directly caused by it. Interestingly, he also noted the presence of 'a latent schizophrenia' which he claimed was 'the most frequent form, although admittedly these people hardly ever come for treatment', thus suggesting the likelihood of a continuum approach (as discussed in Chapter 1).

The next influential contributor was German philosopher and psychiatrist Karl Jaspers (1883-1969), who considered the psychological aspects of mental illness to be important. He furthered the understanding of psychiatric disorders by bringing a detailed study of individual case histories to the forefront of nosological classifications. In examining such cases, Jaspers distinguished between primary delusions, which were ‘ununderstandable’ (i.e., the observer could see no relation between this belief and the holder’s life experiences), and secondary delusions, where a belief could be placed in the context of the holder’s life story. This distinction is elaborated later in this chapter (section 2.4).

Another German psychiatrist, Kurt Schneider (1887-1967), further honed the psychiatric conceptualisation of schizophrenia by focusing on those symptoms most predictive of the disorder. These symptoms, which he termed ‘first-rank symptoms’, comprised delusions, hallucinations and passivity experiences. In contrast to the increasingly psychological approaches of his time, Schneider also proposed that the ‘form’ that symptoms took should be viewed as more significant than their content (i.e., delusions should not be diagnosed on the basis of content but rather on the manner in which they are held).

2.2.2 Diagnostic reliability

The consensus between many of these authors was the suggestion that psychotic illness could be categorised using a number of different symptoms. Indeed, this approach, following Kraepelin’s ideas, continues to exert a powerful influence today. Similar distinctions are made in current psychiatric diagnosis, whereby patients are compared across symptoms, determining the subsequent treatment of the patient. This is in large part due to the ‘official’ diagnostic manuals (*Diagnostic and*

Statistical Manual of Mental Disorders [American Psychiatric Association]; *International Classification of Diseases* [World Health Organisation]), which carve mental illness into such categories.

The evolution of the current criteria from the initial Kraepelinian account has been driven by evaluation of the usefulness of these classifications. These can be assessed by examining the reliability of these diagnoses, i.e., (1) whether the named condition is stable over time and in different contexts, and (2) whether the diagnosis is consistent when the patient is assessed by different clinicians. In an attempt to standardise diagnosis, the American Psychiatric Association (APA) produced a chapter on psychiatric disorders for the 1933 medical manual *Standard Classified Nomenclature of Disease*. This was the first classification system widely used in the US. However, it was quickly found wanting following the rise in psychiatric disorders during the Second World War. Adding to the confusion, organisations such as the US Army used their own criteria. To solve these difficulties, the APA created a task force to establish a new diagnostic system, which was published in 1952 as the *Diagnostic and Statistical Manual of Mental Disorders* (DSM). At around the same time, the World Health Organisation (WHO) was also trying to secure a consensus on psychiatric classification at an international level. Their first attempt, the *International Classification of Diseases* (ICD), was published in 1951 but, having little impact, was revised to include only operational definitions (which was closer to the DSM system), rather than suggesting aetiological factors, which it was felt led to controversy over classifications.

Simultaneously, researchers were beginning to subject the reliability of diagnoses to empirical evaluation (Ash, 1949; Hunt, Wittson & Hunt, 1953; Masserman & Carmichael, 1938; Sandifer, Pettus & Quade, 1964). Initial findings

confirmed that a substantial proportion of the diagnoses employed showed low reliability. Furthermore, different diagnostic practices in different countries contributed to the problem (Cooper et al., 1972; Kendell et al., 1971; Kramer, 1961; WHO, 1973). In addition, the ongoing concern regarding reliability coincided with a shift in scientific thinking (neoKraepelinism), which emphasised a more biological understanding of psychiatric disorders. These factors provided an impetus for researchers to re-examine the issue of diagnosis. Simultaneously, cultural and political changes (in particular, a new focus on gay rights, given that homosexuality was listed as a disorder in DSM-II), and also pressure from health insurance companies for tighter regulation, contributed to the need for yet further revisions to the official guidelines. Consequentially, alternative, more specific guidelines (“Feighner criteria”) were developed, with rules that specified the number of symptoms required for each diagnosis, and a more detailed portrayal of the nature of the symptoms themselves (Feighner et al., 1972). This also provided the model for the revised DSM-III, published in 1980 and quickly accepted, with journals requiring authors to confirm their patients had been diagnosed according to these standards.

Despite claims of increased reliability following DSM-III (Hyer, Williams & Spitzer, 1982; Klerman, 1986), two further major revisions have taken place, in 1987 (DSM-III-R) and 1994 (DSM-IV), and a text revision in 2000 (DSM-IV-TR). Currently work is underway on DSM-V, which is due to be published in 2012.

However, many authors (both psychiatrists and non-psychiatrists) continue to question the reliability of these new systems (e.g., Kutchins & Kirk, 1997; McGorry et al., 1995). Moreover, the presence of competing systems remains a source of concern. A comparison of the diagnoses suggested by DSM-II-R, ICD-10 and a variant of the Feighner criteria (the Research Diagnostic Criteria) in a group of over

700 patients found that 371, 387 and 268 participants respectively would be diagnosed with schizophrenia (van Os et al., 1999). This has led some researchers to advocate the use of several criteria sets simultaneously; a polydiagnostic approach (McGuffin, Farmer & Harvey, 1991).

As such, it is clear that despite the considerable cross-decade efforts, the categorisation of psychotic illnesses remains controversial and tentative. Furthermore, some changes in definition may reflect the medical context of the time. Boyle (1990) has suggested that Kraepelin's work was influenced by the prevalence of encephalitis lethargica between 1916-1927, which left afflicted patients with tremors or catatonic-like symptoms and thus could have been diagnosed as dementia praecox. Indeed, these issues regarding reliability could be predicted. Any categorical diagnostic system that attempts to provide a simple answer to a complex multifactorial disorder can be disputed if the symptoms really exist along a continuum. One way of avoiding some of these issues is to follow the cognitive neuropsychiatric tradition, by focusing on symptoms (e.g., hallucinations and delusions).

2.2.3 The cognitive neuropsychiatric approach

One difficulty with much of syndrome-led psychiatric research remains the inherently subjective and unrealistic nature of its diagnosis. By classifying patients according to a 'syndrome', arbitrary distinctions may separate individuals with similar symptoms into different diagnostic groups. Furthermore, as Marshall and Halligan (1996, p.5) note, there is "no guarantee that patients within a particular taxonomic category have anything in common with each other, other than the diagnostic label itself". Indeed, when Copeland et al. (1971) presented clinicians with the same vignette, 69% of US psychiatrists but only 2% of British psychiatrists diagnosed

schizophrenia. Thus, as Read (2004, p.45) points out, “for decades ‘schizophrenia’ researchers on either side of the Atlantic were researching different groups of people”.

To avoid some of the arbitrary and controversial distinctions between various syndromes, some researchers have chosen to instead examine different symptoms associated with these (Bentall, Jackson & Pilgrim, 1988; Persons, 1986). As well as shifting the focus onto a more tangible and ultimately more quantifiable aspect of the psychiatric illness, this approach allows the researcher to make a more direct comparison between the processes that appear to be dysfunctional in these disorders and their healthy counterparts. This developed from the cognitive neuropsychological approach (Ellis & Young, 1990), where researchers interested in drawing inferences about cognitive processes (e.g., reading) studied the dysfunctions of these processes in brain-damaged patients. In a similar manner, cognitive neuropsychiatry is concerned with the study of processes such as belief formation, where dysfunctions are associated with psychiatric disorders.

The cognitive neuropsychiatric perspective emphasises (1) the study of symptoms (independent of psychiatric syndrome) and (2) that delusions, as unusual beliefs, cannot be fully explained without an understanding of the normal processes by which beliefs are formed and maintained. Indeed, as discussed in the previous chapter, debates regarding the similarities of delusions to beliefs can only be fully addressed by reference to a (currently non-universal) definition of belief. By studying both healthy and abnormal beliefs, it is possible to build a testable cognitive model of the processes involved in their formation.

One of the best examples of the use of this approach was that proposed by Ellis and Young (1990) for Capgras syndrome (the belief that a loved one has been replaced by an identical impostor). Ellis and Young suggest that patients draw this

conclusion as the result of a deficit mirroring that of patients with prosopagnosia (the inability to recognise faces). In prosopagnosia, patients are unable to explicitly recognise faces but typically retain a differential skin conductance response for familiar compared to unfamiliar faces (an implicit recognition measure) (Tranel & Damasio, 1985). Ellis and Young (1990) hypothesised that whilst patients with Capgras syndrome were able to recognise faces, their implicit recognition was impaired. This was confirmed by later studies (Ellis et al., 1997; Hirstein & Ramachandran, 1997). The delusion was thought to develop as a result of attempting to integrate these disparate familiarity cues, along with other psychological factors which mean that this belief is not rejected in light of its apparent unlikeliness (Halligan & David, 2001).

Thus far, cognitive neuropsychiatric research into models of belief (e.g., Coltheart et al., 2007) has focused on relatively rare but typically circumscribed delusional beliefs (e.g., Capgras syndrome), given the more precise nature of these deficits. In contrast recent investigations focusing on a continuum of psychotic symptoms have looked at the equivalent counterparts of more common non-bizarre (i.e., logically possible) delusions. As the factors contributing to delusion formation are likely to be many, it is important to consider the range of delusional types before attempting a definition of delusion.

2.3 TYPES OF DELUSION

Following Schneider's (1959) suggestions, delusions remain an important and distinctive component when diagnosing psychosis. They are especially characteristic of schizophrenia, with 90% of patients with this diagnosis reporting delusions at some point during their illness (Hirsch & Weinberger, 2003). Furthermore, the type of

delusion (see Table 2.1 for examples of delusional themes) can have a significant impact on the nature of the diagnosis.

2.3.1 Different diagnoses

While schizophrenia is the most common diagnosis involving delusions, there is also the possibility of “delusional disorder”. Delusional disorder itself is extremely uncommon, with an estimated 0.03% of the population affected (Hillert et al., 2004). It is primarily a single symptom diagnosis - while hallucinations can be present, these are not prominent (APA, 2000), whereas patients with schizophrenia often have auditory hallucinations (Roberts & Stock, 2005). In addition to being differentiated by the presence of other symptoms, these diagnoses can sometimes be distinguished by the nature of the delusional beliefs. Delusions associated with schizophrenia may have a bizarre quality, whereas individuals with delusional disorder are commonly systematic and coherent in their beliefs (Guryanova, Smith & Toricelli, 2006). These content-based differences will be considered in more detail below.

Table 2.1. Recurrent themes of reported clinical delusions (adapted from Bell, Halligan & Ellis, 2006b)

<i>Delusional Theme</i>	<i>Example</i>
<i>Delusional disorder (DSM defined)</i>	
Persecutory	“The Mafia are out to get me”
Grandiose	“I have special talents that other people fail to recognise”
Jealous	“My partner is cheating on me”
Erotomanic	“A celebrity is secretly in love with me”
Somatic: General	“I am deformed”
Somatic: Delusional parasitosis	“I am infected by tiny parasites”
<i>Misidentification (Bizarre*)</i>	
Capgras syndrome	“My relatives have been replaced by identical looking impostors”
Reduplicative paramnesia: Place	“This location exists in two places simultaneously”
Reduplicative paramnesia: Person	“That person exists in two places simultaneously”
Frégoli syndrome	“The same person is disguising himself as others”
Mirrored self misidentification	“The reflection in the mirror is not me”
Somatoparaphrenia	“Part of my body doesn’t belong to me”
Subjective doubles	“There is another person who looks and acts like me”
<i>Control (Bizarre)</i>	
Thought insertion/withdrawal	“Thoughts are being inserted into/withdrawn from my mind”
External control	“My mind/body is being controlled by an external agent”
<i>Other</i>	
Reference (<i>Non-bizarre</i>)	“Articles in magazines are written especially for me”
Nihilistic (<i>Non-bizarre</i>)	“The world is about to end”
Cotard delusion (<i>Bizarre</i>)	“I am dead”
Lycanthropy (<i>Bizarre</i>)	“I am/have transformed into an animal”

* The bizarre/ non-bizarre distinction is determined here by the generic example given and may not always hold for individual cases

2.3.2 Bizarre vs. non-bizarre

DSM-IV defines delusions as bizarre when they are clearly implausible, not understandable and do not derive from ordinary life experiences. Bizarre delusions have a key influence on the DSM-IV-TR diagnostic criteria for schizophrenia (see Box 1), since even one such delusion is sufficient to fulfil the characteristic symptom requirements for diagnosis. The boundaries between bizarre and non-bizarre, however, are not always clear, and there is disagreement even between experienced clinicians (Flaum, Arndt & Andreasen, 1991). As well as having implications for the study of delusions, this lack of specificity has potentially life-altering consequences when a diagnosis of mental illness (i.e., schizophrenia) relies so heavily upon it.

Box 1: DSM-IV-TR Diagnostic Criteria for Schizophrenia (APA, 2000)

Criterion A. Characteristic symptoms: For a diagnosis of schizophrenia, at least two of the following symptoms must be present over a 1-month period:

- (1) Delusions
- (2) Hallucinations
- (3) Disorganized speech
- (4) Grossly disorganized or catatonic behaviour
- (5) Negative symptoms

However, only one of the Criterion A symptoms is required if:

- Delusions are bizarre
- Hallucinations consist of a voice keeping up a running commentary on the person's behaviour or thoughts
- Hallucinations consist of two or more voices conversing with each other

In addition, a person must meet criteria B (Social/occupational dysfunction) and C (6 month duration) to qualify for diagnosis.

2.3.2.1 Types of non-bizarre delusions

Non-bizarre delusions present in both schizophrenia and delusional disorder (indeed, delusions must be non-bizarre for a diagnosis of delusional disorder: see Box 2). The delusional theme thought to be most common, ideas of reference (an estimated 92.5% of psychotic patients hold such ideas: Bowins & Shugar, 1998), is typically non-bizarre, although not a subtype of delusional disorder. There are five subtypes of delusional disorder, defined largely by the content of the delusion: erotomanic, grandiose, jealous, persecutory or somatic. These are also amongst the most common delusional themes, present in several different psychiatric disorders: with an estimated 72.5% of psychotic patients reporting persecutory ideas, 57.5% grandiose ideas, 17.5% somatic concerns and 5% ideas of jealousy (Bowins & Shugar, 1998). It is worth noting that whilst these subtypes of delusion may be non-bizarre, in individual cases it may be more appropriate to classify these as bizarre, depending on the justification and wider web of beliefs associated with the delusion.

Box 2: DSM-IV-TR Diagnostic Criteria for Delusional Disorder (APA, 2000)

All the following criteria must be fulfilled for a diagnosis of delusional disorder:

- A. *Non-bizarre delusions*: Delusions that can occur in real life, held over a 1-month period
- B. Diagnosis for schizophrenia is not met
- C. Aside from the consequences of holding the delusion, functioning is not impaired nor behaviour odd
- D. If present, mood disturbances have been brief relative to delusion duration
- E. The delusion is not the direct result of physiological (e.g., drug) effects or another general medical condition

2.3.2.2 Types of bizarre delusion

Two groups of delusions that tend to be classified as bizarre are delusions of control and delusions of misidentification (see Table 2.1). Delusions of control (e.g., ideas of thought insertion/withdrawal or thoughts/actions being manipulated by an external source) are relatively common: Bowins and Shugar (1998) report that ideas of thought insertion and external control are endorsed by 22.5% and 40% of psychotic patients respectively.

In contrast, delusions of misidentification (DM) are very rare; one study reported them as accounting for only 4.1% of admissions for psychotic illness (Kirov, Jones & Lewis, 1994). Tamam et al. (2003) reported a five year prevalence of 1.3% for Capgras syndrome, and other delusions of misidentification or Cotard delusion are believed to be even rarer (Förstl et al., 1991; McClenahan & Westphal, 2006). These delusions are thought to develop following impairment in an individual's ability to recognise people (or places) known to them, or even to recognise themselves (e.g., Ellis & Young, 1990). They are more likely than other delusions to be circumscribed, and often occur as a result of brain injury, but also can present in disorders such as Alzheimer's (Förstl et al., 1994) and schizophrenia (Edelstyn & Oyebode, 1999).

Another bizarre delusion, Cotard delusion (similarly often found following brain trauma) has been linked to Capgras delusion, and may be due to a global affective processing deficit (Gerrans, 2003).

2.4 DEFINING DELUSION

Considering the wide range of beliefs described as delusional, it is important to establish the core features that a delusion must possess to satisfy the current psychiatric diagnosis. It seems clear that content alone is not sufficient, given the non-

bizarre nature of many beliefs (e.g., those found in delusional disorder). Instead the way in which a belief is held (i.e., the conviction, preoccupation or distress associated with the delusion) plays a critical role.

Of the individuals described in the preceding historical summary, Jaspers drew most attention to the individual symptom of delusion. As discussed earlier, Jaspers distinguished between what he termed 'true' or primary delusional beliefs that were 'irreducible' and those that could be understood as the result of the individual's personality and past experiences. Jaspers (1963, pp. 95-96) defined 'true' delusions as false judgements, with four qualifying characteristics:

- (1) Held with extraordinary conviction
- (2) Impervious to other experiences and compelling counter-argument
- (3) Impossible content
- (4) Ununderstandable

By 'ununderstandable', Jaspers meant that an observer could not understand the belief in terms of the holder's background or experiences, but rather the belief seemingly arose in the absence of any meaningful context. However, as Bentall (2003, p.28) comments, "far from making the borderline between normality and madness more objective, [this final criterion] introduces an alarming degree of subjectivity". The judgement of what constitutes a meaningful context for a delusion remains unclear. Indeed, as is apparent from Table 2.1, delusional content themes usually contain an explicitly personally-relevant element (with the exceptions of reduplicative paramnesia and nihilism in these examples). This feature is confirmed by findings from several clinical studies. Garety, Everitt and Hemsley (1988) reported that only 4 out of their sample of 55 patients described delusions that did not directly integrate themselves. Moreover, Bowins and Shugar (1998) estimated that 92.5% of psychotic

patients held ideas of reference, which are necessarily refer to the individual concerned. Thus in most cases delusions have an understandability at least for the subject reporting them, in that they originate from and appear to link in with (e.g., as a way of explaining events or perceptions) the patient's own background.

Given concerns regarding the 'ununderstandability' distinction, it is not surprising that only the first three of Jaspers's criteria are advocated in the DSM-IV-TR (APA, 2000) definition of a delusion:

'A false belief (1A) based on incorrect inference about external reality (2) that is firmly sustained (3) despite what almost everybody believes (4A) and despite what constitutes incontrovertible and obvious proof or evidence to the contrary (1B). The belief is not one ordinarily accepted by other members of the person's culture or subculture (4B) (e.g. it is not an article of religious faith).'

There remain substantial criticisms of this APA definition, however. These criteria and limitations are discussed in detail below, with reference to the particular clauses indicated by the numbers in brackets.

(1) A false belief [held] despite incontrovertible and obvious proof or evidence to the contrary

In chapter 1 the case for treating delusions as beliefs was accepted, although this view is not without its critics. However, this first statement may still be criticised on the grounds that a delusion need not necessarily be false. Delusions may begin as false, but actually become true, as in cases where delusions of infidelity led to conflict in the patient's relationship, which in turn caused the belief to become reality (Jaspers, 1963). Indeed, Davies et al. (2001) argue that the content of a delusion may happen to

be true, but this should still be considered a delusion as long as the holder has no good reason to maintain this belief.

One major difficulty is our inability to categorically classify a belief as false (as discussed above) or bizarre (Bell, Halligan & Ellis, 2003). Delusions may be unfalsifiable in that they are value statements, e.g., 'I am an amazing artist' (as a grandiose delusion), or if they are of a religious nature. Moreover, non-bizarre delusions, such as delusional jealousy, are inherently plausible (albeit deemed unlikely), with the clinician's judgement of credibility as the deciding factor in diagnosis, again bringing a high degree of subjectivity to each diagnosis. Indeed, for a busy clinician, ascertaining the truth of such claims may be impossible and/or an inappropriate expense of time. However, this is not a trivial decision, given the *'enormous implications for diagnosis and treatment, as well as complex notions concerning responsibility, prediction of behaviour, etc.'* (David, 1999, p. 17).

For example, the case of Martha Mitchell (Maher, 1988) illustrates how cultural or political perceptions can colour the diagnostic procedure. The wife of US Attorney General John Mitchell (who served under President Nixon), Martha Mitchell contacted the press after details of the Watergate scandal began to emerge, to divulge information regarding the role her husband and his colleagues had played. Her claims that illegal activities were being carried out by the government led to a smear campaign against her, and she was discredited and labelled as delusional. She was subsequently vindicated by the release of further information confirming her originally far-fetched sounding story.

(2) Incorrect inference about external reality

Linked to the first set of criticisms (1) is the notion of delusions involving an incorrect inference. Although there is evidence of reasoning biases in patients with delusions (e.g., Garety & Hemsley, 1994), which will be covered later in this chapter, the difficulties outlined above in determining the falsity or otherwise of a belief remain.

Moreover, the second part of this statement raises a further concern - not all delusions are necessarily formed by reference to external reality. Coltheart (2007) gives the example of 'thoughts are inserted into my mind by others', which would generally be considered as delusional despite its internal basis. In fact, several delusions refer to internal thought processes (e.g., thought broadcasting, thought withdrawal).

(3) Firmly sustained

Delusions vary in their bizarreness (see Table 2.1), the degree of conviction they are held with, and the extent to which participants are preoccupied with or distressed by them (Appelbaum et al., 1999; Garety & Hemsley, 1987; Kendler, Glazer & Morgenstern, 1983). Given that the content of the belief may not in itself be sufficient to warrant diagnosis, delusions (in particular, those categorised as non-bizarre) are often distinguished on the basis of the intensity (e.g., conviction) with which they are judged to be held. While delusions may persist for years (Harrow, Rattenbury & Stoll, 1988; Harrow et al., 1995), changes to content and intensity have also been described (Appelbaum et al., 2004; Kuipers et al., 1997; Sharp et al., 1996). Indeed, some patients report varying levels of conviction over the period of a single

day (Myin-Germeys et al., 2001), or even agree to the possibility that they could be mistaken in their belief (Garety et al., 2005).

Despite this, some degree of conviction is considered an important criterion in diagnosing delusion. The DSM-IV-TR considers obsessive-compulsive disorder to involve delusional disorder if the obsession reaches '*delusional proportions*'. Similarly, if an imagined defect in body dysmorphic disorder is '*held with delusional intensity*', an additional diagnosis of delusional disorder is made. However, Phillips et al. (1994) compared patients with delusional and non-delusional forms of body dysmorphic disorder and found that there were no major differences between the two groups in terms of their response to treatment or results on various measures. Some authors have suggested a category of partial delusions (Wing, Cooper & Sartorius, 1974) consisting of delusions without complete conviction. However, Mullen (2003) criticises this idea, arguing that the term 'delusional' would lose all meaning if it becomes synonymous with 'severe'. Cutting (1997) also criticises this emphasis on conviction in delusions as naïve.

This highlights another challenge in establishing an adequate definition of delusion (one not fully addressed by the DSM definition) - the distinction between delusions and other forms of belief (e.g., overvalued ideas). David (1999) provides a useful illustration of this problem. He suggests that a belief in alien abduction may not be delusional but many people would doubt it (referring to such beliefs as 'daft'), whereas a belief that one needs to lose weight when already dangerously thin is usually classed as an overvalued idea. Nevertheless, it is clear that such ideas have much in common with delusional beliefs, demonstrating the ill-defined boundaries between these categories.

(4) Despite what almost everybody believes, i.e., not a belief ordinarily accepted by other members of the person's culture or subculture

A major and neglected issue in defining delusion concerns this final statement of the DSM definition. Interestingly, without this statement, the definition would seem to include religious or paranormal beliefs. Religious beliefs (like paranormal beliefs) typically lie outside the clinical domain, despite the fact that they cannot be rationally explained. As suggested by DSM, the distinction between these and delusional beliefs seems primarily to be the perceived number of people considered to hold these beliefs. (Although work by Harris and colleagues [Harris, 2002; Harris & Koenig, 2006] suggests religion is taught and spoken about in a different way from other beliefs.) There is a major difficulty distinguishing such beliefs on the grounds of sheer numbers, however, as there is little knowledge of the beliefs held within any population (Chapter 5 will address this issue in more detail). Furthermore, as Moor and Tucker (1979) point out, it is not impossible for the majority of people to be mistaken. Indeed, recent evidence suggests that subcultures may actually form around delusional beliefs (Bell, Maiden et al., 2006).

These debates highlight the blurred boundaries between different categorisations of belief, as characterised by DSM. Thus, as David (1999, p. 17) observed, there is '*no acceptable (rather than accepted) definition of a delusion*'.

2.5 THEORETICAL ACCOUNTS OF DELUSION

Despite the ongoing controversy and dissatisfaction regarding the definition of delusion, studies have nevertheless utilised this categorisation to further investigate these beliefs. Theories of delusion formation generally fall into two camps: (1) those

that concentrate on perceived motivational influences and cognitive biases, and (2) those focusing on potential anomalous experiences that may play a critical role in the belief process. The former tend to primarily focus on non-bizarre (in particular, persecutory) delusions, whereas the latter often consider bizarre delusions to illustrate their models. As can be seen from the model of persecutory delusion formation used by Freeman et al. (2002) (see Figure 2.1), this is often just a matter of emphasis (in reference to the particular delusion type in mind), with researchers acknowledging that both factors may actually play a role. This section outlines the key theories of delusion formation.

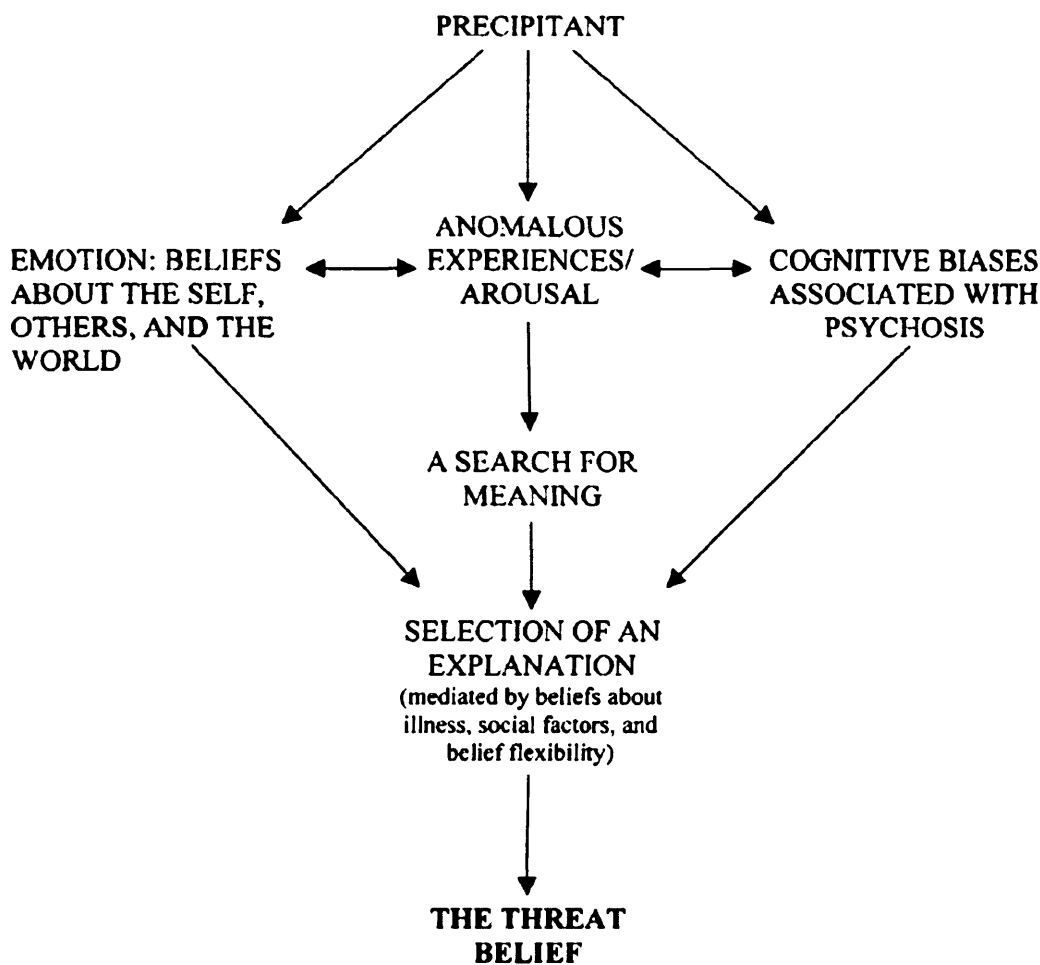


Figure 2.1. Summary of the formation of a persecutory delusion (from Freeman et al., 2002). *This model integrates factors (cognitive/motivational influences and anomalous perceptual experiences) highlighted by both approaches outlined above.*

There are several cognitive biases proposed to contribute to or account for delusion formation (summarised in Table 2.2). Some of these have been developed with particular reference to certain types of delusions, whereas others are hypothesised to play a role in the formation of all or most delusions. Given the varied nature of delusion, it seems likely that there are several routes to delusion formation, with these types of factors playing roles to differing degrees for each. The proposed factors will be discussed in turn below.

Table 2.2. The main cognitive factors proposed to contribute to delusion formation

Proposed deficit/bias	Main account	Key proponents
Perceptual experience	Delusions result from normal reasoning applied to abnormal perceptual experiences	Maher (1999)
Belief evaluation	Deficit/bias in the belief formation process leads to unlikely hypotheses (generated by perceptual experiences, see above) being accepted as beliefs	Stone and Young (1997) Langdon and Coltheart (2000) Coltheart et al. (2007)
Face processing	Capgras delusion stems from reasoning bias, and a covert affective face processing deficit	Ellis et al. (1997) Ellis and Lewis (2001)
Attribution processes	Persecutory delusions are the result of excessive attribution of negative events to other people in an attempt to protect self-esteem	Bentall et al. (2001)
Inferential reasoning	'Jumping to conclusions' reasoning style causes delusional beliefs to be formed from low levels of perceptual information	Garety and Hemsley (1994) Garety and Freeman (1999)
Metacognitive beliefs	Delusions result from information that is accurately perceived but is misinterpreted due to faulty self and social knowledge	Morrison (2001)
Metarepresentation	Delusions of reference, misinterpretation and persecution may result from misinterpretation of another person's behaviour or intentions; Delusions of control may result from the loss of the ability to identify self-generated thoughts and actions as one's own	Frith (1992) Garety and Freeman (1999)

2.5.1 The role of anomalous perceptual experiences

Anomalous experiences (AE) have been suggested as a necessary and understandable condition for delusion formation (Maher, 1988; Stone & Young, 1997). As such, AE have been implicated in the cause of some major delusions of misidentification. Capgras delusion, the belief that (usually) someone close to the affected individual has been replaced by an impostor, was predicted to result from a loss of the expected feeling of familiarity one should get when perceiving a known face (Ellis & Young, 1990). As expected from this account, studies showed that when Capgras patients viewed familiar faces the usual skin conductance responses were absent (Ellis et al., 1997; Hirstein & Ramachandran, 1997). Similarly, Breen et al. (2001) examined patients with mirrored-self misidentification (where individuals misidentify their reflection); finding that one had a deficit in face recognition, and a second was impaired in his ability to correctly understand the workings of a mirror. Thus there is evidence of anomalous perceptual experiences being present in patients with delusions.

Further support for this proposal comes from the strong associations between hallucinations (a form of anomalous perceptual experience) and delusions, noted within both clinical and non-clinical samples (Bilder et al., 1985; Johns et al., 2002; Larøi & van der Linden, 2005; Lewinsohn, 1970; Liddle, 1987; Lincoln, 2007; Mortimer et al., 1996; Peralta et al., 1992; Verdoux et al., 1998). Furthermore, findings indicate that hearing difficulties (a cause of AE) are associated with psychotic symptoms (Cooper & Curry, 1976; David et al., 1995; Stefanis et al., 2006). Indeed, delusions have been elicited from patients who are encountering anomalous experiences: Zimbardo et al. (1981) hypnotised participants and induced temporary deafness, leading to an increase in reported paranoid ideas. However, further evidence

suggests that simply generating an unusual AE is not sufficient to lead participants to develop an abnormal belief (Blakemore et al., 2003; Cahill et al., 1996).

These ideas that AE provide for delusion have been especially prominent in the two-factor model (Coltheart et al., 2007; Davies et al., 2001; Langdon & Coltheart, 2000). This model builds on the ideas of Maher (1988), but argues that the perceptual experience alone does not seem sufficient to account for the development and maintenance of a delusion; patients could instead acknowledge their perceptual deficit. Indeed, patients with Capgras often report other delusional ideas (Young, 1994), suggesting an additional, more cognitive or psychological problem. Coltheart et al. (2007) use the example of patients with a right temporoparietal lesion and resulting hemiplegia. Some of these patients may develop anosognosia (i.e., deny or show unawareness of their paralysis), and of these a few may further develop the delusion of somatoparaphrenia (that a part of one's body belongs to someone else). However, it is clear that, given the number of patients who do not develop this delusion, an additional factor is necessary. Moreover, as the patients that go on to develop the delusion have right-hemisphere damage, then this is the obvious candidate for the location of a belief evaluation system. Indeed, patients with Capgras have also been shown to have right-hemisphere damage (Edelstyn & Oyebode, 1999; Feinberg & Shapiro, 1989). The two-factor model suggests that in addition to the perceptual deficit, a second deficit in this belief evaluation system is necessary to account for delusional beliefs. However, there remain difficulties for this model; for instance, this would predict that the beliefs should be stable, whereas studies have indicated that belief conviction varies (Coltheart, 2007). Coltheart (2007) offers a speculative account of this, suggesting that if belief evaluation was defective but not defunct, this could be explained in terms of the salience of evidence at the point in

time (e.g., presentation of sufficient contradictory evidence could lead to the individual no longer reporting the delusion at some points, whereas at other times their perceptual input would override this).

Other difficulties are highlighted by findings that AE are distributed throughout the normal population and a significant number of patients with delusions do not report such abnormalities (Bell, Halligan & Ellis, 2006c), indicating that this may be a contributory factor rather than a necessary condition. Similarly, evidence casting doubt on the universality of this hypothesis comes from Chapman and Chapman's (1988) interviews with students scoring high on schizotypy, which found that not all those reporting delusional ideas reported anomalous experiences and vice versa. They also report that there were seldom obvious potential causal links between reported experiences and beliefs. Moreover, Escher et al. (2002) report that only 9% of their sample of child voice hearers developed delusions over a three year period. While the causal importance of APEs for delusions has yet to be determined, it seems likely that this is a contributory factor, but will not hold for all delusional beliefs. This issue is picked up in Chapter 6, where the degree of association and dissociation between anomalous beliefs and experiences will be considered in detail.

2.5.2 The role of cognitive biases

2.5.2.1 Attributional and attentional biases

Several studies have found evidence for both attributional and attentional biases in patients with delusions, although much of this work has largely focused on those with persecutory beliefs. Kaney and Bentall (1989) found that paranoid patients tended to report explanations for negative events that extended to all aspects of their lives and were impossible to avoid or change. Furthermore, patients with persecutory

delusions showed an externalising bias: a tendency to assume responsibility for positive events and blame external situations for negative outcomes (Candido & Romney, 1990; Kaney & Bentall, 1989, 1992; Krstev, Jackson & Maude, 1999). This was later refined to include a personalising bias, whereby patients tended to blame other people rather than general external situations (Beck & Proctor, 2002; Freeman & Garety, 2004; Kinderman & Bentall, 1996). However, Sharp, Fear and Healy (1997) found that this bias only occurred in those reporting paranoid or grandiose ideas rather than other delusional themes.

In addition, some differences have been noted regarding attention in people with paranoid delusions, whereby they pay selective attention to self-referential, and, in particular, threatening information (Bentall & Kaney, 1989; Fear et al., 1996; Kinderman, 1994). Furthermore, there is some evidence that these biases are specifically linked to the presence of delusions. One patient with both Cotard and Capgras delusions was slower to name the colours of words in the Stroop test when these related to her delusions during an acute phase of her illness but had no difficulties when these delusions had remitted (Leafhead et al., 1996). Moreover, patients are more likely to recall threatening episodes (Kaney et al., 1992), which could lead to the propagation of these beliefs (Blackwood et al., 2001). However, Phillips and colleagues (Phillips & David, 1997; Phillips et al., 2000) found that patients with paranoid delusions did not attend more to threatening stimuli; in fact they seemed faster at identifying potential threat but then moved on to scan the remainder of the stimuli quickly.

Bentall et al. (2001) focus on attentional and attributional biases to address the formation of persecutory delusions. Their model emphasises the attributional style

and self-representation of the individual (see Figure 2.2). They propose that persecutory delusions are the result of attempting to minimise discrepancies between patients' actual and ideal selves, by blaming others for negative events.

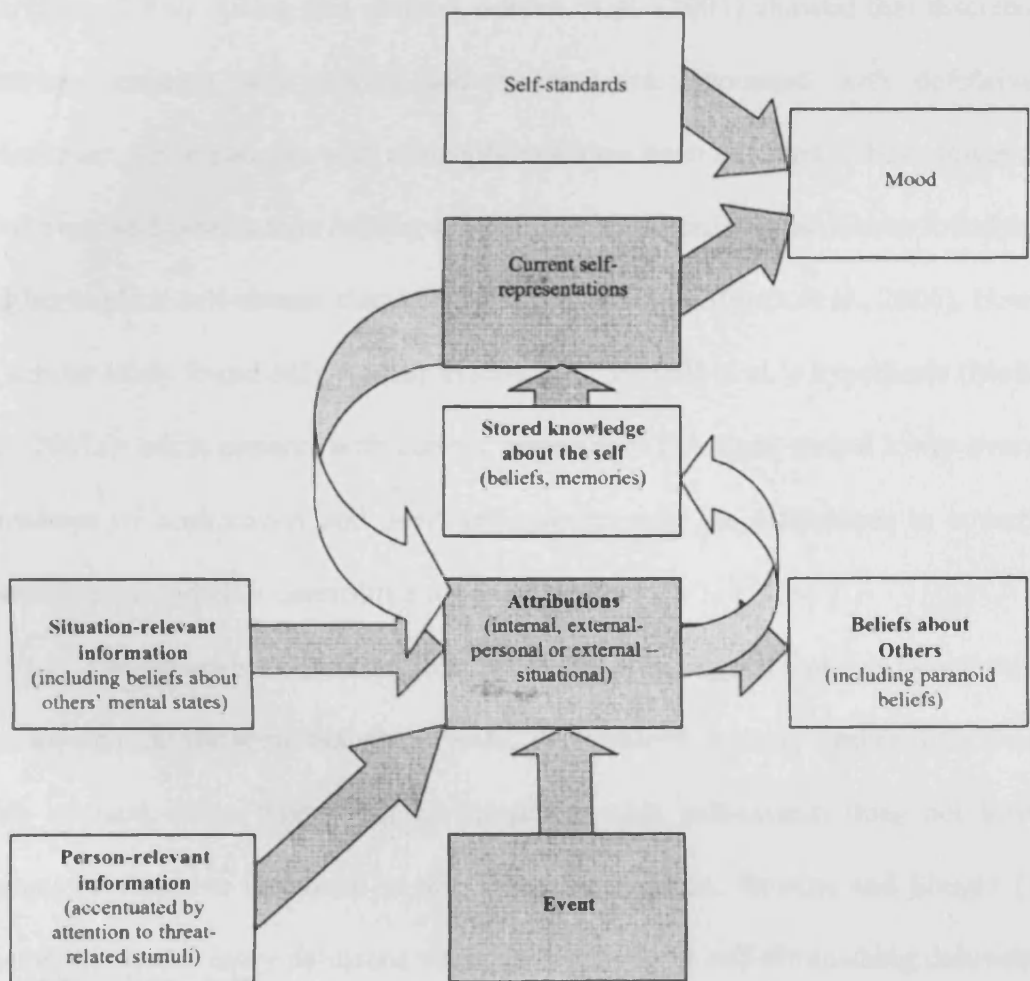


Figure 2.2. The attribution – self-representation cycle (from Bentall & Kaney, 2001)

The authors believe that negative beliefs about the self can lower implicit self-esteem, even though explicit reports of self-esteem may be high, a view supported by studies suggesting that self-esteem is affected by attributions in both healthy and delusional individuals (Kinderman et al., 2003). However, not all studies attempting to compare overt and covert self-esteem have supported this hypothesis (Krstev et al., 1999), and

different measures of attributional style have not always correlated with persecutory ideation (Martin & Penn, 2002). On the other hand, recent findings using the Implicit Association Test (IAT: Greenwald et al., 1998) have suggested that this may provide a better means of distinguishing implicit and explicit self-esteem (Greenwald & Farnham, 2000). Using this method, Jordan et al. (2003) showed that discrepancies between implicit and explicit self-esteem were associated with defensiveness. Moreover, while patients with schizophrenia have been reported to have lower covert and overt self-esteem than healthy controls, paranoid patients have been found to have higher explicit self-esteem than non-paranoid patients (Moritz et al., 2006). However, a similar study found only weaker evidence for Bentall et al.'s hypothesis (McKay et al., 2007a): while patients with current persecutory delusions scored lower overall on measures of both covert and overt self-esteem, only the differences in covert self-esteem remained after controlling for depression.

The somewhat equivocal findings in this area suggest that this hypothesis may be appropriate for some but not all cases of delusions. Indeed, further difficulties for this account come from findings suggesting that self-esteem does not lower as delusions improve (Freeman et al., 1998). In addition, Bowins and Shugar (1998) found that persecutory delusions were among the most self-diminishing delusions and that lower self-esteem was linked to more self-diminishing delusions. This highlights another aspect that has been incorporated into models of delusion – the idea of a direct link between emotions and the development of delusional beliefs (Garety et al., 2001), as included in the Freeman et al. (2002) adaptation of this model for persecutory beliefs (see Figure 2.1).

These authors (Freeman et al., 2002; Garety et al., 2001) also include the idea of AE leading to delusional beliefs. Garety et al. (2001) suggest that biased appraisal

processes (such as those identified by Bentall and colleagues) could result in these experiences being judged as externally motivated rather than as the result of an internal process. Freeman and Garety (2004) further suggest that maintaining the delusion provides the individual with an explanation for any ongoing experiences, and therefore resolves cognitive dissonance. In addition, McKay et al. (2007b) have also combined deficit and motivational approaches in an update to the original two-factor model. In this modified account, the first factor constitutes the sources of information providing for a particular delusional belief (including anomalous perceptual experiences and defensive desires). The second factor comprises biases in belief evaluation, such as unwarranted influence of unreliable sensory information or motivational factors. In this manner, many of the accounts have converged to some degree, allowing for the incorporation of a range of contributory factors.

These ideas have been further expanded by Young (2008), who highlights the limitations of linear-focused models, advocating instead an interactionist model, which allows for both bottom-up and top-down processes, thus providing the potential for anomalous experiences and delusions to feed into each other. For example, Young (2008) suggests that Capgras beliefs may form following an AE, but it is the delusion itself that leads to the maintenance of the experience being perceived in a manner consistent with the belief.

2.5.2.2 Reasoning biases

Furthermore, other cognitive biases may contribute to the development of some or all delusions to an extent. Patients with delusions also have a tendency to jump to conclusions, and to change their minds easily when presented with contradictory evidence (Garety et al., 1991; Garety & Hemsley, 1994; Huq et al.,

1988; Linney et al., 1998). This effect is thought to be more pronounced with meaningful stimuli (Dudley et al., 1997a; Young & Bentall, 1997). Moreover, this is unlikely to be due to patients responding to the most immediate stimuli in the environment, as patients with delusions still follow trends to become more cautious as evidence becomes less meaningful (Dudley et al., 1997b; Young & Bentall, 1997). An additional bias is suggested as that both patients with paranoid delusions and individuals scoring highly on delusional ideation have a higher need for closure (less tolerance of ambiguity) than others (Bentall & Swarbrick, 2003; Colbert & Peters, 2002).

One version of the reasoning bias accounts is the Bayesian account of belief formation (Hemsley & Garety, 1986). In these accounts, beliefs are subjective probabilities, based on the evidence available at the time, that some proposition is true. A failure to update beliefs in accordance with new evidence could lead to the belief becoming abnormally tenacious, as with many delusions.

2.5.2.3 Metacognitive beliefs

Previous research has suggested meta-cognitive beliefs (beliefs about one's thought processes) play a critical role in emotional dysfunction (Wells & Matthews, 1994). Morrison (2001) adapted this idea, emphasising the influence of metacognitive beliefs on the development of psychotic symptoms, especially those relating to the controllability and causal influence of one's thoughts, and the degree to which one is personally responsible for thought content. Indeed, studies show that patients with hallucinations (compared to patients without hallucinations) and hallucination-prone individuals (compared to non-hallucination-prone subjects) report differences in metacognitive beliefs, in particular those relating to controllability of thoughts (Larøi

& van der Linden, 2005; Morrison & Wells, 2003). These metacognitive appraisals of belief processes may determine the degree to which an individual is distressed by a particular experience (e.g., a person who believes that all their thoughts should always be controllable is likely to be more distressed by intrusive or unpleasant thoughts than someone who does not hold such a belief). Given that the continuum account suggests anomalous experiences occur in the non-clinical population, maladaptive metacognitive beliefs may be one factor that increases the likelihood of an experience developing into a psychiatric symptom, mediated by the associated degree of distress. However, the influence of metacognitive beliefs was originally considered in terms of more general psychological distress, and even when focusing on psychotic symptoms this theory has been developed mainly with reference to hallucinations. As such, while metacognitive beliefs may be a contributory factor to delusion formation, study of these is limited in terms of its insight into the specific correlates of delusions.

2.5.2.4 Theory of mind deficits

Another key cognitive deficit implicated in delusions, highlighted by Frith (1994), focuses on the ability of patients with schizophrenia to complete theory of mind (ToM) tasks. Theory of mind deficits are often associated with autistic spectrum disorders (e.g., Baron-Cohen, 1995), but are regarded as milder and more transient (present only during psychotic episodes) in schizophrenia, suggesting this is a state rather than trait variable (Pickup & Frith, 2001). Frith and Corcoran (1996) found that both patients with current paranoid delusions and those with predominantly negative symptoms were impaired on higher order ToM tasks, but only with the latter group was this associated with IQ scores. Further studies indicated deficits in other higher order ToM tasks (Corcoran, Cahill & Frith, 1997; Corcoran, Frith & Mercer, 1995),

and with patients with delusions other than paranoia (Drury et al., 1998). However, some evidence suggests that patients may have good ToM performance even when delusions are present (Walston et al., 2000), and others failed to find associations with persecutory delusions but rather with thought disorder (Sarfati et al., 1999) or negative symptoms (Langdon et al., 1997). Moreover, conversational interactions with patients with schizophrenia do not reveal ToM deficits (McCabe et al., 2004). As with the results on attributional and attentional biases, the multiple aetiology and presentation of delusion makes it difficult to fully evaluate the impact of each cognitive factor.

2.5.3 Physiological models

In addition to the cognitive models outlined above, physiological theories regarding delusion formation have been proposed. These are briefly outlined below, but, given the focus of this thesis on cognitive mechanisms, will not be discussed in detail.

2.5.3.1 Misattribution of self-generated thoughts and/or actions

When one performs an action, the body usually sends an internal copy (the efference copy) of the motor signals to allow an estimate of the sensory feedback that will occur as a result of this movement (corollary discharge). As a result of this prediction, one's awareness of the sensory consequences is modulated and dampened (Ford et al., 2007; Heinks-Maldonado et al., 2005; Shergill et al., 2003). Several studies have indicated that patients experiencing hallucinations or delusions do not have this reduced sensory feedback for their own self-generated speech and/or actions (Blakemore et al., 2000; Ford & Mathalon, 2004; Shergill et al., 2005).

Proponents of this account note that many of the delusions and hallucinations associated with schizophrenia seem to involve a misattribution of self-generated thoughts and actions to other people. For example, Blakemore et al. (2002) argued that delusions of control could follow from a propensity towards labelling one's own actions as belonging to others, and hallucinations of voices could reflect inner speech (Allen et al., 2007). However, whilst this account seems plausible for delusions of control, other delusions (e.g., persecutory or grandiose) are less easily accounted for by such a failure in physiological mechanisms. Furthermore, this account is subject to the same criticism as those relying on other perceptual anomalies; that this alone does not seem sufficient to explain the formation and maintenance of the belief.

2.5.3.2 Dopamine hypothesis

This influential hypothesis suggests that dopamine (DA) plays a key role in the manifestation of psychotic symptoms (Kapur, 2003). DA is widely believed to be an important mediator of reward pathways, and as such is responsible for the affective (attractive/aversive) reactions people experience in response to different external stimuli and thus the salience of each stimulus (Kapur, 2003). If this process becomes dysregulated, and DA released regardless of the presence of a stimulus, then any external objects or internal representations present at that time might become imbued with an inappropriate level of salience. From this, a delusional web of beliefs may form to provide a cognitive explanation for the aberrant salience. As such, the dopamine hypothesis acts alongside various psychological processes to contribute to delusion formation. One advantage of this approach is that, given the proposed process of delusion formation, it allows for individuals with similar dysfunctions to react in different ways, thus accounting for the individual variation found with

delusional beliefs. Furthermore, as people can recover from delusions, this suggests that this is not a fixed deficit but rather a result of an abnormal process of belief formation.

2.6 SUMMARY

Research into delusions has predominantly focused on those commonly found in schizophrenia and delusional disorder (with a particular focus on persecutory delusions). A somewhat neglected strand of research concerns those (often monothematic) delusions that are generally found in neuropsychiatric conditions (e.g., Capgras syndrome). However, research rarely combines delusions from both these groups. As such, the models for delusion and/or belief formation proposed as a result of these two types of investigations focus on particular phenomena (perceptual experiences vs. cognitive biases).

Whilst such models have been useful in conceptualising delusions, as yet, these tend to be too specialised when focused primarily on one type of delusion but too complex when accounting for the generic processes involved. It is important to note that these contributors are not mutually exclusive; both AE and cognitive biases could play a role in delusion formation (Freeman et al., 2002; McKay et al., 2007b). The importance of each of these biases is likely to vary depending on the type of delusion formed, as is reflected by the different emphasis placed on these in different models. One element agreed upon by the majority of these approaches is that delusion formation occurs as a result of some dysfunction of normal belief formation processes. Establishing the characteristics of 'normal' beliefs could help to elaborate on these processes. The following chapter describes two studies that set out to characterise the features of 'normal' belief as understood by the general public.

CHAPTER 3

CHARACTERISTIC FEATURES OF BELIEF

3.1 BACKGROUND

Chapters 1 and 2 reviewed the wide ranging literature on belief and delusion. From this it is clear that many questions regarding the formation and maintenance of beliefs and delusions remain unanswered. One first step towards further investigation of these phenomena is to consider how best to approach studies of belief in the general population. To do this it is important to establish the key characteristics of belief in order to determine whether the assumptions inherent in some current conceptualisations of delusions are justified (i.e., whether features, such as the stability, coherence and prevalence, of a 'normal' belief can be distinguished from those of delusion). This chapter describes two preparatory empirical studies addressing some methodological and conceptual issues concerning the nature of beliefs.

3.1.1 How should we assess reports of 'belief'?

Given that most clinical delusions are typically considered to be a type of 'belief', it is of particular interest to establish how people understand or interpret this term when they encounter it in the various measures of beliefs, delusions and delusional ideation. As yet, no study has formally investigated the characteristics associated with this concept, or whether there is a consistent interpretation and usage of the term 'belief' throughout the general population. While the consistent use of this term seems an inherently plausible assumption, there would be considerable methodological difficulties for studies of belief if this was not the case.

In addition, this study is of theoretical interest, given that both philosophical and psychiatric research have referred to the nature of belief, despite the lack of either an agreed formal definition or any empirical work to substantiate this concept. Within philosophy (see Chapter 1), the validity of the ‘folk psychological’ view of belief has been the subject of ongoing debates. Moreover, Chapter 2 described controversies relating to the definition of delusion as a form of belief, whereby concerns focused on the extent to which the qualities of delusion differed from (what the authors assumed to be) the features of a belief. While establishing the general public’s understanding of the characteristics of belief does not provide a way to fully overcome these issues, it may provide some support for or against previous assumptions concerning the features of belief.

An additional and not unrelated issue is that research on delusions, religion and other belief-type phenomena has often utilised a variety of terms in their measures to describe subjects holding beliefs (e.g., ‘believe’, ‘think’, ‘feel’), and many of these have seemingly used such terms interchangeably. No study has as yet confirmed that these terms are synonymous, however, leaving their degree of comparability open to question.

To address these issues, the aim is to explore two main research questions:

- (1) (a) What are the key characteristics or features that people consider the term ‘belief’ to imply?
(b) Are these characteristics or features consistently endorsed?
- (2) Does people’s use of the term ‘belief’ differ from their use of other terms (e.g., ‘think’ and ‘feel’) or are they used synonymously as evidenced by their interchangeable use on clinical and research questionnaires?

Investigation of these questions will allow more accurate conclusions to be drawn regarding people's reports of specific beliefs, particularly by comparison with reports that have used similar terms to assess delusions or other beliefs.

3.2 STUDY 1: PEOPLE'S UNDERSTANDING OF 'BELIEF'

3.2.1 Background

Chapter 1 described growing support for the position that delusions lie on a continuum of normal beliefs, where only a minority attain clinical relevance and demonstrate any significant morbidity or disability (Blackwood et al., 2001; Claridge, 1994; Crow et al., 1995; Johns & van Os, 2001; Rutten et al., 2008; Strauss, 1969; van Os et al., 2009). In addition, discussion of both the definition and models of delusion in Chapter 2 showed that there appears to be considerable support in psychiatry for the assumption that delusions are best understood as beliefs resulting from dysfunction or abnormal belief processes (e.g., Bentall et al., 2001; Davies et al., 2001; Freeman, Garety & Kuipers, 2001; Langdon & Coltheart, 2000; Oltmanns & Maher, 1988; van Os, 2003). Hence a better understanding of belief in the general population would in turn benefit research into delusions.

Much work has been carried out on the prevalence of different beliefs, involving health and illness beliefs (e.g., Harvey & Lawson, 2009; Salmon, Woloshynowych & Valor, 1996), paranormal phenomena (e.g., Taylor, 2003), religious beliefs (Magyar-Russell et al., 2008), psychiatric delusions (Peters, Joseph & Garety, 1999), and public and medical beliefs (Jorm & Griffiths, 2006). Assessments of illness and health-related beliefs are common, as revealed by several large systematic reviews covering thousands of studies, including those investigating the

beliefs of patients and non-patients for mental health care of anxiety and depression (Prins, Verhaak, Bensing & van der Meer, 2009), illness beliefs and health care in young people (Haller, Sanci, Sawyer & Patton, 2008), and parents' beliefs regarding childhood vaccination (Mills, Jadad, Ross & Wilson, 2005).

Despite numerous studies, little is known about what constitutes an acceptable definition of the term 'belief' or whether the term represents a unitary construct or a loose cluster of discrete but superficial similar features. Participant understanding of the term 'belief' is typically assumed in most questionnaires. Indeed, no studies were found that specifically explored what participants (patients and/or non-patients) consider or understood to be the defining properties of a 'belief'. The absence of such studies assumes that people hold a relatively consistent interpretation of the term. However, this may underestimate differences in pre-existing 'folk' uses of the term that are likely to have developed over time and depend on experiences or situations in which the term is used.

It is possible that many of the respondents think about belief in a different manner to that assumed by researchers, given that beliefs often "*travel in disguise*" under various aliases (e.g., attitudes, values, judgements, axioms, opinions, perceptions, preconceptions: Pajares, 1992, p. 309). Indeed, research from cognitive anthropology casts doubt on the existence of a universal understanding of this term. Needham (1972, p.188) suggests that belief "*does not constitute a natural resemblance among men, and it does not belong to the 'common behaviour of mankind'*". Furthermore, the beliefs of patients and health care professionals have been found to differ with regard to distinct health problems (Boot, Meijman & van Dulmen, 2009) and cultures (Des Courtis et al., 2008), thus it is useful to know how the term 'belief' is understood in the general public.

Analogous empirical evidence on defining delusion exists and suggests that belief can be considered a multidimensional construct (Garety & Hemsley, 1994; Harrow et al., 2004). Since deluded patients can rate the characteristics of their beliefs in clinical studies (Appelbaum, Robbins & Roth, 1999; Garety & Hemsley, 1987; Jones & Watson, 1997), it should be possible to establish what healthy individuals understand as the defining features of belief by evaluating a similar set of belief-relevant properties in the general population (see Freeman, 2008).

To investigate the general public's understanding of 'belief', the first study took a similar multi-dimensional approach to that used by many researchers attempting to define delusions (Appelbaum et al., 1999; Garety & Hemsley, 1987; Oltmanns, 1988). This involved coming up with a "*list of characteristics or dimensions, none of which may be necessary or sufficient*" (Freeman, 2008, p. 24). Although there is no logical limit to the number of defining characteristics/ dimensions, a review of the clinical literature and philosophy of belief literature (together with feedback from 2 earlier pilot studies) suggested a number of relatively distinct defining features. While not comprehensive or exhaustive, these defining features provided a reasonably wide set of options and were considered relevant by most participants in the two pilot studies.

Using these dimensional features, members of the general public were asked to evaluate the relevance of each feature when considering the term 'belief'. The definitional features concerned declarative beliefs (i.e., those that participants can articulate), as these are the types of belief explicitly focused on by all questionnaires. In this study the aim was to establish whether the general public hold a relatively coherent and common understanding of the term 'belief'.

3.2.2 Developing a nature of belief measure

To derive a set of defining properties or features of belief, an initial literature review was conducted that compiled a small set of definitional features drawn from delusional belief studies, standard dictionaries and reviews of relevant philosophical, psychological and clinical literature (e.g., Bell, Halligan & Ellis, 2006a; Campbell, 1967; Quine & Ullian, 1970; Schwitzgebel, 2006).

3.2.2.1 Pilot Studies

In an initial pilot study, 254 participants were asked to choose one of five complex statements, defining multidimensional aspects of what constitutes a belief. These sentences comprised aggregations of several discrete component features (e.g., ‘strong conviction’, ‘considered as true’, ‘personal nature’ and ‘influence on thoughts’). While the strongest definition (*A strongly held personal conviction about the nature of the world, that one holds as true and influences the way you act or think*) was selected as the most appropriate by 43% of participants, there was considerable variation between choices (with 23% of participants selecting the second strongest, which suggested belief need not have any influence on behaviour, and 6% the weakest, which implied belief need not have any influence on behaviour nor stability over time). Importantly, the initial results and participant feedback suggested the need to decompose belief characteristics into constituent features to facilitate ratings.

Subsequently, thirteen stand-alone defining characteristics were identified (see Table 3.1, features A, B, and D-N). A second pilot study using this revised version requested 119 new participants to rate the extent to which each feature reflected their current understanding and use of the term ‘belief’. All 13 features were endorsed by the majority of participants (between 77%-100%). Participants were also given the

option of suggesting additional features and/or amending the existing wording. Most were content with the 13 features but 11% suggested some additional components and/or modifications, which focused on the stability and the personal nature of belief.

Following these suggestions, one additional characteristic (C: ‘a significant part of personal core values’) was included. Defining properties covered descriptive qualities (e.g., ‘a strongly held conviction’), functions (e.g., ‘provide a framework for explaining how things are or should be’) and consequences (e.g., ‘influence your behaviour’) of holding beliefs. Inevitably, some properties overlapped. Table 3.1 describes the final 14 characteristics/features and provides a brief summary of the background and origins of each feature.

In the final version, participants were asked to “consider each of the following characteristics carefully, and rate the extent to which each is an accurate description of belief”. Each item from Table 3.1 was then presented in the form ‘To what extent are/do beliefs...’ The response options consisted of a three-point Likert scale (labelled ‘Not at all’, ‘Partly’ and ‘Totally’).

3.2.3 Participants

For the final evaluation of the belief characteristic scale a stratified random sampling technique was used to obtain a large sample from across Britain, with quotas set on age, gender and employment status. Data were collected using computer-assisted telephone interviewing, carried out by an experienced market research company. For further details on the sampling methodology and participant characteristics see Chapter 5 (section 5.2). One thousand adults (aged 18 or over) took part in the survey. The study was approved by the School of Psychology’s ethics committee, and all participants gave verbal consent to the interview.

Table 3.1. Defining features of a ‘belief’

Property Type	Property	Question [and order in brackets] <i>Does/ Is a belief...</i>	Description
<i>Functional features</i>	A. Provides an explanation	<i>Provide a framework for explaining how things are or should be [4]</i>	Beliefs offer a way of explaining past events and predicting new ones. This property dates back to the philosopher Locke, but was subsequently used in influential accounts linking delusions and anomalous perceptual experiences (e.g., Maher, 1988).
	B. Personal interpretation	<i>A personal interpretation about an event, or about the nature of the world [2]</i>	Unlike knowledge, beliefs have a personally-relevant element (e.g., some delusional beliefs’ “content is crucially related to the individual’s personal fears, needs or security”: Reed, 1972, p.144). Oltmanns (1988) and Freeman (2008) include personal reference as a defining feature of delusion.
	C. Constitutes part of a participant’s core values	<i>A significant part of your personal core values [14]</i>	For many participants in the pilot studies, beliefs were seen as equated to values or value statements (often most clearly seen in the case of moral beliefs) and reflected the extent to which beliefs were seen as having a pervasive and a preoccupying influence on participants’ experience.
<i>Consequential effects</i>	D. Influences behaviour	<i>Influence your behaviour [12]</i>	This is a fundamental assumption of the dispositional approach towards belief taken by some philosophers (e.g., Dennett, 1987). Moreover, psychiatric studies report that some patients act on delusional beliefs (e.g., Buchanan & Wessely, 2004; Förstl et al., 1991). Also included as a key feature of delusion by Appelbaum et al. (1999), Freeman (2008), Harrow et al. (2004) and Jones and Watson (1997).
	E. Influences attitudes/ decisions	<i>Shape or colour your attitudes and decisions [5]</i>	Beliefs may influence attitudes (e.g., towards political parties or religious organisations).
	F. Influences thoughts	<i>Influence your thoughts [3]</i>	Some beliefs may be dispositional and almost never come to consciousness but others may be very preoccupying (in particular, some delusional beliefs, as included by Appelbaum et al. [1999], Freeman [2008], Haddock et al. [1999], Jones & Watson [1997] and Oltmanns [1988]).
	G. Influences feelings	<i>Influence the way you feel [8]</i>	Beliefs can have significant emotional impact on the holder. Whilst distress is often associated with delusion, beliefs can have positive and/or supportive emotional impacts. This feature is described by Appelbaum et al. (1999), Freeman (2008), Haddock et al. (1999), Harrow et al. (2004), Jones and Watson (1997) and Oltmanns (1988) and was considered by Eisen et al. (1998).

	H. Capable of articulation	<i>Something you would acknowledge or talk about publicly [13]</i>	This feature emphasises the declarative or potentially public nature of beliefs; i.e., the belief statements covered in all questionnaires.
<i>Dispositional characteristics</i>	I. Veracity of a given proposition	<i>Right and/or true [11]</i>	Belief is a proposition “ <i>mentally asserted or judged by [a person] to be true</i> ” (Campbell, 1967, p. 217). This feature was included previously by Jones and Watson (1997). It is not possible to consciously hold a false belief and so a key feature of holding a belief remains its perceived truth for the individual holding it.
	J. Conviction	<i>A strongly held conviction [1]</i>	As with the influence of a delusion, conviction or certainty varies depending on how relevant the belief is and quality of the evidential base. Delusions are often thought of as being held with “extraordinary conviction” (Jaspers, 1963) and this has been included in previous sets of characteristics of delusion (Appelbaum et al., 1999; Brett-Jones, Garety & Hemsley, 1987; Eisen et al., 1998; Freeman, 2008; Garety, Everitt & Hemsley, 1988; Haddock et al., 1999; Harrow et al., 2004; Jones & Watson, 1997; Kendler, Glazer & Morgenstern, 1983; Oltmanns, 1988).
	K. Stable	<i>Relatively permanent across time and different situations [7]</i>	This varies depending on the belief. Some may be “firmly sustained” (as suggested in the DSM-IV-TR criteria for delusions: APA, 2000), others may be situation dependent (e.g., a belief in ghosts when alone at night). This was included as a dimension of delusion by Haddock et al. (1999) and considered by Eisen et al. (1998).
	L. Resistant to change	<i>Resistant to change [10]</i>	Some people continue to accept a belief despite being presented with powerful evidence to the contrary, i.e., there are no “ <i>subjective efforts to resist the belief</i> ” (Oltmanns, 1988, p.5). This characteristic was also included by Freeman (2008), who links it in with the above statement (11), and by Garety et al. (1988).
	M. More than memories/ facts	<i>More than memories or facts [9]</i>	Some beliefs may overlap with factual knowledge, but many others have an emotional component that is not specifically associated with facts per se, and beliefs need not be objectively true. Memories per se can be differentiated in that they do not have the state of currency (i.e., of being here-and-now) that a stated belief possesses, although clearly to recall a belief in consciousness requires that it be accessed from memory.
	N. More than passing thoughts/ feelings	<i>More than a passing thought or feeling [6]</i>	This feature links to the previous points relating to pervasiveness and preoccupation. Again the functional elements described at the start of the table are relevant as potential discriminatory features, which could account for the participants’ impression of belief as a stronger term than the others.

3.2.4 Results

3.2.4.1 Number of components endorsed

Forty-nine percent of the sample considered all 14 belief components/features either 'partly' or 'totally' relevant when defining a belief, with this figure rising to 88% for 10 (71%) features (see Figure 3.1).

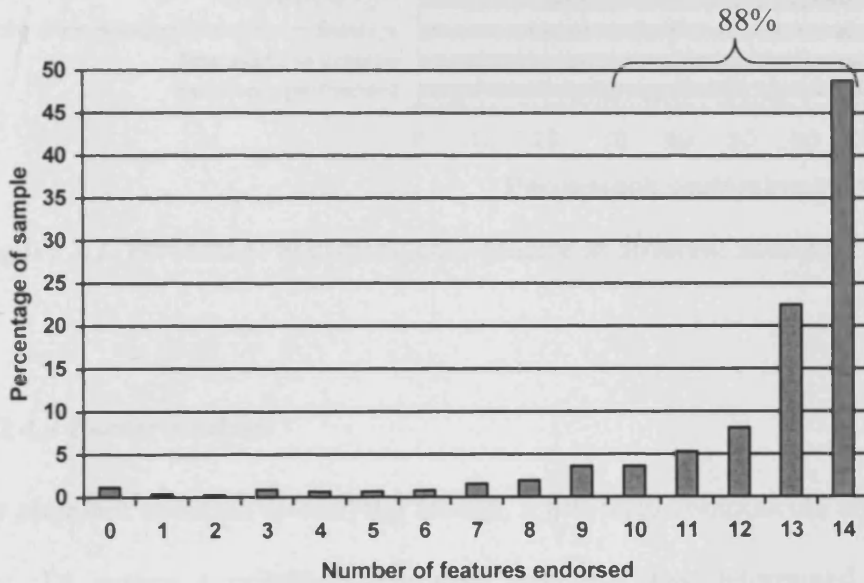


Figure 3.1. The number of features endorsed by each participant

3.2.4.2 Strength of endorsements

The mean endorsement for each feature was greater than 1 (Partly), indicating that all 14 features were considered a reasonable fit to what participants considered a belief to be. Indeed, each feature was endorsed (either 'Partly' or 'Totally') by between 79-90% of the sample (see Figure 3.2).

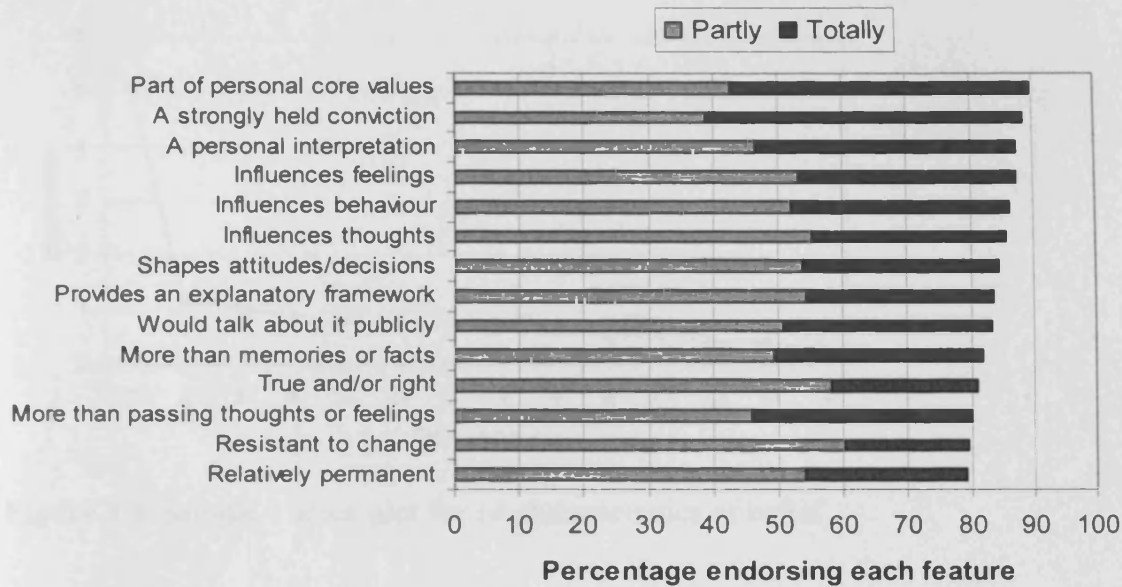


Figure 3.2. Percentage endorsing each feature at different strengths

3.2.4.3 Factor analysis

To ascertain common underlying factors, a principal components analysis was carried out. To ensure a reliable component structure was determined, the sample was randomly split in half, with each half analysed separately and the two solutions compared.

Sample 1

Initial analysis of all items showed these had Kaiser-Meyer-Olkin (KMO) measures of sampling adequacy between 0.812-0.934, with an overall KMO of 0.903. The Bartlett test for sphericity was significant. The Kaiser criterion of eigenvalue > 1 suggested a three component solution, whereas the scree plot suggested a one component solution (see Figure 3.3).

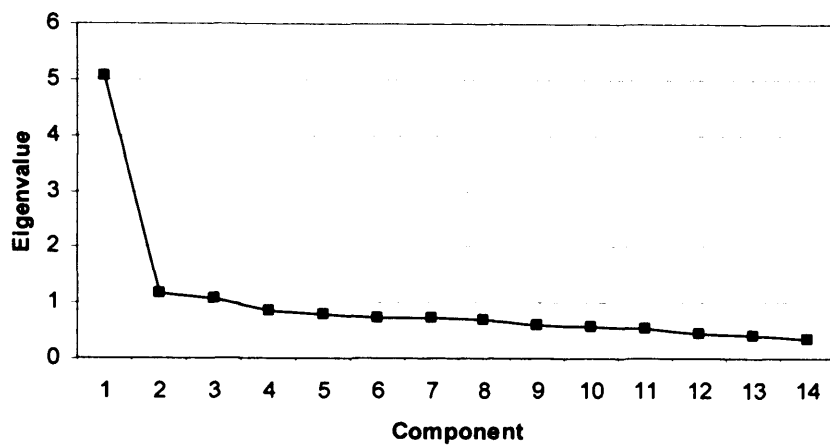


Figure 3.3. Sample 1 scree plot for 14 characteristics of belief

Following the advice of Stevens (1992), given that there was a large sample but relatively low communalities, the solution indicated by the scree plot was taken as the most appropriate. Therefore, the analysis was re-run with a forced one component solution. The single component solution explained 36.2% of the variance.

Sample 2

Initial analysis of the 14 items showed these had Kaiser-Meyer-Olkin (KMO) measures of sampling adequacy between 0.820-0.941, with an overall KMO of 0.906. The Bartlett test for sphericity was significant. The Kaiser criterion again suggested a three component solution, whereas the scree plot suggested a one component solution (see Figure 3.4)

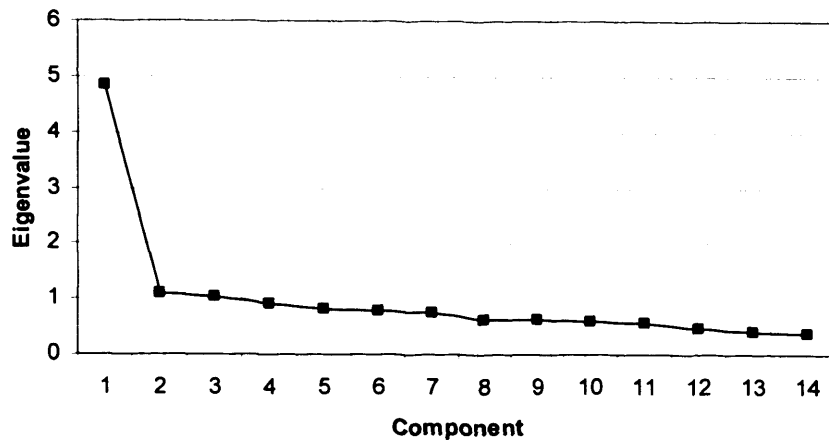


Figure 3.4. Sample 2 scree plot for 14 characteristics of belief

Therefore, this analysis was also re-run with a forced one component solution (again following Stevens, 1992). Overall, the single component solution explained 34.5% of the variance.

As Table 3.2 shows, those features of belief describing influence, and ‘a significant part of personal core values’ loaded highest onto the component for both samples.

Table 3.2. Factor loadings for the 14 belief features

<i>To what extent do/are beliefs...</i>	Factor loading	
	Sample 1	Sample 2
Shape or colour your attitudes and decisions	0.708	0.721
A significant part of your personal core values	0.717	0.702
Influence your behaviour	0.703	0.710
Influence your thoughts	0.672	0.685
Influence the way you feel	0.706	0.650
Provide a framework for explaining how things are or should be	0.672	0.634
More than a passing thought or feeling	0.668	0.648
Relatively permanent across time and different situations	0.619	0.639
More than memories or facts	0.579	0.557
True and/or right	0.571	0.566
Something you would acknowledge or talk about publicly	0.511	0.546
Resistant to change	0.460	0.483
A strongly held conviction	0.430	0.387
A personal interpretation about events, or the nature of the world	0.315	0.340

The features 'a strongly held conviction' and 'a personal interpretation about events, or the nature of the world' only loaded weakly onto this single component, however, suggesting that these may not be adequately represented by this factorial solution.

3.2.4.4 Demographic Variables

Non-parametric tests (Kruskal-Wallis or Mann-Whitney) were used to assess whether basic demographic variables (Age group; Gender; Socioeconomic group; Education [secondary/university/higher]; Ethnicity [white/other]; Member of organised religion [yes/no]) influenced the mean endorsement of features of belief. Due to the number of comparisons, only effects significant at $p \leq 0.0001$ are considered (Bonferroni's correction).

Socioeconomic group ($\chi^2(3)=19.78$, $p < 0.0001$), education ($\chi^2(2)=20.07$, $p < 0.0001$) and religion were all significant factors relating to mean endorsement of belief features. Participants who reported belonging to a religion provided significantly higher and/or more endorsements than those who did not ($U=76804.5$, $N_1 = 293$, $N_2 = 700$, $p < 0.0001$). Follow up Mann-Whitney tests were carried out to compare between levels of socioeconomic group and education.

Socioeconomic group

Individuals in socioeconomic groups A and B showed significantly higher mean levels of endorsement than those in group C2 ($U=11776.0$, $N_1 = 345$, $N_2 = 92$, $p=0.0001$) but not compared to those in groups D and E ($U=29531.0$, $N_1 = 345$, $N_2 = 202$, $p=0.003$). All other group comparisons were not significant at $p < 0.0001$. A brief summary of the group classification is provided overleaf.

- A & B** **Modern professional occupations**
 Such as: teacher, nurse, physiotherapist, social worker, welfare officer, artist, musician, police officer (sergeant or above), software designer
- Senior managers or administrators**
 (Usually responsible for planning, organising and co-ordinating work and for finance). Such as: finance manager or chief executive
- Middle or junior managers**
 Such as: office manager, retail manager, bank manager, restaurant manager, warehouse manager, publican
- Traditional professional occupations**
 Such as: accountant, solicitor, medical practitioner, scientist, civil / mechanical engineer
- C1** **Clerical and intermediate occupations**
 Such as: secretary, personal assistant, clerical worker, office clerk, call centre agent, nursing auxiliary, nursery nurse
- C2** **Technical and craft occupations**
 Such as: motor mechanic, fitter, inspector, plumber, printer, tool maker, electrician, gardener, train driver
- D & E** **Semi-routine manual and service occupations**
 Such as: postal worker, machine operative, security guard, caretaker, farm worker, catering assistant, receptionist, sales assistant
- Routine manual and service occupations**
 Such as: HGV driver, van driver, cleaner, porter, packer, sewing machinist, messenger, labourer, waiter / waitress, bar staff

Education

Individuals whose highest educational qualification was secondary level (qualification from secondary/high school or NVQ 1-3) provided significantly lower mean endorsements than those with university qualifications (e.g., bachelor's degree or equivalent professional qualification or NVQ 4) ($U=62206.5$, $N_1 = 549$, $N_2 = 273$, $p<0.0001$) (but not those with a higher university degree (e.g., doctorate, MBA or NVQ 5) qualification; $U=14801.0$, $N_1 = 549$, $N_2 = 68$, $p=0.005$).

3.2.5 Discussion

The results showed that all 14 features were regarded as relevant by most participants when requested to indicate the defining properties of the term ‘belief’. Even the poorest ranked feature (‘relatively permanent across time and different situations’) was endorsed by 79% of participants. However, as a group only 49% endorsed all 14 features as comprising characteristic properties of belief (i.e., rated all features ‘Partly’ or ‘Totally’).

As to individual items, 90% of the sample felt that beliefs comprised ‘a significant part of [their] personal core values’ and 88% considered beliefs to be ‘a personal interpretation about an event, or about the nature of the world’. Thus the personal, self-referential nature of belief appears clearly important, as was the explanatory nature of belief, with 84% holding beliefs to comprise ‘a framework for explaining how things are or should be’. The idea that beliefs were explanatory in function was particularly prominent in the study of delusions, where they have been suggested to arise from anomalous perceptual experiences (e.g., Maher, 1988).

All five properties relating to the consequential effects of belief (effects on thoughts, behaviour, feelings, attitudes/decisions, and public acknowledgement) were closely grouped in terms of levels of endorsement, varying between 83-87%. These are particularly significant, since delusional beliefs that do not impact onto behaviour have been questioned as ‘true’ beliefs (e.g., Berrios, 1991: see Chapter 2).

More participants endorsed ‘a strongly held conviction’ (89% endorsement), which implies a personal judgement, than ‘right and/or true’ (81%), which suggests a more objective evaluation of the evidence for a belief. This potentially ties in with the ideas of the philosopher Kant (1781), who regarded belief as the judgement of the truth of a statement using “*objectively insufficient but subjectively sufficient*”

justification. Instead, 'right and/or true' may be more characteristic of knowledge (considered by Kant to be based on both objectively and subjectively sufficient evidence) than belief.

The notion that a belief is stable over time and resistant to change features highly in mainstream politics, where the degree of stability of voters' beliefs is actively considered in campaigning, as is shown in the strategic attempts to woo floating voters (those with less stable beliefs). In contrast, "*The loyalty of voters in heartland constituencies is always presumed and rarely questioned*" (Hodge, 2005). These characteristics may contribute to the fact that 80% felt that a belief was 'more than a passing thought or feeling', and 81.8% that it was 'more than memories or facts'. These results confirm a clear difference between such terms and belief, and can question the interchangeable use of terms in some previous studies. In particular, with regard to the work on delusional beliefs, this distinction between 'feeling' and 'believing' suggests that using words other than 'belief' can produce differential prevalence estimates. That is, using terms such as 'feel' to investigate persecutory delusions (e.g., on the PDI: Peters, Joseph & Garety, 1999) may not be equivalent to using the term 'believe' (such as on the CIDI: Robins et al., 1998). Furthermore, given that many researchers consider delusion to be a form of belief, the appropriateness of using other terms, such as 'feel' or 'think', in such investigations can be questioned. This provides the focus of the second study described later in this chapter.

Whilst each of the 14 properties was individually highly endorsed (and the principal components analysis suggested that the majority of these loaded onto a single component), there was still substantial variety within participants' endorsements. As some participants seem prepared to endorse a proposition as a

‘belief’ at a weaker threshold than others, assessing participants’ notion of ‘belief’ in studies of belief prevalence may be of value. This would allow researchers to interpret answers accordingly (i.e., a person who thinks of ‘belief’ as little more than a passing thought or feeling could be distinguished from another who reports the same beliefs but holds that ‘belief’ is a strong conviction resistant to change). Notwithstanding the recommendation that participants’ endorsements of belief characteristics be assessed, as a minimum these results suggest researchers need to use caution when comparing between participants’ reports of belief.

Individuals who reported being religious, being in formal education for longer, or who came from a higher socioeconomic group were significantly more likely to provide more and/or higher endorsements to the properties of belief proposed in this study. Socioeconomic group and length of formal education are often linked (in this study: Pearson’s $\chi^2(6)=161.9$, $p<0.0001$), and it is possible that those who have a university level education were more prepared to consider the abstract nature of the belief properties. Those who identified with a religion may also be more aware of strong or influential beliefs than non-religious people, thus they may find it easier to assess the impact of belief on their lives.

Although the current study confirmed the general endorsement of the 14 assessed properties, other properties associated with belief could have been included. Furthermore, the study could have been improved by including additional discriminatory features not expected to comprise key components of a belief. In addition, some items might benefit from further clarification. For example, ‘Are ‘beliefs’ more than memories or facts?’ could suggest that all beliefs are at least memories or facts. Although beliefs clearly comprise a particular subset of autobiographical memories (or we would not be able to recall them), not all beliefs are

considered facts. Instead beliefs might be considered more than facts in that they are thought to hold an additional emotional, self-referential or personal value that need not be attributed to facts.

In summary, the findings provide support for a relatively coherent set of belief-relevant characteristics held by the general public. Although the different components suggested do not exhaust all possible properties, the extensive piloting carried out and feedback received from over 300 participants provides a reasonable list of relevant characteristics. From this we can conclude that, for most participants, a belief usually describes a strongly held conviction that has influence over thoughts, attitudes and behaviour. Importantly, it describes something more than a passing thought or feeling.

Despite general agreement as to the relevance of most of the 14 properties, variation was observed for both the level and number of characteristic features endorsed. Given that only half of the sample endorsed all 14 properties, it might be prudent to establish participants' understanding of the term 'belief' when evaluating and comparing across individuals' endorsements of particular content-specific beliefs, and in particular on clinical measures used to diagnose psychosis.

One finding of this study that has significant methodological implications was that participants considered belief to be different from passing thoughts or feelings. Given that these terms are often used synonymously in research instruments, it is important to establish whether participants' responses depend on the choice of terminology used in the measure. This provides the focus for the next study.

3.3 STUDY 2: ASSESSING BELIEF: ARE ALL TERMS CONSIDERED EQUAL?

3.3.1 Background

It is not uncommon in research on delusions and delusional ideation to employ questions that use different terms interchangeably on the assumption that such terms are broadly the same and as such are likely to elicit similar responses. Indeed, current clinical tools use a variety of different terms when employing self-report to establish the prevalence of beliefs and delusions (see Table 3.3). In addition to some measures using terms such as ‘think’ and ‘feel’ to assess delusional beliefs, often the terminology chosen can vary within a questionnaire. This assumption of equivalence may not be unwarranted, given that such terms are used synonymously in certain colloquial contexts. The Columbia Guide to Standard American English (1993) states that three terms (believe, feel, think) are:

“almost interchangeable when used to express opinions, ideas, or feelings: I believe [think, feel] I’m coming down with a cold. In most uses none of the three is very explicit, and any precision you hope to gain by choosing one over the others is likely to be blurred or lost in transmission, at least in all but the most Formal or Oratorical uses.”

Table 3.3. Different terms used to assess delusions or delusional ideation

Instrument	Term						
	Feel	Think	Believe	Worry	Are; Have	Experience; Consider; Wonder	Be convinced
CAPE; PDI	Y	Y	Y	Y			
CIDI			Y				Y
DSSI	Y	Y			Y	Y	
MINI			Y				
PSQ	Y						
SAPS	Y	Y		Y	Y		

CAPE: Community Assessment of Psychic Experiences (Stefanis et al., 2002);
 CIDI: Composite International Diagnostic Interview (Robins et al., 1998);
 DSSI: Delusions-Symptoms-States Inventory (Bedford & Foulds, 1978);
 MINI: Mini-International Neuropsychiatric Interview (Sheehan et al., 1998);
 PDI: Peters et al. Delusions Inventory (Peters, Joseph & Garety, 1999);
 PSQ: Psychosis Screening Questionnaire (Bebbington & Nayani, 1995);
 SAPS: Scale for the Assessment of Positive Symptoms (Andreasen, 1984)

In contrast, others suggest differences in the use of these terms, for example, arguing that ‘feel’ is a “*weak and informal substitute for think, believe*” (Garner, 2000, p.143). Videbeck (2008, p.116) recommends that psychiatric nurses use the term ‘think’ when talking to patients about cognitive issues but ‘feel’ when trying to engage them in discussion about their emotions. Indeed, Schuman and Presser (1981, p. 301) indicated that there is a “*common belief among experienced survey researchers that almost any change in question wording will affect question marginals*”. This includes the suggestion that the term ‘feel’ is associated more with attitudes and belief is seen as a more rational, less emotional statement. “*Attitude questions try to assess how respondents feel about something*”, whereas “*Belief questions often assess what a respondent thinks is true or false...There isn’t any implied goodness or badness about the assessment*” (Barnes, 2001).

Given the different views expressed in the literature, the aim of the second study was to ascertain whether the format of wording could differentiate between

participants' responses. To investigate this, participants' responses to the same questions but using three different response mode options (believe, feel, think) were directly compared. This provided an indication of the differences or similarities that may be elicited by simple variations in wording (commonly used interchangeably on different survey measures). The three main research questions (and null hypotheses) were as follows:

1. *Do participants consider the terms 'believe', 'think' and 'feel' to be equivalent in terms of the strength of personal endorsement implied when using each term?*

Intuitively, it seems that participants might consider the term 'believe' to be the strongest type of personal endorsement over 'think' or 'feel' (i.e., Strength: Believe [B] > Think [T] > Feel [F])

2. *Do participants use these terms differently when answering content-specific questions?*

In keeping with prediction 1, the null hypothesis was that participants would use the term 'believe' less often to describe their endorsement and 'feel' or 'think' more commonly (i.e., Prevalence: Feel [F] > Think [T] > Believe [B])

3. *Does the content of the item affect the way these terms are used?*

Some items may have different strengths for each term. For example, religious/paranormal items may have more equivalent endorsements for 'believe' and 'feel', given the importance of the emotional aspects of these ideas, whereas both of these terms may remain stronger endorsements than 'think'

3.3.2 Measure

A short questionnaire was developed to evaluate how participants employ each of three terms ('believe', 'think' and 'feel') when given a particular statement. This comprised two parts: the first asked participants to complete content-specific questions for the three terms, and the second to rate the strength they associated with each term (having been primed by the first section).

The first part of the questionnaire addressed the latter two research questions outlined above (see Appendix I for the full instrument used in this study). This section used 37 content-based items adapted from the Cardiff Beliefs Questionnaire (see Chapter 4 for the development of these items and Appendix II for the full set of CBQ questions). These comprised 10 paranormal and religious items, 12 societal/cultural items and 15 delusion-like items. This allowed for an investigation of the use of the different terms in the contexts of a range of different content propositions. Participants were asked to provide a dichotomous 'yes' or 'no' answer as to whether their position regarding each statement X could be represented by 'I believe X'/'I feel X'/'I think X' (see example below).

Illustrative Example

A. Some houses are haunted

'I believe this'	Yes	<input type="radio"/> No
'I feel this'	<input type="radio"/> Yes	No
'I think this'	Yes	<input type="radio"/> No

In the second part of the questionnaire (addressing the first research question), participants were requested to consider how they commonly used each of the qualifying terms (believe, think and feel) and to rank these in terms of the typical strength of personal endorsement that they imply. Participants could rate each term from 1 ('Very weak endorsement of a statement') to 5 ('Very strong endorsement of a statement'), providing a measure of their overall sense of the relative strength of each of these terms independent of specific content. By placing this question at the end of the questionnaire, participants' answers were informed by how they used the terms initially in order to respond to the 37 content-based items.

3.3.3 Sample

Participants (n=166) consisted of first year students studying psychology at Cardiff University. For this study, a short verbal introduction was provided and students asked to complete the questionnaire. The sample was self-selecting; students who did not wish to participate returned an uncompleted questionnaire. One hundred and eighty-one students returned the questionnaire, of whom 15 who had incorrectly completed the questionnaire were dropped, leaving the final sample of 166. The sample was predominantly young (M=18.65, s.d.=1.38, range = 18-31; 2 did not disclose their age) and female (N=140, 86.4%; 4 did not disclose their gender).

3.3.4 Research Question 1: *Do participants consider the terms 'believe', 'think' and 'feel' as equivalent in terms of strength of personal endorsement?*

3.3.4.1 Results

Participants were asked to judge how they used 'believe', 'think' and 'feel' in terms of the relative strength of personal endorsement (with 5 reflecting the strongest endorsement). Overall, people rated 'believe' as the stronger term ($M = 4.05$, $s.d. = 0.97$) over 'think' ($M = 3.65$, $s.d. = 1.04$) or 'feel' ($M = 3.44$, $s.d. = 1.10$).

These results were compared using Wilcoxon matched pairs tests and the ratings for 'believe' were significantly higher than for both 'think' ($z = -3.104$, $N - \text{Ties} = 144$, $p = 0.002$, two-tailed) and 'feel' ($z = -5.254$, $N - \text{Ties} = 125$, $p < 0.001$, two-tailed). There was no significant difference between 'feel' and 'think' rankings ($z = -1.608$, $N - \text{Ties} = 135$, $p = 0.108$, two-tailed).

3.3.4.2 Discussion

The results confirm that the term 'believe' was judged by participants to be the strongest personal endorsement over and above either 'think' or 'feel'. As such, one might expect participants to use the term 'believe' more selectively when offered the option of applying different terms to propositions. This provided the focus of the second research question, involving content-specific beliefs.



3.3.5 Research Question 2: Do participants use the 3 terms differently when answering content-based questions?

3.3.5.1. Results

Comparing between terms

Participants were given 37 content-specific questions, and answered by stating whether or not they believed, felt and/or thought each statement (a yes/no answer for each term). The majority of questions received equivalent answers for all three terms (62%). Overall, 31.9% of items were believed, 30.6% of items were felt and 35.2% of items were thought. However, there appeared to be differences in the patterns of endorsement between belief categories (see Tables 3.4 to 3.6).

Table 3.4. Percentage of participants responding ‘Yes’ to each of the three types of endorsement (‘believe’, ‘think’ and ‘feel’) for **societal/cultural** items

<i>Statement presented to participants</i>	<i>Believe</i>	<i>Feel</i>	<i>Think</i>
Positive thoughts and attitudes improve my physical wellbeing	91.6	85.5	88
Human activities cause significant global warming	87.8	65.2	94.5
I have free choice or free will	85.3	73.6	85.3
The theory of evolution is correct	82.2	66.3	90.2
Democracy is the best system of government	77.2	65.6	86.7
Euthanasia (ending the life of a person who is incurably ill in order to limit suffering) is right	76.4	67.9	83.3
Same sex relationships are right	78.3	59.4	81.1
Abortion is right	61.3	51.5	69.3
Organised religion is one of the main sources of human strife	42.1	45	53.1
It is right to use animals for medically related research	37.2	31.3	53.4
It is right to use the death penalty for serious crimes	37.3	30.7	42.8
There is extra-terrestrial life	38.4	21.3	43.9
MEAN	66.3	55.3	72.6

Table 3.5. Percentage of participants responding ‘Yes’ to each of the three types of endorsement (‘believe’, ‘think’ and ‘feel’) for **paranormal and religious** items

<i>Statement presented to participants</i>	<i>Believe</i>	<i>Feel</i>	<i>Think</i>
The soul or spirit survives death	49.1	42.3	41.7
There is a god or gods	38.9	41.7	36.2
The complexity of the world suggests that it was purposefully designed by an intelligent creator	37.8	41.5	35.4
Some people communicate with the dead	27.9	25.6	25.5
Black magic and/or witchcraft exists	24.1	16.9	22.3
There are demons or evil spirits	18.9	20	17.7
When I die my soul will be reborn in another body	14.3	14.3	13
Some people are possessed by evil spirits	7.3	7.8	11.5
The position of the stars and planets affects or determines my life	7.4	10.4	7.4
Some people change into werewolves	0.6	1.2	1.8
MEAN	22.6	22.2	21.3

Table 3.6. Percentage of participants responding ‘Yes’ to each of the three types of endorsement (‘believe’, ‘think’ and ‘feel’) for **delusion-like** items

<i>Statement presented to participants</i>	<i>Believe</i>	<i>Feel</i>	<i>Think</i>
My body or part of my body is misshapen or ugly	49.1	61.3	69.3
My thoughts or actions are not fully under my control	24.7	43.4	36.1
People say or do things that contain special messages for me	27.4	36.6	28
There is another person who looks and acts like me	21.1	16.9	24.1
Certain people are out to harm or discredit me	10.4	25	20
I am an exceptionally gifted person that others do not recognise	12.7	13.3	15.1
The reflection in the mirror is sometimes not me	1.2	18.9	7.9
Certain people or places are duplicated, i.e. are in two different locations at the same time	6.7	11.6	7.9
The world is about to end	6.1	7.9	9.7
People I know disguise themselves as others to manipulate or influence me	4.9	10.4	4.9
I am infested by parasites	9.6	1.8	7.8
My relatives or close friends are sometimes replaced by identical-looking impostors	1.8	4.2	2.4
Part of my body doesn’t belong to me	0.6	5.5	1.2
I am dead and/or do not exist	1.2	4.8	1.2
Some well-known celebrity is secretly in love with me	1.8	1.8	1.8
MEAN	12.0	17.6	15.8

For societal/cultural items (see Table 3.4), 'Think' was the most commonly endorsed term in nearly every case, followed by 'believe', and 'feel' having the lowest frequency of 'yes' responses. In contrast, 'believe' was often the lowest (or equal lowest) endorsed term (with two exceptions) for delusion-like items (Table 3.6), with 'feel' receiving the highest levels of endorsements. There did not appear to be much difference in the use of any of the three terms for paranormal and religious items (Table 3.5).

Although the majority of answers were given the same responses, it was interesting to compare whether there were any differences in the use of the terms for those items that were endorsed differently. To test these results on an individual level, Wilcoxon signed ranks tests were used to compare the number of times individuals endorsed items using each term.

Societal/cultural

Significant differences in endorsements were found between all terms for societal/cultural content statements (T: Think; B: Believe; F: Feel) in the following manner:

T v. B: Z = -5.857 (p<0.001)

F v. B: Z = -7.487 (p<0.001)

F v. T: Z = -9.070 (p<0.001)

Delusion-like

For these items, significant differences were found between 'believe' and both of the other two terms but there was no significant difference between endorsements for 'feel' and 'think':

T v. B: Z = -5.008 (p<0.001)

F v. B: Z = -5.493 (p<0.001)

F v. T: Z = -1.556 (p=0.120)

Paranormal and religious

For these items no significant differences were found:

T v. B: Z = -0.799 (p=0.424)

F v. B: Z = -0.263 (p=0.792)

F v. T: Z = -0.372 (p=0.710)

Comparing between categories

As well as comparing between terms, the aim was to test whether the above pattern of results (suggesting differences between categories) was significant. To measure endorsement difference between two terms for each category (societal/cultural, paranormal and religious, and delusion-like), the frequency of both types of non-identical endorsements (e.g., (1) 'believe' but not 'think' and (2) 'think' but not 'believe') was calculated for items within the relevant category, and the second total subtracted from the first. This was then divided by the number of items in the category, to standardise the results for comparison across categories. Wilcoxon signed ranks tests were then conducted on these scores to compare the pattern of results.

'Believe' versus 'Think'

Figure 3.5 shows that for delusion-like (DL) and societal/cultural (SC) items, if a participant endorsed 'believe' they were more likely to also endorse 'think' than vice versa, although there were occasions when they endorsed 'believe' in the absence of 'think'. For paranormal and religious items (P&R), there was no obvious pattern, with participants answering yes to 'believe' and no to 'think' as often as vice versa.

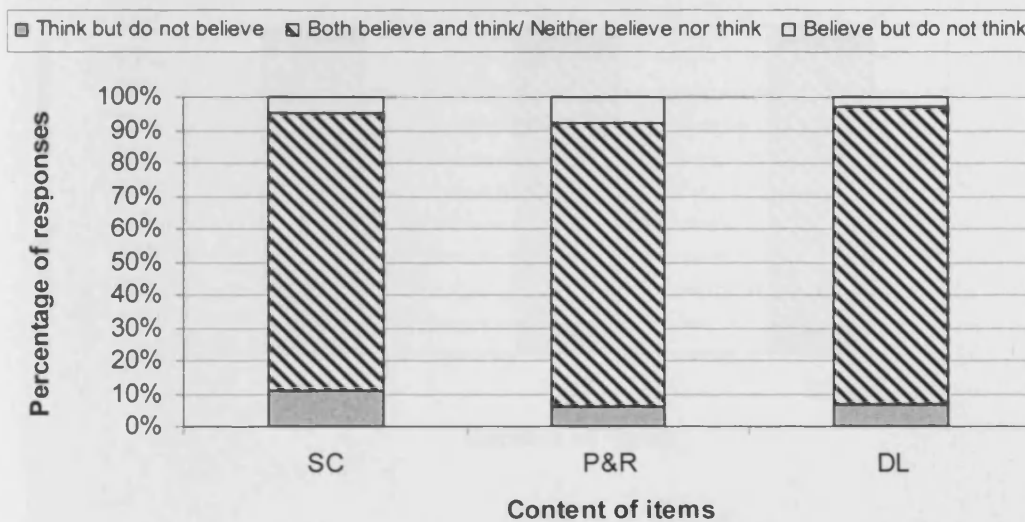


Figure 3.5. Percentages of each type of response for 'think' and 'believe' by content (SC: Societal/cultural; P&R: Paranormal and religious; DL: Delusion-like)

The Wilcoxon tests revealed that paranormal and religious showed a significantly different pattern to SC and DL, whereas DL and SC are not significantly different from each other:

DL v. P&R: $Z = -3.925$ ($p < 0.001$)

DL v. SC: $Z = -2.186$ ($p = 0.029$)

P&R v. SC: $Z = -4.754$ ($p < 0.001$)

'Feel' versus 'Think'

Figure 3.6 shows that for SC items, if a participant endorsed 'feel' they were more likely to also endorse 'think' than vice versa. For P&R and DL items, there was no more likely pattern, with participants answering yes to 'feel' and no to 'think' as often as vice versa.

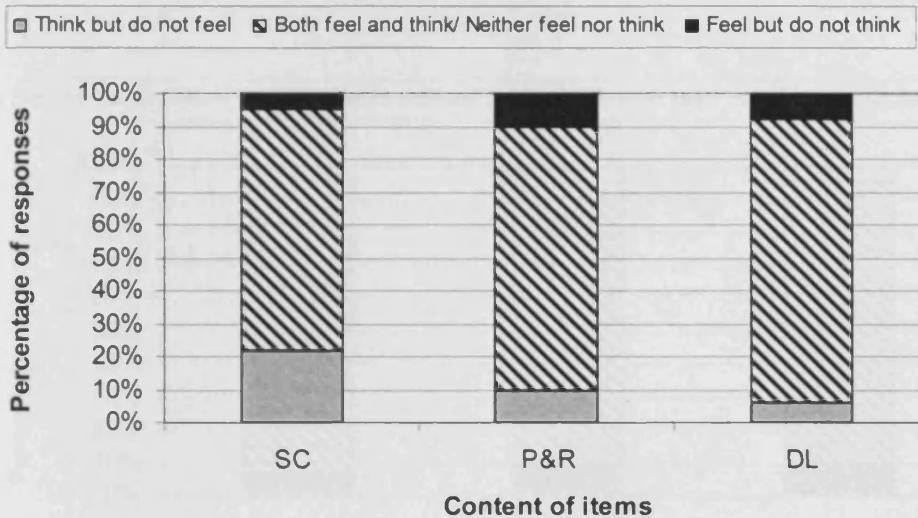


Figure 3.6. Percentages of each type of response for 'think' and 'feel' by content

The endorsements for SC show a significantly different pattern to the other categories, whereas DL and P&R are not significantly different from each other:

DL v. P&R: $Z = -0.116$ ($p=0.908$)

DL v. SC: $Z = -9.056$ ($p<0.001$)

P&R v. SC: $Z = -7.506$ ($p<0.001$)

'Believe' versus 'Feel'

Figure 3.7 shows that for SC items, if a participant endorsed 'feel' they were more likely to also endorse 'believe' than vice versa. For religious and paranormal items, there was no more likely pattern, with participants answering yes to 'believe' and no to 'feel' as often as vice versa. For delusion-like items, the opposite pattern occurred, with more items being felt but not believed than believed but not felt.

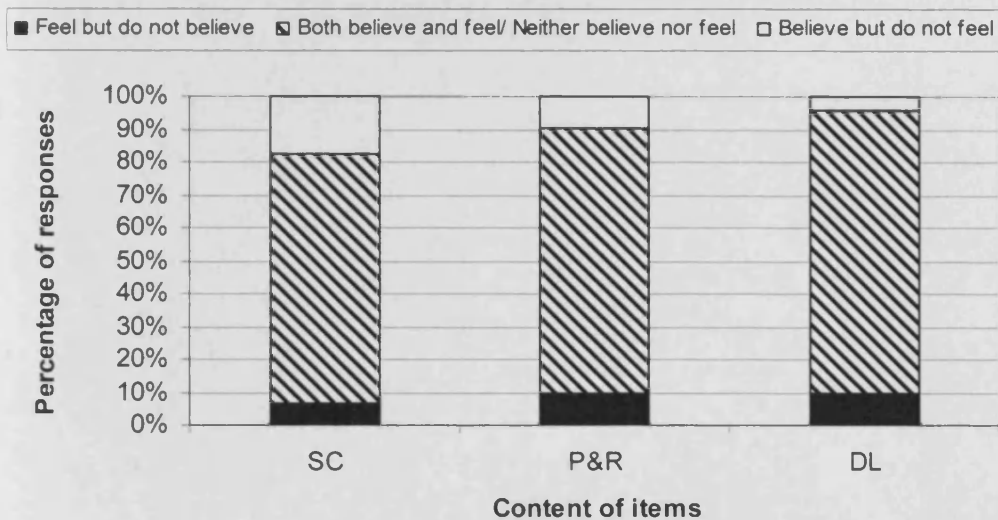


Figure 3.7. Percentages of each type of response for 'feel' and 'believe' by content

The pattern of endorsement for all three terms is significantly different for 'believe' and 'feel':

DL v. P&R: $Z = -3.459$ ($p=0.001$)

DL v. SC: $Z = -8.794$ ($p<0.001$)

P&R v. SC: $Z = -5.571$ ($p<0.001$)

3.3.5.2 Discussion

As clearly shown by Figures 3.5-3.7, participants frequently used the terms ‘believe’, ‘think’ and ‘feel’ interchangeably, as has been assumed in previous research and as is evidenced by certain colloquial uses. Indeed, given the widespread synonymous use of these terms, it is reassuring that the results support this intuition to a considerable extent. However, this was not the pattern for all cases, with different responses for different terms being given 38% of the time. This suggests that there are differences in the use of these terms, worth further consideration.

Given the findings of the first research question, which suggested that ‘believe’ was considered by participants to imply a stronger endorsement than either ‘think’ or ‘feel’, it was predicted that participants would use the term ‘believe’ more stringently. The results from the second study confirmed this pattern for endorsements of delusion-like items, whereby ‘believe’ was indeed used less often than either ‘feel’ or ‘think’. However, when looking at other belief types this pattern did not always hold.

The findings confirm that the content of the question influences the adoption of different terms for endorsement. ‘Think’ was the most commonly used term with societal/cultural items, followed by ‘believe’ and then ‘feel’. The low responses rates to ‘feel’ in this group may reflect less personal connection with the content items. As these questions relate to general issues, it may be that people did not have as strong emotional responses to the items, and therefore the more emotive term ‘feel’ is endorsed less. By contrast, paranormal and religious items show no differences in the rates of endorsements of all three terms (‘believe’, ‘think’ and ‘feel’). The lack of differences may be due to the presence of religious beliefs in this group. It is possible that people consider religious belief to form a greater part of their identity than the

other forms of belief assessed here, and so these items had greater consistency – with participants either holding all or none of the options.

One potential limitation of this study was that by highlighting the comparison between these terms, the differences between terms were emphasised. However, to provide a reliable comparison between terms, it was necessary to use a design in which the same participants completed the questions for each term. Furthermore, this should not affect the pattern of the results discussed here.

The major implication of these findings is the need for caution when different words are used to elicit responses for different questions. One particularly relevant area relates to the assessment of delusional beliefs. In this context area, estimates of the prevalence of delusions and delusion-like beliefs vary widely (Eaton et al., 1991; Freeman et al., 2005; Kendler et al., 1996; Olfson et al., 2002; Peters, Joseph & Garety, 1999; Poulton et al., 2000; Scott et al., 2005; van Os et al., 2000), and perhaps some of this variation could be due to the interchangeable use of different terms (including ‘believe’, ‘think’ and ‘feel’), sometimes within a single instrument. Furthermore, this (albeit small) study highlights the need to further investigate the nuances of participants’ understanding of each of these terms.

3.4 SUMMARY

This chapter has provided some evidence regarding the implications of using different terms when assessing beliefs in questionnaire research. By taking a dimensional approach, the findings of the first study avoided some of the limitations inherent in attempting a formal definition that might only account for a proportion of what participants regard as belief. In terms of identifying characteristic properties of ‘belief’ in the general public, the study revealed a reasonably consistent endorsement

of properties involving a relatively stable personal conviction, for an explanatory purpose, and capable of influencing behaviour. The second study builds on these findings by comparing the use of the terms 'believe', 'think' and 'feel' on questionnaires. Although these terms were often used interchangeably by participants, this was not always the case, and participants considered the term 'believe' to imply a stronger endorsement. Overall, the findings recommend caution at a clinical level when comparing between individual participants' endorsements of 'believe' questions, and also when comparing responses to questions that use different terms to probe specific propositions in clinical and health questionnaires.

These studies are particularly relevant to measures of delusions and delusional ideation. Existing measures will be discussed in the following chapter, and a new instrument designed to assess delusion-like beliefs, alongside other beliefs and experiences, will be introduced.

CHAPTER 4

DEVELOPMENT OF THE CARDIFF BELIEFS QUESTIONNAIRE (CBQ)

4.1 INTRODUCTION

The last chapter described the results of studies investigating public understanding of the term 'belief'. These suggested that there is a broad agreement as to the key characteristics of belief, and in particular with regard to the personal nature of these propositions, their stability, conviction and influence. Furthermore, the study examining the distinction between the terms 'believe', 'think' and 'feel' found that whilst in general these terms are often used interchangeably, most participants explicitly distinguished between these terms and their use when asked about their respective strength of endorsement in general (i.e., independent of context). These findings suggest caution when using such terms in assessment measures. In addressing the aims of this chapter, some of the lessons relating to methodological issues from the previous studies are incorporated, as part of the motivation and development of a new standardised measure to assess delusions/delusion-like beliefs.

4.1.1 Background

Chapter 1 introduced the 'continuum of delusion' hypothesis (Claridge, 1994; Crow, 1995; Johns & van Os, 2001; Strauss, 1969), which claims that delusional beliefs are just one form of belief that constitute part of a belief continuum, and therefore it would not be unusual for similar beliefs to be found in the non-clinical population. While there is convincing evidence from several studies supporting the continuum

account (Barrett & Etheridge, 1992; Eaton et al., 1991; Freeman et al., 2005; Johns et al., 2002; Johns et al., 2004; Kendler et al., 1996; Ohayon, 2000; Olfson et al., 2002; Posey & Losch, 1983; Poulton et al., 2000; Scott et al., 2005; Slade & Bentall, 1988; Tien, 1991; van Os et al., 2000) (reviewed in Chapter 1), differences in assessment instruments employed (e.g., clinical vs. non-clinical, different use of wording, and explicit use of psychiatric terms) have understandably led to different prevalence estimates (Johns et al., 2004). Moreover, many studies fail to examine the range of clinical delusions that may present or the prevalence of non-clinical beliefs, or to ascertain the relationships between types of belief or between beliefs and experiences. The latter point is particularly relevant given Quine and Ullian's (1970) contention for belief coherence (as outlined in Chapter 1); whereby new or incoming beliefs are assumed to be consistent with an individual's existing 'web of beliefs' (see Chapter 7). Assessing different belief types on the same measure provides insight into the different kinds of beliefs that may co-exist within an individual's set or web of beliefs.

This chapter describes the development of the Cardiff Beliefs Questionnaire (CBQ), a new instrument that attempts to improve on previous measures, when assessing the presence, level of endorsement and interconnections of delusional-type beliefs in non-clinical samples. Chapters 5-7 will describe the empirical findings of the CBQ and related studies when applied to a large stratified general population sample.

4.1.2 Current measures of delusional beliefs

The diagnosis of delusion (considered as one form of anomalous or illness-related belief) is typically based on extensive clinical psychiatric interview. This

allows the clinician to construct a detailed picture of the anomalous belief(s) while exploring the background, context, social and functional consequences. Over the past 20 years several measures (both clinical and non-clinical) have been developed (see Table 4.1) to aid assessment of forms of delusion. As well as detailed structured interviews, designed to establish the clinical relevance of delusional beliefs, measures have been developed to address ideas with a similar content to delusions (e.g., beliefs in being persecuted) (delusional ideation or delusion-like beliefs).

Self-reported data (elicited upon questioning) are the mainstay of much clinical research, however, a number of factors can undermine the validity of this type of data (Harrell, 1985), including:

(1) Factors in the questioning situation that may influence the response (e.g., question wording and order, and degree of anonymity, etc.)

(2) Inability of the participant to provide correct information (e.g., respondent never knew or has forgotten the answer)

(3) Unwillingness of the participant to provide the relevant information, given that their answers may present them in a socially unacceptable manner

In particular, the validity of using self-report measures to identify psychiatric symptoms has been questioned by Eaton et al., (1991) and Kendler et al. (1996), as has the validity of using clinical instruments in non-clinical samples (Henderson, 1996). Some of these concerns and related issues will be considered in turn.

Table 4.1. Some of the clinical and non-clinical measures used to assess delusions or delusional ideation

Administration	Assessment	Name	
Self-report questionnaire	Non-clinical delusional ideation	Community Assessment of Psychic Experiences (CAPE: Stefanis et al., 2002)	
		Peters et al. Delusions Inventory (PDI: Peters, Joseph & Garety, 1999)	
	Persecutory ideation/paranoia	Green et al. Paranoid Thoughts Scale (G-PTS: Green et al., 2008)	
		Paranoia Scale (PS: Fenigstein & Venable, 1992)	
		Paranoia/Suspiciousness Questionnaire (PSQ: Rawlings & Freeman, 1996)	
		Persecution and Deservedness Scale (PaDS: Melo et al., 2009)	
		Persecutory Ideation Questionnaire (PIQ: McKay et al., 2006)	
		State Social Paranoia Scale (SSPS: Freeman, Pugh et al., 2007)	
	Schizotypy	Magical Ideation Scale (MIS: Eckblad & Chapman, 1983)	
		Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE: Mason et al., 1995)	
		Rust Inventory of Schizotypal Cognitions (RISC: Rust, 1987)	
		Schizotypal Personality Questionnaire (SPQ: Raine, 1991)	
		Schizotypal Traits Questionnaire (STQ: Claridge & Broks, 1984)	
	Clinical psychotic symptoms	Delusions-Symptoms-States Inventory (DSSI: Bedford & Foulds, 1978)	
		Psychosis Screening Questionnaire (PSQ: Bebbington & Nayani, 1995)	
		Scale for the Assessment of Positive Symptoms (SAPS: Andreasen, 1984)	
	Diagnostic interview	Range of clinical disorders	Composite International Diagnostic Interview (CIDI: Robins et al., 1998)
			Mini-International Neuropsychiatric Interview (MINI: Sheehan et al., 1998)
			NIMH Diagnostic Interview Schedule (DIS: Robins et al., 1981)
Present State Examination (PSE: Wing, Sartorius & Cooper, 1974)			
Structured Clinical Interview for DSM-III-R (SCID: Spitzer et al., 1992)			
Sleep-Eval (Ohayon, 1999)			

(i) *Fixed response measures*: One difficulty for large scale representative studies is the use of measures requiring responses on Likert scales, with standard (usually labelled) points from which a respondent must choose (sometimes as simple as selecting 'yes' or 'no'). While financial and logistical restrictions mean that full interviews are often not possible (or desirable) for these types of studies, the use of a small number of constrained response scales to assess symptoms raises concerns that these fail to capture the full range of potential responses. In particular, it can limit the researchers' ability to distinguish between a delusional or reality-based belief with the same content (e.g., a report of a partner's infidelity may in fact be accurate or an unfounded belief, but would require further investigation to distinguish between these options). In addition, reported beliefs may not be classed as delusional if they are (1) culturally sanctioned, (2) understandable solely in terms of the individual's family or social context, or (3) involve a misunderstanding of the question. Kessler et al. (2000) suggest this last scenario could be a particular problem when applied to a non-clinical group, as the bizarre nature of some of the delusions may increase the chances of the questions being misinterpreted (i.e., people may attempt to 'normalise' the question to something more akin to their own experiences). On the other hand, the plausibility of a belief may still be in doubt even after a detailed interview with an experienced clinician (David, 1999), and in most cases it is impossible to establish the essential 'veracity' of the evidence underlying many beliefs, however implausible. As Young (2000, p.47) points out, "*there is often no attempt to check whether such things actually are happening to people who say they are being persecuted. Instead, it is usual for the intuitive implausibility of a belief to medical staff to form the primary yardstick*". Although the risk of misinterpretation can be reduced in those studies that

involve a more detailed assessment of participants' beliefs, it remains a potential concern whenever beliefs are assessed.

(ii) Declarative beliefs and insight: Chapter 3 described how most individuals appear to hold a similar concept of what constitutes a 'belief', considering a belief to be a personal and essentially private process, which can affect and be affected by other cognitions, emotions and behaviour. As discussed in Chapter 1, asking people to reveal their beliefs assumes that participants (1) understand (the question), (2) know (i.e., are capable of recalling and describing) the beliefs and (3) are willing to attribute these to themselves. Notwithstanding well-established frailties of introspection (Nisbett & Wilson, 1977) and limited explicit control over our cognitive processes (Halligan & Oakley 2000; Wegner, 2002), the most common (and obvious) method for assessing such private convictions/propositions remains questionnaires, which clearly require declarative responses.

Such methods have limitations given the potential susceptibility to deception, misinterpretation and self-presentational strategies (Barnes-Holmes et al., 2006). That said, simply asking participants remains the method of choice when trying to assess others' beliefs (whether clinically or non-clinically). Specific problems arise, however, when asking people suffering from mental illness for self-reports, as they may not be capable of providing an accurate report. David (1990) discusses the multidimensional problem of insight, differentiating between situations where patients (a) may not be aware that they are ill, or (b) may not recognise that psychotic symptoms are abnormal or (c) may not acknowledge the need for or comply with treatment. Indeed, self-report can easily be affected by poor insight, suspiciousness, recent life events, or affective bias (Verdoux et al., 1998). In experiments looking at quality of life judgements, Atkinson, Zibin and Chuang (1997) showed that

schizophrenic patients judged their quality of life to be better than average, whereas independent observers considered it below average.

(iii) Clinical vs. non-clinical measures: Given the assumption of the continuum account that the contents of ‘normal’ (i.e., non-clinical but delusion-like) beliefs overlaps with that of beliefs diagnosed in mainstream psychiatric conditions, it seems reasonable to use clinical measures to ascertain the prevalence of delusion-like beliefs in non-clinical samples (e.g., CIDI [Robins et al., 1998; used by: Kendler et al., 1996; Scott et al., 2005; van Os et al., 2000]; DIS [Robins et al., 1981; used by: Eaton et al., 1991; Poulton et al., 2000; Tien, 1991]; MINI [Sheehan et al., 1998; used by Olfson et al., 2002]; PSQ [Bebbington & Nayani, 1995; used by Johns et al., 2002; 2004]). However, participants’ knowledge of the explicit purpose of these measures (namely to diagnose psychiatric disorder) and the clinical vocabulary used can be expected to limit full participation.

(iv) Social acceptability: There remains a critical issue concerning the validity of self-reported data, particularly where these concern mental illness, given the understandable unwillingness of participants (clinical and non-clinical) to provide responses that present themselves in a socially unacceptable manner (Byrne, 2000; Corrigan, 2000). Social desirability theory (Edwards, 1957) suggests that the more highly stigmatised and negatively sanctioned a behaviour, the stronger the tendency to under-report it. On the other hand, behaviours that are seen as culturally desirable tend to be over-reported, i.e., individuals provide the perceived-to-be more socially acceptable response. In particular, older people and women are more likely to respond in a socially desirable manner (Ray & Lovejoy, 2003; Thomsen et al., 2005). Thus if participants are aware of the associations with psychotic symptoms, they are less likely to endorse items for fear of being labelled mentally ill.

Stigma associated with mental illness is well-recognised as an important factor influencing access to mental healthcare in the general population (White et al., 2006). Even within the psychiatric profession (which has high rates of mental illness: Caplan, 1994), staff are reluctant to disclose mental illness to colleagues or professional organisations (White et al., 2006). A pilot study for a large health screening study of military personnel revealed that many had not honestly answered items in the questionnaire for reasons of lack of trust in medical confidentiality, stigmatisation and fears that the process would jeopardise career prospects (French et al., 2004).

To moderate the effects of clinical language, some researchers have developed more clinically neutral measures of ‘delusional ideation’ (Peters, Joseph & Garety, 1999; Peters et al., 2004; Verdoux et al., 1998). This was one of the motivations behind the development of the Peters et al. Delusions Inventory (PDI: Peters, Joseph & Garety, 1999), much of whose content is taken from the Present State Examination (Wing et al., 1974). The PDI measures the less clinically explicit ‘delusional ideation’, which has been used to support the continuum hypothesis (Peters, Joseph & Garety, 1999). Peters et al. used normalised vocabulary, and indicate in the introduction that the “experiences” under investigation are assumed to be more common than previously supposed. Studies have shown that the use of such introductions and neutral vocabulary appear to significantly decrease the under-reporting of potentially embarrassing and social unacceptable questions (Vinokur et al., 1979).

(v) Terms chosen to assess delusion/delusional ideation: Moreover, Peters, Joseph and Garety (1999) used items that were “*cast into a format that was thought to capture their ‘normal’ equivalents*” (p. 555), for example, ‘Do you ever *feel as if* there is a conspiracy against you?’ for persecutory beliefs [emphasis added].

However, the majority of authors suggest that belief is the basis of delusion (Davies et al., 2001; Langdon & Coltheart, 2000; van Os, 2003) and the findings of Chapter 3 highlight some potential difficulties of interpretation when equating terms such as ‘belief’ and ‘feel’. Thus a more direct probe of delusion-like belief is desirable, given the uncertain boundaries between holding a belief and having an experience.

(vi) Range of beliefs assessed: Most of these non-clinical measures (as with many existing clinical measures described above) focus almost exclusively on the delusions commonly found in schizophrenia, namely non-bizarre delusions (e.g., persecutory beliefs) and some bizarre delusions concerning thought and action control. According to the DSM-IV, delusions are bizarre if they are “clearly implausible and not understandable and do not derive from ordinary life experiences” (APA, 2000, p. 275). Many well-documented monothematic bizarre delusions, typically those associated with neuropsychiatric disorders (e.g., Capgras, Cotard, reduplicative paramnesia, mirrored-self misidentification), have been the subject of considerable research recently but have not been fully investigated in general population studies (Coltheart, 2007; Davies et al., 2001; Ellis & Lewis, 2001; Stone & Young, 1997).

4.1.3 Paranormal, religious and other ‘normal’ beliefs

One subject area where prevalence data for the general public do exist is for religious and paranormal beliefs. Religious beliefs continue to be common, despite survey results confirming that the U.S. (following Europe) has become less religious (Financial Times/Harris Interactive, 2006; Pew Forum Survey, 2006; Taylor, 2003). Paranormal beliefs are similarly prevalent, with Moore (2005) reporting that paranormal beliefs were endorsed by 73% of the US population.

Although different, religious beliefs and paranormal beliefs are considered to share a number of common aspects including high intuitive thinking, low analytical thinking, number of mystical experiences and positive attitude toward the supernatural (Aarnio & Lindeman, 2007). Moreover, both are predominantly non-materialistic in that they do not conceive of the world as a place controlled exclusively by sequences of natural physical or biological laws. Instead, to provide meaning and coherence for what appears random and chaotic, both hold with the precept of a supernatural presence that can influence or control the course of their lives. This view is supported by research that shows that believers in superstitious, magical, and paranormal beliefs accepted more violations of core ontological distinctions about physical, psychological, and biological phenomena than skeptics did and that these core ontological confusions could discriminate believers from skeptics better than intuitive thinking, analytical thinking, or emotional instability (Lindeman & Aarnio, 2006). Such beliefs are viewed by the skeptical scientific community as being non-evidential and irrational (Dawkins, 2006; Dennett, 2006), e.g., being grouped for research purposes as both “*transcend the explanatory power of mainstream science*” (Gray, 1991, p.7).

As might be predicted given this overlap, there is evidence of association between paranormal and religious beliefs (e.g., Irwin, 1985). However, findings in this area vary widely, with some authors reporting no relationship (e.g., Rice, 2003), or even negative associations (Persinger & Makarec, 1990). These varying results highlight the need for further investigation of the relationship between religious and paranormal beliefs. Furthermore, they illustrate the pitfalls of research in this area, where there is no agreed definition of what constitutes a paranormal belief.

Although many of these types of belief (given their popularity) are traditionally regarded as 'normal', they also share certain characteristics with delusional type beliefs. Indeed, problems with the definition of delusion (see Chapter 1) have led to some controversy over how to deal with the issue of religious beliefs. Freud (1964) famously regarded all religious beliefs as delusional (although many clinicians would disagree). Furthermore, evidence linking delusional and religious belief comes from studies suggesting that members of new religious movements (NRMs) report higher levels of delusional ideation than other non-clinical populations, but significantly not the levels of distress or preoccupation found in clinical patients (Day & Peters, 1999; Peters, Day, McKenna & Orbach, 1999; Smith, Riley & Peters, 2009).

Similarly, while paranormal beliefs are still regarded as unusual by some, they are typically not generally seen as incomprehensible or bizarre, as are some delusional beliefs. In other words, many religious and paranormal beliefs are generally considered socially acceptable, as witnessed by a review of market research polls (e.g., Gallup & Newport, 1991; Rice, 2003; Taylor, 2003) and increasing popularity of science fiction and fantasy novels and films (e.g., *Harry Potter*, *Star Wars*, and *Lord of the Rings*: currently the 1st, 3rd and 4th highest grossing film series respectively). Nevertheless, people who report paranormal experiences tend to have higher than usual levels of psychiatric symptoms (McCreery & Claridge, 1995), and, conversely, those with mental illness often hold unusually strong convictions regarding supernatural forces (Eckblad & Chapman, 1983; Thalbourne, 1994a, b). Similarly, Lawrence and Peters (2004) found that people who reported strong belief in the paranormal scored higher on delusional ideation, as measured using the PDI.

Moreover, neurophysiological evidence linking paranormal beliefs to delusions comes from studies that found that those who hold paranormal beliefs show increased right hemisphere activation during verbal (Brugger, Gamma et al., 1993) and visual (Brugger, Regard et al., 1993) tasks and at rest (Pizzagalli et al., 2000), as well as a reduction in the left hemisphere dominance for language (Leonhard & Brugger, 1998). Crow (1997) has argued that this brain pattern is also found in patients with psychosis. Whilst lacking conclusive evidence, these findings provide additional support for a link between paranormal and delusional beliefs.

Given views of paranormal and religious beliefs as irrational and unscientific (Dawkins, 2006; Dennett, 2006), the distinction (both clinically and socially) between these and beliefs considered delusional seems to depend primarily on prevalence and consequences – namely the number of people who appear or claim to hold these beliefs, and the social and health-related effects such beliefs have on the individual or society. This is reflected by the final criterion of the APA's (2000) definition of delusion, which explicitly excludes religious beliefs (*'The belief is not one ordinarily accepted by other members of the person's culture or subculture (e.g. it is not an article of religious faith)'*). There has been substantial criticism made of this criterion, however, as discussed in Chapter 2. For example, without empirical evidence of the types of beliefs held within a non-clinical population, it is not clear that this criterion could be consistently operationally employed (save in the case of bizarre, logically-impossible beliefs: Bell, Halligan & Ellis, 2003). In particular, there is a lack of research investigating 'normal' beliefs other than those with a religious basis (e.g., moral beliefs or beliefs regarding global warming).

The links between socially tolerated beliefs (i.e., paranormal or religious) and those that are clinically delusional provide *"a particular challenge to those who*

believe in an easy distinction between normal and abnormal beliefs” (Bentall, 2000, p. 83). Indeed, if one follows Quine and Ullian’s (1970) proposal for a web of beliefs (see Chapter 1), it is important to examine the links between delusion-like beliefs and the (assumed-to-be) more common beliefs regarded by the scientific community as non-rational, such as paranormal or religious ideas (see Chapter 7). To explore this further, it is necessary to examine the interactions between, and distributions of, these different belief types within the same individuals.

4.2 DEVELOPMENT OF CBQ

4.2.1 Questionnaire rationale

To try and address some of the limitations of previous measures, and in particular, the social stigma attached to reporting psychotic-like beliefs, a new measure, the Cardiff Beliefs Questionnaire (CBQ), was developed. The CBQ was designed to be a self-report measure (similar to the PDI) that explicitly assesses beliefs, including those with delusion-like content, and avoids psychiatric terms. The term ‘delusion-like belief’ (DLB) is used, given that ‘delusional ideation’ lacks a formal standard definition (and in any case has been used interchangeably with ‘delusion’: Wang & Lee, 1997). Moreover, unlike other non-clinical measures (PDI: Peters, Joseph & Garety, 1999; CAPE: Stefanis et al., 2002), which use a variety of terms (e.g., ‘feel’, ‘think’ or ‘worry’) interchangeably in their questions, all relevant CBQ questions used the term ‘belief’ to avoid ambiguity (e.g., ‘feel’ may highlight affective features).

The CBQ (in addition to avoiding reference to any clinical terms) captures a wider range of beliefs (including delusion-like beliefs) than previous assessments, and

critically embeds relevant questions within a general societal or cultural context by including moral, paranormal and religious beliefs. Unlike previous measures of delusions or delusional ideation, the CBQ also includes a range of bizarre delusion-like beliefs.

Questions covering more common, less stigmatising beliefs serve to de-emphasise the psychiatric associations and encourage participants to engage more honestly with the questions. In addition, the inclusion of these other belief types allows further investigation of the web of belief hypothesis (Quine & Ullian, 1970). A small number of experiences analogous to (auditory/visual) hallucinations ('hallucination-like experiences': HLE) were also included to allow an evaluation of possible links between beliefs and experiences. As such, the CBQ has the advantage that it covers a range of both beliefs and experiences, which is not the case for many non-clinical measures (see Table 4.2).

4.2.2 Questionnaire description

The Cardiff Beliefs Questionnaire (CBQ) includes 58 questions covering a wide range of beliefs and a smaller number of experiences and meta-beliefs. The belief items (n=46) consist of 17 delusion-like beliefs (10 of which were considered bizarre by the DSM criteria), 10 paranormal and religious beliefs and 19 societal/cultural beliefs. The remainder comprise 8 anomalous experience questions and 4 questions targeting meta-beliefs (i.e., participants' insight into their propensity to hold beliefs). The CBQ is described below, and a full list of questions included in Appendix II.

Table 4.2. Comparison of CBQ and other general delusion/delusion-like belief measures

	CBQ	CAPE & PDI	CIDI	DSSI	MINI	PSQ	SAPS
Assessment	Non-clinical delusion-like beliefs	Non-clinical delusional ideation	Clinical psychotic symptoms	Clinical psychotic symptoms	Clinical psychotic symptoms	Clinical psychotic symptoms	Clinical psychotic symptoms
Probe term(s) used	'Believe'	Mixture (Predominantly 'feel')	Mixture (Predominantly 'believe')	Mixture (Predominantly 'feel')	'Believe'	'Feel'	Mixture (Predominantly direct, i.e., 'are'/'have')
Paranormal beliefs included	Yes	Yes ¹	No	No	No	No	No
Religious beliefs included	Yes	Religious delusions	No	No	No	No	Religious delusions
Societal/cultural beliefs included	Yes	No	No	No	No	No	No
Hallucinations/ HLE included	Yes	Yes ¹	Yes	Yes	Yes	Yes	Yes
Paranormal experiences included	Yes	Yes ¹	No	No	No	No	No
Non-bizarre delusions/DLB ²	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Delusions/DLB of control	Yes	Yes	Yes	No	Yes	Yes	Yes
Bizarre delusions/DLB (e.g., misidentification) ²	Yes	Yes ³	Yes	No	No	No	No
Self-appraisals (e.g., superstitiousness)	Yes	No	No	No	No	No	No

¹ The items are scored as part of the scale with delusional ideation

² The bizarre/non-bizarre distinction is made here on the basis of question content alone. Therefore, this does not take into account that during interviews respondents could elaborate on initially non-bizarre questions and describe a bizarre set of beliefs (e.g., the MINI has options for interviewers to code responses as 'yes' or 'yes - bizarre')

³ One/two items: CAPE & PDI: General misidentification ('some people are not what they seem to be'); CAPE: Capgras

4.2.3 Questionnaire development

The final version of the CBQ was developed following a long iterative process, involving feedback from three earlier pilot versions and a total of 559 participants (see Table 4.3). Each version was reviewed following each pilot and ambiguous or unrepresentative items were revised or removed. As Table 4.3 shows, the majority of revisions involved non-clinical beliefs, although minor grammatical changes to the wording of other items were also made. The major change to DLB items occurred between versions 2 and 3, when three new items (addressing somatoparaphrenia, subjective doubles and nihilism) were added. The final version was therefore very similar to version 3, albeit with minor changes in wording and the addition of 7 new societal/cultural belief items to ensure a balance in the ratio of non-clinical to clinical-like items. The key developments covered by the pilot studies are summarised below. (Full lists of revisions made to the questionnaire items following the pilot studies are presented in Tables (i)-(v) in Appendix III.)

Questions regarding “actual vs. possibility”

One of the main revisions to the initial scale following piloting the first version on 254 participants was to ensure that questions were consistently framed in a direct format rather than as “potential” or “possibility” judgements (i.e., items were phrased ‘do you believe that people are possessed by evil spirits?’ rather than ‘do you believe that people can be possessed by evil spirits?’ as in the first version). This provided for a better comparison between questions, particularly in the case of the delusion-like belief questions, where it was felt that these should be based on current beliefs, rather than abstract hypothetical judgements or possibilities.

Table 4.3. Participant sample characteristics for the three pilot studies and final large study

	N	Recruited from...	Method of administration	Age	Gender % female	Question numbers (and changes)
Pilot 1	254	Open University conference; University volunteer panel; Secondary schools (staff); Student societies	Paper and pen	Range: 18-68; Mean = 36.7; s.d. = 13.8	68.0%	<i>Version 1:</i> 14 DLB; 5 PB; 6 SCB
Pilot 2	119	University volunteer panel	Paper and pen	Range: 18-48; Mean = 21.6; s.d. = 4.9	76.3%	<i>Version 2:</i> 14 DLB; 8 P&RB (+3 RB, -2 PB, +2 PB); 10 SCB (-3, +7)
Pilot 3	186	First year undergraduates in psychology	Paper and pen	Range: 18-38; Mean = 18.8; s.d. = 2.1	89.6%	<i>Version 3:</i> 17 DLB (+3); 10 P&RB (+2); 2 SCB (-1, +3)
Final study	1000	Stratified random sample of British adults	Telephone	Grouped: 18-29 (19.4%); 30-44 (29.2%); 45-59 (24.5%); 60+ (26.9%)	52.1%	<i>Version 4:</i> 17 DLB; 10 P&RB; 19 SCB (+7)

DLB: *Delusion-like beliefs*; PB: *Paranormal beliefs*; RB: *Religious beliefs*; SCB: *Societal/cultural beliefs*; + added; - removed

Current vs. lifetime focus

A second main change concerned the format of the questions. Initially participants were requested to answer 'Do you believe, or have you believed...'. As this tended to emphasise both current and lifetime positions (the latter also involving long term memory), this was changed to 'Do you believe...' to emphasise currently held beliefs. This provides an estimate of the number of people holding the belief at the time of being interviewed rather than depending on past recollections which might involve occasions and periods when they did or did not believe. This also provided for analysis of differences across age groups and in particular to determine whether younger people were more likely to hold delusion-like beliefs, as is the case with delusional ideation (Verdoux et al., 1998).

Personally relevant nature

The major change between versions 2 and 3 (described in Tables (i)-(iii), Appendix III) was that items were now revised to emphasise their personally relevant nature. It was noted that all the delusion-like items except the pair addressing reduplicative paramnesia were personally relevant (e.g. 'Do you believe that your relatives have been replaced by similar looking people?'), whereas none of the other belief type questions had this personal emphasis. Those items which could be adapted to focus on an individual were changed to increase the similarity between the delusion-like and other questions on the CBQ.

Leading questions

A small revision between versions 2 and 3 attempted to ensure that questions did not appear to lead participants' responses. This applied particularly to the moral questions, which had previously required individuals to say whether they believed that a statement was right. These were adapted to ask instead whether each statement was right or wrong, with a new answer scale, from 'Strongly believe it is right' through to 'No opinion' and on through to 'Strongly believe it is wrong'.

Belief coherence

A main revision to version 3 of the CBQ was the inclusion of five pairs of beliefs that could be used to directly assess participants' belief coherence on the assumption that, if beliefs are core personally-relevant propositions that are strongly endorsed, they should show some internal consistency. This reflects the arguments made in Chapter 1, whereby a criterion of 'belief' should be that it is logically coherent with other beliefs held by an individual. The five pairs are described below:

- a) If a participant answered believe (at any level) to a question: 'To what extent do you believe in reincarnation (i.e. that when you die your soul is reborn in another body)?', it was predicted that they should also answer positively to 'To what extent do you believe that the soul or spirit survives death?'

b) If a participant responded believe (at any level) to the question: ‘To what extent do you believe that some people communicate with the dead?’, it was expected that they should also answer believe to ‘To what extent do you believe that the soul or spirit survives death?’

c) If a participant answered believe (at any level) to the question: ‘To what extent do you believe that earth has been visited by aliens from other solar systems?’, it was expected that they should also answer believe to ‘To what extent do you believe in extra-terrestrial life?’

d) If a participant responded believe (at any level) to the question: ‘To what extent do you believe that some people are possessed by evil spirits?’, it was expected that they should also answer believe to ‘To what extent do you believe in demons or evil spirits?’

e) If a participant answered believe to either of the questions: ‘To what extent do you believe in the theory of evolution?’ or ‘To what extent do you believe that humans share a common ancestor with apes?’, then it was expected that they should answer believe to the other.

These pairs were also used to further investigate the web of belief hypothesis (Quine & Ullian, 1970), and to investigate the assumption that all beliefs held by an individual are consistent with each other (see Chapter 7).

4.2.4 Question content

4.2.4.1 *Delusion-like beliefs (DLB)*

Delusion-like beliefs were based on the major thematic delusions found in mainstream psychotic and neuropsychiatric conditions. Items addressing DLB were adapted from DSM-IV-TR (APA, 2000), existing clinical measures (Bebbington & Nayani, 1995; Peters, Joseph & Garety, 2004; Robins et al., 1998; Sheehan et al., 1988) and relevant examples from the cognitive neuropsychological research literature (Bell, Halligan & Ellis, 2006b; Davies & Coltheart, 2000; Ellis & Young, 1990). To ensure coverage of a broad range, items were chosen to be representative of each delusional theme. These included five questions relating to the major subtypes of delusional disorder (APA, 2000); one item each for persecutory, erotomanic and grandiose ideas, and two different aspects of the somatic subtype (body dysmorphia and parasitosis). Two other items assessed the non-bizarre ideas of reference and nihilistic beliefs.

In addition, ten questions specifically addressed bizarre themes (as defined by DSM-IV). This type of delusion has been comparatively under-researched in non-clinical samples, due to the assumption that the bizarreness of these ideas makes them unlikely to be found in general populations. However, given the emphasis on the content of beliefs for diagnosing schizophrenia (with different requirements depending on the bizarre/non-bizarre distinction), it was valuable to determine the degree to which bizarre beliefs are present. Bizarre items covered beliefs of external control, thought insertion, Capgras syndrome, Cotard syndrome, Frégoli syndrome, reduplicative paramnesia (of both person and place), mirrored-self misidentification, subjective doubles and somatoparaphrenia.

4.2.4.2 Paranormal and religious beliefs

Rice (2003) drew a distinction between classic paranormal beliefs (e.g., in ESP) and religious beliefs, often considered to be a subset of paranormal beliefs. In terms of the relationship between these beliefs, there exist two opposing hypotheses in the literature. One predicts a negative relationship between these two, given that paranormal beliefs may fulfil the spiritualist needs of those without religion (Emmons & Sobal, 1981) and/or because mainstream religious doctrines contribute to rejecting such beliefs (Sparks, 2001). On the other hand, a positive relationship between these two types of beliefs could be expected, given that both consist of “beliefs in physical, biological or psychological phenomena that feature fundamental or core ontological properties of another ontological category” (Lindeman & Aarnio, 2006, p. 586-7). In other words, both relate to beliefs in the existence of phenomena that cannot be explained by current scientific theories.

Indeed, studies have found support for both (contradictory) predictions, which might in part be explained by the lack a single well-validated measure of religiousness (or an agreed definition of paranormal beliefs). For example, Orenstein (2002) found that church attendance was related to content-specific religious beliefs but not to certain classic paranormal beliefs. Similarly, Thalbourne and O’Brien (1999) tested three different religiosity scales against a measure of paranormal beliefs (the Australian Sheep-Goat Scale: Thalbourne & Delin, 1993), and found a close to significant negative correlation, no correlation and a significant positive correlation between the different scales. Finally, Tobacyk and Milford (1983) found that religious beliefs were positively correlated with beliefs in precognition and witchcraft, but uncorrelated with beliefs in telepathy or extraordinary life forms.

The relationship between these two sets of belief used in the CBQ was therefore investigated, and will be outlined further in the following section describing the CBQ's psychometric credentials. As the paranormal and religious beliefs did indeed form a reliable scale, these beliefs will be described together.

Questions concerning paranormal and religious beliefs were constructed from reviews of published market research polls (Gallup & Newport, 1991; Rice, 2003; Taylor, 2003) and paranormal belief measures (Eckblad & Chapman, 1983; Thalbourne & Delin, 1993; Tobacyk & Milford, 1983). Following Lindeman and Aarnio (2006, pp. 586-7), this group of beliefs was defined as “beliefs in physical, biological or psychological phenomena that feature fundamental or core ontological properties of another ontological category” (e.g., ‘Do you believe that some people communicate with the dead?’).

4.2.4.3 Societal/cultural

Finally, the last group of beliefs were classified as societal/cultural beliefs (of which paranormal and religious beliefs can, depending on one's viewpoint, be considered a subset) and included scientific, political and moral items (e.g., ‘Do you believe that humans cause significant global warming?’). Importantly, the large number of non-clinical belief questions, while interesting in their own right, were strategically inserted to provide a balanced context that encouraged participants to respond more truthfully and allowed exploration of the links between delusion-like beliefs and other belief types.

4.2.4.4 Anomalous experiences

In addition, 8 anomalous experience items were included, of which 4 items focused on common paranormal experiences, selected from reviews of published market research polls (Gallup & Newport, 1991; Rice, 2003; Taylor, 2003) and measures of paranormal phenomena (Eckblad & Chapman, 1983; Thalbourne & Delin, 1993; Tobacyk & Milford, 1983), to ensure that items comprised a wide range of experiences. In addition, two items (relating to changed feelings towards others and towards objects) were chosen to evaluate specific hypothesised links between anomalous experiences and beliefs (described in Chapter 6). The final 2 items targeted visual and auditory hallucination-like experiences to allow a more direct evaluation of their association with delusion-like beliefs.

Although many more hallucinatory items have been included in some studies (e.g., Larøi & van der Linden, 2005), the number of hallucination-like items is not that dissimilar from those included in several other studies (e.g., Johns et al., 2002, 2004; Verdoux et al., 1998). Moreover, the two clinically related items cover the most common types of hallucinations by modality. Cutting (1990) estimated auditory hallucinations occurred in 55% of participants and visual in 15%. These are also amongst those most commonly associated with psychotic disorder (along with haptic hallucinations: Ohayon, 2000). Moreover, although different versions of the more comprehensive Launay-Slade Hallucination Scale (Launay & Slade, 1981) yield different factor structures, visual and auditory hallucinations remain the two most consistent factors, with others consisting of non-hallucinatory factors relating to vivid thoughts and daydreaming or sleep-related experiences (Larøi & van der Linden, 2005; Morrison et al., 2000; Morrison et al., 2002).

4.2.4.5 Self-appraisals and insight

A final feature of the CBQ was to briefly investigate individual's self-appraisals of their beliefs and in particular their collective judgement of the likelihood of holding delusion-like beliefs or hallucination-like experiences. In the CBQ participants are asked to rate the extent to which they consider themselves (a) 'superstitious (i.e. likely to believe certain events occur through mysterious or magical means)', (b) 'a religious person', (c) 'likely to believe in things that others do not' and/or (d) 'tolerant of people with different beliefs'.

4.2.5 Questionnaire scale

Unlike previous questionnaires, CBQ questions only involved current beliefs to avoid relying on participants' memory (asking 'Do you believe...'), with participants responding using a 5-point Likert scale: '-1' ('Do not believe'), '0' ('Don't know'), '1' ('Weakly believe'), '2' ('Moderately believe'), '3' ('Strongly believe').

In contrast, experience questions probe both current and lifetime experiences (e.g., 'Have you seen...'), as one aim was to investigate whether a past or current anomalous experience could have led to an anomalous belief. Participants responded using a 4-point Likert scale, with the options 0 ('Never'), 1 ('Rarely'), 2 ('Sometimes') and 3 ('Often'). The insight questions used a scale with the response options 0 ('Not at all'), 1 ('Quite') or 2 ('Very'). To minimise response bias and ensure participants' attention, the scales were configured by alternating endpoints indicating the presence or absence of the belief or experience.

Similar to the introduction used by Peters, Joseph & Garety (1999) to help neutralise the effects of some of the questions, it was explained to all participants that

the study ‘included “a wide range of beliefs and experiences that some people may find unusual but which are more common than most people realise”. Participants, moreover, were asked not to consider beliefs or experiences that might be attributed to the influence of drugs or alcohol.

4.3 PSYCHOMETRIC CREDENTIALS: RELIABILITY AND VALIDITY OF CBQ

4.3.1 Test-retest reliability

Test-retest reliability provides an index of score consistency over time and was derived by inviting the same respondents to complete the CBQ on two different occasions. Seventy-six participants (aged 18-48: $M=21.4$, $s.d.=4.91$) completed version 2 of the CBQ on two separate occasions, on average one month apart. These participants comprised a subset of the sample of 119 described in Table 4.3. Fifty participants filled out a paper-and-pencil version in both sessions while (to lessen the burden on participants and encourage a higher response rate) the remaining twenty-six received the questionnaire and responded by email for the second session. Previous studies suggest that responses to questionnaires are not affected by changes from paper-and-pencil to electronic methodology (e.g., Davis, 1999; Vallejo et al., 2007), and indeed there was no difference in means between the two groups. A strong correlation was found between participants’ responses for the two sessions ($r=0.865$, $p<0.001$).

4.3.2 Factor Analysis

To ascertain common underlying factors, a principal components analysis (PCA) was carried out on both of the two belief groups expected to form reliable scales (i.e., delusion-like and paranormal and religious). To ensure a reliable component structure was determined, the sample was randomly split in half, with each half analysed separately and the two solutions compared.

Delusion-like beliefs

Sample 1 (n=448)

Individual items had KMO measures of sampling adequacy varying between 0.807-0.895. The overall KMO was 0.848 and the Bartlett test for sphericity was highly significant, confirming that the data were suitable for PCA. The Kaiser criterion of eigenvalue > 1 suggested a four component solution, whereas the scree plot suggested a one component solution (see Figure 4.1). Following Stevens (1992), the solution indicated by the scree plot was taken as the most appropriate (as there was a large sample but relatively low communalities).

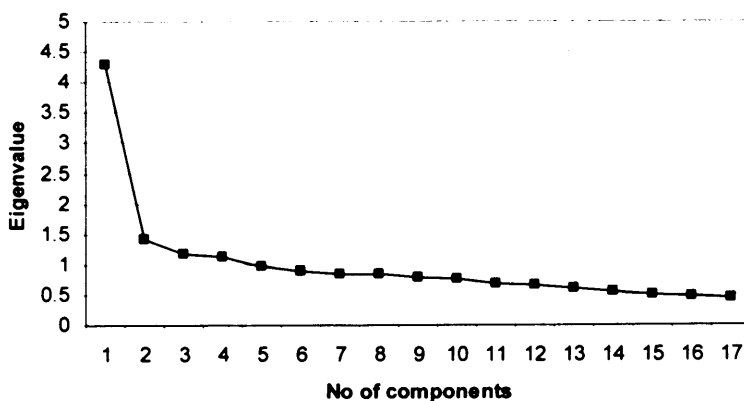


Figure 4.1. Sample 1 scree plot for DLB items

Overall, a single component solution explained 25.2% of the total variance. Table 4.4 shows the factor loadings for this component.

Sample 2 (n=461)

The Kaiser criterion of eigenvalue>1 again suggested a four component solution, whereas the scree plot suggested a one component solution (see Figure 4.2).

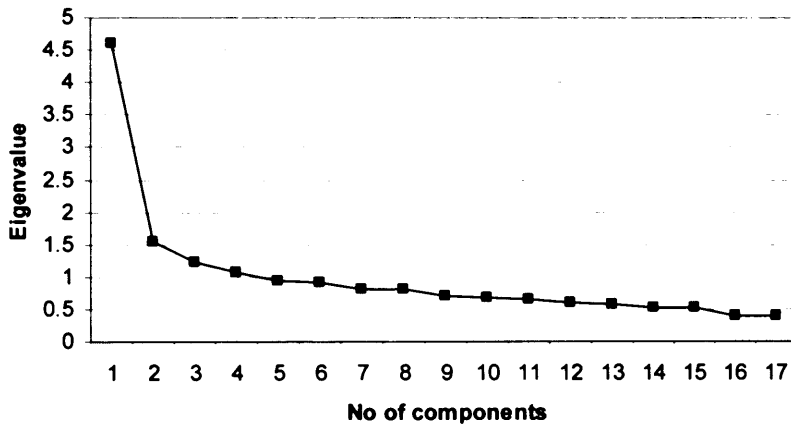


Figure 4.2. Sample 2 scree plot for DLB items

Individual items had KMO measures of sampling adequacy varying between 0.797-0.934. The overall KMO was 0.864 and the Bartlett test for sphericity was highly significant, confirming that the data were suitable for PCA. Overall, a single component solution explained 27.1% of the total variance. Table 4.4 shows the factor loadings for this component.

Table 4.4. Factor loadings for DLB items

<i>To what extent do you believe...</i>	Factor loading	
	Sample 1	Sample 2
That part of your body doesn't belong to you?	0.564	0.658
That some people are duplicated, i.e. are in two places at the same time?	0.601	0.562
That the reflection in the mirror is sometimes not you?	0.513	0.608
That certain places are duplicated, i.e. are in two different locations at the same time?	0.525	0.588
That people say or do things that contain special messages for you?	0.533	0.571
That relatives or close friends are sometimes replaced by identical-looking impostors?	0.547	0.550
That some well-known celebrity is secretly in love with you?	0.545	0.552
That you are dead and/or do not exist?	0.477	0.592
That people you know disguise themselves as others to manipulate or influence you?	0.567	0.493
That your thoughts are not fully under your control?	0.497	0.498
That certain people are out to harm or discredit you?	0.459	0.533
That there is another person who looks and acts like you?	0.495	0.487
That you are not in control of some of your actions?	0.513	0.443
That you are infested by parasites?	0.479	0.438
That you are an exceptionally gifted person that others do not recognise?	0.362	0.459
That the world is about to end?	0.373	0.415
That your body or part of your body is misshapen or ugly?	0.431	0.271

It is clear from Table 4.4 that while most DLB items loaded highly onto this component, this was not true for all 17 items. As the purpose of conducting these analyses was to establish whether it would be appropriate to combine these items into one scale, these results suggest that some items would not contribute reliably to such a scale. Given this aim, it was decided that when creating a total DLB score (described in Chapter 5), items with loadings from one sample of below 0.4, or average items less than 0.45 would be dropped (these criteria define the last three items in Table 4.4, leaving 14 DLB items). These relatively stringent criteria helped to ensure that reliable comparisons can be made using a DLB scale.

Paranormal and religious beliefs

In a similar manner to that for the DLB, two PCA were carried out on P&RB items to assess the dimensionality of this scale.

Sample 1 (n=455)

Initial analysis of the 10 items showed these had Kaiser-Meyer-Olkin (KMO) measures of sampling adequacy between 0.795-0.856, with an overall KMO of 0.832. The Bartlett test for sphericity was significant. The Kaiser criterion of eigenvalue>1 suggested a three component solution, whereas the scree plot suggested a one component solution (see Figure 4.3)

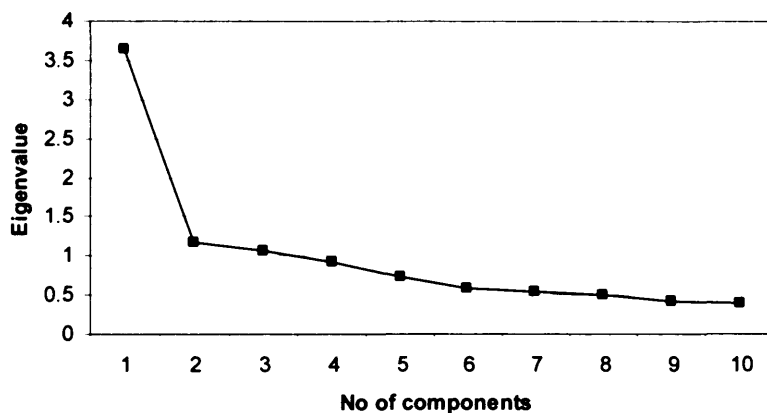


Figure 4.3. Sample 1 scree plot for P&RB items

Therefore, the analysis was also re-run with a forced one component solution (again following Stevens, 1992). Overall, the single component solution explained 36.4% of the variance. Table 4.5 shows the factor loadings for this component.

Sample 2 (n=458)

Individual items had KMO measures of sampling adequacy varying between 0.764-0.860. The overall KMO was 0.808 and the Bartlett test for sphericity was highly significant, confirming that the data were suitable for PCA. The Kaiser criterion again suggested a three component solution, whereas the scree plot (see Figure 4.4) suggested a one component solution. Following the methods outlined above, a single component solution was chosen, which explained 34.9% of the total variance. Table 4.5 shows the factor loadings for this component.

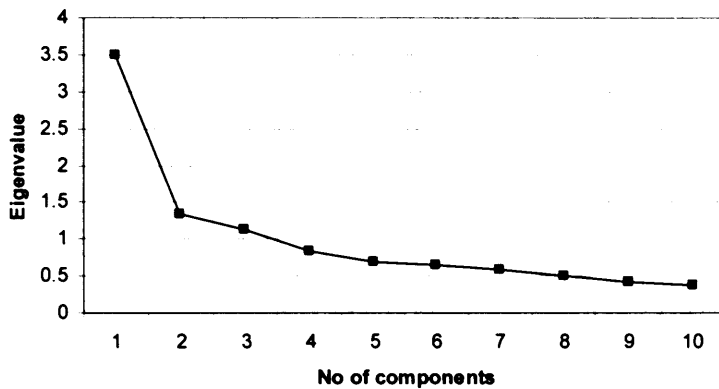


Figure 4.4. Sample 2 scree plot for P&RB items

Using the same criteria as described above for DLB items, items with loadings from one sample of below 0.4, or average items less than 0.45 were dropped (these criteria define the last two items in Table 4.5). Thus the remaining 8 P&RB items will be used when calculating scores for this belief group.

Table 4.5. The factor loadings for P&RB items

To what extent do you believe...	Factor loading	
	Sample 1	Sample 2
That the soul or spirit survives death?	0.712	0.742
In demons or evil spirits?	0.666	0.712
That some people communicate with the dead?	0.687	0.664
That some people are possessed by evil spirits?	0.655	0.643
In reincarnation (i.e. that when you die your soul is reborn in another body)?	0.677	0.603
In black magic or witchcraft?	0.592	0.579
In a god or gods?	0.604	0.533
In "intelligent design" (i.e. that the complexity of the world suggests that it was purposefully designed by an intelligent creator)?	0.571	0.467
In astrology (i.e. that the position of the stars and planets affects or determines your life)?	0.422	0.469
Some people transform into werewolves?	0.328	0.402

4.3.3 Internal consistency

Internal consistency provides a measure of the reliability of different questionnaire items and permits an estimate of how consistently individuals respond to the items within a scale. The Cronbach alpha coefficient measures the extent to which item responses obtained at the same time correlate highly with each other. Given the dimensionality indicated by the factor analyses, these internal consistency tests were carried out on the final 14 DLB items and 8 P&RB items. We also carried out tests for societal/cultural items (although these were not designed to cohere into a single scale), to determine whether items were sufficiently related as to allow comparisons between types of belief endorsement.

Using the large final sample described in Table 4.3 (n=1000), both the CBQ delusion-like and paranormal and religious items demonstrated good internal consistency (Cronbach's alphas of 0.79 and 0.80 respectively). The item-whole

correlations ranged between 0.35-0.50 for delusion-like items and 0.42-0.63 for paranormal and religious. Split-half reliability analysis indicated relatively good correlations of 0.82 for delusion-like and 0.81 for paranormal and religious (using the Spearman-Brown correction). Thirteen of the societal/cultural items, given the wide range of beliefs covered in this category, yielded a less stable, but nevertheless adequate scale, with a Cronbach's alpha of 0.65. Item-whole correlations ranged between 0.16-0.45, and the corrected split-half reliability produced a reasonable correlation of 0.69.

4.3.4 Construct validity

Construct validity measures whether a new scale measures or correlates with a theorised or psychological construct or similar existing measures. The Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE: Mason et al., 1995) is an established measure of psychosis-proneness, and has previously been used when evaluating the construct validity of the PDI, which addresses delusional ideation (Peters et al., 2004). It is divided into four subscales (unusual experiences [UE], cognitive disorganisation [CD], introverted anhedonia [IA] and impulsive nonconformity [IN]) thus allowing one to establish which aspects of psychosis a new scale taps into. This provides a strong evaluation of construct validity (for the DLB items in particular) as, with a scale such as the CBQ, looking at beliefs similar to positive symptoms of psychosis, one would expect correlations with these aspects of the scale (unusual experiences) but not or to a lesser extent with the others. This reflects the distinction between congruent validity (when a scale correlates with predicted constructs) and discriminant validity (when a scale does not correlate with constructs it has no theoretical reason to correlate with).

One hundred and sixty-nine participants completed both the O-LIFE and version 3 of the CBQ (the majority of the 186 participants who completed version 3: see Table 4.3). Participants' age ranged from 18-29 ($M=18.6$, $s.d.=1.45$), and the majority were female. CBQ scores (for (1) delusion-like beliefs, (2) paranormal and religious beliefs and (3) societal/cultural beliefs) were calculated by summing participants' positive responses to the relevant belief items (i.e., an item scored '0' for 'Don't know'/'Do not believe', 1 for 'Weakly believe', 2 for 'Moderately believe' and 3 for 'Strongly believe').

These scores were correlated against all four O-LIFE scales (only those significant at $p<0.001$ [Bonferroni's correction] were considered). Congruent validity was established as the O-LIFE unusual experiences scale significantly correlated with delusion-like and paranormal and religious beliefs ($\rho=0.35$ and $\rho=0.36$ respectively), as might be expected, but not with societal/cultural beliefs. The other O-LIFE scales, as expected given their predicted relevance, did not correlate with the CBQ belief scores (see Table 4.6), demonstrating discriminant validity.

Table 4.6. The non-parametric correlations between CBQ and O-LIFE scores

	O-LIFE (UE)	O-LIFE (CD)	O-LIFE (IA)	O-LIFE (IN)
DLB Score	0.35 (*)	0.19	0.03	0.18
P&RB Score	0.36 (*)	0.09	-0.07	0.14
SCB Score	-0.08	-0.05	-0.05	0.17

DLB: Delusion-like belief; P&RB: Paranormal and religious belief; SCB: Societal/cultural belief

* Correlation significant at $p<0.001$

Thus the paranormal and religious beliefs and delusion-like beliefs on the CBQ were both significantly associated with positive symptomatology scores, in particular those relating to aberrant beliefs and experiences.

4.4 SUMMARY

This chapter highlighted the need for a more wide-ranging analysis of both clinical and non-clinical beliefs; first, to further investigate those beliefs with similar content to delusions; and second to explore the prevalence of 'normal' beliefs within the general population. However, there remain concerns regarding the use of clinical measures in the non-clinical populations, and also whether regarding belief and experience as interchangeable is appropriate.

As a result, the Cardiff Beliefs Questionnaire (CBQ) was developed, to address a range of beliefs using neutral, non-clinical language throughout. Following extensive piloting, the CBQ demonstrated good reliability and validity. Thus the CBQ allows us to further explore the prevalence and relationships between different types of belief, and as such will be the basis of the following chapters.

CHAPTER 5

PREVALENCE OF DELUSION-LIKE AND OTHER BELIEF TYPES IN THE GENERAL POPULATION

5.1 INTRODUCTION

Chapter 4 described the reasons underlying and subsequent process of new questionnaire development with a view to measuring the prevalence of delusion-like beliefs together with other forms of belief. The current chapter describes the findings of a large study where the final version of the CBQ was used in a large stratified sample of British adults. In particular, the study addresses the prevalence of each belief type, the relationships between these different kinds of belief and the extent to which participants' self-appraisals of their beliefs could predict content-specific endorsements.

5.1.1 Background

Clinical psychosis remains comparatively rare, with a recent study estimating lifetime prevalence of broadly defined psychosis at 3.48% (Perälä et al., 2007). Individuals presenting at psychiatric clinics therefore represent the more serious consequences of mental illness, and, in particular, those subjects for whom the symptoms have functional consequences involving significant disruption to their lives and/or those of family and friends. Most patients presenting with psychotic illness will typically report delusions, considered to be one of the most significant aetiological factors within psychiatric diagnosis and once thought as 'psychologically irreducible' (Jaspers, 1963). The presence of a bizarre delusion alone is often

sufficient to diagnose schizophrenia (once the belief has been held for a 6 month period, and where the belief significantly impairs the individual's everyday functioning).

Despite the fact that established psychiatric definitions of delusion claim that such beliefs are not 'those ordinarily held by other members of a person's culture', psychiatrists have little by way of an evidence base from which to rule in or out the likelihood of others in a patient's culture holding similar beliefs, in particular as it seems these can occur without functional consequences. As described in Chapter 1, drawing such a conclusion becomes more difficult given that it has been shown that "many people in the general population express beliefs that resemble the delusions of patients with a clinical diagnosis of psychotic disorder" (Delespaul & van Os, 2003, p. 286). Indeed, general population studies estimate lifetime prevalence of delusions at around 15% (Rutten et al., 2008) with an average annual prevalence rate of 5% (van Os et al., 2009).

5.1.2 Previous Research

A variety of clinical and non-clinical instruments have been used to assess the prevalence of delusions (some of which have been discussed in Chapter 4) making it difficult to establish a reliable estimate for delusion-like beliefs or delusional ideas in the general public. Although delusional ideas are commonly found in non-clinical populations, published lifetime prevalence estimates appear relatively small. Van Os et al. (2000) found that 3.3% of the general population held psychiatrist-rated delusions, although a further 8.7% held what were described as 'not clinically relevant' delusional beliefs and another 3.8% reported plausible explanations for their delusion-like ideas. However, higher estimates of annual prevalence (using less strict

definitions of delusion) have been reported. Poulton et al. (2000) reported that 20.1% of a 26-yr-old cohort endorsed delusions on a self-report measure and Scott et al. (2005) found that 11.7% of a representative sample of Australian adults reported one or more psychosis screening items.

Despite these higher figures, recent meta-analysis suggests an average annual prevalence rate of approximately 5% for delusions (van Os et al., 2009). Difficulties arise when reviewing the literature, however, as there is considerable variation in the range of symptoms targeted, definitions of 'delusion' employed, assessment measures used, and the time periods covered in different studies (see Table 5.1 for a summary). Kendler et al. (1996), for example, investigated lifetime prevalence, reporting that while 28.4% of respondents endorsed at least one psychosis probe (including items addressing hallucinations), only 2.2% or less of the population were affected by psychotic illness (see Freeman [2006] for a review of the difficulties of comparing studies in this area).

5.1.3 Research Aims

Given some of the difficulties when using clinical measures in non-clinical populations (see Chapter 4), Peters et al. (1999, 2004) developed the Peters et al. Delusions Inventory (PDI) as a less clinically explicit measure, assessing delusional ideation. This has received wide usage with studies employing this measure finding that around 10% of healthy individuals score above the mean for deluded patients (Peters, Joseph & Garety, 1999; Peters et al., 2004; Verdoux et al., 1998). Furthermore, median scores of 8 for healthy participants on the PDI-40 (Peters, Joseph & Garety, 1999) and 6 on the PDI-21 (Peters et al., 2004) show that the majority of these non-clinical samples endorsed at least one psychosis-based item.

Table 5.1. Selected studies used to investigate delusional beliefs in non-clinical populations. (See Table 4.1 [Chapter 4] for instrument references)

Focus		Author(s)	N	Instrument	Sample	Prevalence
Psychosis	Currently present	Olfson et al. (2002)	1005	MINI	US adults (attending an urban general medical practice)	10.6% persecutory; 4.7% reference
	Past Month	Eaton et al. (1991)	810	DIS self-report and psychiatrist-assessed interviews	US adults	6-10% overall: 2% bizarre; 4-8% paranoid/ grandiose
	Annual Prevalence	Poulton et al. (2000)	761	DIS (Longitudinal study)	26-yr-old New Zealanders	20.1%
		Scott et al. (2005)	10641	Screening items from CIDI	Australian adults	11.7% overall: 5.9% thought insertion/withdrawal; 4.8% persecutory/ reference; 3.4% grandiose
	Onset over past year	Tien & Anthony (1990)	4994	DIS	Adults (aged 18-49) selected from a US survey, 1 yr after reporting no symptoms	2.6% being watched/spied on; 1.6% being followed; Between 0.2-0.6% for mind control/ reading, ideas of reference, people plotting against one
	Lifetime Prevalence	Ohayon & Schatzberg (2002)	18980	Sleep-Eval	European adults	1.9% clinically evaluated
van Os et al. (2000)		7076	CIDI Interviews	Dutch adults	12.3% overall: 3.3% 'true' clinically rated delusions	
Delusional Ideation	Lifetime Prevalence	Peters, Joseph & Garety (1999)	292	PDI-40	Healthy British adults (n=272), psychotic patients (n =20)	10% of healthy individuals scored above the mean for deluded patients
		Peters et al. (2004)	477	PDI-21	Healthy British adults (n=444), psychotic patients (n =33)	11% of healthy individuals scored above the mean for deluded patients
		Verdoux et al. (1998)	462	PDI-21	French adults (attending a general medical practice)	Between 5-70% of all items: 25.5% persecutory; 12.1% grandiose; 5.6% reference; 8.6% control

The need to improve on existing non-clinical measures further, so that they can be more applicable to studies estimating delusion-like beliefs in non-clinical samples, provides a major reason for developing the CBQ (as described in Chapter 4). Given concerns regarding different measures (described in Chapter 4), another aim of the CBQ was to capture a wider range of beliefs (including delusion-like beliefs) and embed the target delusion-like questions within more general societal or cultural beliefs (including moral, paranormal and religious beliefs). This strategy was intended to de-emphasise the psychiatric associations and encourage participants to engage more honestly with the questions. In addition, the inclusion of a range of bizarre delusion-like beliefs distinguishes the CBQ from previous clinical and non-clinical measures of delusions and/or delusional ideation. With these factors in mind the main aims of the current study described in this chapter were as follows:

- (a) By avoiding clinical language and locating delusion-like beliefs (DLB) within a broader non-clinical belief context, the aim was to encourage participants to endorse items honestly and openly and hence derive a more complete indication of the levels of delusion-like beliefs in the general public.
- (b) By investigating a wider range of delusion-like-items and in particular including bizarre beliefs (commonly associated with neuropsychiatric disorders), another aim was to estimate and compare the prevalence of both bizarre and non-bizarre delusion-like beliefs. The expectation was that bizarre beliefs would be reported to a lesser extent than the non-bizarre beliefs.

- (c) A third aim was to provide clinicians with a clinically relevant benchmark to compare those holding clinically relevant beliefs (delusions) with those in society holding similar beliefs, given that the standard psychiatric glossary considers that such beliefs should not be commonly endorsed by other members of a person's culture. An association between delusion-like and paranormal and religious beliefs was predicted but not for delusion-like and general societal/cultural beliefs.
- (d) Assuming a psychosis continuum, a fourth aim was to establish whether the same demographic characteristics found in clinical groups could also be observed in non-clinical groups (van Os et al., 2009). To investigate this, several demographic probes, previously found to relate to delusion (e.g., van Os et al., 2000) were included.
- (e) A further aim was to establish whether participants' self-ratings of their meta-beliefs (e.g., religiousness) were related to endorsements for different belief types, allowing an evaluation of the insight non-clinical participants hold into their belief processes.
- (f) The final aim was to examine the belief scores (for each of the three belief types) of a small group of patients to ascertain the degree to which these were similar or distinct from those of age and gender matched controls.

5.2 STUDY DESCRIPTION

5.2.1 Participants

The sample comprised 1000 British adults (aged 18 or over). Data were collected using computer-assisted telephone interviewing, carried out by an experienced market

research company (MRUK), with quotas set on age, gender and employment status (see Table 5.3, section 5.4, for a demographic breakdown of the sample). Telephone interviews were chosen specifically given that they are considered more conducive to honest responding compared to face-to-face interviews and given the potentially sensitive nature of some questions (Frey & Oishi, 1995). The survey was conducted using random digit dialling, so as to include unlisted numbers in the potential sample. Calls were made predominantly in the evenings or at weekends, to target as wide a range of potential participants as possible. To achieve quotas, hard-to-reach groups, such as young males, were targeted within the household. Call backs were carried out if respondents asked for an alternative time, or if contact was not made (i.e., no reply, answer phone, line engaged). The interviewers were asked to make an explicit judgement as to whether each individual had sufficient comprehension of English and capacity to answer the questions before proceeding.

5.2.2 Measure

Participants completed the final version of the CBQ, described in Chapter 4. This included 46 belief items, consisting of 17 delusion-like beliefs (10 of which were considered bizarre by the DSM criteria), 10 paranormal and religious beliefs and 19 societal/cultural beliefs. Participants were asked to rate their current beliefs using the options: 'Do not believe', 'Don't know', 'Weakly believe', 'Moderately believe', or 'Strongly believe'. In addition, participants were asked four meta-beliefs questions, to examine the associations of these with the content beliefs.

Some adaptations were made to the CBQ to render it more suitable for telephone interview administration. The moral belief questions were answered using the same responses as the other items to avoid changing scales (this meant changing

the phrasing to ‘do you believe that X is right?’ rather than ‘right or wrong?’). In addition, reversing polarity on the individual scales (i.e., alternating presenting ‘Do not believe’ and ‘Strongly believe’ as the first option) was not used due to concerns, confirmed by MRUK, that this might confuse respondents.

The following analysis will consider results for each of the three belief content types in turn, beginning with DLB.

5.3 DELUSION-LIKE BELIEFS (DLB)

5.3.1 Prevalence

The three large scale pilot studies previously described (see Chapter 4) were carried out to develop and refine the final version of the CBQ questionnaire in advance of applying it to the large stratified British sample. The percentage of participants from the first pilot (n=254) endorsing one or more of the original 14 DLB items was 69%, with a similar level of 71% found in pilot 2 (n=119). In pilot 3 (n=186), the number of DLB questions increased to 17, following the inclusion of items addressing somatoparaphrenia, subjective doubles and nihilism, and the percentage endorsing one or more of these items rose to 90%. This confirms that overall prevalence is highly dependent on the number of DLB items chosen (as well as the nature of the items included), and highlights one of the key issues when comparing between estimates using different measures.

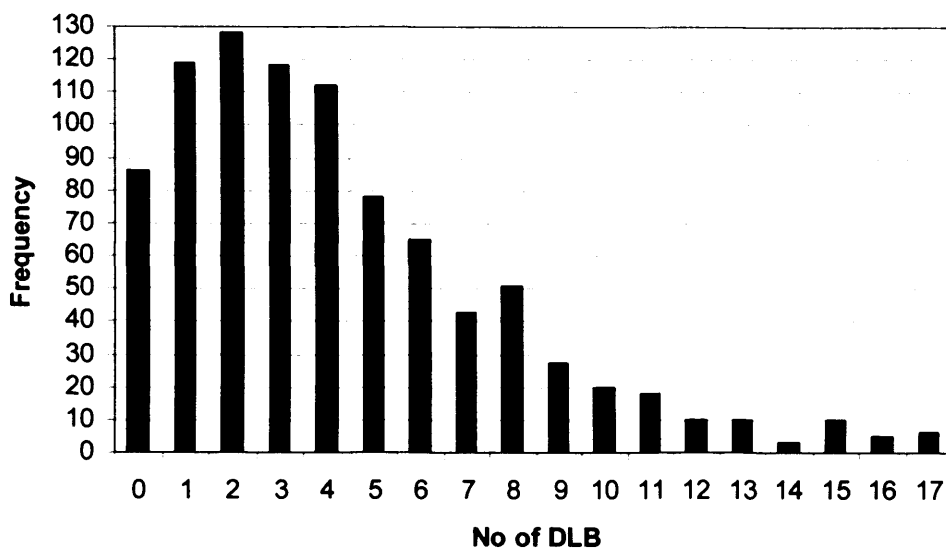


Figure 5.1. The distribution of the number of delusion-like beliefs (DLB) endorsed at any strength

The results from the large scale final sample were broadly similar (see Figure 5.1). One or more of the 17 delusion-like beliefs were strongly endorsed (rated '3') by 38% of participants, with this figure rising to 91% endorsement when the entire rating range (1-3) was included. More than one DLB was strongly endorsed by 17%, and 77% of participants endorsed more than one at any belief strength. Comparing non-bizarre delusion-like beliefs (e.g., ideas of reference) and bizarre delusion-like beliefs (e.g., beliefs of control or misidentification), results showed both were given similar levels of endorsement, being strongly endorsed by 25% and 26% respectively (and endorsed to some degree by 79% and 78% respectively).

Table 5.2 shows that beliefs concerning one's body being misshapen or ugly and of not being in control of one's actions were by far the most common with both being strongly endorsed by 11% (and endorsed at any strength by 46% and 44% respectively). The pattern of responses was fairly consistent when comparing between belief at any strength and strong belief (with one exception: beliefs about being an

exceptionally gifted person (the tenth most reported strongly held belief [4%]) but the third most reported at any strength [41%]). Even bizarre delusional themes thought of as clinically rare (such as Capgras syndrome and Cotard syndrome, were endorsed by a small but notable number of this sample (0.4% and 0.9% strongly, 5.8% and 5.4% at any strength) amounting to 58 and 54 participants respectively.

Table 5.2. The percentage of the 1000 participants endorsing delusion-like beliefs weakly [W], moderately [M] or strongly [S] in the final study (AS: at any strength)

Delusion-like belief	Percentage reporting belief			Number reporting belief (AS)
	W	M	S	
<i>* Bizarre delusion-like beliefs</i>				
<i>You are dead and/or do not exist*</i>	3.2	1.3	0.9	54
<i>Relatives or close friends are sometimes replaced by identical-looking impostors*</i>	3.4	2.0	0.4	58
<i>Part of your body doesn't belong to you*</i>	3.0	2.0	1.1	61
Some well-known celebrity is secretly in love with you	4.9	1.0	1.0	69
You are infested by parasites	5.7	3.9	2.8	124
The world is about to end	7.6	3.6	1.7	129
<i>The reflection in the mirror is sometimes not you*</i>	7.1	8.7	2.6	184
<i>People you know disguise themselves as others to manipulate or influence you*</i>	10.6	9.9	4.4	249
<i>Some people are duplicated, i.e. are in two places at the same time*</i>	12.4	9.7	4.1	262
<i>There is another person who looks and acts like you*</i>	13.0	14.3	5.4	327
<i>Your thoughts are not fully under your control*</i>	12.3	15.1	6.2	336
Certain people are out to harm or discredit you	14.8	12.5	6.5	338
People say or do things that contain special messages for you	14.4	17.1	7.0	385
<i>Certain places are duplicated, i.e. are in two different locations at the same time*</i>	14.3	17.6	6.8	387
You are an exceptionally gifted person that others do not recognise	17.0	19.7	3.8	405
<i>You are not in control of some of your actions*</i>	15.4	18.1	10.8	443
Your body or part of your body is misshapen or ugly	14.0	21.6	10.8	464

Despite high levels of endorsement for DLBs overall, the number of bizarre beliefs endorsed was relatively low compared to that of non-bizarre beliefs, as predicted.

5.3.2 Discussion

In this study a substantial proportion of participants (38%) strongly endorsed at least one delusion-like belief (with 91% endorsement at any strength), indicating that endorsing such belief types in the general public may be more common than previously estimated. The level of endorsement (given that these were currently held beliefs) is higher than previous lifetime prevalence studies of delusional-type beliefs (around 15%: Rutten et al., 2008). This, however, was predicted as previous estimates employed stricter definitions of delusion (e.g., only taking those beliefs that cause distress to the holder, or investigating the plausibility, etc.), employed clinical terminology and required recollection. In contrast, the CBQ was less clinically explicit than previous measures, which may account (in part) for the increased prevalence of DLB.

Moreover, these prevalence levels for currently held beliefs were not that dissimilar to levels of lifetime delusional ideation found using the PDI measure (Peters et al., 2004), where around 95% of the non-clinical sample endorsed at least one PDI item to some degree. However, the PDI does not address the problem of response bias resulting from potential psychiatric stigmatisation to the same extent as the CBQ. Furthermore, the CBQ allows an investigation of a much wider range of beliefs, including a more varied selection of DLB due to the inclusion of several bizarre themes.

Some 26% of participants strongly endorsed at least one bizarre delusion-like belief (rising to 78% at any strength), suggesting that the endorsement of such a belief

may not by itself be sufficient to qualify as a clinical delusion. Only a few bizarre beliefs have been investigated in general population studies before. In contrast to the DSM assumption that these are so significantly different as to warrant a special set of criteria for the diagnosis of schizophrenia, it seems that some of these types of belief may be relatively common in non-clinical populations, all of which provides further support and extension of the continuum hypothesis to include bizarre delusion-like beliefs in non-clinical samples.

5.4 DEMOGRAPHIC VARIABLES

5.4.1 Background

If the psychosis phenotype is considered as lying on a dimensional continuum, as suggested by previous results, the relationships observed between clinical disorder and demographic characteristics might be expected to extend to sub-clinical beliefs (van Os et al., 2009). Incorporated into the large CBQ study were questions addressing demographic characteristics previously found to be related to psychosis, including those of age, gender, socioeconomic group, education ethnicity, religion and living alone (Cantor-Graae & Selten, 2005; Johns et al., 2004; Neeleman & Lewis, 1994; Scott et al., 2005; Sundquist et al., 2004; Tien, 1991; van Os et al., 2000). A final demographic worth consideration was participants' handedness. Previous reports have suggested a link to higher levels of magical ideation for those with mixed-handedness (Barnett & Corballis, 2002) and magical ideation has been associated in turn with delusions (Eckblad & Chapman, 1983). Finally, part of the initial pre-assessment screening for the CBQ required all participants to indicate whether or not

they currently suffered from a physical and/or mental condition. The prevalence of each of these demographics within the sample is given in Table 5.3.

Table 5.3. The sample characteristics

Demographic group		%
Gender	Female	52.1
	Male	47.9
Age	18-29	19.4
	30-44	29.2
	45-59	24.5
	60+	26.9
Socioeconomic group	AB	34.6
	C1	21.2
	C2	9.3
	DE	20.3
	Not classified	14.6
Highest educational qualification	Secondary / high school / NVQ 1-3	55.1
	University degree or equivalent professional qualification	27.4
	Higher university degree / Doctorate / MBA / NVQ 5 or equivalent	6.8
Ethnicity	Asian / Asian British	1.1
	Black / Black British	0.3
	Mixed background	0.3
	White	97.5
	Other ethnic group	0.2
Religion	Christianity	66.5
	Hinduism	0.4
	Islam	0.5
	Judaism	0.5
	Sikhism	0.1
	Other	2.2
	None	29.5
Living arrangements	Live alone	9.8
	Live with other(s)	90.2
	With partner	64.5
	With child(ren)	38.8
	With parent(s)	17.5
	With other relative(s)	2.2
With friend(s) / housemate(s)	0.6	
Handedness	Left	14.9
	Ambidextrous	1.7
	Right	83.1

5.4.2 Results

Non-parametric tests (Kruskal-Wallis or Mann-Whitney) were used to assess the effects of each of the demographic variables ((i) Gender; (ii) Age; (iii) Socioeconomic group; (iv) Education; (v) Ethnicity [white/other]; (vi) Religion [Christian/other/none]; (vii) Presence of a current physical or mental condition [present/absent]; (viii) Household [live with others/live alone]; (ix) Handedness) on the overall delusion-like belief score. Threshold levels of significance for inferential statistics were adjusted for multiple comparisons using Bonferroni's correction ($p < 0.0001$).

Two factors were found to be related to DLB score: age ($\chi^2(3)=39.88$) and socioeconomic group ($\chi^2(3)=32.08$). Education showed a trend towards significance ($\chi^2(2)=15.79$, $p=0.0004$). Follow-up Mann-Whitney tests were carried out to compare between levels for each significant demographic variable. Odds ratios were calculated for significant comparisons by dividing participants into above and below average DLB scores.

Age

Participants in the youngest age band (18-29 years) showed significantly higher DLB scores than participants aged 30-44 ($U(194,292)=21701.0$; OR: 2.131, 95%CI: 1.473-3.084 [reference group: 18-29]), aged 45-59 ($U(194,245)=18131.0$; OR: 2.066, 95%CI: 1.409-3.030 [reference group: 18-29]) or aged 60 and over ($U(194,269)=17122.5$; OR: 2.787, 95%CI: 1.903-4.082 [reference group: 18-29]). No other age group comparisons were significant.

Socioeconomic group

Individuals from socioeconomic groups D and E (semi/unskilled manual workers) showed significantly higher DLB scores ($U(346,203)=25179.0$; OR: 2.521, 95%CI: 1.765-3.600 [reference group: D&E]) than those in groups A and B (e.g., managers, administrators and professionals).

Concurrent physical/mental condition

In the general public it is not unusual for some to report having physical or mental disorders. All participants were asked to report if they currently suffered from a mental or physical condition and, if so, the effect of this on their lives and whether they were currently taking medication. Forty-nine individuals (4.9% of the total sample) reported longstanding physical/mental conditions, that had a substantial effect on day-to-day activities, and for which they took medication. The results are described in detail in Table 5.4.

Table 5.4. The presence of a longstanding physical/mental condition

<i>Response options</i>	<i>Number</i>	<i>Percentage of total sample</i>	<i>Percentage of those reporting a condition</i>
(a) Yes (physical or mental)	108 (4 refused)	10.8%	100%
(b) Substantial adverse effect on day-to-day activities	59 (1 refused)	5.9%	55%
(c) Currently taking medication	87 (2 refused)	8.8%	82%

To ensure that results represented participants without or with only mild mental or physical health conditions, the presence or absence of a reported medical/psychiatric condition was explored. Such self-reports were not significantly related to DLB score ($U(888,108)=43083.0$, $p=0.08$), suggesting that the results reflect the findings from a non-clinical sample.

5.4.3 Discussion

Individuals aged 18-29 and/or who belonged to the lowest socioeconomic groups tended to report higher DLB scores (i.e., endorsed a greater number of DLB and/or endorsed DLB with greater strength). Younger age has previously been found to correlate with delusional ideation (Verdoux et al., 1998). In addition, both factors identified here have been associated with clinical delusional beliefs (Johns et al., 2004; Scott et al., 2005; Tien, 1991; van Os et al., 2000). Although no associations were found for ethnicity, religion and household status (thought to be potentially related to isolation, which has been linked to psychosis: Boydell et al., 2004), the minority groups were relatively small, suggesting a lack of sufficient power to fully investigate these. Gender also did not appear to contribute significantly to DLB scores in this study, despite previous association with sub-clinical psychosis in a large meta-analysis by van Os et al. (2009). This may be due to the wider range of delusion-like items included in the CBQ, for example, body dysmorphia, is more commonly reported among females (Phillips et al., 2006). Interestingly, a large Australian sample (N=2441) reported by Scott et al. (2008) found that women were significantly more likely to endorse items related to hallucinations but not delusions on the PDI.

5.5 PARANORMAL AND RELIGIOUS BELIEFS

A second strand of research in this study investigated the prevalence of more 'ordinary' beliefs and their relationship to DLB. The 3 religious beliefs (beliefs in a god or gods, soul or spirit surviving death and/or intelligent design) were (not surprisingly) all highly endorsed, with 47.9% of participants endorsing at least one

strongly and 84.7% endorsing one or more at any strength. Each individual belief was endorsed by over half of the sample (see Figure 5.2).

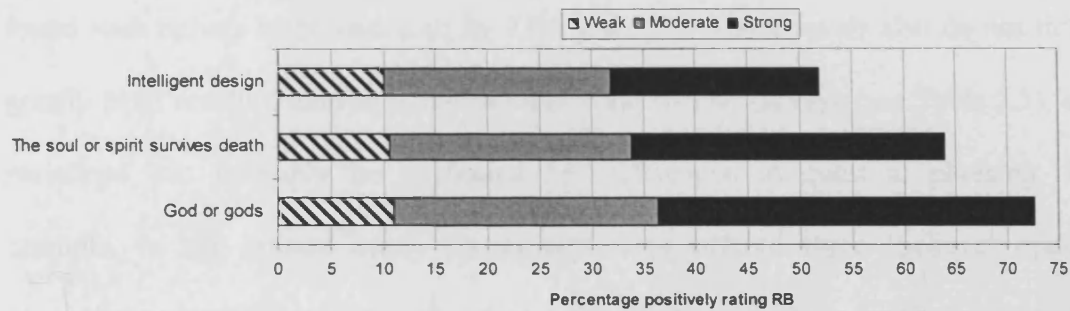


Figure 5.2. The percentage of participants reporting holding religious beliefs weakly, moderately or strongly (Note: the question on intelligent design included an elaboration of this as the belief 'that the complexity of the world suggests that it was purposefully designed by an intelligent creator')

The seven paranormal beliefs were, as predicted, also highly endorsed with 29.3% of participants reporting at least one strong belief and 78.9% of the sample claiming to hold one or more of these beliefs at any strength (see Figure 5.3).

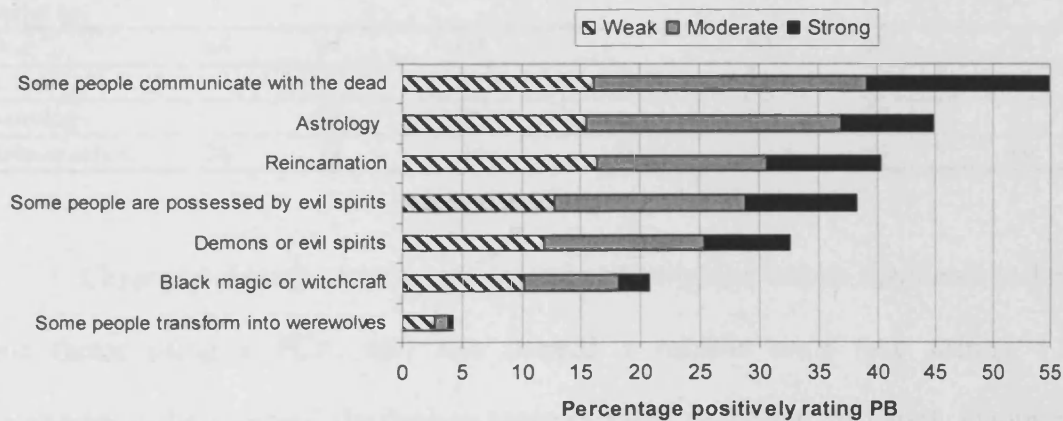


Figure 5.3. The percentage of participants reporting holding paranormal beliefs weakly, moderately or strongly (Note: the question on astrology included an elaboration of this belief as 'the position of the stars and planets affects or determines your life' and the question on reincarnation described this as 'when you die your soul is reborn in another body')

The levels of endorsement reported for one or more paranormal-type beliefs at any strength (79%) are similar to those of Gallup studies (Moore, 2005; Newport & Strausberg, 2001) using large US samples (n=1002 and n=1012 respectively), which found such beliefs to be endorsed by 73% and 76%. These levels also do not differ greatly from results found in previous large scale British surveys (see Table 5.5), and variations can probably be explained by differences in question phrasing. For example, in the present study participants were offered three ‘believe’ options (strongly/moderately/weakly) rather than a simple categorical yes/no choice presented in several other studies. The general consistency in belief prevalence between published large public polls suggests that the findings of the current study are reliable.

Table 5.5. The prevalence (%) of selected religious and paranormal beliefs in recent British surveys

Date conducted:	Jan-98	Feb-98	Aug-03	Oct-04	Apr-05	Jan-06	Jan-08
Conducted by:	ICM	MORI	MORI	YouGov	Populus	Ipsos-MORI	MRUK
Conducted for:	Daily Mail	The Sun	BBC: Heaven and Earth Show	ITV: This Morning	The Sun	The Sun	Cardiff University
N	1000	721	1001	2116	1009	1001	1000
Belief in							
God	64	64	60	-	70	60	73
A soul	-	67	68	-	71	-	64
Astrology	-	38	31	-	-	28	45
Reincarnation	25	24	23	29	-	23	40

Chapter 4 described how paranormal and religious beliefs combined to form one factor using a PCA, and also formed a reliable scale (see section 4.3), emphasising the overlap/ similarities between these two types of belief. Figure 5.4 shows the number of combined paranormal and religious beliefs endorsed by participants, showing a pattern resembling an approximately normal distribution.

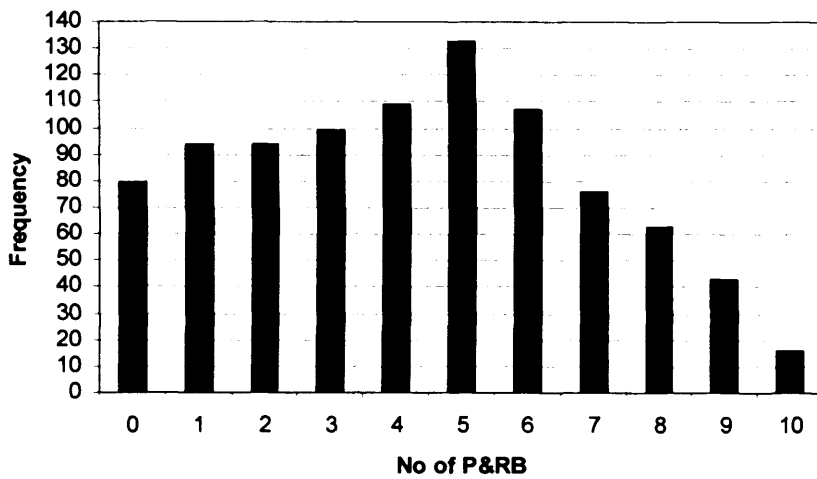


Figure 5.4. The distribution of the number of paranormal and religious beliefs (P&RB) endorsed

5.6 SOCIETAL/CULTURAL BELIEFS

Most studies have focused on levels of delusional belief in the general population but little research has been carried out on more generic non-clinical beliefs such as moral, political or cultural beliefs. The main sources of data regarding the prevalence of these types of belief typically come from customised opinion polls (see Table 5.6). In the CBQ study, it was found that these beliefs were by far the most commonly endorsed of all three belief types (delusion-like, paranormal and religious and societal/cultural) with 100% of participants endorsing one or more at any strength and 98.0% endorsing at least one strongly.

Table 5.6. The prevalence of moral belief endorsement in several recent British polls

Date conducted:	Sep-99	Apr-05	Dec-05	May-06	May-06	Jul-06	Jan-08
Conducted by:	MORI	Populus	ICM	YouGov	YouGov	ICM	MRUK
Conducted for:	Medical Research Council	The Sun	Research Defence Society	Daily Telegraph	Dignity in Dying	BBC: Newsnight	Cardiff University
N	1014	1009	1003	2102	2000	1001	1000
Belief in							
Animal testing for medical research	64%		55%	57%		70%	69%
Death penalty		61%	61%				72%
Euthanasia		66% (Should be legal)	87% (People have right to choose)		76% (Law should be changed)		74%

As Figure 5.5 shows, the most common of these items included a range of political (e.g., ‘democracy is the best system of government’) and what could be described as scientific beliefs (e.g., ‘theory of evolution’). Others could be considered as relatively close to paranormal and religious beliefs (‘positive thoughts and feelings improve your physical wellbeing’) – although such a belief does not necessarily involve the type of ontological confusion described by Lindeman and Aarnio (2007), while a more extreme version, ‘positive thoughts and feelings cure physical ailments’ might. Some of the questions (e.g., on ‘evolution’ and ‘sharing a common ancestor with apes’) were deliberately similar to assess the consistency of answers on the questionnaire. This and four similar question pairs will be considered in more detail in Chapter 7.

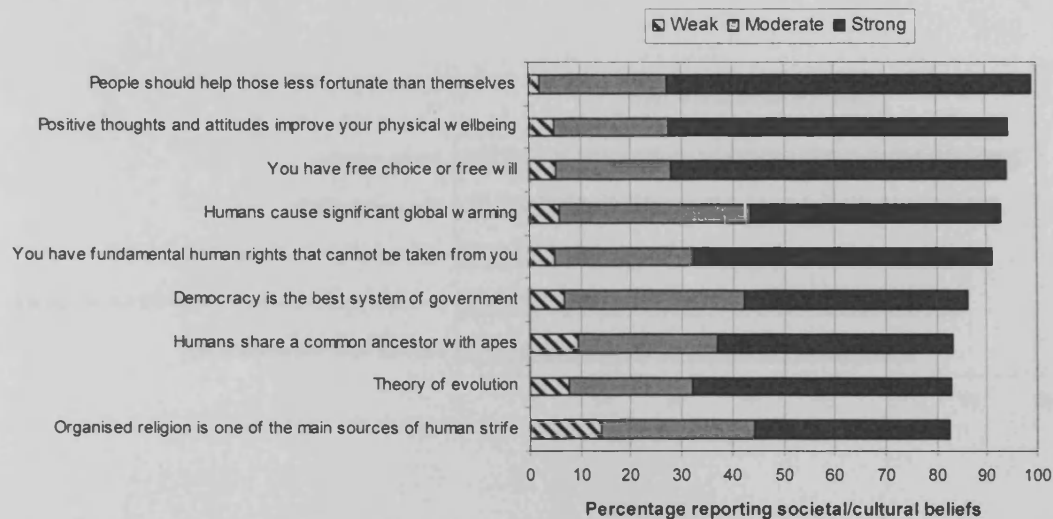


Figure 5.5. The percentage of participants reporting holding the most common societal/cultural beliefs weakly, moderately or strongly

Figure 5.6 shows that most moral beliefs were endorsed slightly less than most other general societal/cultural beliefs, with between 60-80% of participants agreeing to each of these statements. This is not unexpected, given that such moral beliefs were chosen given the range of opinions they evoke and being discussed frequently in the media. As can be seen the CBQ figures are also similar to previous findings. Reviewing the online archives available from large market research companies (Ipsos-MORI, ICM, Populus and YouGov), it is clear that despite changes in question wording and response options, the percentages holding with these positions remain relatively consistent over the past ten years (see Table 5.6).

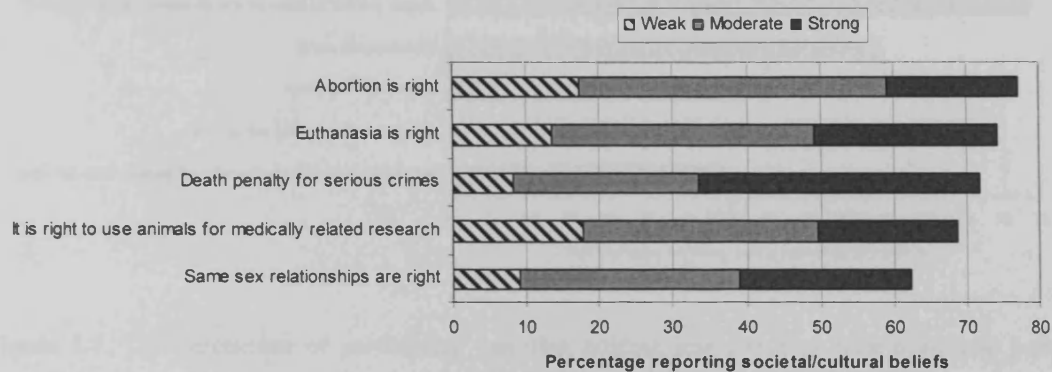


Figure 5.6. The percentage of participants reporting holding moral societal/cultural beliefs weakly, moderately or strongly

Finally, as expected, the societal/cultural beliefs with the least number of people endorsing them were those relating to judgements regarding beliefs or those with less objective evidence to support them (see Figure 5.7). Beliefs regarding extraterrestrial life could be classified as paranormal beliefs and indeed have been by several researchers (e.g., Jones et al., 1977; Rice, 2003; Tobacyk & Milford, 1983). However, ‘paranormal’ has become a “catch-it-all” term for any seemingly irrational or unprovable belief, preventing meaningful comparisons by including too many disparate beliefs. Using the definition adopted by Lindeman and Aarnio (2007), beliefs in extraterrestrial life would not be classed as paranormal as they do not involve any confusion between ontological categories. Notwithstanding the question of where such beliefs might best be categorised, belief in extraterrestrial life per se remains relatively common, with 54% endorsing this to any degree, similar to the 49% found by an ICM/Daily Mail poll in 1998. The more extreme version of this belief, that extraterrestrial life has visited earth, was endorsed by 34% at any strength.

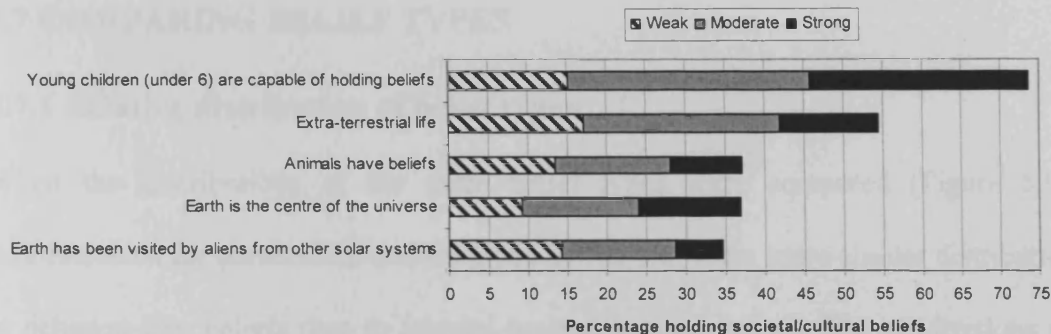


Figure 5.7. The percentage of participants reporting holding less common societal/cultural beliefs weakly, moderately or strongly

Societal/cultural were, as predicted, the most commonly endorsed beliefs, with the majority being endorsed (at any strength) by over 80% of the sample (see Figure 5.8 for the distribution of these items). Furthermore, it is clear that the content of some beliefs in this category also link with paranormal and religious beliefs, which can be considered to form a subcategory of societal/cultural beliefs. More importantly, this is the first study to provide a quantitative benchmark from which levels of clinically relevant beliefs (delusions) can be compared with more ordinary beliefs in the same individuals.

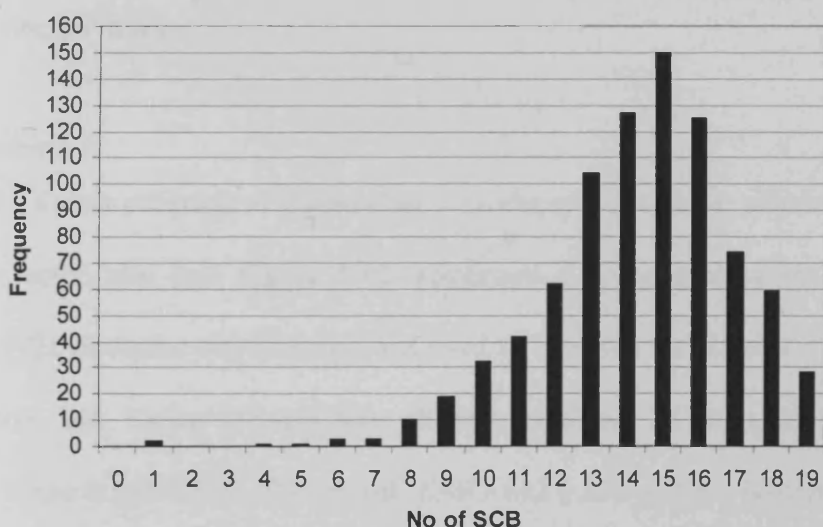


Figure 5.8. The distribution of the number of societal/cultural beliefs (SCB) endorsed

5.7 COMPARING BELIEF TYPES

5.7.1 Relative distribution of belief types

When the distributions of the three belief types were compared (Figure 5.9), endorsements for paranormal and religious beliefs showed a more similar distribution to delusion-like beliefs than to general societal/cultural beliefs. The subdivisions on the figure show the proportion of beliefs held weakly, moderately or strongly (for those participants who endorsed that number of beliefs).

5.7.2 Shared underlying factors

To discover if the three belief clusters shared common underlying factors, a principal components analysis was carried out on all belief items. Oblimin rotation was used, as it was felt that any components would be likely to correlate. To ensure a reliable component structure, the sample was randomly split in half, with each half analysed separately. Several belief items were subsequently dropped from the analyses, due to low communalities (below 0.3). This left a total of 20 beliefs: 4 societal/cultural beliefs, 7 delusion-like beliefs and 9 paranormal and religious beliefs (see Table 5.7 for belief items).

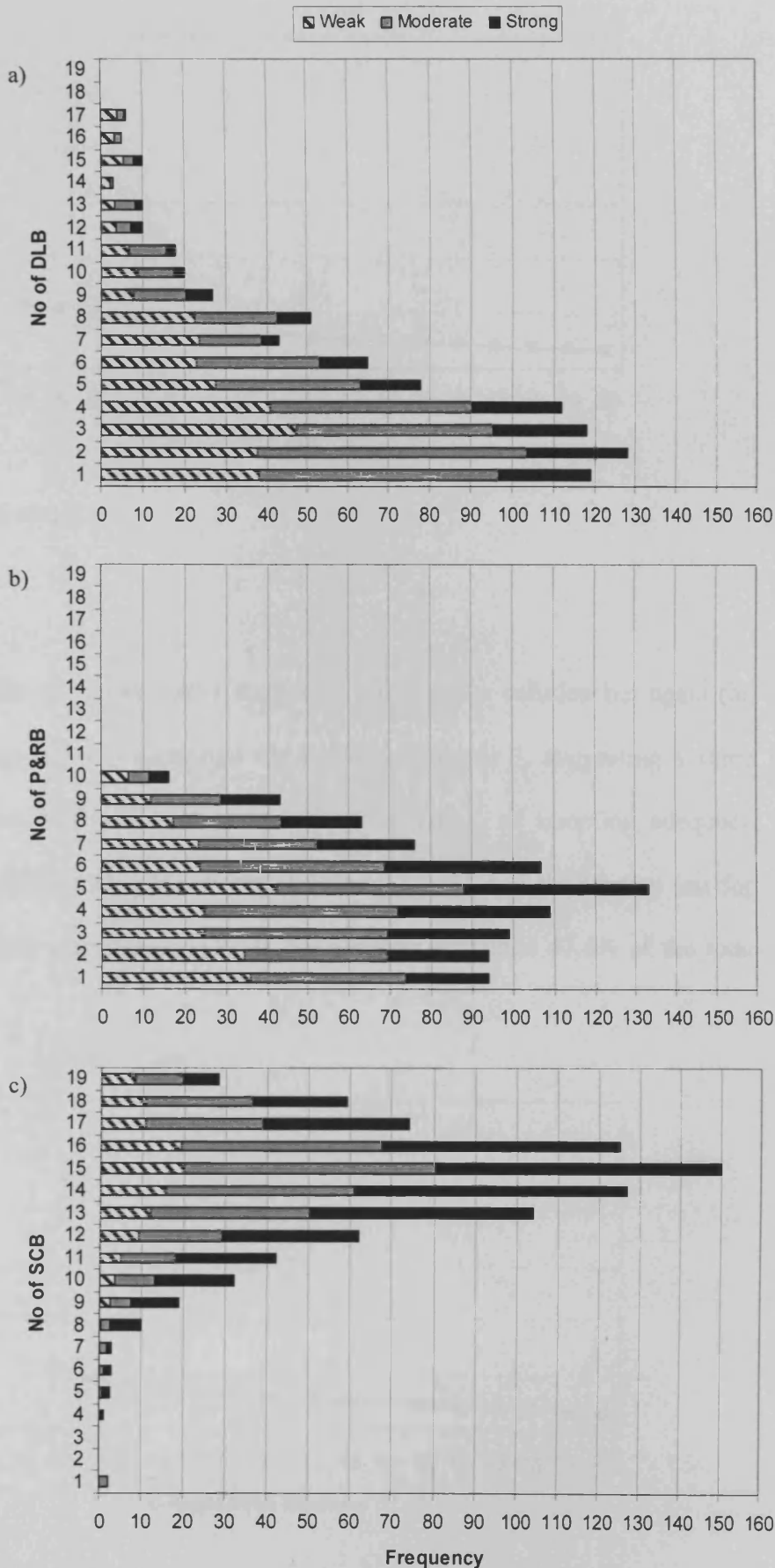
Sample 1

The Kaiser criterion of eigenvalue >1 produced a six-factor solution but inspection of the scree plot (see Figure 5.10) suggested a 3 factor solution. Following Stevens (1992), the scree plot criterion was used to establish the number of factors. Individual items had Kaiser-Meyer-Olkin (KMO) measures of sampling adequacy varying between 0.584-0.915. The overall KMO was 0.836 and the Bartlett test for sphericity was highly significant, confirming that the data were suitable for PCA. Overall, the three-component solution explained some 45.4% of the total variance.

Figure 5.9.

The number of (a) delusion-like beliefs (DLB), (b) paranormal and religious beliefs (P&RB) and (c) societal/cultural beliefs (SCB) reported by participants (subdivided into proportion of weak, moderate and strongly held beliefs)

NB: DLB had a maximum of 17 and P&RB a maximum of 10 possible beliefs



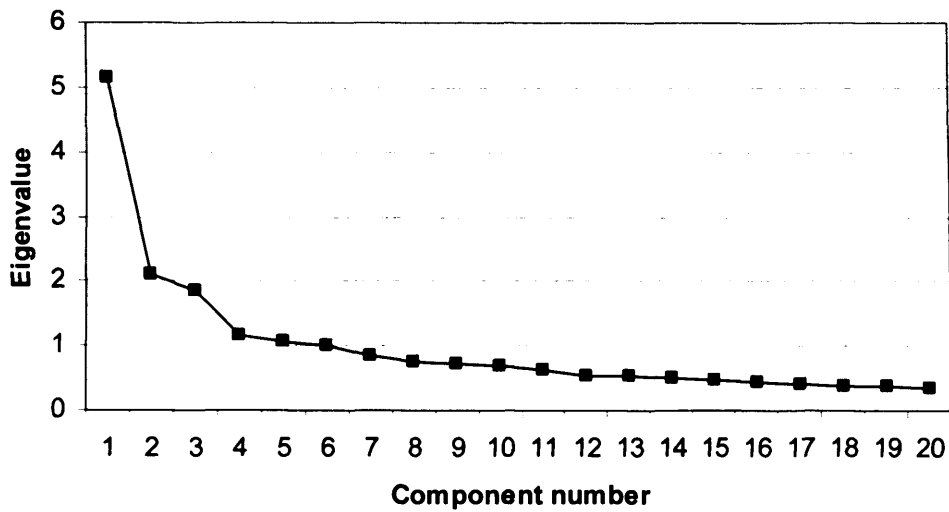


Figure 5.10. Scree plot for group 1

Sample 2

The Kaiser criterion of eigenvalue > 1 suggested a five-factor solution but again the scree plot (see Figure 5.11) supported the results of sample 1, suggesting a three component solution. Individual items had KMO measures of sampling adequacy varying between 0.583-0.935. The overall KMO was 0.852 and the Bartlett test for sphericity was highly significant. Overall, the solution explained 47.6% of the total variance.

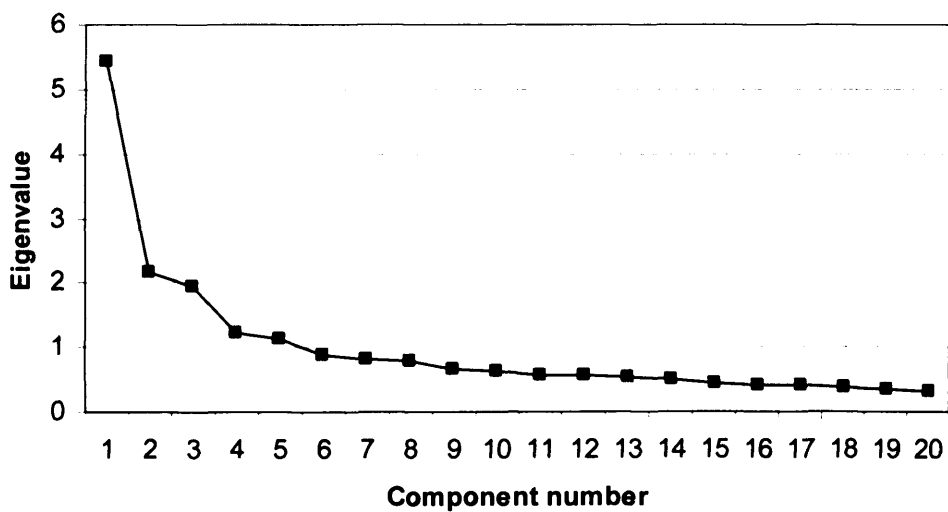


Figure 5.11. Scree plot for group 2

Table 5.7 shows the factor loadings of the different belief items onto the three factors. Factor 1 consisted of mainly paranormal and religious ideas but also included the delusion-like beliefs corresponding to reduplicative paramnesia, which perhaps links to a belief in other parallel worlds. The second factor is harder to interpret as it comprises beliefs in both evolution and extra-terrestrial life. These may tie in with science and science fiction types of belief. The final component is made up of the more bizarre delusions, alongside the most unusual paranormal and religious belief (werewolves) and the most unusual non-bizarre DLB (erotomania).

Although low communalities meant that it was not possible to analyse all CBQ belief items, the exploratory factor analysis suggests some overlap between belief categories, with delusion-like and paranormal and religious beliefs combining across factors. Indeed, Table 5.8 clearly shows the religious and paranormal component is positively correlated with the predominantly bizarre component (as the bizarre grouping has negative factor loadings). This relationship will be discussed in further detail in the next section.

Table 5.8. Correlations between components

	Group	Paranormal/ religious	Science/ science fiction	Bizarre
Paranormal/ religious	1	1.00		
	2	1.00		
Science/ science fiction	1	0.11	1.00	
	2	0.03	1.00	
Bizarre	1	-0.34	-0.17	1.00
	2	-0.33	-0.12	1.00

Table 5.7. Factor loadings (>0.3) for belief items

Belief type	Factor Group number	Paranormal/ religious		Science/ science fiction		Bizarre	
		1	2	1	2	1	2
PR	That the soul or spirit survives death	0.78	0.78				
PR	That some people communicate with the dead	0.67	0.67				
DL(NB)	That people say or do things that contain special messages for you	0.43	0.59				
PR	In black magic or witchcraft	0.45	0.44				
PR	That some people are possessed by evil spirits	0.64	0.50				
PR	In demons or evil spirits	0.59	0.64				
PR	In reincarnation (i.e. that when you die your soul is reborn in another body)	0.65	0.62	0.31			
PR	In "intelligent design" (i.e. that the complexity of the world suggests that it was purposefully designed by an intelligent creator)	0.58	0.49		-0.39		
PR	In a god or gods	0.73	0.58	-0.32	-0.41		
DL(B)	That certain places are duplicated, i.e. are in two different locations at the same time	0.37	0.53	0.34	0.31		
DL(B)	That some people are duplicated, i.e. are in two places at the same time	0.31	0.45				
SC	That earth has been visited by aliens from other solar systems		0.46	0.56	0.50		
SC	In extra-terrestrial life		0.45	0.62	0.56		
SC	In the theory of evolution			0.69	0.66		
SC	That humans share a common ancestor with apes			0.67	0.68		
DL(B)	That you are dead and/or do not exist					-0.71	-0.81
DL(B)	That part of your body doesn't belong to you					-0.70	-0.81
DL(B)	That relatives or close friends are sometimes replaced by identical-looking impostors					-0.81	-0.69
PR	Some people transform into werewolves					-0.73	-0.76
DL(NB)	That some well-known celebrity is secretly in love with you					-0.52	-0.62

DL(B): Delusion-like (bizarre); DL(NB): Delusion-like (non-bizarre); PR: Paranormal and religious; SC: Societal/cultural

5.7.3 Calculating belief scores

To investigate the relationships between the different types of belief, scores for each belief type were calculated based on the number of and conviction for relevant beliefs. These scores were based on those beliefs that comprised a reliable scale (as described in Chapter 4), and were calculated for 14 DLB, 8 P&RB and 13 SCB items. Responses of 'weakly believe' were scored 1, 'moderately believe' scored 2 and 'strongly believe' scored 3. These were then summed to give the total score for each category. Figures 5.12-5.14 display the distributions of the scores for each group, which follow the same pattern as for the number of beliefs endorsed for each category.

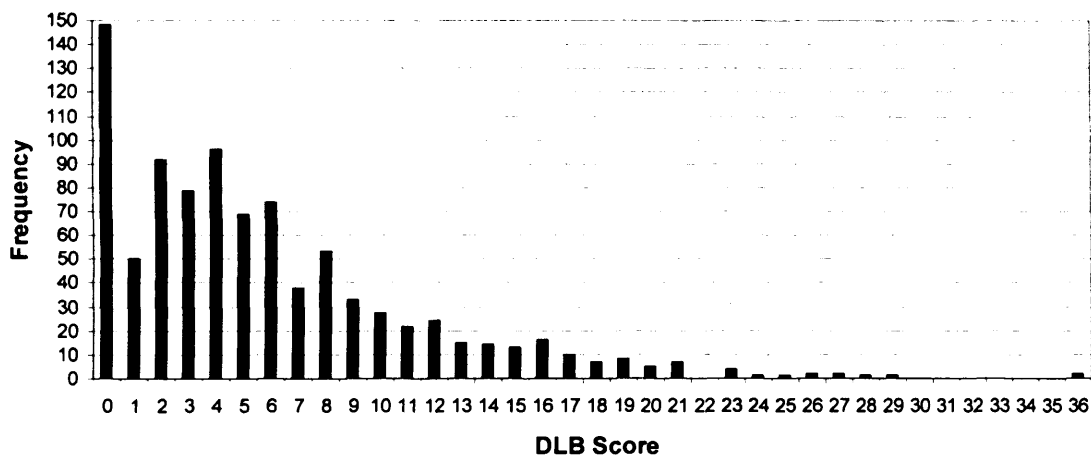


Figure 5.12. The distribution of DLB scores

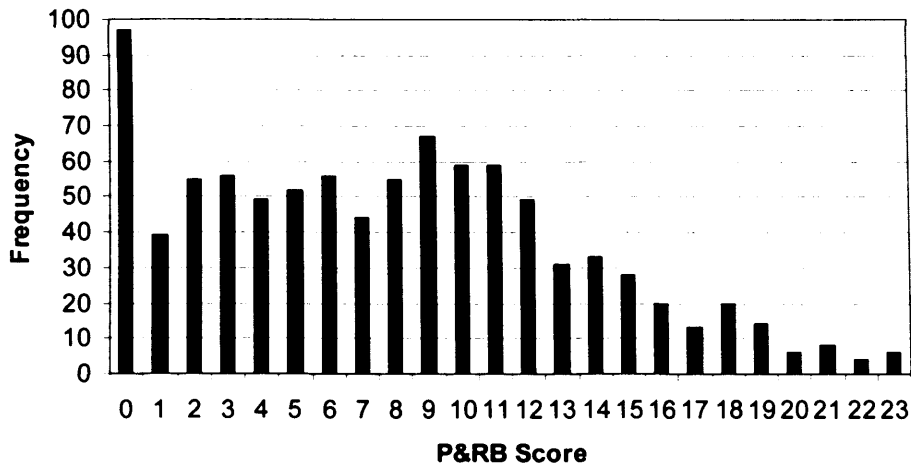


Figure 5.13. The distribution of P&RB scores

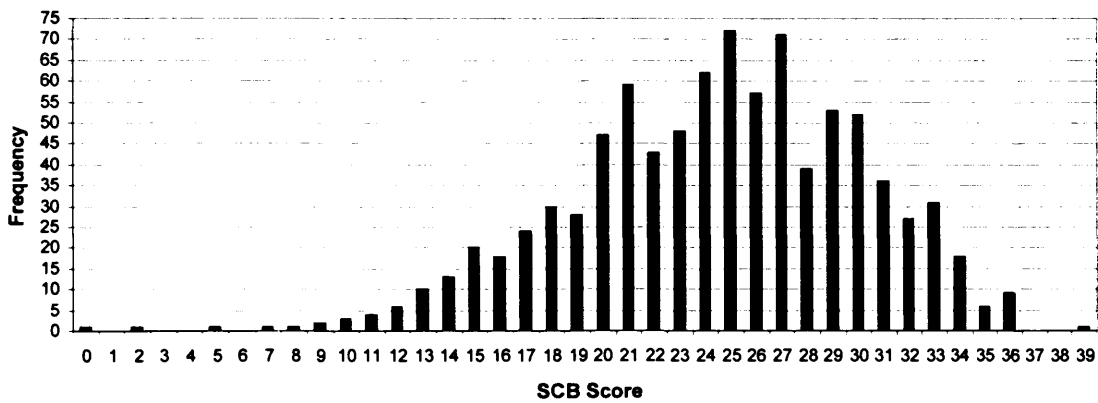


Figure 5.14. The distribution of SCB scores

5.8 RELATIONSHIPS BETWEEN BELIEF TYPES

5.8.1 Background

Paranormal beliefs, such as beliefs in astrology or ghosts, are often viewed as anomalous, pre-scientific and unusual (e.g., Iping-Petterson & Roll, 1994; Lawrence & Peters, 2004; Rattet & Bursik, 2001). However, while they may lack scientific credibility, few studies support the contention that such beliefs are uncommon. Gallup

studies (Moore, 2005; Newport & Strausberg, 2001) using large US samples (n=1002 and n=1012 respectively) found such beliefs to be endorsed by 73% and 76% – a finding confirmed in the current study. Paranormal beliefs or experiences per se are not symptomatic of mental illness, but have been shown to have an indirect link. People who report paranormal experiences tend to have higher than usual levels of psychiatric symptoms (McCreery & Claridge, 1995). Moreover, the converse relationship is also true: Many of those with mental illness report having unusually strong convictions regarding supernatural forces (Eckblad & Chapman, 1983; Thalbourne, 1994a,b). Similarly, those who report intense religious experiences are likely to score higher on measures of positive symptomatology (Jackson, 1997).

Furthermore, there is some evidence for similarities in the types of reasoning biases. Blackmore (1997) proposed three potential underlying causes for paranormal beliefs: personal experience, selective bias and probability misjudgement. In an earlier study Blackmore and Troscianko (1985) found that believers in the paranormal were more susceptible to illusions of control, with believers in ESP reporting more control over two tasks (one with an element of skill involved and one where participants had no control) than non-believers, despite no score differences on the task itself. This may relate to a failure to appreciate randomness (Brugger & Mohr, 2008; French, 1992). Mohr et al. (2003) found that participants with higher magical ideation scores showed hyperdopaminergia (a persistent increase of dopaminergic transmission) in the right hemisphere. As discussed in Chapter 2, dysfunction in the transmission of dopamine may cause sensitivity to coincidences, and has also been associated with schizophrenia (Bowers, 1968; Kapur, 2003; MacDonald, 1960). The links between delusional and paranormal beliefs suggest that holding one such belief may make an individual more likely to also hold or develop others, despite these belief types being

differentially classed as non-clinical or as potentially symptomatic of psychosis. Therefore, a positive correlation between delusion-like and paranormal and religious belief types was predicted for the CBQ study.

5.8.2 Results

Spearman's correlations were carried between belief scores but given the large sample size, the data were split randomly into 4 groups. These showed significant correlations between delusion-like and paranormal and religious beliefs (ρ ranging from 0.32-0.46, all $p < 0.0001$) but no association between societal/cultural beliefs and either paranormal and religious or delusion-like belief types, confirming the distinctive nature of this relationship.

5.8.3 Discussion

The strong relationship between paranormal and religious and delusion-like beliefs suggests that the clinical boundary between such beliefs may be relatively porous, particularly given the strong and reliable association between delusional and paranormal beliefs shown in other studies (Houran et al., 2001; Irwin & Green, 1998; McCreery & Claridge, 2002; Thalbourne, 1994a,b). This finding also ties in with evidence suggesting that members of new religious movements report higher levels of delusional ideation than other non-clinical populations but significantly not the levels of distress or preoccupation found in clinical patients (Day & Peters, 1999; Peters, Day et al., 1999; Smith et al., 2009). But what is the basis for this reliable relationship? One potential explanation is that holding one type of belief impacts upon an individual's wider belief system such that the endorsement of similar beliefs

becomes more likely. This is in keeping with the web of belief hypothesis proposed by Quine and Ullian (1970), which suggests that belief coheres with other similar beliefs held by an individual. In addition, it is possible that other cognitive factors, such as the reasoning biases associated with delusions (e.g., Garety & Hemsley, 1994; Linney et al., 1998), also play a role in the development of these beliefs. Finally, shared or common anomalous experiences, suggested by Maher (1988) to lead to the development of delusional beliefs, could provide for more wide-ranging beliefs.

5.9 DLB ENDORSEMENT AND RATINGS OF KEY BELIEF FEATURES

It is worth noting that the current data were derived from the same sample as those reported in Chapter 3. Since the information regarding belief characteristics was obtained first, it is reasonable to assume that participants were better prepared to consider what a belief was before being asked about specific content-based items. If reports of delusion-like or other beliefs were independent of the endorsements given to the nature of belief, it is reasonable to assume that even when examining participants who endorsed a number of (e.g.) delusion-like beliefs, the majority of these individuals do hold with the characteristics of belief described in Chapter 3 (i.e., consider belief to be a stable conviction capable of influencing behaviour).

Participants' overall mean endorsements for the characteristics of belief were subsequently correlated with different belief types across the four subsamples described earlier. Higher mean levels of endorsement were significantly associated (at $p < 0.0001$) with higher paranormal and religious scores for two of the four groups, with a third indicating a trend towards this (rhos of 0.29 and 0.42, $p < 0.0001$, and $\rho = 0.23$, $p = 0.0002$; for the final group, $\rho = 0.16$, $p = 0.012$). This was probably due

to the presence of religious beliefs in this category, tying in with the finding from Chapter 3 that people who belonged to an organised religion tended to give more or stronger endorsements to the characteristics of belief. Correlations for delusion-like and societal/cultural beliefs were not significant for any of the four subsamples. As such, we can deduce that a majority of these participants endorsing DLB considered a belief to be a strongly held conviction, which impacts on their behaviour, thoughts and emotions.

5.10 META-BELIEFS

5.10.1 Background

Although many delusion-like beliefs and experiences in the general population overlap with those found in clinical studies, these are still generally considered rare phenomena. As such, participants' awareness/insight into their propensity to hold (in some cases) unusual beliefs remains unknown. In addition, it would be interesting to know whether participants remain internally consistent with regard to beliefs endorsed (i.e., those endorsing many religious beliefs would be expected to report being religious). The aim for the following section was to ascertain participants' meta-beliefs (i.e., their self-appraisals regarding the types of beliefs they hold), using simple probe questions. In addition to discovering participants' evaluation of the types of beliefs they held, a secondary aim was to explore responses in terms of potential utility for predicting delusion-like beliefs and other types of belief. To probe this issue further, 4 simple questions addressing meta-beliefs were included in the CBQ. These followed the main CBQ questions relating to beliefs and experiences, all of which primed participants to reflect on the way they had responded to the 46 belief items.

Meta-beliefs focus on participants' subjective evaluation of their own set of beliefs and, although different, are related to metacognitive beliefs ("beliefs that are linked to the interpretation, selection and execution of particular thought processes": Larøi & van der Linden, 2005, p. 1426). The latter has received attention in studies of psychosis and in particular when considering the putative processes that determine the manner in which individuals assess their anomalous experiences. Recent psychological models of psychotic symptoms suggest that metacognitive beliefs can impact on subjects' appraisal of anomalous experiences to the extent that these appraisals can influence the onset of distress or elevated levels of general psychopathology (Brett et al., 2009). Maladaptive metacognitive beliefs, such as those assessed on the Metacognitions Questionnaire (Cartwright-Hatton & Wells, 1997), have been shown to be associated with psychotic symptoms in both clinical (Morrison & Wells, 2003) and non-clinical samples (Larøi & van der Linden, 2005). While metacognitive beliefs "determine the kinds of appraisals [participants] will make of their anomalous experiences" (Brett et al., 2009, p.1), meta-beliefs provide a more direct measure of individuals' self-appraisals of their beliefs.

As part of the main CBQ study all participants were asked to rate themselves (choosing 'not at all', 'quite' or 'very') on four key simple meta-beliefs:

- (i) whether they considered themselves *religious*;
- (ii) whether they considered themselves *superstitious*;
- (iii) whether they considered themselves *likely to believe things others do not*; and
- (iv) whether they considered themselves *tolerant of others' beliefs*.

Following a brief description of the basic results for each of the above, the findings will consider how each of the 4 meta-beliefs was predictive of the three different types of belief covered in the main CBQ (delusion-like, paranormal and religious and societal/cultural).

5.10.2 Religion

Earlier in this chapter it was established that there was a significant relationship between religious and paranormal and delusion-like beliefs but not with societal/cultural beliefs. Estimates of religiousness not surprisingly vary depending on the type and number of questions asked. An ICM poll in 1998 found that 7% of the 1000 participants described themselves as ‘very religious’, 31% ‘quite religious’, while 35% described themselves as ‘not very religious’ and 24% ‘not at all religious’. This is similar to the type of question adopted in the CBQ study but with an additional ‘not very’ category. By comparison, in a MORI poll in 2003 (N=1001) 18% described themselves as a ‘practising member of an organised religion’, 25% ‘a non-practising member of an organised religion’ and 24% were ‘spiritually inclined but don't really "belong" to an organised religion’.

Interrogating the CBQ data (see Table 5.9) showed that 55.8% of participants considered themselves religious (when combined over both ‘Quite’ and ‘Very’ responses). The percentage that considered themselves ‘very religious’ (8.6%) compares well with the 7% from the 1998 ICM poll and the ‘not very’ religious group from the same poll splits between the ‘quite’ and ‘not at all’ groups in the CBQ study.

Table 5.9. The responses to the religiousness meta-belief (%)

Question	Not at all	Quite	Very
To what extent do you consider yourself a religious person?	44.2	47.2	8.6

Examining the data further for the effects of basic demographics (age, gender, education and socioeconomic group) on these ratings (using Mann-Whitney and Kruskal-Wallis tests), results (see Figures 5.15 and 5.16) showed that younger participants were less likely to consider themselves religious than older people ($\chi^2(3, N=987)=36.440, p<0.0001$). Females were more likely to rate themselves as religious ($\chi^2(1, N=987)=29.117, p<0.0001$). This mirrors the findings of the 2001 British census, which found that females and older individuals were more likely to describe themselves as belonging to a religion. Similarly, a Harris poll of adults in the US found women were more likely to hold Christian beliefs, and people aged 25-29 reported low levels of these beliefs (Taylor, 2003).

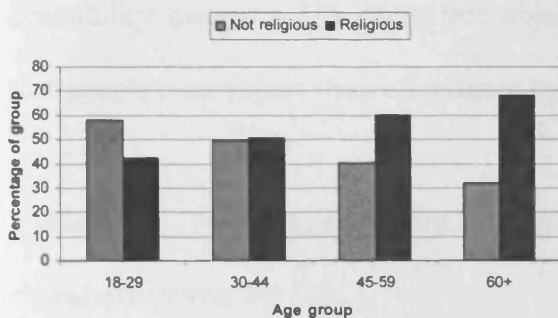


Figure 5.15. Ratings of religiousness by age group **Figure 5.16.** Ratings of religiousness by gender

Overall 56% of people rated themselves as religious to some extent ('Quite' or 'Very'), and this compared to 70% who initially reported belonging to an organised religion and 72% reporting belief in god(s) to some degree on the CBQ. Some participants may have been members of religions which do not require belief in a god or god(s) (2.2% of participants reported being a member of an organised religion, which was not offered as a response option), so this factor may account for some of the difference between the two latter responses. It would appear that believing oneself to be 'religious' is seen to comprise both holding beliefs with a religious content and

being a member of an organised religion, whereas some people may only fulfil one of these criteria, leading to the difference in prevalence described above.

As can be seen from Table 5.10, identification with a religious group appears highly dependent on the question asked. On top of the main group of 41.5% (who believe in God, consider themselves religious, are a member of an organised religion and attend religious services), asking about belief in God recruits an additional 31.9%, while asking about belonging to an organised religion adds 29%. In contrast, a question on attendance at religious services only adds 15.6%, and self-reported religiousness just 14.4% more. Indeed, only 12.9% of participants would not be included in any one of these options. Such questions are also open to social desirability biases; a US study that objectively quantified church attendance found that people over-report their attendance by a factor of two (Hadaway et al., 1993).

Table 5.10. Percentage of CBQ sample who identified themselves by religious characteristics on the CBQ

CBQ question		Believe in God		Do not believe in God	
		Consider themselves religious	Do not consider themselves religious	Consider themselves religious	Do not consider themselves religious
Belong to an organised religion	Attend religious services	41.5%	5.2%	1.1%	2.0%
	Do not attend religious services	8.0%	5.7%	0.6%	6.4%
Do not belong to an organised religion	Attend religious services	1.8%	2.2%	0.3%	3.0%
	Do not attend religious services	2.3%	6.7%	0.3%	12.9%

Percentages do not account for strength or frequency: Attend religious services includes responses of 'rarely', 'sometimes' and 'often'; Consider themselves religious includes responses of 'quite' and 'very'; Believe in God includes responses of 'weakly', 'moderately' and 'strongly'

5.10.3 Superstition

Superstition has been defined as the propensity to believe in causal relationships between two unrelated events (Brugger, Dowdy & Graves, 1994). People may learn such beliefs from others (e.g., observing that other people may avoid walking under ladders). Indeed, Campbell (1996) suggests that many people perform superstitious acts even though they deny holding superstitious beliefs, describing those manifesting these contradictory behaviours as holding ‘half-beliefs’, whereby they turn to superstitious beliefs when feeling particularly stressed or helpless.

Superstition appears relatively common (Griffiths & Bingham, 2005). A 1996 Gallup poll revealed that 25% of Americans reported being ‘somewhat’ or ‘very’ superstitious (1% very superstitious), with a further 28% choosing ‘not very’ superstitious. In Britain, a recent Ipsos-MORI poll (2007) found that 22% of people considered themselves superstitious. However, many more people could be described as having “half-beliefs”, since the Ipsos-MORI poll found that 51% of people touched wood for luck, 39% crossed their fingers, 16% had lucky charms and 15% considered the number 13 unlucky. Such a mismatch between reported behaviours and overall meta-belief shows how subjects may choose to interpret the question.

As can be seen from Table 5.11, 43.5% considered themselves superstitious (combining over ‘Quite’ and ‘Very’), more than in the recent Ipsos-MORI poll. This may be due to the inclusion of the ‘Quite’ category here (the Ipsos-MORI poll included only a yes/no response), whereby some of those individuals holding ‘half-beliefs’ might have been willing to acknowledge a lesser degree of superstitiousness.

Table 5.11. The responses to the superstitiousness meta-belief (%)

Question	Not at all	Quite	Very
To what extent do you consider yourself superstitious (i.e. likely to believe certain events occur through mysterious or magical means)?	56.5	38.1	5.4

In terms of basic demographics, ratings of superstitiousness decreased with level of education ($\chi^2(2, N=888)=20.429, p<0.0001$) (see Figure 5.17). In addition, Figure 5.18 showed that males were less likely to rate themselves as superstitious ($\chi^2(1, N=992)=26.849, p<0.0001$). Griffiths and Bingham (2005) also found significant associations between being female and holding superstitious beliefs. The CBQ results also confirm findings from previous polls, namely the 2007 Ipsos-MORI poll that similarly found women were more superstitious.

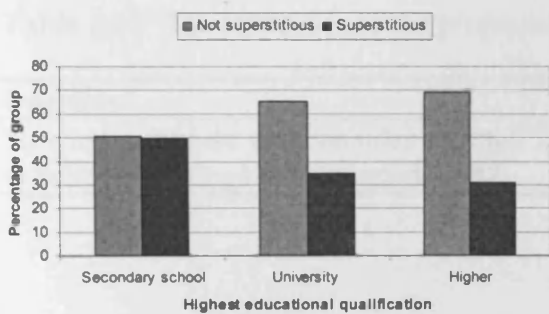


Figure 5.17. Ratings of superstitiousness by highest educational qualification

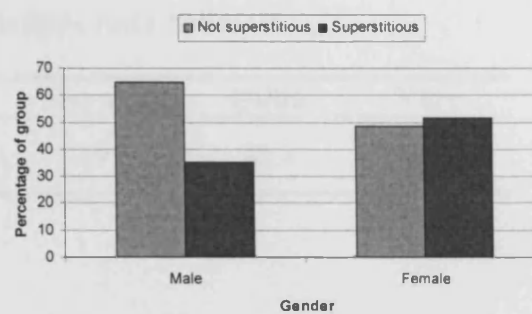


Figure 5.18. Ratings of superstitiousness by gender

5.10.4 Propensity to believe

The third meta-belief investigated participants' self ratings of their propensity to believe in things that others do not. McKay, Langdon and Coltheart (2005) suggest that credulity is one possible dimension along which belief evaluation could vary, when considering the impaired 'second factor' in their account of delusions. Again the

issue here relates to participants' insight regarding their own beliefs. Individuals who see themselves as likely to endorse beliefs might be more likely to entertain delusional, paranormal or religious ideas.

Table 5.12 shows that approximately half of the sample (50.4%, combining over 'Quite' and 'Very') considered themselves as being likely to believe things others do not. As this question was asked following the questions on the wider range of beliefs and experiences included on the CBQ, it may be that participants have been primed to think about their beliefs, and therefore were aware of any perceived-to-be unusual beliefs or experiences (although the high levels of DLB and P&RB found here indicate that such perceptions may not be accurate). These ratings were not associated with any of the basic demographics.

Table 5.12. The responses to the propensity to believe meta-belief (%)

Question	Not at all	Quite	Very
To what extent do you consider yourself likely to believe in things that others do not?	49.5	42.1	8.3

5.10.5 Tolerance of others' beliefs

The final meta-belief concerned participants' judgements/beliefs regarding their tolerance of others' beliefs. Table 5.13 shows that an overwhelming majority of people (94.7%) considered that they were tolerant of beliefs that were different to their own. This is not unexpected, given that people tend to see themselves as above average on good characteristics (e.g., fair-mindedness) (Gilovich, 1991). Indeed, it is perhaps more interesting to look at the 5.3% of people who declared that they were not at all tolerant of other people's beliefs, as this may reflect a small group of individuals who may be less open to beliefs generally. Perhaps unsurprisingly, given

the high levels of tolerance ratings, these were not associated with any basic demographics. Relationships between meta-beliefs and belief scores were further explored, as described below.

Table 5.13. The responses to the tolerance meta-belief (%)

Question	Not at all	Quite	Very
To what extent do you consider yourself tolerant of people with different beliefs?	5.3	43.2	51.5

5.10.6 Relationships between meta-beliefs

Table 5.14 shows that there were significant associations (using chi-square tests) between three of the four meta-beliefs, but ratings of tolerance did not relate to any of the other three. It is not surprising that it is harder to distinguish within this group, given that the ratings for tolerance were so high (94%).

Table 5.14. The associations between the four meta-beliefs (bold type indicates significance at $p \leq 0.0001$)

	Superstitiousness	Propensity to believe	Tolerance
Religiousness	$\chi^2(4, N=981) = 27.643, p < 0.00002^*$	$\chi^2(4, N=963) = 23.415, p = 0.0001$	$\chi^2(4, N=979) = 2.054, p = 0.726^*$
Superstitiousness	-	$\chi^2(4, N=968) = 83.469, p < 0.05E-15^*$	$\chi^2(4, N=985) = 7.379, p = 0.117^*$
Propensity to believe	-	-	$\chi^2(4, N=967) = 11.001, p = 0.027^*$

* These contingency tables each had one expected count less than 5 (11.1%) but none of the expected counts were below 1 so these were considered sound (Field, 2000).

Religiousness and superstitiousness were significantly associated (Cramer's $V = 0.119$), as might be expected, given that superstitiousness is typically associated with holding paranormal beliefs, and religious beliefs can be considered to be a

special variant of these types of belief (Gray, 1991). The strongest relationship, however, was between superstitiousness and likeliness to believe things others do not (Cramer's $V= 0.208$). This correlation may arise from the fact that superstitious-type beliefs (particularly those associated with the paranormal) may be types of beliefs that people are less likely to admit to holding and so those participants who currently endorse these types of beliefs were more likely to rate themselves as having a high propensity to believe in things. The relationship between ratings of religiousness and likeliness to believe things others do not (Cramer's $V= 0.110$) may also reflect the same kind of reasoning, particularly as religious beliefs are not felt to be as popular as they once were.

5.10.7 Relationships with the three belief types

If the meta-beliefs provide an accurate overview of an individual's evaluation or appraisal of their portfolio of current beliefs then it might be expected that meta-beliefs would relate, albeit differentially, to at least two of the three main belief types. Participants were grouped according to their self-ratings for each meta-belief (e.g., those responding 'Not at all' formed a 'not religious' group and those responding 'Quite' or 'Very' comprised the 'religious' group). Mann-Whitney tests were subsequently conducted to see if the belief scores for each of the three belief types differed between the 'Not at all' and 'Quite'/'Very' groups (see Table 5.15).

Table 5.15. Mann-Whitney tests comparing participants' meta-belief ratings with belief scores, scores in bold significant at $p < 0.0001$

Meta-belief	Group N*		DLB	P&RB	SCB
	N1	N2	U	U	U
Religiousness	436	551	119328.0 (p=0.86)	56060.0 (p=3.3 E-47)	97699.5 (p=4.5 E-7)
Superstitiousness	560	432	85946.0 (p=3.9 E-15)	85310.0 (p=1.4 E-15)	106324.0 (p=0.001)
Propensity to believe in things that others do not	482	491	89062.5 (p=2.0 E-11)	79341.0 (p=5.0 E-19)	112133.0 (p=0.16)
Tolerance of others' beliefs	52	938	23711.5 (p=0.24)	19780.0 (p=0.044)	16095.5 (p=3.5 E-5)

* N1: 'Not at all' group; N2: 'Quite'/'Very' group

The meta-belief and CBQ belief ratings provide for some interesting results, including several suggesting that self-rated simple meta-beliefs provide some early indication of proneness to endorse certain belief types.

Moving through the findings, it was clear that those who judged themselves as superstitious were significantly more likely to endorse higher paranormal and religious belief and delusion-like belief scores than those who judged themselves 'not at all' superstitious (see Figure 5.19). These results support previous findings whereby the abnormal linking of events or over-evaluation of coincidences remains a key feature pertaining to delusion formation (Hemsley, 1993). Maher (1988) noted the case of a patient who believed he was responsible for World War I after noticing the house he was in front of on Armistice Day (11/11) was numbered 11. Moreover, these cross links are supported by several findings linking assessments of superstition and general psychopathology or schizotypy (e.g., Brugger, Dowdy & Graves, 1994; Dag, 1999; Hergovich et al., 2008).

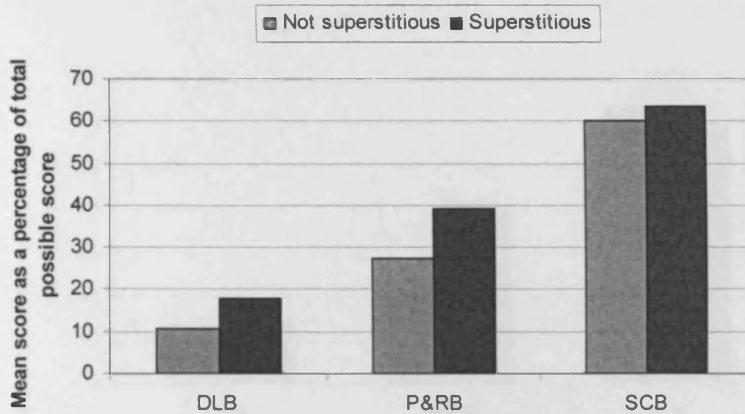


Figure 5.19. Mean belief scores compared to ratings of superstitiousness

Lindeman and Aarnio (2007) went so far as to suggest that “*notions of superstition, magical thinking, and paranormal beliefs share the same ontological confusion and can thus be regarded synonymous*” (p. 734). Thus in a similar manner to delusional coincidences, paranormal beliefs can form as a result of placing too much weight on everyday coincidences. For example, most people will at some point be telephoned by someone just as they were thinking about that person, but not everyone will go on to develop a belief in ESP on the basis of this evidence.

Self-rating judgements of religiousness were also significantly associated with higher paranormal and religious belief scores. This association is expected, given that both are intended to tap into a generic religious construct. However, unlike superstitiousness, religiousness was not associated with delusion-like beliefs (see Figure 5.20). This might arise because religious beliefs result from a different method of formation to that of DLB, as many religious beliefs are actively encouraged and taught from early childhood. In addition, those who rated themselves as religious tended to provide fewer or weaker endorsements of SCB items. This could be due to the presence of some items (such as belief in evolution), which may conflict with more traditional religious beliefs.

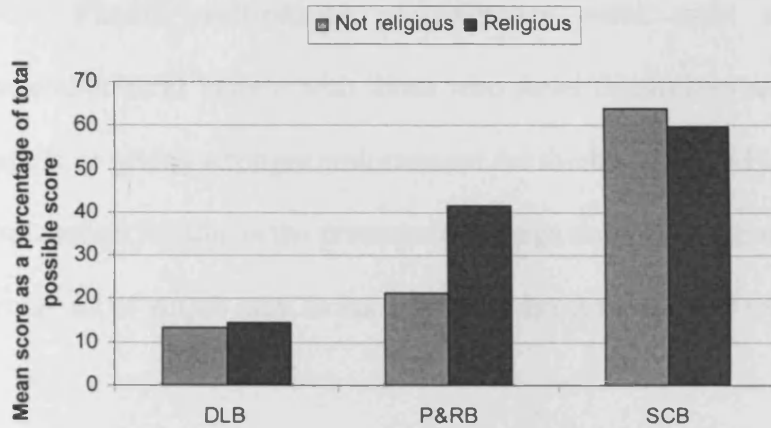


Figure 5.20. Mean belief scores compared to ratings of religiousness

Those who endorsed having a propensity to believe things that others do not were significantly more likely to have higher paranormal and religious belief and delusion-like belief scores than those who rated themselves ‘not at all’ likely (see Figure 5.21). This may reflect a similar trend to that discussed above regarding the relationship between this meta-belief and superstitiousness (also associated with both of these scores), in that participants were aware that some people may consider paranormal or delusion-like beliefs unusual or irrational, and (having just acknowledged holding these types of beliefs) are therefore more likely to report that they are likely to hold beliefs others do not.

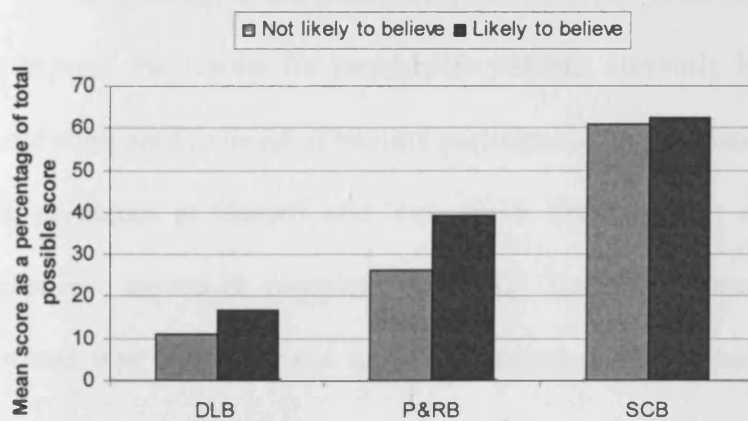


Figure 5.21. Mean belief scores compared to ratings of likeliness to believe things others do not

Finally, self-ratings of tolerance were only significantly related to societal/cultural beliefs with those who rated themselves as tolerant reporting more beliefs or giving stronger endorsement for the beliefs (see Figure 5.22). One potential explanation for this is the presence of a large number of the moral beliefs in this belief group, all of which may be taken as an indirect measure of tolerance.

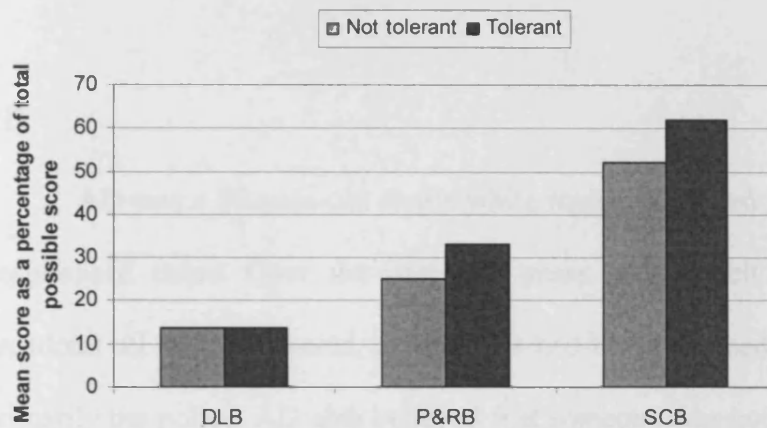


Figure 5.22. Mean belief scores compared to ratings of tolerance

5.11 PATIENTS

5.11.1 Introduction

In addition to the general population study described above, it was interesting to explore the results for psychiatric patients currently holding delusions and how these compared to those of healthy participants. Six outpatients currently being treated for psychosis at Cardiff and Vale NHS Trust clinics, and in particular reporting delusions, agreed to complete the CBQ. The aim of including a small number of patients was to explore the range and extent of beliefs held by patients with clinical

delusions (assessed using the CBQ) and to compare these with relevant age/sex matched controls given the continuum account. Specific aims included exploring:

- (1) whether such patients endorsed more delusion-like beliefs;
- (2) patients' performance on the P&RB and SCB items and
- (3) whether their beliefs were more strongly held.

A brief summary of each patient's relevant psychiatric history is provided below.

AD

AD was a 39-year-old single white male, diagnosed with paranoid illness and hospitalised twice. Over the past few years he had felt that his life was being broadcast all over the world, and that he had been watched and followed by others, primarily the police. AD also believed that someone was going to murder him. At the point when he completed the CBQ he was responding to risperidone, and had been discharged about 7 weeks. Nevertheless, at this time, he was still anxious about people watching him and also reported that he was murdered as a child. He believed that he and his sister had been chased by a man with a knife, who had eventually caught and stabbed him. AD reported dying while his parents watched from a window. He spoke of having nightmares of dying again, and was very anxious about this.

BN

BN was a 30-year-old single white male with schizophrenia. Admitted to hospital at 14, due to auditory and visual hallucinations (seeing ghosts), paranoid ideas, ideas of reference and passivity, in 2001, he was diagnosed as having paranoid

delusions, and was prescribed clozapine. When he completed the CBQ, he talked of blocking thoughts about people watching him. In addition, he had difficulty making eye contact and socialising, and was consulting a specialist on Asperger Syndrome at this point.

CH

CH was a single white 42-year-old male with a history of erratic employment, drug and alcohol abuse, and attempted suicide. He was diagnosed in 1990 with schizophrenia and depression (including Messianic delusions), although he reports having delusions for five years prior to that. In particular, he believed his home phone had been tapped by police and also believed his neighbours were plotting against him. When he completed the CBQ, CH was anxious about people and avoided situations where he would have to socialise. He also seemed preoccupied with the significance of coincidences.

DV

DV was a single white 42-year-old male with a history of taking drugs, including cannabis, cocaine and ecstasy. About three years ago he was diagnosed with anxiety disorder and depression, following some deaths in his family. At the session when he completed the CBQ, he reported avoiding crowded places and feeling very anxious about people watching him (describing sweating and heart palpitations 'all the time'). He was also generally depressed, which he attributed to the anxiety.

EM

EM is a 40-year-old divorced white female, who was diagnosed with paranoid schizophrenia 14 years ago, and had been hospitalised twice (for 6 months in 1994 and a further 6 months in 2005 [following an acrimonious divorce]). She had made several suicide attempts but was almost entirely symptom-free between episodes. Most of her delusions had quasi-religious themes (e.g., she tried to kill her ex-husband, believing he was the Anti-Christ and that she was told this by the presenters of a TV breakfast show). When she completed the CBQ, she reported that her only current symptom was hearing muffled music (describing this as not distracting but like a CD in the background) for a significant part of every day.

FR

FR was a 67-year-old divorced white female, who took clozapine for her schizophrenia. Amongst several bizarre beliefs she believed that she was receiving instructions from a priest, sometimes through the radio, and that her spirit (a protective angel) was moving in and out of her body at will. She also reported experiencing visual hallucinations and was concerned about thought withdrawal and broadcasting. When she completed the CBQ, FR reported that she was no longer seeing/ hearing things, although she continued to hold beliefs regarding both the priest and the spirit.

5.11.2 Results

5.11.2.1 Number of beliefs

All patients were compared to their age and gender matched cohort from participants in the large CBQ study (see Table 5.16). This meant patients AD, BN, CH and DV were compared to males aged 30-44, EM to females aged 30-44 and FR to females aged 60+.

Table 5.16. Descriptive statistics for the number of reported beliefs at any strength by belief type and selected demographic groups for the control group and patient data

Group		Matched Group's Range	Matched Group's Mean (s.d.)	Patients' Range/ Score	Patients' Mean (s.d.)
Males, 30-44 (n=133)	DLB	0-17	4.09 (3.52)	1-10	4.8 (4.11)
	SCB	1-19	14.11 (2.68)	7-11	9.3 (2.06)
	P&RB	0-10	3.62 (2.94)	0-5	3.3 (2.36)
Females, 30-44 (n=159)	DLB	0-17	4.56 (3.59)	0	-
	SCB	2-19	14.58 (2.77)	15	-
	P&RB	0-10	5.29 (2.35)	1	-
Females, 60+ (n=142)	DLB	0-15	3.07 (2.48)	3	-
	SCB	4-18	12.97 (2.59)	13	-
	P&RB	0-10	4.04 (2.08)	9	-

Delusion-like beliefs

The number of DLB endorsed by the 4 male patients aged 30-44 were 10, 6, 2 and 1 (AD, BN, CH and DV respectively), the latter three all being close to the mean for their group (see Table 5.16). The first, while higher than average for the age group, is within 2 s.d. of the mean. EM did not endorse any DLB, which was slightly below the mean for her group. FR endorsed 3 DLB, which was about average for the age and gender.

Paranormal and religious beliefs

The numbers of P&RB endorsed by AD, BN, CH and DV were 5, 5, 0 and 3 respectively, which again were all close to the mean for their group, with the lowest score of 0 being the most unusual. EM endorsed one P&RB, which was slightly below the mean for her group. FR endorsed 9 P&RB, which was over 2 standard deviations higher than the mean for her comparison group.

Societal/cultural beliefs

The male participants endorsed 8, 11, 11 and 7 SCB (respectively). Interestingly, these were all fairly low scores, with both AD and DV's scores falling below 2 s.d. of the mean. In contrast, EM and FR endorsed similar numbers to the means for their comparison groups (15 and 13 respectively).

5.11.2.2 Strength of beliefs

Although the questions completed by patients and poll respondents were identical in content, the version of the CBQ completed by patients had similar scales to previous versions (using a scale from '-2' ['Do not believe'] to '2' ['Believe']).

Patients' strength of belief endorsement was therefore determined from their choice of either '1' or '2' on this scale. These scores were transformed to make them comparable to those of the poll respondents. The average strength of endorsement given to each belief type was calculated by giving the highest category (e.g., 'strongly') a strength of 1 and the other ratings a strength relative to this (i.e., for the patients, the rating 'weakly' was given a weight of 0.5, for the poll respondents, 'weakly' had a rating of 0.33 and 'moderately' 0.66). These ratings were summed for all questions for which the belief had been endorsed at any strength and divided by this number of questions.

The mean strength ratings provided by the four male patients were 1, 0.57, 0.88 and 0.86 respectively, the latter three all being reasonably close to the mean for their group (see Table 5.17). AD's mean strength rating, while higher than average, was just within 2 s.d. of the mean. EM's mean strength rating of 1 was more than 2 s.d. higher than the mean for her comparison group and FR again gave fairly high ratings, with a mean strength of 0.96, slightly above average for her age and gender.

Table 5.17. Descriptive statistics for the mean strength rating given to reported beliefs by belief type and selected demographic groups for controls and patient

Group	Range	Mean (s.d.)	Patient Range	Mean (s.d.)
Males, 30-44 (n=133)	0.50-1.00	0.76 (0.12)	0.57-1.00	0.82 (0.18)
Females, 30-44 (n=159)	0.46-1.00	0.71 (0.11)	1	-
Females, 60+ (n=142)	0.48-1.00	0.78 (0.11)	0.96	-

While collectively these findings only involve a small number of patients and therefore can only provide preliminary results, it seems clear that there is a considerable overlap between these patients' and healthy respondents' number, and to a lesser extent strength, of beliefs. This supports the point made in Chapter 2 regarding the issues of defining of delusions – namely that belief content and level of conviction are unlikely to distinguish clinical implications.

5.12 SUMMARY

This main focus of this chapter has been on reporting and analysing the key findings of the large CBQ study. The results confirm that it was not statistically unusual for members of the general population to hold DLBs; 39% reported holding one or more DLB strongly (with approximately 90% at any strength). Moreover, the nature of these delusion-like beliefs were often bizarre (25% endorsing one or more of these items strongly), including those that had not been researched in previous clinical and non-clinical measures. Thus the findings largely confirm and extend the results of previous relevant studies (Bell, Halligan & Ellis, 2006c; Johns & van Os, 2001; Peters et al., 2004; van Os et al., 2009), demonstrating that declarative belief endorsement, while necessary, is not sufficient to distinguish clinically presenting beliefs. Clinical diagnosis of delusions largely depends on the functional consequences (e.g., distress, preoccupation) that such beliefs and associated factors conspire to impact on an individual's quality of life. Moreover, the results support the continuum account of psychotic-like symptomology and previous reports showing delusion-like beliefs are not uncommon in non-clinical populations (Eaton et al., 1991; Freeman et al., 2005; Kendler et al., 1996; Olfson et al., 2002; Poulton et al., 2000; Scott et al., 2005; van

Os et al., 2000). The high levels of DLB within the normal population, and association between DLB and paranormal and/or religious beliefs, also raise important questions regarding the assumption that delusions per se are distinguishable from other beliefs depending on the proportion of people assumed to hold them, as proposed in the DSM definition (APA, 2000).

Having considered beliefs in detail in this chapter, the next chapter will focus on experiences and in particular the relationships between belief and experience, both in the context of the anomalous (psychotic-like and paranormal and religious) items and the general societal/cultural items.

CHAPTER 6

ANOMALOUS EXPERIENCE: PREVALENCE AND RELATIONSHIP TO BELIEFS

6.1 INTRODUCTION

The last chapter largely focused on elucidating the prevalence of different types of beliefs, and in particular, the numbers of delusion-like beliefs held in the general population. However, as indicated earlier in Chapter 1, beliefs (as psychosocial constructs) are unlikely to exist in isolation. They are influenced by emotions, other beliefs (as seen in Chapter 5) and, critically in terms of delusional belief formation and proximal cause, are thought to be possibly triggered by salient phenomenological experiences.

The idea that delusions can arise from a disturbance of perceptual experience was originally put forward by philosopher John Locke (Locke, 1689/2004; Porter, 1987). In keeping with this approach, Maher's (1999) influential account considered delusions to be the product of attempts to explain anomalous perceptual experiences using normal reasoning. This theoretical account forms the basis for a number of neuropsychological theories of delusion formation (Davies et al., 2001; Ellis et al., 1997; Langdon and Coltheart, 2000) and is also recognised as an important factor for a number of equally influential cognitive theories (Bentall et al., 2001; Freeman & Garety, 2004; Garety & Hemsley, 1994). Although causally implicated in many accounts of delusions, such experiences receive less attention than their proposed output belief. This chapter will consider such experiences, and in particular their relationship with delusions and other beliefs.

6.2 THE RELEVANCE OF EXPERIENCES FOR DELUSION

FORMATION

The association between hallucinations (considered as one form of anomalous experience) and delusions in psychotic patients is clinically well accepted (Bilder et al., 1985; Lewinsohn, 1970; Liddle, 1987; Lincoln, 2007; Mortimer et al., 1996; Peralta et al., 1992). Indeed, this is reflected in the characterisation of both symptoms as comprising a positive psychotic dimension (DSM-IV-TR: APA, 2000), perhaps suggesting a similar psychopathological process. The clinical co-existence of these symptoms has also fuelled several influential theoretical accounts that argue that delusions are causally linked to anomalous perceptual experiences (e.g., Maher, 1974). Some neuropsychological theories (Coltheart et al., 2007; Davies et al., 2001; Ellis & Young, 1990) propose that anomalous perceptual experiences (attributable to discernable and quantifiable neuropsychological impairments) provide the necessary causal trigger (and content specificity) for monothematic delusions. However, many of the original theoretical accounts now suggest the need for a second factor (e.g., a dysfunction of belief evaluation), given the resilience and content-specific nature of many clinical delusional beliefs. Furthermore, prior beliefs and experiences are likely to affect the interpretation of any anomalous experience (AE) or any subsequent belief, suggesting the presence of AE may be a necessary but not a sufficient condition for delusion formation (see Bell, Halligan & Ellis, 2006c).

Such accounts do not argue that the anomalous perception involved has to be a hallucination (i.e., a perception in the absence of a stimulus). Indeed, there are a wide range of anomalous experiences that have been linked to delusions (Bell, Halligan & Ellis, 2006c, 2008). Furthermore, it is not just delusional beliefs that have been linked to AE, McNally and Clancy (2005) found that those who reported being abducted by

aliens experienced higher rates of sleep paralysis, suggesting that the belief in alien abduction was formed following AE experienced during sleep paralysis.

Despite compelling evidence for their clinical co-occurrence, the precise nature of the association between delusions (considered as anomalous beliefs) and anomalous experiences remains unclear. Some researchers, while recognising the strong link between anomalous perceptual experiences and delusions, have questioned the causal dependency in all cases (e.g., Bell et al., 2008; Brugger & Mohr, 2008). Given that studies generally focus on chronic patients suffering from a general diagnosis of psychosis, and the cross-sectional nature and timings of most patient evaluations, the neuropsychological deficits (even where present and relevant) underpinning anomalous experiences could be a consequence rather than a cause, following a deficit involving more central belief generation and/or evaluation systems.

Assuming a continuum account of psychotic symptoms (Claridge, 1994; Crow et al., 1995; Johns & van Os, 2001), whereby “core symptoms...are much more prevalent in the general population than their clinical counterparts” (Rutten et al., 2008, p.53), a relevant research question involves the relationships between anomalous beliefs (AB) and anomalous experiences (AE) in a general population sample.

Reports of delusion-like beliefs and/or hallucination-like experiences are not uncommon in many non-clinical populations (Barrett & Etheridge, 1992; Eaton et al., 1991; Freeman et al., 2005; Johns et al., 2002; Johns et al., 2004; Kendler et al., 1996; Larøi & van der Linden, 2005; Ohayon, 2000; Olfson et al., 2002; Posey & Losch, 1983; Poulton et al., 2000; Scott et al., 2005; Tien, 1991; van Os et al., 2000) and “do not differ qualitatively” from those of clinical patients “on a number of levels, including their distribution and aetiology” (Larøi & van der Linden, 2005, p.1438).

Indeed, evidence suggests that hallucinatory experiences in non-clinical and clinical samples are similar (albeit with non-patients more likely to perceive the voices as predominantly positive [see Honig et al., 1998]), and that both share similar socio-demographic risk factors and neurocognitive mechanisms (Johns, 2005). Furthermore, several studies indicate a general relationship between hallucinatory experiences and delusional ideation (Johns et al., 2002; Lincoln, 2007; Verdoux et al., 1998), although Larøi and van der Linden (2005) found that one of five hallucinatory factors (relating to daydreaming) did not correlate to delusion-proneness and one of seven delusion factors (relating to religious ideation) did not correlate with hallucination-proneness.

With these considerations in mind, the studies described in this chapter set out to:

- (i) Investigate the prevalence and distribution of self-reported anomalous experiences (AE) in a large stratified sample.
- (ii) Assuming a continuum account, examine known demographic characteristics and other correlates of clinical hallucinations to ascertain if these also extend to non-clinical experiences (van Os et al., 2009). In particular:
 - a. Evaluate the co-occurrence and content association between AE and beliefs, at both the group and individual levels. Few studies have empirically evaluated the nature of this relationship.
 - b. More specifically, establish the association or dissociation between overall anomalous experience and belief groups and also determine whether specific AEs predicted specific ABs.
 - c. Establish whether participants' self-ratings of meta-beliefs (e.g., religiousness) might predict AE proneness.

- (iii) Finally, examine the experience scores of a small group of patients to ascertain the degree to which these are similar or distinct from those of age and gender matched controls.

6.3 PREVALENCE OF HALLUCINATION-LIKE EXPERIENCES

Several studies of hallucinations report lifetime prevalence estimates of around 6-15% (Slade & Bentall, 1988; Tien, 1991; van Os et al., 2000: see Table 6.1). However, a few give higher estimates: both Barrett and Etheridge (1992) and Ohayon (2000) found 30-40% of participants reported some hallucinatory experiences, and Posey and Losch (1983) found that 71% of their student sample reported brief hallucinated voices.

The use of student samples by Barrett and Etheridge and Posey and Losch, and the inclusion of a wide range of experiences (gustatory, olfactory and haptic items) in Ohayon's case, lead to these increased prevalence rates. However, a study on current hallucinatory experiences of general practice attendees by Olfson et al. (2002) confirms the high prevalence rate, as 10% of their sample reported having visual hallucinatory experiences, and 13% reported auditory. Given that this study still used a clinical measure (MINI), it is expected that these prevalence levels might rise further if a potentially more stigma-reducing questionnaire was used, such as the CBQ (described in Chapter 4).

Table 6.1. Selected studies investigating hallucinations in non-clinical populations. (See Table 4.1 [Chapter 4] for abbreviated instrument references. Instrument names listed in full here are described in the reference given in this table).

	Focus	Author(s)	N	Instrument	Sample	Prevalence
Currently Present	Auditory and visual experiences	Olfson et al. (2002)	1005	MINI	US adults (attending an urban general medical practice)	12.7% (Auditory), 10.3% (Visual)
		Tien (1991)	18572	DIS	US adults	10% men, 15% women
Lifetime Prevalence	Auditory, visual, haptic, olfactory and gustatory experiences	Ohayon (2000)	13507	Sleep-EVAL	European adults	38.7%
		van Os et al. (2000)	7076	CIDI	Dutch adults	8.2% (1.7% 'true' clinically rated hallucination)
	Auditory experiences	Posey & Losch (1983)	375	Questionnaire: 'Hearing Voices'	US college students	71% (Brief hallucinated voices)
		Barrett & Etheridge (1992)	586	Verbal Hallucination Questionnaire	US college students	30-40% (Hearing voices)
		Johns et al. (2002)	8063	PSQ, PSE	British adults	4.0% (White sample only)
Annual Prevalence	Auditory and visual experiences	Johns et al. (2004)	8580	PSQ	British adults	4.2%
		Poulton et al. (2000)	761	DIS	26-yr-old New Zealanders (Longitudinal study)	13.2%

6.4 METHODS

6.4.1 CBQ Experience items

Chapter 4 described 8 anomalous experience items which comprised a part of the Cardiff Beliefs Questionnaire (CBQ). These experience items include six items addressing a range of paranormal experiences and two items addressing visual and auditory hallucination-like experiences. Questions concerned both current and lifetime experiences (e.g., 'Have you seen...'), with participants responding using a 4-point Likert scale, with the options 0 ('Never'), 1 ('Rarely'), 2 ('Sometimes') and 3 ('Often').

Given validity concerns discussed in earlier chapters (see Chapter 4) when using clinical measures to reveal sub-clinical symptoms from non-clinical samples (Henderson, 1996) and the understandable unwillingness of subjects to provide responses that present subjects in a socially unacceptable manner (Byrne, 2000; Corrigan, 2000) these questions avoided clinical vocabulary and were embedded within a broader context of the 3 different beliefs groups described in Chapters 4 and 5. These three belief groups (delusion-like, paranormal and religious and societal/cultural) were employed in this study to compare the relationships between beliefs and experiences, as were the four meta-belief questions (earlier described in Chapter 4) to examine whether these related to anomalous experiences.

6.4.2 Participants

The general population sample (1000 British adults) described in detail earlier in Chapter 5 was used with quotas set on age, gender and employment status. Data were collected using computer-assisted telephone interviewing, carried out by an

experienced market research company. For further details on the sampling methodology and participant characteristics see Chapter 5 (section 5.2).

6.5 ANOMALOUS EXPERIENCES

6.5.1 Overall Prevalence

One or more of the 8 anomalous experiences were reported at any frequency (i.e., ratings of 1-3) by 74.5% of subjects, with 44.0% of subjects reported having one or more AE occurring 'sometimes', and 13.1% reporting these occurring 'often'. As Figure 6.1 shows, AE are not uncommon (complementing previous reports of paranormal experiences and the continuum account), with one or more 'sometimes' or 'often' occurring AE being reported by nearly half of the sample.

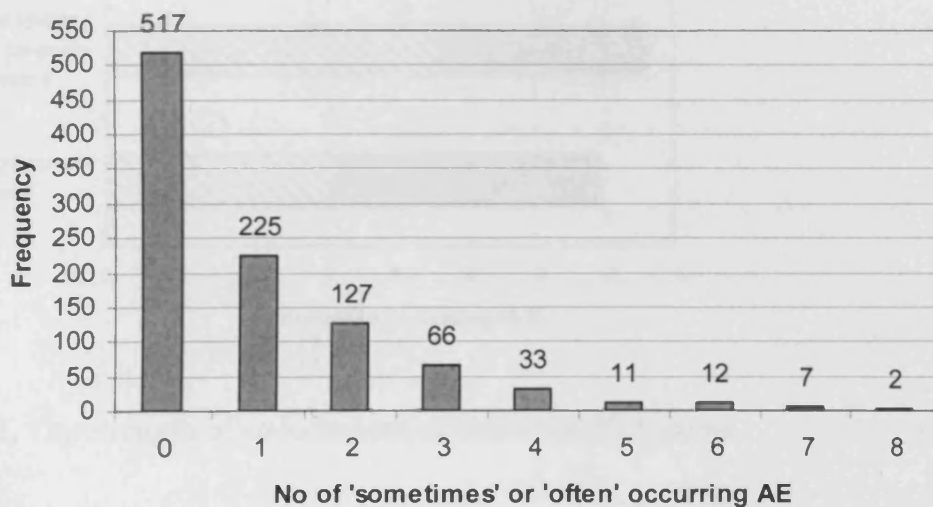


Figure 6.1. The frequency of participants reporting different numbers of 'sometimes' or 'often' occurring AE

The prevalence of these items are now considered with regard to their categories (hallucination-like and paranormal), and the case for combining all items together to form one AE scale is discussed.

6.5.2 Prevalence of HLE

6.5.2.1 Results

One or both of the hallucination-like experiences were reported by 24.1% of participants, with 9.7% of participants reporting having at least one HLE occurring 'sometimes', and 2.5% reporting these occurring 'often'. Hearing voices was reported by 15.3%, while seeing things that other people cannot was reported by 13.8% (see Figure 6.2). Five percent ($n=50$) of the sample endorsed both of the items.

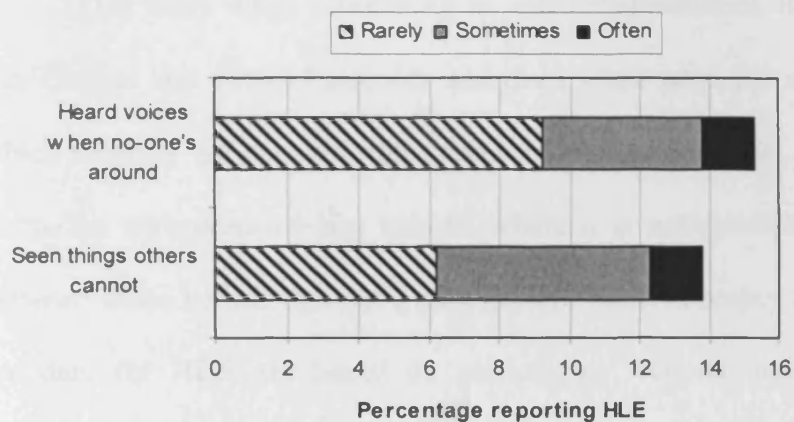


Figure 6.2. The strength of endorsement of individual HLE items

6.5.2.2 Discussion

Despite only including two items directly comparable to clinical hallucination-like experiences, and avoiding psychiatric associations, a substantial proportion of

participants endorsed these items (24%) compared to previous estimates of around 10% when using clinical measures (Tien, 1991; van Os et al., 2000).

However, a higher prevalence estimate (38.7%) was reported by Ohayon (2000) who used large telephone based samples from the UK, Germany and Italy (n=13,057). The higher level in this study could, however, be explained by the much wider range of items used (e.g., including gustatory, olfactory and haptic experiences) to assess hallucinatory experiences. This was also true for the study by Posey and Losch (1983), who found that 71% of college students reported brief auditory hallucinations, using a wide range of items (e.g., hypnopompic/hypnagogic experiences and hearing the phone or doorbell ring when it didn't), all of which makes it difficult to compare with the current study's findings and results of studies employing clinical measures.

One issue when attempting to assess hallucination-like experiences, in both non-clinical and clinical samples and even when neutrally defined, is the extent to which subjects are capable of recognising such experiences as a departure from the norm. As with delusion-like beliefs, where it is not possible to reliably distinguish between those beliefs that have an objective basis in reality and those which do not, the data for HLE are based on participants' reports and without any objective evidence. Moreover, unlike with the DLB, the methods used to assess HLE on the CBQ rely on participants themselves distinguishing between objective and subjective realities, e.g., there being another person present or not in the case of hearing voices.

6.5.3 Paranormal Experiences

The results for the 6 paranormal items (see Figure 6.3) confirm results from several similar large market research polls. In a MORI (1998) poll, belief in ghosts was reported by 40% of a UK sample of 721 people, of whom 37% reported experiences of ghosts (15% of the total sample, although only those reporting belief were questioned regarding their experiences). Similarly, another MORI poll in 2003 (using 1001 respondents from the UK) found that 49% of the 38% who reported beliefs in ghosts had also reported some experiences (19% of the total sample, compared to 22% at any frequency in this study). In the same two polls described above, 7% (21% of believers, who made up 31% of the sample) and 8% (26% of believers, who were 32% of the sample) respectively reported out-of-body experiences compared to 10% in the current study, suggesting the current results are not dissimilar. Interestingly, the methodology used in both polls assumed that beliefs followed from relevant experiences.

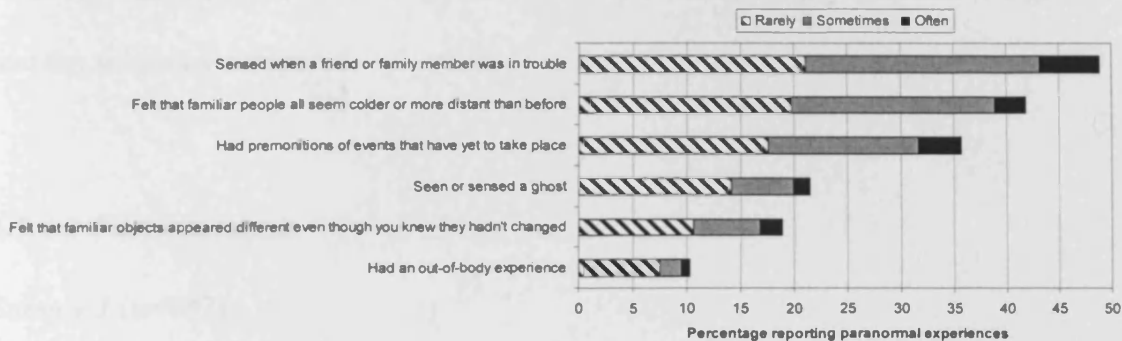


Figure 6.3. The prevalence of the 6 paranormal experiences (*Note: the question on out-of-body experiences included an elaboration of this as having 'felt as though you were looking down on your own body from above'*)

6.5.4 Hallucination-like and paranormal experiences

6.5.4.1 Correlational analysis

Spearman's correlations were also used to assess the associations between these two different subtypes of anomalous experiences. Given the large sample size, the data were split randomly into 4 groups, and correlations were carried out on each. As expected the two hallucination-like experiences were strongly associated with 6 paranormal experiences (rho between 0.38-0.46 for the four subsamples, all $p < 0.0001$), suggesting that the subtypes might be better placed within a continuum of anomalous experiences, despite the different clinical, historical and social interpretations attributed to both.

To test this further, the results from both experiences were combined and subjected to principal components analysis (PCA) to assess underlying communalities between both. As with the other factor analyses, the sample was randomly split into two groups and the solutions compared.

6.5.4.2 Factor analysis

Sample 1 (n=487)

Individual items had KMO measures of sampling adequacy varying between 0.770-0.849. The overall KMO was 0.801 and the Bartlett test for sphericity was highly significant, confirming that the data were suitable for PCA. The Kaiser criterion of eigenvalue > 1 suggested a two component solution, whereas the scree plot indicated a one component solution (see Figure 6.4). Following Stevens (1992), the solution indicated by the scree plot was taken given that there was a large sample with relatively low communalities.

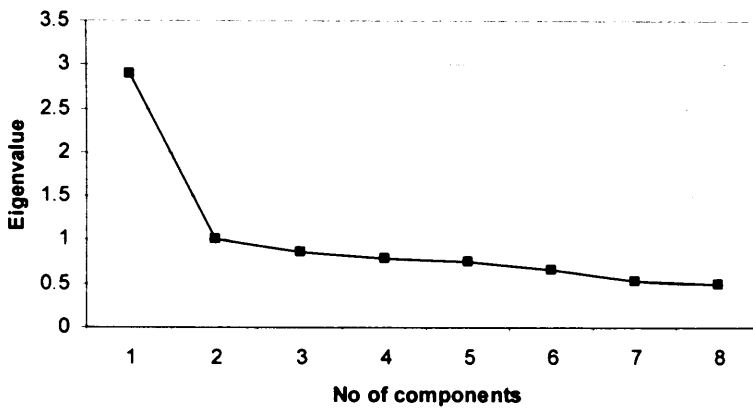


Figure 6.4. Sample 1 scree plot for experience items

Overall, a single component solution explained 36.1% of the total variance. Table 6.2 shows the factor loadings for this component.

Sample 2 (n=489)

The Kaiser criterion of eigenvalue>1 again indicated a two component solution, whereas the scree plot suggested a one component solution (see Figure 6.5).

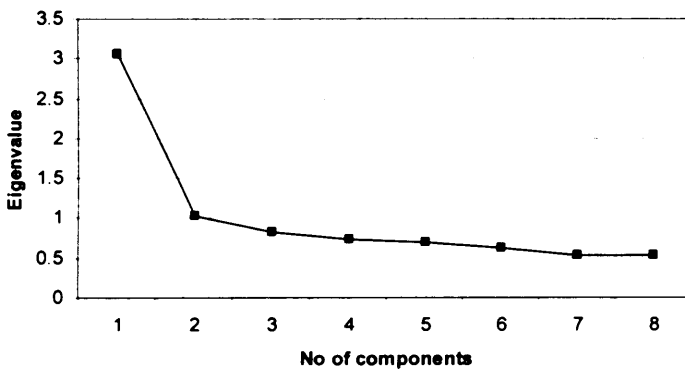


Figure 6.5. Sample 2 scree plot for experience items

Individual items had KMO measures of sampling adequacy varying between 0.812-0.863. The overall KMO was 0.840 and the Bartlett test for sphericity was highly

significant, confirming that the data were suitable for PCA. Overall, a single component solution explained 38.1% of the total variance. Table 6.2 shows the factor loadings for this component.

Table 6.2. Factor loadings for experience items

<i>How often have you...</i>	Factor loading	
	Sample 1	Sample 2
Seen or sensed a ghost?	0.668	0.696
Seen things which other people cannot?	0.680	0.674
Felt that familiar objects appeared different even though you knew they hadn't changed?	0.661	0.615
Sensed when a friend or family member was in trouble?	0.592	0.637
Had premonitions of events that have yet to take place?	0.554	0.665
Heard voices when no one is around?	0.558	0.613
Had an out of body experience (e.g. felt as though you were looking down on your own body from above)?	0.574	0.484
Felt that familiar people all seem colder or more distant than before?	0.493	0.528

Importantly neither PCA suggested the separation of hallucination-like and paranormal experiences. Nor did either PCA distinguish unexplained perceptual experiences from the specific paranormal-type experiences: those that may have resulted from perceptual experiences but have already been interpreted in a particular way.

6.5.4.3 Internal consistency

Internal consistency tests were conducted on the 8 anomalous experience items to establish whether these would form a reliable scale. Collectively the anomalous experience (AE) items demonstrated an acceptable level of internal consistency, with a Cronbach alpha coefficient of 0.74 and item-whole correlations ranging between 0.37-0.51. A corrected split-half reliability analysis indicated a reasonable correlation of 0.79.

Given that both the PCA and the internal consistency results suggest that all 8 experience items could be combined to form an adequate scale, an overall anomalous experiences score was calculated for each participant. This was calculated by summing the number of reported experiences weighted by frequency (i.e., a response of ‘never’ scored nothing, ‘rarely’ was scored as ‘1’, ‘sometimes’ as ‘2’ and ‘often’ as ‘3’). The distribution of these scores is shown in Figure 6.6.

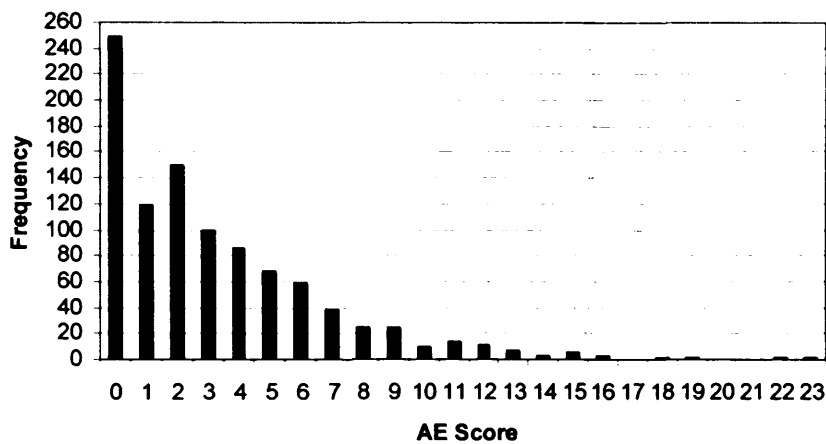


Figure 6.6. The distribution of anomalous experience (AE) scores

6.5.5 Demographics

6.5.5.1 Results

Non-parametric tests (Kruskal-Wallis or Mann-Whitney) were used to explore relationships between established clinical demographic variables (Age; Gender; Socioeconomic group; Education; Ethnicity; Religion; Household [live with others / live alone]; Handedness) and the anomalous experience score. Given the number of comparisons, only effects significant at $p \leq 0.0001$ were considered (Bonferroni’s correction).

Two variables were found to be significantly associated with AE score. Odds ratios were calculated for significant comparisons by dividing participants into above and below average experience scores. With regard to gender, females showed significantly higher experience scores ($M=3.56$, $s.d.=3.50$) than males ($M=2.94$, $s.d.=3.47$) ($U(468,508)=102266.5$, $p=0.0001$; OR: 1.418, 95%CI: 1.091-1.843 [reference group: Female]). This finding is consistent with several previous studies that also found that females were more likely than males to report hallucinations (Preti et al., 2007; Scott et al., 2008; Shevlin et al., 2007).

In terms of religion, participants who identified themselves as belonging to non-Christian religions ($M=6.46$, $s.d.=5.73$) showed significantly higher anomalous experience scores than those who identified themselves as Christians ($M=3.06$, $s.d.=3.23$) ($U(37,650)=7423.0$, $p<0.0001$; OR: 4.348, 95%CI: 2.121-8.911 [reference group: non-Christian]).

6.5.5.2 Discussion

The gender difference in favour of females has been partially explained by the effects of sex hormones on brain development and social factors (Scott et al., 2008). Furthermore, these findings tie in with those suggesting that women also tend to be more superstitious (Griffiths & Bingham, 2005; Ipsos-MORI, 2007). Interestingly, when only the two clinically relevant items (i.e., hallucination-like experiences) were considered, no significant gender difference was apparent.

The only other significant finding that related to the combined score was those being identified as a Christian. These participants ($N=650$) tended to report significantly fewer and/or less frequent anomalous experiences than those who identified themselves as belonging to non-Christian religions ($N=37$). The explanation

for this difference is not immediately obvious. The non-Christian group constituted individuals from several mainstream religions (predominantly Islam, Judaism and Hinduism), in addition to those who identified themselves as part of smaller religious groups. It is possible, however, that a general association with religious beliefs exists but with the increasing secularisation of Christianity in the UK, the interpretation of unusual experiences by individuals in this group had greater competition from other less religious accounts. Another possible explanation is that there is a greater feeling of isolation in minority religious groups, a factor that has been linked with the development of psychotic illness (Boydell et al., 2004). It is important to note that the interpretation of visual hallucinations is influenced by a patient's social and cultural milieu (Knight et al., 2008). As such, certain experiences that have been given a religious explanation may not always be considered hallucinatory. Nevertheless, in China, religious beliefs and superstitions have been shown to have important influence on delusions and hallucinations (Yip, 2003).

6.6 BELIEFS AND EXPERIENCES

6.6.1 Results

6.6.1.1 Comparisons of overall scores

The influential Maherian account of delusions predicts that anomalous experiences provide for delusions and hence from a continuum account such experiences are likely to be associated with both delusion-like and paranormal and religious beliefs but not with societal/cultural beliefs. In the following study, Spearman's correlations (for the four subgroups of 250 individuals) were used to

assess the associations between experiences and delusion-like, paranormal and religious and societal/cultural beliefs.

Anomalous experiences (AE) correlated strongly with anomalous beliefs (AB: comprising both delusion-like and paranormal and religious) (with ρ between 0.36-0.47, all $p \leq 1.0E-06$) but not with societal/cultural beliefs (ρ between 0.05-0.19). In terms of individual belief groups anomalous experiences correlated with paranormal and religious (with ρ between 0.32-0.38) and delusion-like beliefs (ρ between 0.27-0.45) (both $p < 2.0E-09$ for all four groups).

Percentage differences

To get an overall picture of the relationship between AB and AE the percentage difference was calculated between participants' anomalous belief (AB) score and their anomalous experience (AE) score (see Figure 6.7). To determine these differences each person's ($n=848$) AE and AB scores were transformed into percentages of the total possible AE or AB score, following which the transformed AE score was subtracted from the transformed AB score. Although the results show a reasonably good fit to a normal distribution, the number of subjects contained in the tails (± 25) are informative, suggesting two-way dissociations between high and low performance on AE and AB respectively.

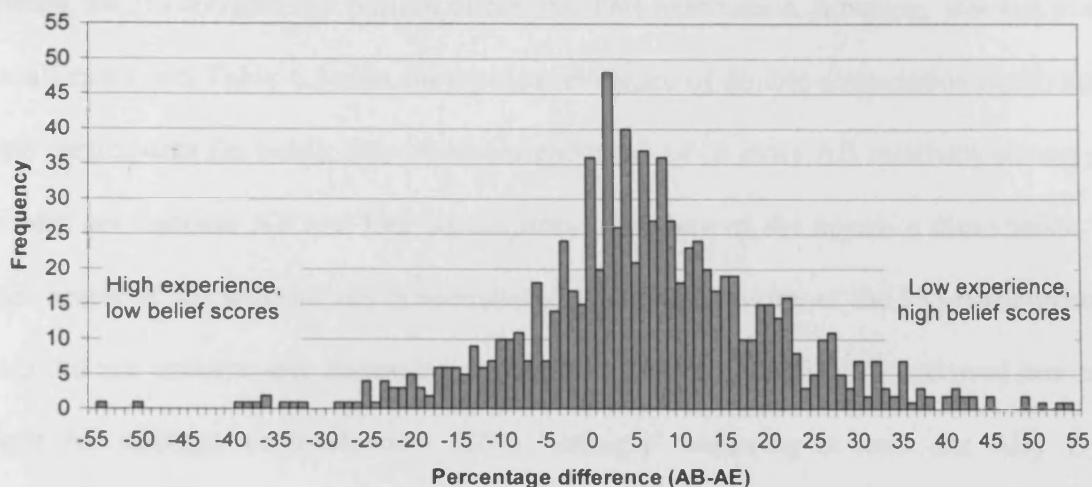


Figure 6.7. The percentage difference between individual participants' anomalous experience and belief scores

6.6.1.2 Exploring individual participants' endorsements

Overall AE and AB scores

To explore the extent of association and dissociation between AE and AB, the performance of smaller subgroups of participants with particularly high or low scores were subsequently examined. To ensure balanced high and low groups, the high AE group included participants who reported at least 2 or more AE occurring 'Sometimes' or 'Often', with the low AE group comprising those who endorsed no AE at any level. For AB, the high group included participants who reported believing in 14 or more delusion-like, paranormal or religious items 'Strongly' or 'Moderately', whereas the low group was those who reported no AB items 'Strongly' or 'Moderately'.

The results (see Table 6.3) confirm that for the most part those that endorsed high levels of AB also endorsed high levels of AE. Reciprocally, most who did not endorse AB did not report AE. Indeed, of the 76 participants falling into these 4

groups, 88.2% showed this pattern of results. This association, however, was not true for all cases and Table 6.3 also shows clear evidence of double dissociation involving nine participants (in bold); five of whom endorsed 14 or more AB relatively strongly but did not endorse AE and four participants who showed the opposite dissociation - high levels of AE without any consequential AB. Furthermore, of the 253 participants who did not endorse any anomalous experiences, 89% (n=225) still endorsed one or more AB strongly or moderately (56% 'strongly' believing at least one AB). By comparison, the 63 participants who reported no strong or moderate AB, 56% (n=35) still reported one or more AE occurring at any frequency (24% reporting at least one occurring 'sometimes' or 'often').

Table 6.3. The frequency of combinations of anomalous beliefs (AB) and anomalous experiences (AE) scores

		AB	
		- (N=63)	+ (N=59)
AE	- (N=253)	28	5
	+ (N=258)	4	39

+ AE: Participants reporting 2 or more (out of 8) 'Sometimes' or 'Often' occurring AE

+ AB: Participants reporting 14 or more (out of 27) 'Strong' or 'Moderate' AB

- AE: Participants reporting no AE

- AB: Participants reporting no 'Strong' or 'Moderate' AB

Relationship with specific beliefs

In attempting to explain monothematic delusions, it has been suggested that an anomalous experience provides for the delusion content, either with the delusion developing as a rational explanation for the AE or with the AE providing the first factor in a two-stage process (Coltheart et al., 2007; Langdon & Coltheart, 2000; Maher, 1988). Moreover, as discussed in Chapter 2, these theories propose that a

specific anomalous perceptual experience leads to particular delusional beliefs (e.g., Capgras delusion is thought to result from a deficit in covert face recognition: Ellis & Lewis, 2001; Ellis & Young, 1990). To examine whether particular belief contents related to reported experience type, correlations between individual AE and AB items were conducted, again using the four sub-samples (n=250) described above (see Table 6.4). Only associations which showed an average correlation of 0.20 or greater were considered. Those where all four correlations were significant at $p \leq 0.0001$ (Bonferroni's correction) are indicated in bold.

Table 6.4. Average correlations taken over the four subsamples for specific AE and AB

	<i>AB</i>										
	<i>Type of AB</i>										
	Ref	Soul/	Reinc	CD	Black	DES	RP:	CA	CT	Astro	PES
<i>AE</i>	<i>DL –</i>	spirit			magic/		Place	<i>DL –</i>	<i>DL –</i>	-logy	
	<i>NB</i>	<i>P&R</i>	<i>P&R</i>	<i>P&R</i>	witch-	<i>P&R</i>	<i>DL –</i>	<i>B</i>	<i>B</i>	<i>P&R</i>	<i>P&R</i>
					craft		<i>B</i>	<i>B</i>	<i>B</i>		
Seen a ghost	0.23	0.20	0.27	0.33	0.23	0.23				0.20	
Seen things	0.24		0.25	0.23	0.21	0.22					
Sensed trouble	0.26	0.25	0.24								
Felt familiar objects changed	0.23		0.20		0.20		0.22				
Had premonitions	0.25		0.25	0.25							
Felt familiar people changed	0.23							0.24	0.22		
Heard voices											0.21

Ref: Ideas of reference; Reinc: Reincarnation; CD: Communication with the dead; DES: Demons or evil spirits; RP: Reduplicative paramnesia; CA: Controlled actions; CT: Controlled thoughts; PES: Possession by evil spirits; DL-B: Delusion-like (bizarre); DL-NB: Delusion-like (non-bizarre); P&R: Paranormal and religious

Table 6.4 shows that seeing a ghost was significantly associated with beliefs in reincarnation and communication with the dead. In addition, sensing when a friend or family member was in trouble correlated with ideas of reference (i.e., believing that certain things people say or do contain special messages for you).

Table 6.5 looks in detail at the relationship between seeing ghosts and belief in communication with the dead, the strongest between a belief and experience. As predicted, while there are many reports of endorsements for both items or for neither; this was not true for all cases.

Table 6.5. The co-occurrence of belief in “communication with the dead” and the experience of “seeing a ghost”

		Experience of seeing a ghost	
		Absent (n=769)	Present (n=213)
Belief in communication with the dead	Absent (n=434)	398 (Expected = 340)	36 (Expected = 94)
	Present (n=548)	371 (Expected = 429)	177 (Expected = 119)

Another AE of particular interest was the feeling that familiar people had changed (e.g., become colder or more distant), because of the hypothesised relationship between this type of experience and Capgras-like beliefs. This relationship did not prove significant in this sample, however, (mean $\rho=0.06$ for the four subsamples), although the majority of those endorsing Capgras-like beliefs (‘Do you believe that relatives or close friends are sometimes replaced by identical-looking impostors?’) did also endorse this experience (see Table 6.6).

Table 6.6. The co-occurrence of Capgras-type beliefs and experiences of familiar people being more distant

		Felt familiar people changed	
		Absent (n=573)	Present (n=416)
Capgras-like belief	Absent (n=931)	546 (Expected = 539)	385 (Expected = 392)
	Present (n=58)	27 (Expected = 34)	31 (Expected = 24)

6.6.2 Discussion

Significant relationships were identified between ‘anomalous’ belief types (combining delusion-like and paranormal and religious) and ‘anomalous’ experiences. In keeping with the prediction that delusions are the product of a subject’s interpretation of their anomalous perceptual experiences (Davies et al., 2001; Ellis et al., 1997; Langdon & Coltheart, 2000; Maher, 1988), anomalous experiences correlated significantly with both paranormal and religious beliefs (rho ranging between 0.32-0.38) and delusion-like beliefs (rho ranging from 0.27-0.45) but *not* with general societal or cultural beliefs. Furthermore, the association between paranormal beliefs and AE suggest a common mechanism for explaining anomalous beliefs. Indeed, given that delusion-like and paranormal beliefs are strongly linked (Houran, Irwin & Lange, 2001; Irwin & Green, 1998; McCreery & Claridge, 2002; Thalbourne, 1994a,b), it seems plausible to assume that the relationship between these anomalous beliefs and experiences would be similar.

As expected, this relationship held for the majority of participants, with 88% of those falling into the extreme high and low AE and AB groups either endorsing high levels of AB and AE or endorsing neither AB nor AE. While these results confirm previous clinical accounts reporting the co-occurrence of delusions and

hallucinations in both clinical (Bilder et al., 1985; Liddle, 1987; Mortimer et al., 1996; Peralta et al., 1992), and non-clinical samples (Johns et al., 2002; Larøi & van der Linden, 2005; Lincoln, 2007; Verdoux et al. 1998), all of these studies (including the findings reported in this thesis) are limited by the cross-sectional methodology used. As such none can imply an explicit directional causal mechanism. Moreover, this type of methodology does not take into account other relevant factors that may influence belief formation, for instance, attentional or attributional biases (Fear et al., 1996; Freeman & Garety, 2004; Kaney & Bentall, 1989). Furthermore, Young (2008) advocates an interactionist model, which allows for both bottom-up and top-down processes in delusion formation, thus providing the potential for AE and AB to feed into each other. For example, Young (2008) suggests that Capgras beliefs may form following an AE, but it is the delusion itself that leads to the maintenance of the experience being perceived in a manner consistent with the belief.

Moreover, Bell et al. (2008) have provided evidence that anomalous perceptual experiences, as measured by the Cardiff Anomalous Perceptions Scale, are not always necessary to account for the presence of all delusions. Indeed, while most participants reported DLB alongside anomalous experiences, this pattern was not found in every case, as is demonstrated by the substantial tails in the distribution on Figure 6.7. Furthermore, as would be expected (given that AE is not thought to be a sufficient condition for AB formation), four participants endorsed high levels of AE without any consequential AB. In addition, five participants endorsed 14 or more AB relatively strongly but did not endorse any AE, suggesting AE is not a necessary condition for AB formation. Furthermore, of the 253 participants who did not endorse any anomalous experiences, 29% still endorsed at least one DLB strongly. As pointed out by Bell et al. (2008), however, there is no comprehensive list of anomalous

experiences, so it may be that these participants have experienced anomalous experiences in a different form to those addressed here.

One way of addressing this difficulty, however, is to investigate the relationships between specific beliefs and experiences that would be predicted to co-occur. In particular, the loss of the expected feeling of familiarity one should get when perceiving a known face has previously been suggested to be associated with Capgras delusion (Ellis & Young, 1990), with people developing the belief that those close to them are impostors as a result of this kind of experience, alongside a second deficit in belief evaluation (Coltheart et al., 2007). From this dual account, it could be predicted that the experience would not be limited to those with Capgras as only a subset of people with the second evaluative deficit would go on to develop the delusion.

In the current study, the experience of feeling that familiar people seem colder or more distant (reported occurring 'sometimes' or 'often' by over 20% of the sample) was used as a potential way of investigating these types of feelings in an attenuated form. However, despite the frequency with which this experience was reported in this study, the association between this particular AE and Capgras-type beliefs was not significant, suggesting that the versions of this anomalous experience captured by the CBQ question were not necessary for the formation of this belief. Lincoln (2007) found that hallucinations were particularly strongly related to delusions that would plausibly follow from hallucinatory experiences (e.g., beliefs about thought insertion, broadcasting, being influenced and loss of control) in a patient sample, whereas in the general population sample the association was independent of content. A similar pattern of results might be found if this association was investigated in a clinical sample. Nonetheless, the context-specific nature of such a pattern, if found, would still question the dependency of the delusional belief on the AE.

However, it is possible that the critical anomalous experience that provided for the current belief may no longer be remembered (given that the study asked for lifetime experiences). Furthermore, the actual experience that people have as a result of this loss of familiarity is unknown; it may be that people feel that others have changed but cannot pinpoint the specific deficit (as seems the case from reports of the delusion itself), or it may be that, as the delusion provides an explanation for this lack of emotion, the belief in a different person rather than the emotional response becomes more salient in the reports. Indeed, one might argue (following the arguments of Young [2008]) that holding the belief would in fact prohibit participants from responding to the experience question, given that the individual perceives these people as impostors, they are no longer 'familiar people' as described in the experience question. On the other hand, Capgras syndrome does not usually affect all persons known by an individual, but rather those closest to him or her, and one would predict that this feeling should still be experienced for those acquaintances whose identity is not questioned.

In terms of other beliefs and experiences, the relationships found included those that might be predicted, namely belief in communication with the dead correlated with the experience of seeing a ghost. This association is more readily explained, as seeing a ghost may well raise the possibility of communication with the dead. In addition, beliefs in reincarnation also correlated with seeing ghosts, and sensing when a friend or family member was in trouble correlated with ideas of reference (i.e., believing that certain things people say or do contain special messages for you). These may be explained as part of a belief system that is catholic with regard to justification, including beliefs beyond those capable of explanation by rational logic alone. In addition, the last pairing may also both be influenced by the over-

evaluation of coincidences, linked to both delusions (Hemsley, 1993) and paranormal beliefs (Brugger & Mohr, 2008). Thus, several relationships suggest a general tendency towards reporting paranormal beliefs and experiences, perhaps reflecting a reasoning bias present in individuals with DLB, which makes paranormal experiences more prominent, or leads to the interpretation of experiences in a particular way.

6.7 RELATIONSHIP TO META-BELIEFS

As the beliefs and experiences on the CBQ were highly associated, the opportunity to investigate whether self-appraisals of participants' own beliefs (i.e., meta-beliefs) could predict (i.e., were associated with) reported experiences was examined. To explore the contribution of meta-beliefs, participants were grouped by their ratings (e.g., those responding 'Not at all' formed a 'not religious' group and those responding 'Quite' or 'Very' comprised the 'religious' group). Mann-Whitney tests showed significant relationships between collective experience scores and self-ratings of *superstitiousness* ($U(560,432)=87997.5, p=0.25E-11$) and *propensity to believe in things others do not* ($U(482,491)=85176.0, p=0.58E-15$). In both cases, where participants rated themselves as possessing the meta-belief, they were significantly more likely to have higher experience scores, i.e., to have endorsed more experiences and/or rated these as occurring more frequently.

Self-reports of superstitiousness were significantly associated with higher scores for experience. This link between superstition and predominantly paranormal experiences (previously covered in Chapter 5) is not unexpected, given strong associations between superstition and paranormal thinking (Lindeman & Aarnio, 2007). Similarly, the relationship between propensity to believe things others do not

and paranormal experiences may be due to an awareness of attitudes towards paranormal beliefs.

6.8 PATIENTS

The six patients described in Chapter 5 (section 5.11) were all asked to complete the 8 questions relating to anomalous experiences. Given that beliefs and experiences tend to co-occur as described above, the aim here was to see whether those holding delusion-like beliefs on the CBQ were more likely to report a greater number or more frequently occurring anomalous experiences than the general population.

6.8.1 Results

Number of experiences

The four male patients (AD, BN, CH and DV) (all aged between 30-44) endorsed a total of 8, 7, 6 and 3 experiences respectively (out of a possible 8) compared to a mean of 1.62 (s.d.=1.70, range = 0-7) for the 133 age and gender matched respondents. As such, all but DV reported a number of anomalous experiences greater than 2 standard deviations above the mean for their gender and age group. Indeed, AD reported more AE than any participant in this group from the total poll sample.

Of the two female patients, EM, the younger female (aged 40), reported 6 experiences, which for the matched group of 159 poll respondents was higher than the average of 2.30 (s.d.=2.04, range = 0-8) but not outside 2 standard deviations of the norm. The older female (aged 67), FR, also reported 6 experiences, which was more

than 2 standard deviations above the mean ($M=2.09$, $s.d.=1.69$, range = 0-7) for the 142 age and gender matched poll respondents. Therefore, it was clear that as a group, anomalous experiences were generally much more common for the patients than for their relative age-/sex-matched group controls.

Frequency of experiences

As described in Chapter 5, while the question content was identical for patient and poll respondent groups, the scales were slightly different. Patients responded on a scale from '0' ('Never') to '4' ('Many times'), rather than the 4-point Likert scale used by poll respondents. As such, the frequency ratings were transformed so as to make responses comparable, in a similar manner to that of beliefs described in Chapter 5: for patients, ratings of '1' were weighted at 0.25, '2' at 0.5 and '3' at 0.75 and '4' at 1; for poll respondents, ratings of 'seldom' were weighted at 0.33, 'sometimes' at 0.66 and 'often' at 1.

Of the 83 male age matched poll respondents with complete data the mean frequency rating was 0.51 ($s.d.=0.19$, range = 0.33-1.00) out of a maximum of 1. The four male patients by comparison had mean frequency ratings of 0.59, 0.43, 0.50 and 0.83 (AD, BN, CH and DV respectively). As such, most were close to the mean, although DV's score was higher than average (but within 2 s.d.). EM had a mean frequency rating of 0.75, which was higher than average compared to the 122 female age matched poll respondents with complete data ($M=0.50$, $s.d.=0.16$, range = 0.33-0.96), although it does not fall outside 2 standard deviations of the norm. FR had a mean frequency rating of 0.38, which was close to the mean ($M=0.52$, $s.d.=0.16$,

range = 0.33-0.89) of the comparison age and gender matched group of 112 poll respondents with complete data.

In conclusion, the patients collectively report higher numbers of experiences: four of the six patients' numbers of experiences were considerably above the means for their groups. The remaining two patients had high (although not as different from average) ratings of frequency. This links in with previous research indicating overlap between beliefs and experiences.

Relationship between AE and AB for patients

To further examine the relationship between AB and AE for the small patient group, the percentage difference was calculated between their anomalous belief score (again combining delusion-like and paranormal and religious) and their anomalous experience score (as with respondents from the general population sample, described in section 6.6). That is, each person's AE and AB scores were transformed into percentages of the total possible AE or AB score, following which the transformed AE score was subtracted from the transformed AB score.

The results, shown in Table 6.7, reveal that all but one patient (FR) had higher experience than belief scores, with two patients (BN and DV) having moderately different scores but a further two patients (CH and EM) falling into the extreme tails of the distribution (see Figure 6.7). As AD was the most ill when completing the CBQ, and FR had a long history of holding stable delusions, it is perhaps not surprising that these two had more balanced AE and AB scores. It is possible that this suggests a higher propensity to experience AE in the patient group, which may have contributed to the development and/or maintenance of their delusional beliefs.

Another possibility is that this may be the result of interventions that preferentially target the beliefs held by individuals rather than their experiences.

Table 6.7. The percentage differences between AE and AB scores for the patient group

Patient	Percentage difference (AB-AE)
AD	-3.82
BN	-17.13
CH	-31.94
DV	-20.14
EM	-52.55
FR	12.62

6.9 SUMMARY

Most participants in the large sample of the general public endorsed anomalous experiences (75%), and 24% endorsed items relating to hallucination-like experiences, providing further support for a continuum account of psychotic symptoms. Moreover, a substantial proportion of this group reported their experiences occurring ‘sometimes’ or ‘often’ (48% for all AE, 12% for HLE). Furthermore, these psychotic-like and paranormal items formed a reliable scale together and could not be distinguished in a factor analysis, indicating that the boundaries between these types of experiences are flexible, albeit one type being more associated with clinical symptoms than the other.

As expected, a strong relationship was found between AB and AE, and this held for the majority of participants, with 88% of those falling into the extreme high and low AE and AB groups either endorsing high levels of AB and AE or endorsing neither AB nor AE. Despite the strength of the group relationship, several participants endorsed high AB in the absence of AE or vice versa. This confirms the findings of

Bell, Halligan and Ellis (2006c), and suggests (using a cross sectional methodology) that AE are not a necessary condition for delusion formation.

Interestingly, those who rated themselves as superstitious or as having a high propensity to believe had significantly higher numbers of and/or more frequent anomalous experiences. This suggests that self-rated judgements of overall dispositions towards self-rated beliefs could provide some indication of participants' propensity to report anomalous experiences.

This chapter has explored the relationship between beliefs and experiences in some detail, including the effect of holding certain content-specific beliefs or experiences. The following chapter will also explore the relationships between specific beliefs by looking directly at the often neglected issues of belief consistency and coherence.

CHAPTER 7

BELIEF CONSISTENCY AND COHERENCE: EXPLORING THE WEB OF BELIEFS

7.1 BACKGROUND

The last chapter explored the relationships between individual beliefs and experiences, and the findings confirmed a relationship between beliefs endorsed and experiences reported. Furthermore, MORI market research polls (1998, 2003) of paranormal experiences also assumed that respondents' relevant experiences (e.g., seeing a ghost) provided for beliefs (e.g., in ghosts). Looking instead at relationships between beliefs, philosophers have proposed that beliefs are not encapsulated (i.e., do not exist in isolation from other beliefs) but rather, in the interests of ensuring consistency, naturally cohere together (Quine & Ullian, 1970). Indeed, several of the key defining characteristics of belief (conviction, influence on behaviour, etc.) endorsed by most participants (Chapter 3) require this and it would be difficult to knowingly hold two contradictory beliefs. That said, this depends on subjects having explicit awareness of their beliefs and insight to know that incoming beliefs could provide for potential inconstancy. In the clinical literature there are examples from cases of somatoparaphrenia (e.g., Halligan et al., 1993), where questions probing the experiential condition (in this case, a supernumerary phantom limb) revealed a form of uncomfortable awareness of contradictory claims. According to cognitive dissonance theory (Festinger, 1957), humans are strongly predisposed to seek consistency among their cognitions (including beliefs) and avoid inconsistency, particularly where the holding of such cognitions (beliefs) would compromise self-esteem (Cooper & Duncan, 2006).

The idea of coherence between beliefs impacts on the earlier discussion involving delusions in Chapter 2. The cognitive neuropsychiatric perspective suggests that unusual beliefs such as delusions are best explained by an understanding of the normal processes by which beliefs are formed and subsequently perturbed. Delusions may occur for several reasons, including misattribution, breakdown in an evaluative component regarding the plausibility of beliefs or a component responsible for updating beliefs (Langdon & Coltheart, 2000; Ramachandran & Blakeslee, 1998). However, the exact nature of the deficit (or more likely, multiple deficits) that might give rise to delusional beliefs is not known, nor is the framework or context in which beliefs develop. One factor that might help refine existing deficit models could be the inclusion of a criterion that assesses whether an individual's beliefs exist within a web of similar beliefs - defined in terms of consistency (i.e., their reliability over time and conviction), coherence (non-contradictory between-belief relationships) and perceived truth. In the case of clinical patients, such coherence might be compromised to a greater extent or not at all. The clinically relevant delusion (e.g., Capgras) could for example "infect" existing beliefs, or indeed provide for new content-dependent delusions (e.g., paranoia), or have no such effects. Indeed, whilst it seems plausible that beliefs should cohere with others held by the same individual for self-consistency, much cognitive research on delusions has tended to focus on stand-alone monothematic delusions and does not explicitly screen for other delusions and/or other co-existing normal beliefs.

Although not the same as coherence, the notion that beliefs are comparatively stable is clearly important when arguing for coherence since if beliefs fluctuated significantly and/or often, then it would be difficult to maintain coherence. Indeed, the (intuitively plausible) assumption of a relatively stable set of core beliefs seems a

necessary condition for coherence. Furthermore, one could argue that the more coherent a belief is (i.e., the more closely associated it is to other beliefs), the more stable it should be, and vice versa. However, notions of stability and coherence have not received much attention within psychiatry, and many discussions of delusions often assume that such beliefs exist in relative isolation.

This chapter considers both the stability (or reliability) of beliefs and the inter-relationship between beliefs (coherence). The first section covers the stability of different types of belief. Following this, studies of coherence will investigate (i) belief dissonance (i.e., holding of contradictory beliefs), and (ii) some preliminary evidence for coherence (i.e., whether holding one belief of a particular type significantly increases the likelihood of holding another belief of that type).

7.2 STABILITY

7.2.1 Background

The conviction with which a belief is held provides some indication of its importance to the belief holder. As such, it seems plausible that conviction would impact upon both belief consistency over time and consistency between beliefs. Kant (1781) regarded belief as the judgement of the truth of a statement using “objectively insufficient but subjectively sufficient” justification. He used this definition to distinguish belief from opinion, the evidence base of which is neither objectively nor subjectively sufficient, and knowledge, for which justification involves both objective and subjective evidence. Indeed, it is commonly accepted that it is the degree of conviction with which a belief is held that typically leads us to term our judgements

differently; ‘belief’, ‘knowledge’ or ‘opinion’ (e.g., Nilsson, 2006). Intuitively, it seems that those judgements one would describe as ‘knowledge’ might be more consistent than those termed ‘belief’.

Given that the conviction attributed to a belief may vary, it follows that stability (i.e., being consistent over time and across situations) similarly holds to differing extents between beliefs. Nevertheless, stability is often considered relevant to the definition (e.g., by almost 80% of participants in the characteristics of belief study reported in Chapter 3). Indeed, to ‘believe’ is defined in the *Merriam-Webster* dictionary as:

1 a: having a firm religious faith

b: accepting as true, genuine, or real

2: having a firm conviction as to the goodness, efficacy, or ability of something

3: holding an opinion

With the exception of feature 3 (opinion), all imply an attribute of consistency (a firm conviction or faith, or accepting something as true).

Indeed, as with the definition above, beliefs presumably play a significant role in self-identity and personality. Yet even key beliefs can undergo significant changes throughout an individual’s life. Scobie (1973) found 20% of trainee Protestant ministers reported having suddenly converted to their religion, although the majority (50%) had undergone a slow process of identification (the remainder being brought up religious). The comparative likelihood of a gradual change seems to fit better with the idea of a “web of beliefs”; where all beliefs held by an individual must be consistent with each other, so if one changes, others may need to be altered to fit with this.

Delusional beliefs in particular are known to be long-lasting, and often held with great tenacity, despite individuals being presented with evidence contradicting their belief. Delusions tend to form around certain themes (e.g., persecutory or grandiose ideas) perhaps indicating that these areas are more likely to be emotionally intense and difficult to change. However, delusions can be relinquished (e.g., Chapman, 2002), albeit often following pharmaceutical interventions.

In contrast, subclinical symptoms seem more transient. Whilst holding subclinical psychotic symptoms increases the risk of developing a psychotic disorder (Hanssen et al., 2005), many subclinical symptoms do not make the transition (e.g., are only held briefly while under a period of stress). Hanssen et al. (2005) found that 8% of their sample still reported subclinical symptoms 2 years after their initial endorsement of these, but in a large majority (84%) these experiences disappeared over the same period. In a shorter time period (18 months), Wiles et al. (2006) found that 31% of the subclinical symptoms reported at T1 persisted. On the other hand, of the 1965 individuals in their study who did not report any psychotic symptoms at T1, 134 (7%) had developed these at T2.

In terms of delusional ideation or paranormal beliefs, estimates of stability focus on test-retest reliability measures for various instruments. These indicate that participants' scores are highly correlated between sessions. Chapman, Chapman and Miller (1982) tested students on the Magical Ideation Scale (MIS: Eckblad & Chapman, 1983) at two sessions, approximately 6 weeks apart, reporting high test-retest correlations of $r = 0.8$ for male and $r = 0.82$ for female participants. Peters et al. (2004) report similar test-retest results for the Peters et al. Delusions Inventory (PDI: Peters, Joseph & Garety, 1999), finding a high reliability between non-clinical samples' scores, even 6-12 months after initial assessment ($r = 0.78$).

The high correlations for measures including more paranormal-type ideas suggest that delusion-like beliefs may have lower levels of consistency than other types of belief held by healthy individuals. This would be expected if (given non-clinical participants' assumed good mental health) beliefs in religion, morals and other societal/cultural beliefs were given more credence (and had greater influence) than those relating to delusion-like themes. Therefore, rather than simply focusing on general associations, the following study aimed to investigate the stability of 3 different types of belief; paranormal and religious, societal/cultural and delusion-like in detail.

It was predicted that beliefs would in general prove to be stable, given their implications for identity, behaviour and decision-making. Indeed, philosophical theories and previous research have generally assumed this to be true. However, the degree of stability may vary according on the type of belief discussed; in particular, delusion-like ideas in non-clinical participants may be less stable than other types of belief.

7.2.2 Method

7.2.2.1 Sample

In total, 76 participants (described in Chapter 4, section 4.3.1) completed an earlier version of the Cardiff Beliefs Questionnaire (CBQ) on two occasions (see Chapter 4: Table 4.3), with an interval of 3-6 weeks ($M=31$ days) between assessments. Participants' age ranged from 18-48, with 90% within the 18-25 age band ($M=21.4$, $s.d. = 4.91$). The majority were female ($n=60$, 79%). Participants were all recruited using the volunteer panel in the School of Psychology at Cardiff

University. These 76 were a subset of 119 who completed the CBQ at T1 (there were no age ($t(59)=-0.667$, $p=0.507$) or gender ($\chi^2(1)=0.035$, $p=0.852$) differences between completers and non-completers of the second stage).

7.2.2.2 Measure

Participants completed version 2 of the CBQ (described in Chapter 4 [Table 4.3]). In this version belief questions (10 SCB, 14 DLB and 8 P&RB) were responded to on a scale from '-2' to '2' (with the endpoints labelled 'Do not believe' and 'Strongly believe', and the midpoint ('0') labelled 'Don't know').

In addition to the standard CBQ questions, participants were asked four basic *knowledge* questions: 'What is the capital of Australia?', 'Which chemical element has the symbol H?', 'When was the Great Fire of London?' and 'Who wrote *The Lord of the Rings*?'. Participants were asked to guess if they did not know the answers. They were also asked how confident they were about their answer, responding on a scale from 0 ('Not at all sure') to 2 ('Certain'). This was to allow a comparison between the stability of beliefs and knowledge (which, having greater conviction in general, should be more stable).

7.2.3 Results

7.2.3.1 Stability of belief

Out of the 2417 beliefs rated by participants at the first (T1) and second (T2) sessions (76 participants x 32 belief questions; 15 beliefs had missing data at T1 or T2), 1742 (72.1%) produced the same rating on both occasions. Furthermore, 83.7% of beliefs did not meaningfully change (i.e., did not change from a positive rating to

an answer of ‘Don’t know’ or to a negative rating, and vice versa). Negative (‘Do not believe’) answers were more likely to remain consistent between T1 and T2 than positive (‘Believe’) answers (see Table 7.1).

Of the beliefs reported with the same conviction at both T1 and T2, 68.8% were endorsed strongly (i.e., received a rating of either ‘2’ or ‘-2’). This trend was reflected in the percentages reported in Table 7.1, where those beliefs given stronger positive or negative ratings are more consistent between sessions.

Table 7.1. The change in distribution of all beliefs at T1 and T2

Rating	No of beliefs			Percentage of stable beliefs ¹		
	T1	T2	T1&T2	Exact rating	General ²	
<i>Believe</i>	2	375	323	261	69.6	81.5
	1	447	415	270	60.4	
<i>Don't know</i>	0	304	308	153	50.3	
<i>Don't believe</i>	-1	259	256	121	46.7	93.0
	-2	1032	1115	937	90.8	

¹ Formula: $\frac{\text{No of constant beliefs}}{\text{No of beliefs at T1}}$

² General: beliefs are consistently answered ‘Believe’, ‘Don’t believe’ or ‘Don’t know’ between T1 and T2

7.2.3.2 Differences in subsets of belief

For the delusion-like beliefs, the total percentage of beliefs holding stable was as high as societal/cultural beliefs (Table 7.2). However, it is clear from Table 7.2 that for DLB this relationship was due to very stable ‘Don’t believe’ responses rather than ‘Believe’ responses, and vice versa for SCB. Paranormal and religious beliefs fall between these two extremes, although somewhat closer to the pattern for DLB, with more stable ‘Don’t believe’ than ‘Believe’ responses.

Table 7.2. The percentage for each belief type remaining consistent

Response	Delusion-like	Paranormal/ Religious	Societal/ Cultural
Believe	55.8	77.1	100
Don't know	22.5	63.1	64.2
Don't believe	100	97.6	68.0
Total	88.2	83.2	88.7

7.2.3.3 Trends in belief change

The mean number of beliefs answered 'Believe' fell significantly between T1 (M=10.8, s.d.=2.60) and T2 (M=9.7, s.d.=2.95) (Wilcoxon signed-ranks, $Z=-4.667$, $p<0.001$), whilst the number answered 'Don't believe' rose from a mean of 17.0 at T1 (s.d. = 3.64) to 18.1 at T2 (s.d. = 3.38) (Wilcoxon signed-ranks, $Z=-3.974$, $p<0.001$). Indeed, 45 participants endorsed fewer beliefs at T2 than at T1, 20 endorsed the same number of beliefs, and only 11 endorsed more at T2. Table 7.3 shows these data by belief type, indicating that (although individuals were picking up and dropping beliefs of each type), in general participants were responding 'Don't believe' to more DLB and P&RB questions at T2, but 'Don't know' to more SCB questions at T2. Average strength of belief did not change between T1 and T2 (with a mean strength of 1.45 out of 2 for 'Believe' answers at both sessions, and 1.8 out of 2 at both times for 'Don't believe' answers).

Table 7.3. Trend in belief change by belief type (calculated using the formula: number of beliefs in category at T1 – number of beliefs in category at T2)

		Minimum	Maximum	Mean	Std. Deviation
DLB	Believe	-2	3	0.41	1.05
	Don't know	-2	4	0.37	1.12
	Don't believe	-4	2	-0.80	1.47
P&RB	Believe	-1	4	0.25	0.79
	Don't know	-3	4	0.11	1.29
	Don't believe	-5	3	-0.37	1.36
SCB	Believe	-2	4	0.46	1.16
	Don't know	-3	3	-0.57	1.15
	Don't believe	-3	2	0.11	0.89

7.2.3.4. Knowledge

Responses to the 4 factual questions were also analysed, by taking those responses that had been rated as 'certain' by participants, and comparing their stability over this period. As might be expected, these were very stable with 96.4% being rated as 'certain' again at T2. This rises slightly to 97.6% if one only considers the same answer being given on both occasions (it is worth noting that the correctness of the answer was not considered, only the degree of certainty with which it was held).

7.2.3.5. Coherence and stability

To evaluate the effects of coherence on stability, a group of individuals with high numbers of reported DLB and another group with high numbers of P&RB were identified, as DLB and P&RB formed reliable scales with other beliefs from their category. It was expected that if an individual endorsed high numbers of these beliefs, they would be more likely to still hold these beliefs at T2, as it would be harder to drop these beliefs if they were linked to similar beliefs.

Table 7.4 shows the results for the high DLB group (n=13), defined as those with three or more DLB at any strength (mean for total sample: 1.34, s.d.=1.29). Compared to those in the overall sample (Table 7.2), DLB seem more stable for the high DLB group (92% overall compared to 88%), while the stability for the other groups remain unchanged. Indeed, it is the stability of the positive DLB that changed in particular, increasing from 56% overall to 93% for this group.

Table 7.4. Percentage of belief type remaining consistent for the high DLB group

Response	Delusion-like	Paranormal/ Religious	Societal/ Cultural
Believe	92.6	77.4	100
Don't know	33.3	72.7	64.7
Don't believe	100	97.8	68.8
Total	92.1	85.7	90.6

Table 7.5 shows the results for the high P&RB group (n=18), defined as those with four or more P&RB at any strength (mean for total sample: 2.05, s.d.=1.80). In a similar manner to the DLB, it seems that the stability of the P&RB increased for this group, raising the percentage of stable 'believe' P&RB responses from 77% to 99%.

Table 7.5. Percentage of belief type remaining consistent for the high P&RB group

Response	Delusion-like	Paranormal/ Religious	Societal/ Cultural
Believe	59.3	98.7	100
Don't know	30.0	50.0	60.9
Don't believe	100	93.8	75.0
Total	88.2	89.1	89.9

7.2.4 Discussion

7.2.4.1 Overall stability

The results suggest that in general beliefs are reasonably stable (when investigated over a month-long period). Over eighty percent of the beliefs endorsed at T1 did not change in terms of content over this period, and over 70% of all beliefs were reported with the same degree of conviction at both sessions. This fits with previous assumptions of belief as a relatively stable and consistent judgement on which to base behaviour. Moreover, as some beliefs addressed here may be ideas that have never occurred to participants before (e.g., some delusion-like beliefs) or ideas that do not usually come up in everyday life (e.g., conspiracies regarding the moon landings), higher levels might be predicted to be found if personally significant beliefs had been targeted.

7.2.4.2 Effect of belief strength

The results also show that the stronger beliefs at T1 were more likely to be still held at T2. Indeed, nearly 75% of all of beliefs held to the same level of conviction at both sessions were beliefs that were rated strongly ('-2' or '2'). This makes intuitive sense as more personally significant beliefs are likely to be held with a greater conviction. In contrast, beliefs held with a weak conviction should require less evidence to induce a change, and thus be more susceptible to fluctuations.

7.2.4.3 Stability of knowledge

As expected, responses to the knowledge questions were more stable in general than beliefs, with 96.4% being rated as 'certain' on both occasions, compared

to 72.1% of beliefs being given the same rating (similarly, knowledge has a consistency of 97.6% compared to 83.7% if one allows general consistency between ratings). It might be expected that knowledge should be 100% consistent (in particular, given that this was the case for some belief types at certain ratings). However, knowledge here is defined in terms of a level of conviction self-reported by participants rather than an objective measure. Given that this result was based on only a small number of items (n=4), the answers to which were not universally known, this estimate is likely to rise further with items that are held with greater conviction.

7.2.4.4 Effect of belief type

Interestingly there were definite differences in the stability of beliefs in terms of the 3 types of belief. Table 7.2 showed delusion-like and societal/cultural beliefs to have slightly higher overall stability than paranormal and religious beliefs. However, this was due to very high stability in most given answers (i.e., 'Don't believe' for DLB and 'Believe' for SCB).

The lower correlation for positive answers to delusion-like belief questions fits with the idea that although very common (91% endorsing one or more at any strength in the study reported in Chapter 5), they were not held with the strength typical of a delusion. This supports the previous suggestion by Peters, Joseph & Garety (1999) that holding of a belief is not sufficient, but rather the way in which a belief is held (e.g., the effect that it has on the individual) is the key factor in establishing whether a belief should be classed as a delusion.

In fact, the majority of the changes in reported beliefs consisted of the dropping of positive beliefs reported at T1 by T2. A general decrease in the number of positive beliefs reported could be due to people challenging the beliefs after their

attention was explicitly drawn to these at T1. However, this seems unlikely as a full explanation due to the scale of the change (58% of participants endorsing fewer beliefs at T2, compared to just 8% endorsing more). Alternatively, due to attempts to neutralise the questions, participants may have initially felt comfortable when endorsing questions at T1, but retained an overall impression of the unusual nature of the questions. This impression could lead them to approach the second session with increased wariness. Indeed, the proportion of changed beliefs fits predictions from a social desirability bias, with less DLB being endorsed in general, and slightly less P&RB, whilst slightly more SCB are endorsed. Thus it is difficult to extract the levels of comparative stability, as this type of bias could lead to differential effects on the stabilities of belief types. However, as the levels of stability would be decreased if this bias is exerting an effect, this should only make our overall (reasonably high) estimate more conservative.

7.2.4.5 Coherence and stability

As predicted, when individuals endorsed high numbers of P&RB or DLB beliefs, a greater number of these kinds of belief continued to be reported at T2, than when the individuals had only endorsed a small number of these beliefs at T1. This provides support for the idea that coherence between beliefs is an important factor in belief maintenance.

A further consideration is that inconsistency decreases the stability of a belief. Previous research has shown that ambivalence decreases the stability of attitudes (Bargh, Chaiken, Govender & Pratto, 1992). However, as this was carried out using an earlier version of the CBQ (before the explicit development of the belief pairs to

assess dissonance), there were not sufficient examples of inconsistent beliefs to evaluate this in the present study.

One finding of this study was that those beliefs that showed greater coherence were more stable, presumably as it would require greater change to the web of belief if one of these were to be dropped. Indeed, examples of those beliefs that should have very strong coherence are those tied up in the notion of self. Self-concept (the nature and organisation of beliefs about one's self) is generally considered relatively stable and multi-dimensional (e.g., including physical, emotional, and social aspects). The following section reports further analysis of belief coherence, carried out using the large CBQ sample (n=1000).

7.3 BELIEF COHERENCE

7.3.1 Background

Chapter 1 introduced Quine & Ullian's idea of a web of beliefs (1970). This suggested that individuals should not be able to maintain two contradictory beliefs if aware of holding both. These ideas were further developed by Thagard (2000), who considered a belief to be justified "not because it is indubitable or is derived from some other indubitable beliefs, but because it coheres with other beliefs that jointly support each other" (p.5). He accounts for coherence in terms of constraint satisfaction, extending discussion of coherence to a much wider range of cognitions, including perception and decision-making (Thagard, 2000). In this manner, each element (i.e., a representation, such as a belief) can either cohere (have a positive constraint) or not cohere (have a negative constraint) with each of the others. Elements are either accepted or rejected, with positive constraints between two

elements being satisfied if both are accepted or rejected and negative constraints satisfied if one is accepted and the other rejected. Coherence is maximised by accepting or rejecting elements so as to satisfy the most constraints (both positive and negative). In this manner, Thagard considers there to be some incoherence between beliefs (unlike in the philosophical argument of Quine and Ullian). However, this work remains largely theoretical.

Another influential approach worth mentioning is that of Festinger (1957), who proposed that people are motivated to avoid cognitive dissonance (i.e., holding contradictory beliefs, thoughts, attitudes, etc.). As such, belief content should be consistent within an individual to avoid negative psychological tension. As with the ideas of Quine and Ullian (1970), according to this theory the individual must be aware of inconsistencies for these to become problematic in terms of psychological discomfort.

Despite general agreement that healthy individuals' beliefs are likely to show content coherence with their other beliefs and the absence of explicit contradictory beliefs (e.g., Davidson, 1984; Festinger, 1957; Quine & Ullian, 1970), there has been little or no empirical investigation, in particular with regard to delusional or delusion-like beliefs. Indeed, "the nature of coherence is usually left vague, with no method provided for determining whether a belief should be accepted or rejected on the basis of its coherence or incoherence with other beliefs" (Thagard, 2000, p. 41).

Notwithstanding few published accounts about possible inter-belief interactions, it seems sensible to consider the range of potential options and consequences for belief inter-relationships. Figures 7.1-7.3 highlight different options for describing between-belief relationships. In Figure 7.1 beliefs were configured as distinct and essentially stand-alone as personalised knowledge units (i.e., they have

little or no apparent between-belief coherence). Such an arrangement could well provide for regular forms of incoherence between an individual's beliefs, which in turn might present an individual as inconsistent, uncomfortable, variable and liable to persuasion (due to the resulting cognitive dissonance: Festinger, 1957).

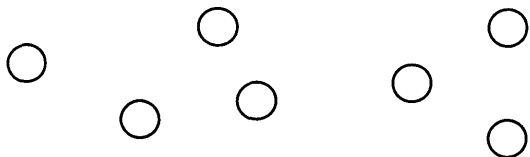


Figure 7.1: All beliefs are islands.

There are no links- each belief is formed without regard to existing beliefs. Ideas regarding belief coherence may instead result from the similarities of one's experiences leading to similar types of beliefs.

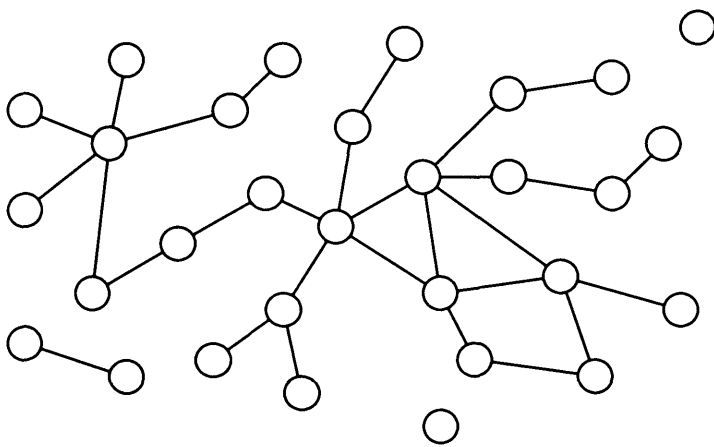


Figure 7.2: Few beliefs are islands (i.e., most but not all show coherence)

Most beliefs are characterised by links to other beliefs and the basis for such links are largely derived by principles of precedence, chronicity, relative salience and parsimonious attempts at coherence for consistency and recall. Salient beliefs (e.g., core beliefs), perhaps gaining influence through repetitive activation and/or experience, are more likely to influence the formation and consideration of new beliefs. However, the formation of isolated beliefs is possible.

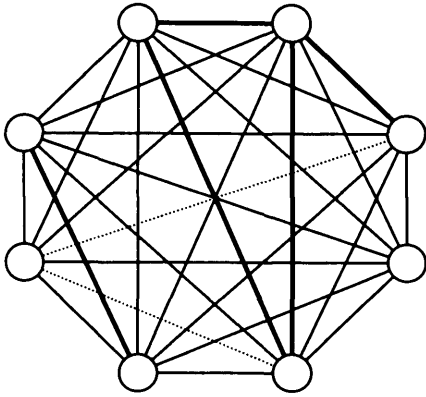


Figure 7.3: Web of beliefs (no beliefs are islands)

Follows the principles outlined in Figure 7.2, but each belief has a number of indirect / direct links with other beliefs to maximise coherence and minimise inconsistency.

Previous attempts to investigate belief inter-relationships

Mathematical

One research avenue that has explored coherence is by developing mathematical models of predicted belief formation. Fifty years ago McGuire (1960) proposed a “probabilogical” model of logical consistency between beliefs, using belief syllogisms. A similar model was later developed by Wyer (1970). This approach defined belief in terms of subjective probability judgements, and used mathematics to examine how beliefs ought to (rather than do) relate to each other.

Wyer (1970) provides one example of a person believing that a particular candidate would be good as their country’s leader (conclusion: C). He suggests this belief/ judgement is likely to follow from other beliefs held by the subject related to the general evaluation of the candidate’s standing (e.g., holding belief A, that ‘The candidate supports a left-wing agenda’, and the premise (C/A) that ‘If a candidate supports a left-wing agenda, such a candidate will be good as the country’s leader’).

Wyer described the relationship between these as:

$$p(C) = p(A) p(C|A) + p(A') p(C|A')$$

Indeed, there is some evidence showing that the predicted and observed values using such models produce a moderately high degree of correspondence (Wyer & Goldberg, 1970). Importantly, it is clear from the equation above, that if the outcome belief (C) was to change (and thus the probability of reaching this conclusion: the left side of the equation), one could assume some changes in the related beliefs (which provide the input for the right side of the equation) and vice versa. While some promising results exist in this area, much of the research is not capable of addressing the extent or degree to which belief coherence occurs. Furthermore, the focus on abstract scenarios may only give a simplified account, given the complexity and number of factors that influence beliefs (see models of delusional beliefs [Chapter 2]: e.g., experiences, emotions, etc.).

Social psychological

Another form of coherence has been suggested from attitudinal studies operating within social psychology by evaluating inconsistent (or 'ambivalent') beliefs. Eagly and Chaiken (1993, p. 123) defined such beliefs as when an individual claims to hold "beliefs that express positive evaluation and other beliefs that express negative evaluation". Evidence of incoherent evaluative beliefs comes from studies by Katz and Hass (e.g., 1988), who looked at white participants' views of black members of the population. Katz and Hass found that whilst participants tended to endorse some positive statements towards this group (e.g., 'this country would be better off if it were more willing to assimilate the good things in black culture'), they also often endorsed some negative beliefs (e.g., 'many black teenagers don't respect themselves

or anyone else'). Katz and Hass found that the positive statements tended to be associated with the overarching value of communalism, whereas the negative statements tended to be associated with individualism. As such, these beliefs may not appear to be incoherent; indeed, the contents of the beliefs may not seem directly contradictory. Furthermore, there are clearly social desirability concerns with any study that attempts to investigate these kinds of attitudes. A test of coherence using less loaded stimuli would provide stronger evidence for the existence of incoherent beliefs.

Attempting to get a picture of belief coherence

One of the important findings from Chapter 4 was that categories of belief used on the CBQ showed sufficient commonalities to form scales. Furthermore, correlational analyses described in Chapter 5 indicated that the hypothesised-to-be-similar belief types (DLB and P&RB) were indeed significantly correlated, whereas those that did not seem to have any overlap (SCB with DLB or P&RB) were unrelated. This provides some preliminary support for coherence between participants' beliefs belonging to the same category. To further explore this area the following studies were carried out:

- (i) The five CBQ belief pairings (described in Chapter 4) were examined in terms of the percentages that showed consistent/inconsistent associations;
- (ii) The contribution of demographic variables in predicting any inconsistency was established;
- (iii) Finally, the levels of co-endorsement between each belief pair included in the total sample of CBQ beliefs (n=46) was investigated

7.3.2 Method

The current study examined the extent of co-endorsements for the 46 CBQ belief items (17 delusion-like beliefs, 10 paranormal and religious beliefs and 19 societal/cultural beliefs). In addition, five pairs of related beliefs were explicitly included on the CBQ to directly explore coherence (i.e., positive endorsement of one belief in a pair, should result in a similar response to the other). These pairs are described in Table 7.6.

Table 7.6. The five belief pairs designed to investigate coherence

Belief pair	A positive response of ‘believe’ to the item below ...	Should predict a similar response to the corresponding item below
1	Reincarnation (i.e. that when you die your soul is reborn in another body)	The soul or spirit survives death
2	Some people communicate with the dead	The soul or spirit survives death
3	Earth has been visited by aliens from other solar systems	Extra-terrestrial life
4	Some people are possessed by evil spirits	Demons or evil spirits
5	The theory of evolution	Humans share a common ancestor with apes
	Humans share a common ancestor with apes	The theory of evolution

For belief pairs 1-4 outlined above, there is a clear ‘If...’, ‘then...’ relationship predicted between participants’ responses (e.g., **if** an individual reports a belief in possession by evil spirits, **then** (s)he would be expected to also report a belief in evil spirits). For the fifth pair this relationship is true whichever belief is

placed first. In every case the ‘Then...’ belief (e.g., ‘demons or evil spirits’) was asked prior to the ‘If...’ belief, so the simpler version of the beliefs was the first encountered by participants (in general, the questionnaire attempted to keep more unusual beliefs towards the end, so as not to discourage participants from endorsing beliefs due to any perceived stigma). (The ‘common ancestor’ version of belief pair 5 was asked first).

7.3.3 Participants

Participants comprised the general population sample of 1000 British adults described in detail earlier in Chapter 5. For further details on the sampling methodology and participant characteristics see Chapter 5 (section 5.2).

7.3.4 Results

Overall, 64.9% of the sample produced consistent belief pairings. However, 35.1% of the sample produced inconsistent belief pairs: 25.8% of these holding one inconsistent belief pair, 7.7% holding two, 1.4% three and 0.2% four. Furthermore, 13.1% held strongly inconsistent belief pairs: 11.1% held one inconsistent belief pair, 1.9% held two, and 0.1% three. Table 7.7 shows the results for the individual belief pairings, where the pairing ‘possession by evil spirits’ and ‘demons or evil spirits’ appeared to be the most inconsistent (42% of those endorsing possession not endorsing evil spirits, with 38% still doing so when endorsing possession strongly).

Table 7.7. The percentage of inconsistent belief pairs reported

If ...	Then ...	Number reporting IB at any strength	Percentage of IB reporters not reporting TB	Number reporting IB strongly	Percentage of strong IB reporters not reporting TB
Possession	Evil spirits	382	41.6% (n=159)	94	38.3% (n=36)
Communicate with dead	Soul/spirit	403	22.6% (n=91)	158	21.5% (n=34)
Aliens visited Earth	ET life	347	12.4% (n=43)	60	8.3% (n=5)
Reincarnation	Soul/spirit	403	9.4% (n=38)	96	4.2% (n=4)
Common ancestor	Evolution	833	8% (n=67)	462	5.6% (n=26)
Evolution	Common ancestor	830	7.7% (n=64)	508	4.3% (n=22)

IB: 'If...' belief; TB: 'Then...' belief

The consistency between one belief-experience pair was also examined. If participants reported some experience of seeing ghosts, then they were expected to endorse the belief: 'To what extent do you believe that the soul or spirit survives death?' Of the 215 participants who reported any experience of seeing ghosts, 15.8% (n=34) reported not believing in a soul or spirit that survives death, not dissimilar to the levels reported in Table 7.7.

7.3.4.1 Demographics

Kruskal-Wallis and Mann-Whitney U tests were used to explore the contribution of demographic variables (Age; Gender; Socioeconomic group; Education; Ethnicity; Religion) to the findings described above for the 5 pairs of beliefs. Significant associations (at $p \leq 0.0001$) with the number of inconsistent beliefs were found with older age ($\chi^2(3)=28.59$) and lower education ($\chi^2(2)=20.14$).

Age

Older participants (aged 60+) endorsed significantly more inconsistent belief pairs than those who were younger (aged 18-29 ($U(194,269)=20855.5$) or aged 30-44 ($U(292,269)=31723.0$)), and there was also a trend towards the 60+ age group having more inconsistent belief pairs than those aged 45-59 ($U(245,269)=27779.0$, $p=0.0004$). No other age group comparisons were significant.

Education

Participants whose highest educational qualification was secondary level showed more inconsistent belief endorsements than those with university qualifications ($U(551,274)=64551.0$). However, the comparison between those with a secondary level qualification and those with a higher qualification failed to reach significance; $U(551,68)=15674.0$, $p=0.010$).

7.3.5 Discussion

Contrary to prior expectations, a substantial proportion of individuals reported inconsistent belief pairings (although this fell to only 13% when looking at reports of strong beliefs). This suggests that option three (Figure 7.3), where all beliefs cohere with each other is unlikely, and that individuals can hold inconsistent beliefs. Interestingly, the paranormal belief pairs tended to be more inconsistent than the societal/cultural pair (evolution/sharing a common ancestor with apes). This may be due to these pairs being less likely to be discussed, and therefore people are less likely to become aware of or address this discrepancy. Indeed, belief coherence should be stronger for those belief pairs that are more likely to be core or salient beliefs, and

need only hold for those belief pairs that the holder is aware of (which are likely to be those that are frequently considered). However, as both of the beliefs in a pair were answered within a short period of time in this study, it seems the requirement that the holder should be conscious of both beliefs would be fulfilled here (although, given the gap between the questions being asked, it is possible that they are not simultaneously aware of holding both).

Some of the inconsistent beliefs may of course arise due to participants' interpretation of the question asked, e.g., believing in a certain kind of spirit capable of possession, but thinking of this as distinct from demons, so being wary of endorsing the demons/evil spirits question. Indeed, it is not possible to determine how participants were interpreting each question, and this may account for some of the apparent discrepancies found in the present study. Furthermore, it could be suggested that these inconsistencies were due to participants not responding accurately, but this charge could be levelled at any study that requires participants to indicate cognitions, and there is no evidence to suggest this was a particular concern in this study.

Given the levels of inconsistent beliefs, it seems likely that not all of these can be accounted for by inaccurate responding, suggesting that people do hold some inconsistent beliefs. Indeed, the demographic results support this in that they reflect a pattern that seems intuitively credible. It seems plausible that people may have varying degrees of tolerance for inconsistent beliefs, in particular given that this is expected to depend on awareness of one's beliefs. Those with higher levels of education may be more inclined to question their beliefs, while the difficulties with memory or other cognitive decline that can occur particularly amongst elderly people (e.g., Katzman & Terry, 1992) may have an impact on the belief system.

7.4 THE NATURE OF A BELIEF WEB

Despite discovering that some participants endorse beliefs that appear to have inconsistencies with each other, the first study still showed most beliefs to be reasonably consistent. Indeed, previous research assumed (and indeed it makes intuitive sense) that beliefs show some degree of coherence with each other. Another way to examine the degree of coherence was to examine the levels of co-endorsement between belief pairs.

7.4.1 Individual webs of belief

Although the number of strong/moderate beliefs endorsed by individuals (mean=17.6) varied considerably (see Figure 7.4) there was no shortage of examples of extensive belief co-endorsements. Males (M=17.2) generally endorsed less than females (M=18.0), and younger people more than older (18-29 (M=18.3); 30-44 (M=18.0); 45-59 (M=18.0); 60+ (M=16.3)).

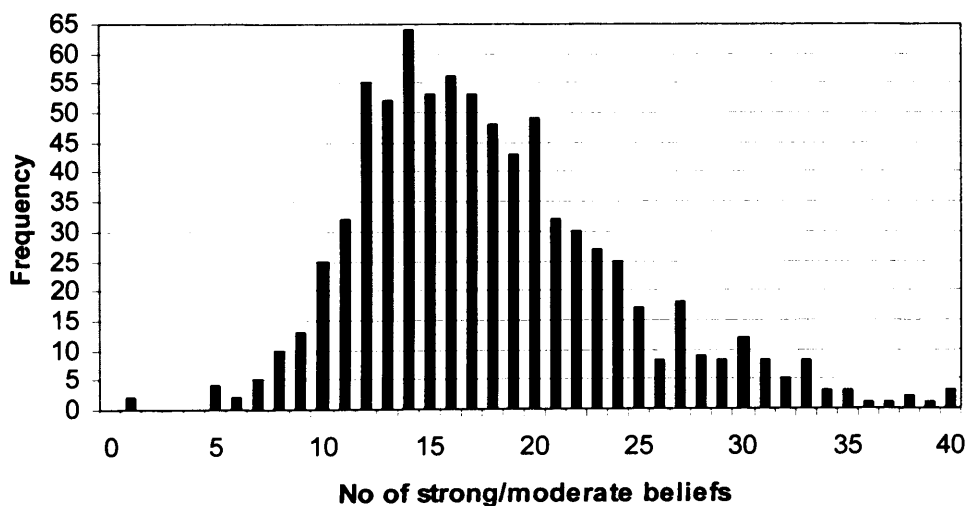


Figure 7.4. The number of strong /moderate beliefs reported by the large stratified sample

By taking a selection of individuals from different points on this distribution, it is possible to compare the kinds of belief co-endorsements occurring in given individuals. In Figure 7.5 the different types of beliefs endorsed by 4 age-matched individuals demonstrate extreme cases from the range of belief co-endorsements (1 vs. 39 beliefs), and also show two participants closer to the mean in terms of overall number of endorsements. Three of these response maps come from non-clinical participants. However, the top left example (showing 24 beliefs) is taken from answers provided by one of the male patients (AD) (see Chapter 5 for further description). Collectively these individuals' co-endorsements of beliefs suggest that while many beliefs may co-occur in content groups, others appear to be the only representative of a specific content group that the person acknowledges (albeit limited to those addressed on the CBQ). Furthermore, it seems that patients with delusions endorse a similar range of beliefs and, in this case, do not stand apart from healthy participants in terms of the patterns of belief they show. While it is interesting to note the considerable variety of belief endorsements made by healthy individuals, it is also useful to look at beliefs from a group level.

7.4.2 Group webs of belief

To determine which levels of co-endorsement might occur more (or less) often than would be expected by chance, the number of times each belief pair within the set of CBQ belief questions was co-endorsed was analysed using chi-square tests (with Yates's and Bonferroni's corrections). The phi statistic was also used as a measure of degree of association.

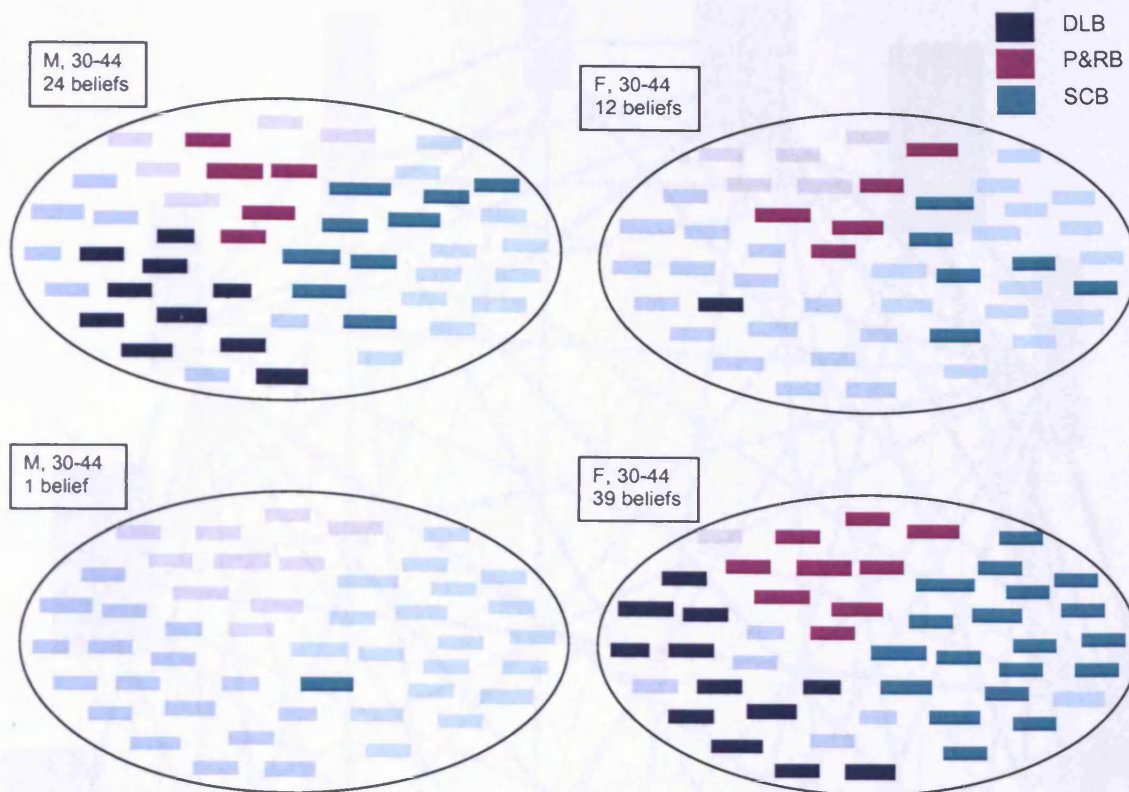


Figure 7.5. Individual webs of belief (displaying strong/moderate beliefs). DLB are shown in blue, P&RB in purple and SCB in green.

7.4.2.1 Results

The first three figures (Figures 7.6-7.8) presented below show all observed links between beliefs for each of the three groups (delusion-like, paranormal and religious and societal/cultural). The thickness of the line joining any two beliefs confirms the strength of the association, with thicker lines representing stronger association.

Figures 7.9-7.11 show only the significant belief pair associations (all $\phi > 0.1$, $p < 0.0001$) for the three belief categories. The findings clearly show that delusion-like and paranormal and religious beliefs have much higher co-endorsements than would be expected by chance alone, and in particular, by comparison to societal/cultural beliefs. Figure 7.12 shows the strongest of these associations ($\phi > 0.2$) for all groups.

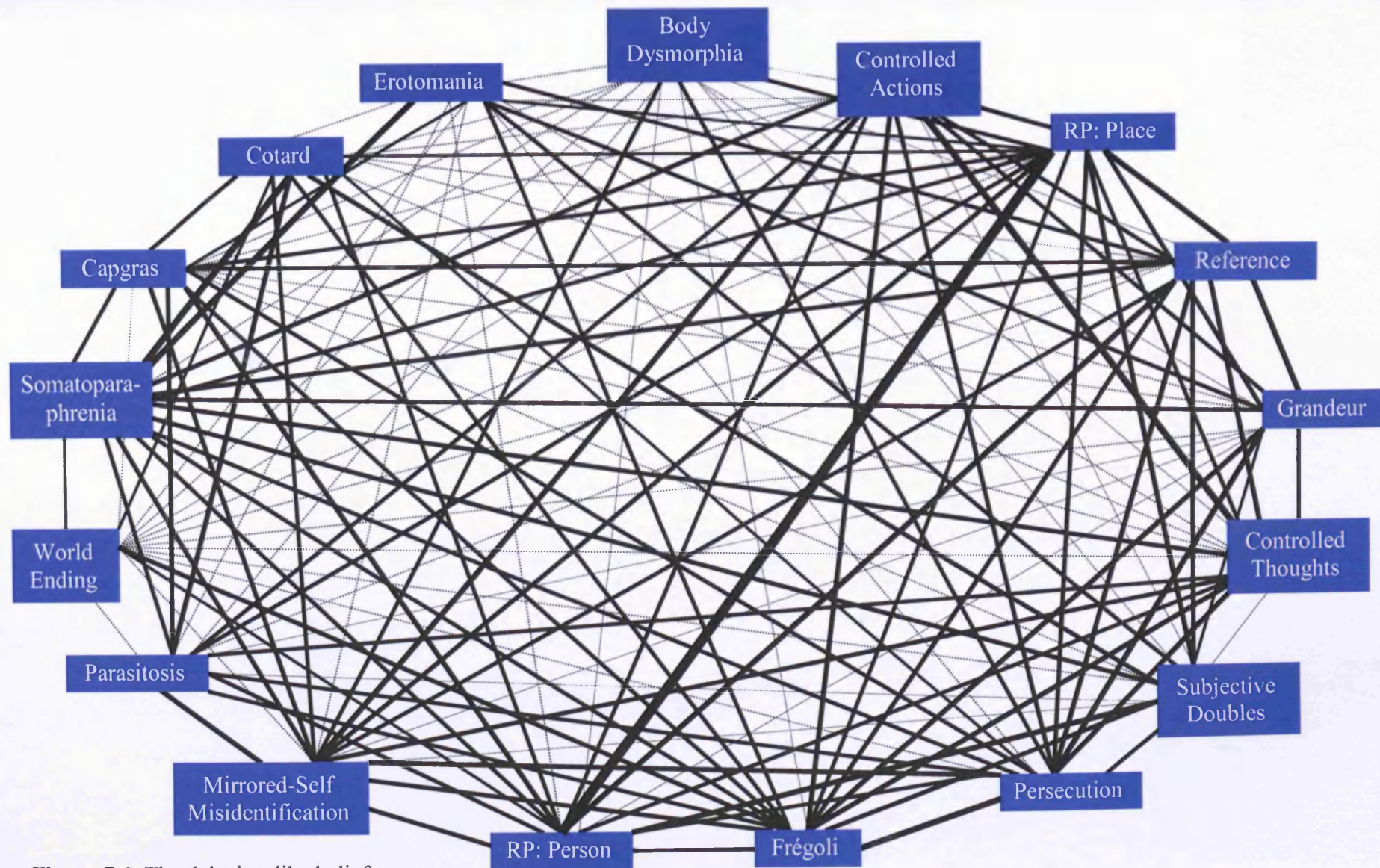


Figure 7.6. The delusion-like belief co-endorsement pairings

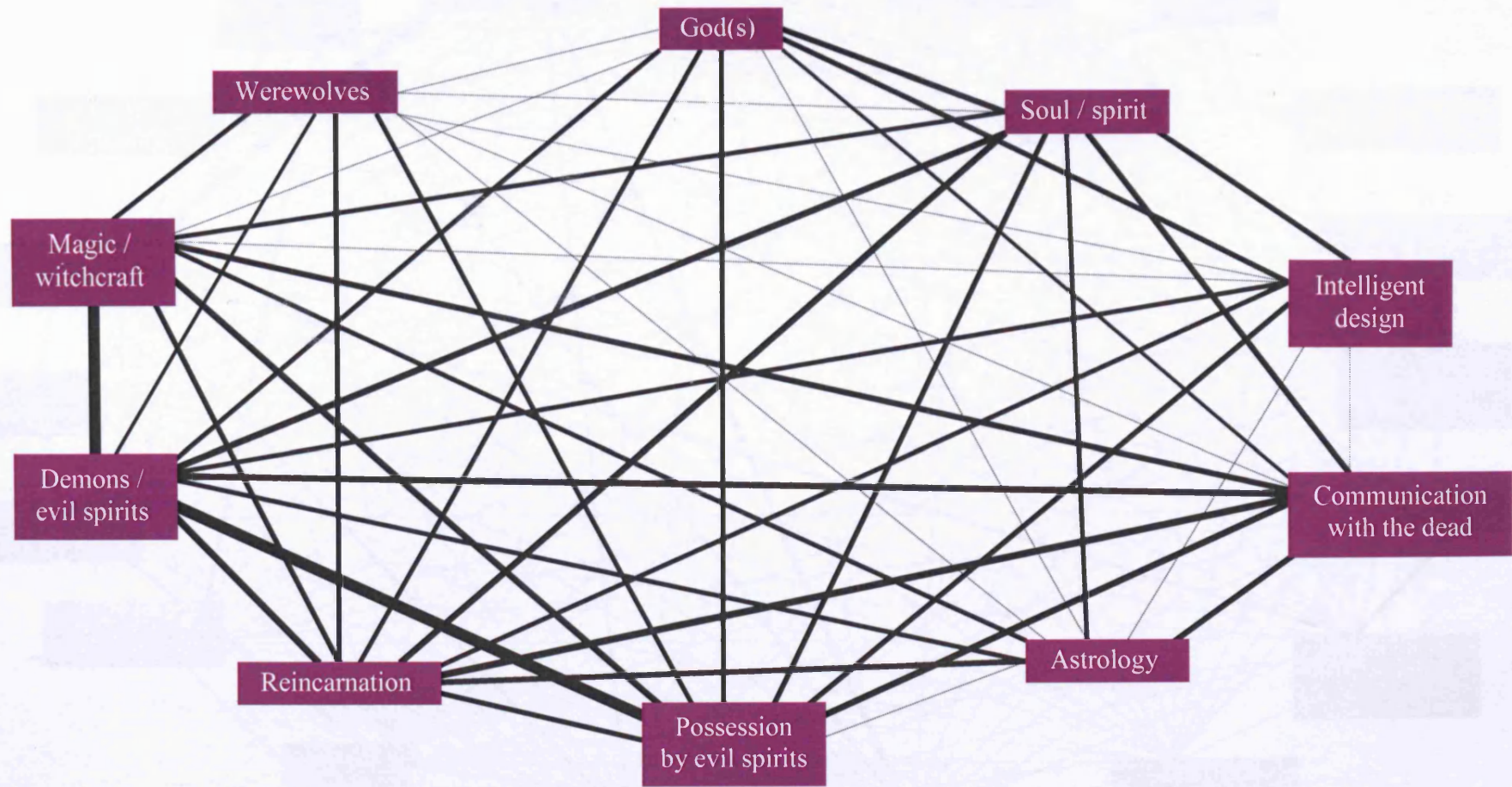


Figure 7.7. The paranormal and religious belief co-endorsement pairings

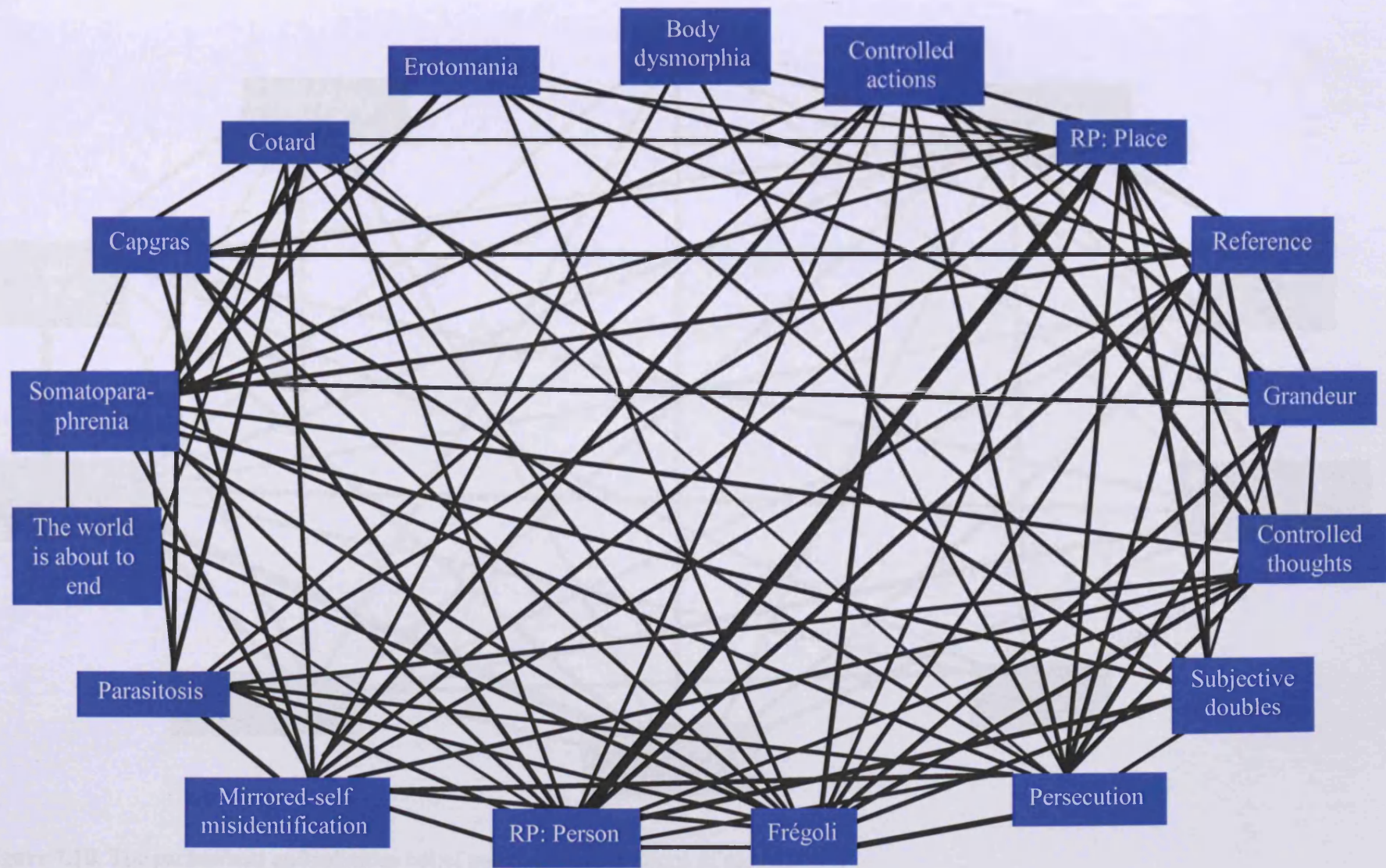


Figure 7.9. The delusion-like belief pairs with associations of phi (ϕ) ≥ 0.1 . (RP: Reduplicative paramnesia)

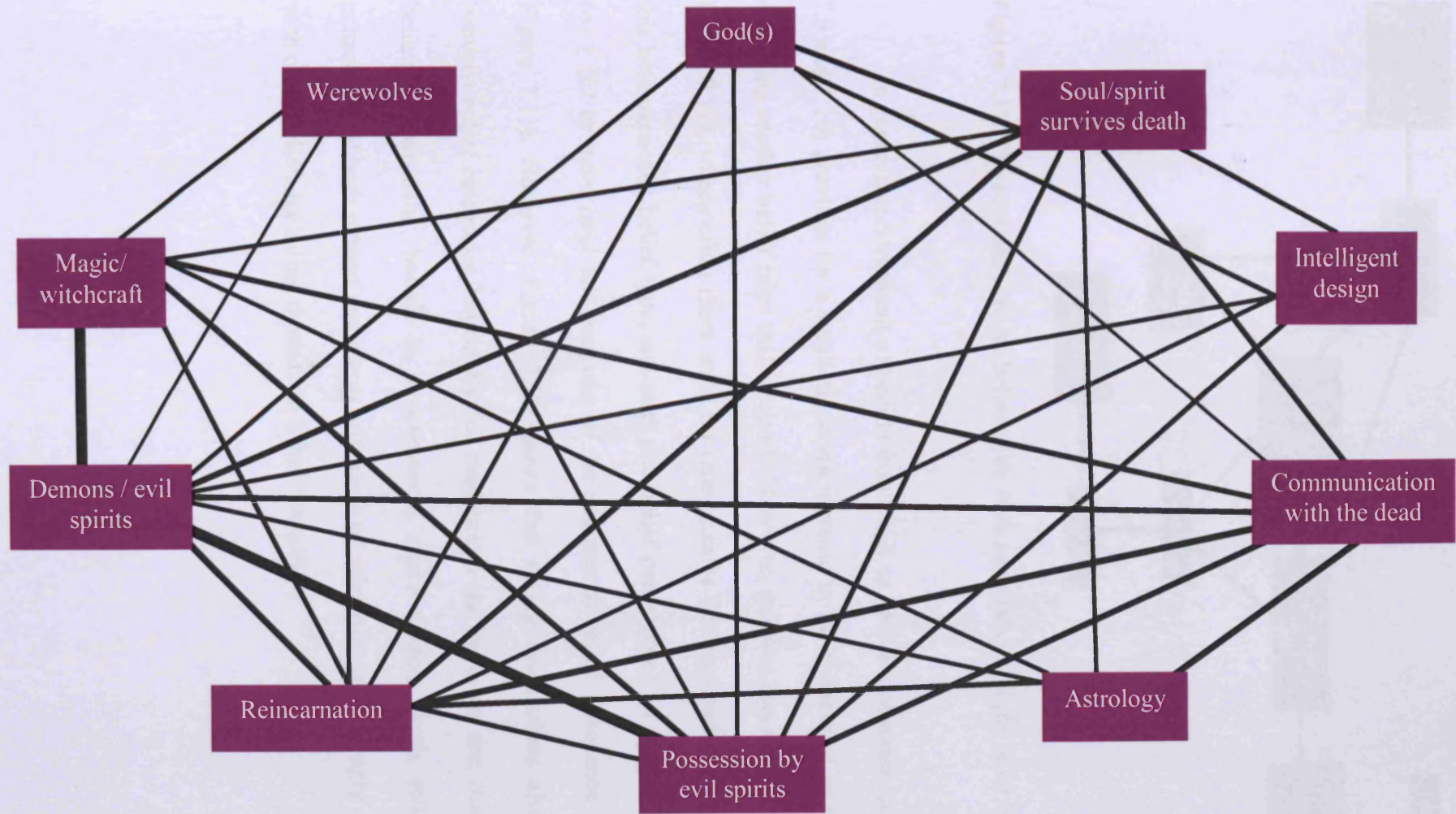


Figure 7.10. The paranormal and religious belief pairs with associations of $\phi (\varphi) \geq 0.1$

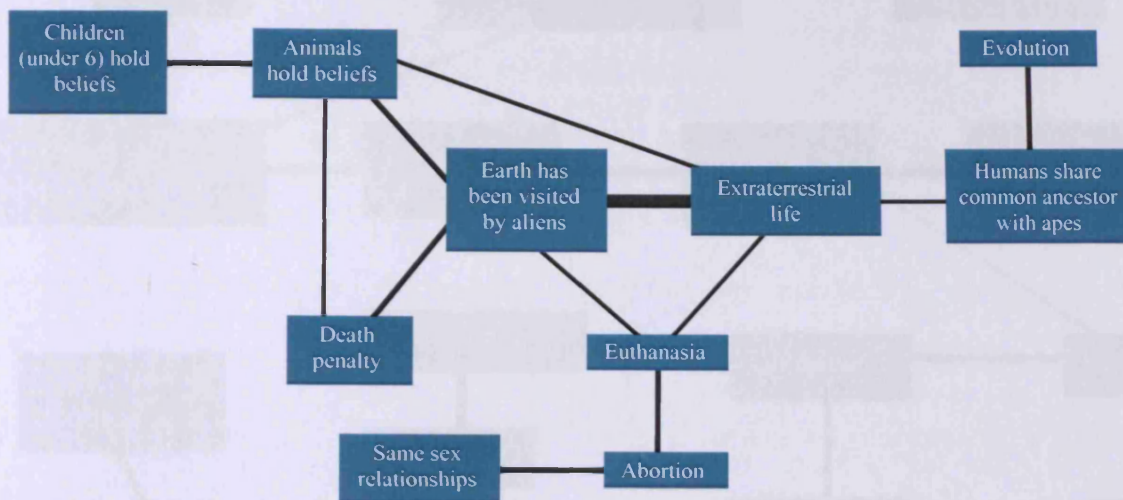


Figure 7.11. The societal/cultural belief pairs with associations of ϕ ($\phi \geq 0.1$)

In general, endorsement of beliefs from DLB or P&RB categories (see Figures 7.9 and 7.10) provides for a small/moderate increase in the chances of an individual endorsing another belief from that category. However, this was less true for SCB (see Figure 7.11), where often there were no relationships between endorsements within this heterogeneous belief type, and only one belief pair showed an association of ϕ ($\phi \geq 0.2$ or more (and this was one of the engineered belief dissonance pairs: see Figure 7.11). However, Figure 7.12 shows that strong associations also crossed between belief categories, especially for paranormal and religious and delusion-like beliefs. In particular, beliefs in reincarnation, aliens visiting Earth, reduplicative paramnesia of both person and place, and ideas of reference were strongly associated with other beliefs including those from other categories.

Figure 7.12. The belief pairs with associations of ϕ ($\phi \geq 0.2$)

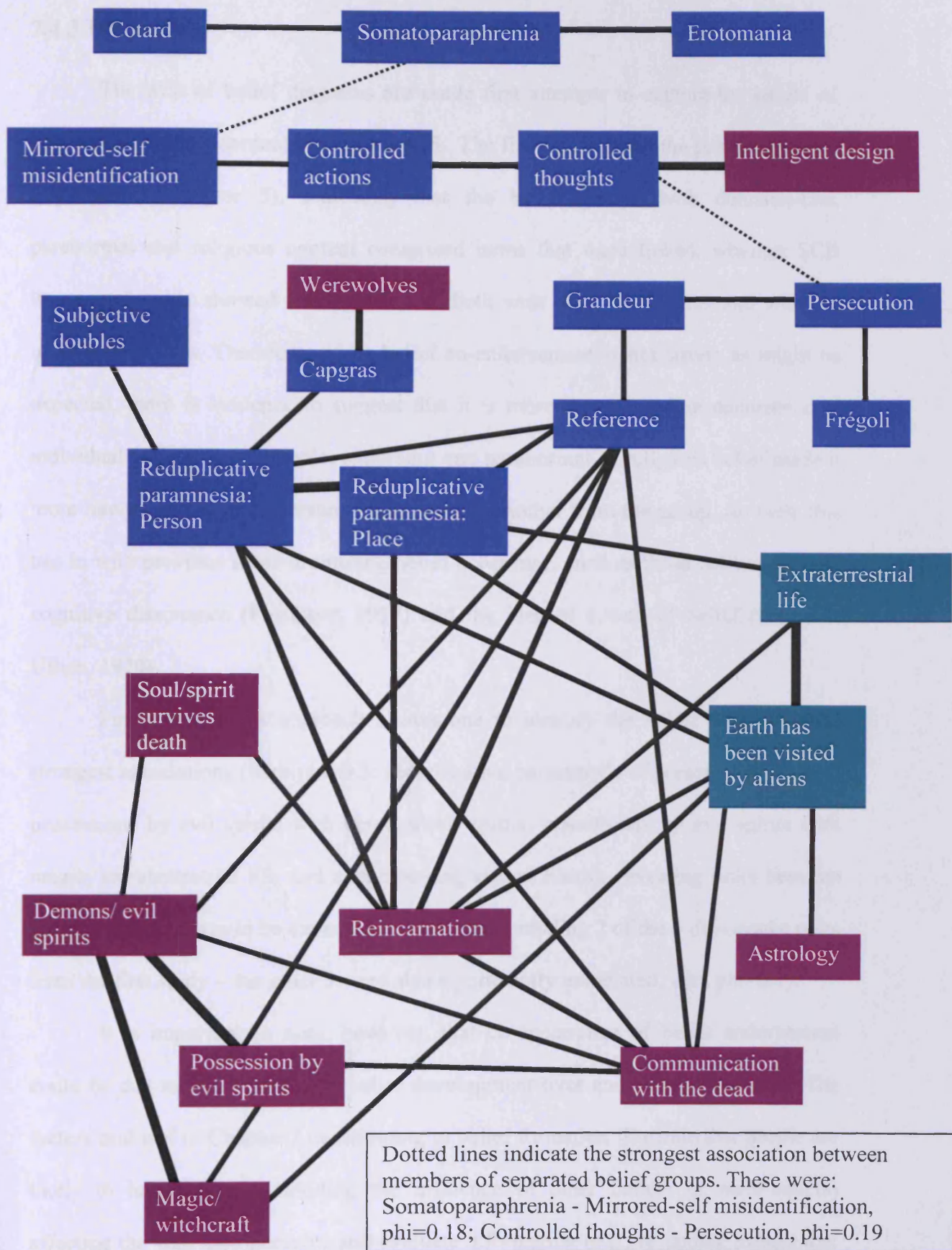


Figure 7.12. The belief pairs with associations of ϕ ($\phi \geq 0.2$)

7.4.3 Discussion

The web of belief diagrams are crude first attempts to capture the extent of coherence (or incoherence) between beliefs. The findings support the previous results (reported in Chapter 5), indicating that the belief groups with delusion-like, paranormal and religious content comprised items that were linked, whereas SCB items predictably showed less association, both with other SCB items and with the other belief types. Therefore, while belief co-endorsement is not strong as might be expected, there is evidence to suggest that it is more than a random occurrence of individual beliefs. For example, endorsing one paranormal or religious belief made it more likely that the same person would endorse another from the group. As such, this ties in with previous ideas promoting belief coherence, such as those relating to both cognitive dissonance (Festinger, 1957) and the idea of a web of belief (Quine & Ullian, 1970).

Furthermore, this approach allows one to identify the belief pairs with the strongest associations (with $\phi > 0.3$: reduplicative paramnesia of person and of place; possessions by evil spirits with demons/evil spirits; possessions by evil spirits with magic; extraterrestrial life and aliens having visited Earth), revealing links between those beliefs that would be expected to co-occur (including 2 of the 5 dissonance pairs from the first study – the other 3 were also significantly associated, with $\phi > 0.1$).

It is important to note, however, that co-occurrence of belief endorsement could be due to other factors in belief development over and above coherence. The factors outlined in Chapter 2 contributing to belief formation illustrate that people are likely to have biases (including the influence of other beliefs or meta-beliefs) affecting the way they perceive and evaluate information (e.g., reasoning biases) that are likely to impact on the types of beliefs they are likely to hold. For example, the

presence of anomalous experiences (e.g., seeing things), could lead to a number of similar beliefs (e.g., in ghosts, spirits, magic, etc.).

7.5 SUMMARY

Contrary to previous expectations, a substantial proportion of individuals reported a larger than expected number of inconsistent belief pairs. However, the web of belief analysis for the larger set of beliefs suggested evidence of coherence between (some) beliefs, in that DLB and P&RB items tended to co-occur with others in their category. This suggests that there is more than a random occurrence of beliefs, as endorsing one paranormal or religious belief generally makes it more likely that the same person will endorse another from the group. This is further supported by the stability analysis, which indicated that the more co-endorsements from DLB or P&RB categories, the more likely these beliefs were to be reported again at T2. Thus, although in general there appears to be coherence between beliefs and particularly within a designated category, this does not seem to always be the case.

Results also indicated that there is variety in the stability of different types of belief. In particular, delusion-like beliefs seem to be held with less tenacity than other types of belief. This may be part of the reason why beliefs with this type of content, which can have a significant impact on the lives of some individuals (in the form of delusions), can also be held by others in non-clinical populations without any serious consequences.

In the following final chapter (Chapter 8) these and previous findings from earlier chapters will be summarised and integrated in a review of the overall findings and possible areas for further research will be suggested.

CHAPTER 8:

CONCLUSIONS

In this final chapter, key findings from the thesis are integrated and implications for future research explored. This is also an opportunity to consider some of the limitations of the different research studies described.

8.1 Defining issues: belief and delusion

The starting point for most of the research studies described in this thesis concerned attempts to come up with an operational definition of the constructs in question; namely belief and delusion. As with other philosophical/psychological constructs it was clearly problematic to agree overarching definitions for these multidimensional constructs, and indeed little progress had been made in identifying or agreeing the key characteristics considered most pertinent to describing 'belief'. Defining delusion, while potentially equally difficult given the wide-ranging content and characteristics attributed to the term, had a more pragmatic solution in the shape of the established psychiatric glossaries. Here it was clear that whatever else delusions were, they were considered a form of belief (APA, 2000). Indeed, as can be seen from the thesis plan (presented at the start of Chapter 1 and reproduced overleaf), this definition provided one of the main pathways from which subsequent studies were developed to investigate the nature of a belief and delusion.

The other major account of delusions that was particularly influential was the continuum account, where beliefs (including delusions) are considered to comprise a continuum where functional characteristics (rather than content) are more relevant

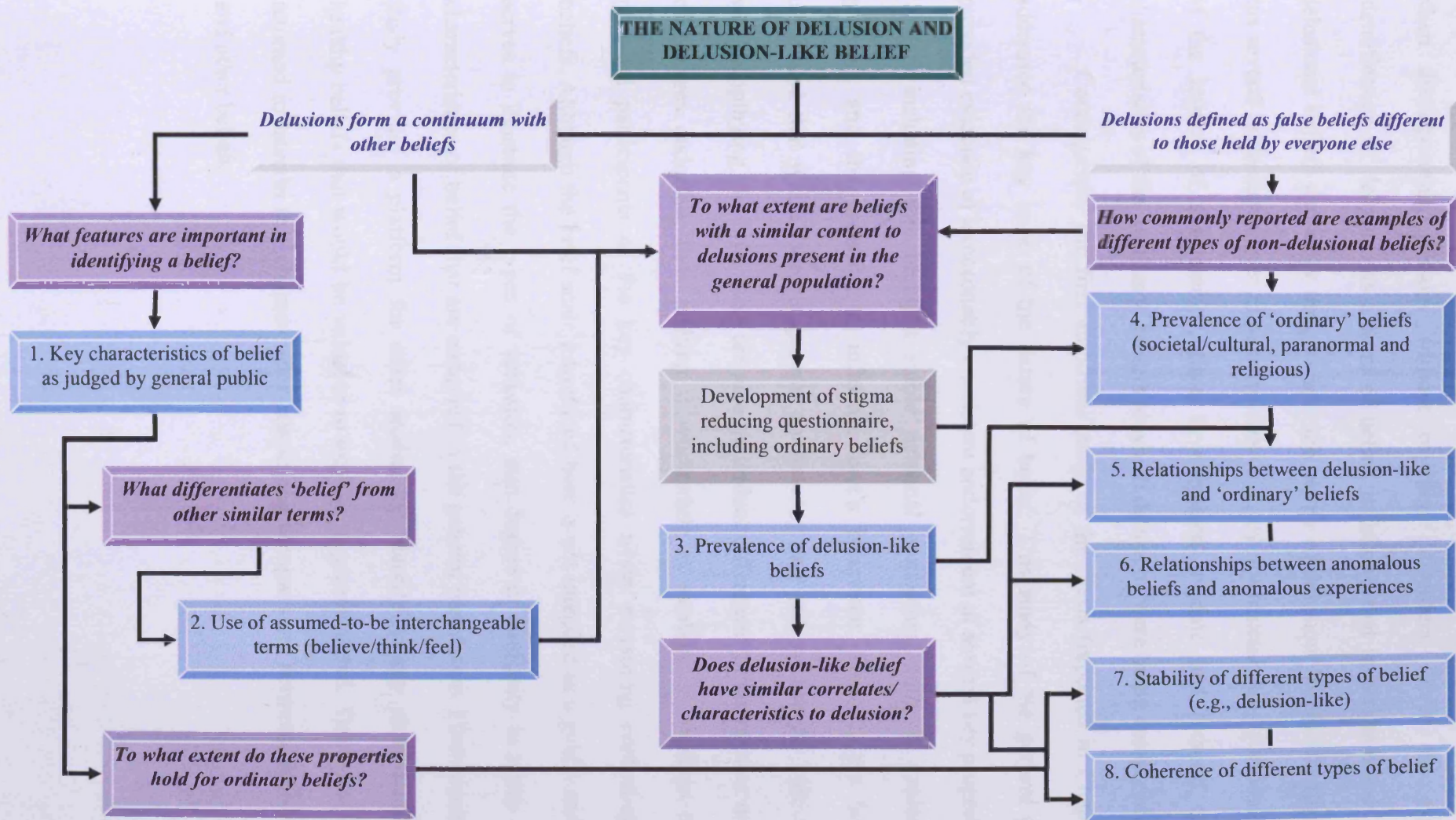


Figure 1.1 [Reproduced]. Main research questions

when distinguishing persons without psychotic disorders. Given the explicit identification of delusion as a form of belief, it follows that investigations of non-delusional beliefs can offer insights into the nature of delusion. While this approach has several advantages over clinical studies (e.g., by not necessitating considerations of the impact of medication), little investigation to date had focused on the characteristics of the 'ordinary' beliefs to which delusions were being compared.

Consequently the first empirical study of the thesis (reported in Chapter 3) addressed the key issue of the nature of belief. This study of the general public provided evidence of a reasonably consistent endorsement of several key properties of 'belief' including this being a stable personal conviction, with an explanatory purpose, and the capacity to influence one's behaviour. Overall, the findings confirmed that while there is general consistency and ease of use for participants when employing the term, there are also individual differences in the number or types of features endorsed, thus making it worthwhile to establish or perhaps remind potential participants of the key characteristics when measuring content-specific beliefs. Although the brief scale introduced here is not intended as a gold standard, it serves to illustrate the types of variation, and degree of similarity in terms of the characteristics of belief that are endorsed in the general population. Furthermore, this study provides a platform for other studies by identifying key characteristics of healthy beliefs that would be valuable to explore in greater detail. This issue will be returned to later in this chapter when discussing comparisons between delusion-like and other beliefs.

8.2 Methodology

One additional benefit from the first study was highlighting the potential differences resulting from using different terms when assessing delusional or delusion-like items. Many of the existing measures tended to employ a mixture of terms interchangeably, although the degree to which participants consider these terms synonymous had not been established. The follow-up study reported in the thesis (see Chapter 3) was designed to address this, by comparing how participants use and view each of three commonly employed terms ('believe', 'think' and 'feel'). The results were somewhat mixed, however, with most participants considering the term 'believe' to be a significantly stronger personal endorsement than either 'think' or 'feel' but often using these terms equivalently (when assessed using a yes/no measure). Overall, the results suggest caution when interpreting responses to questions that use different probe terms in clinical and health questionnaires of beliefs, as there appeared to be some differences (albeit a minority) in participants' usage of these. There are also some preliminary suggestions that these may be context-dependent, although further investigation will be necessary to establish the degree to which this occurs for different types of item.

These considerations played a role in the next research aim, namely the development of the Cardiff Beliefs Questionnaire (reported in Chapter 4), which demonstrated good psychometric properties in general. A key feature of the CBQ was the inclusion of a range of non-clinical beliefs, which, as well as providing a relative baseline from which to compare the prevalence of delusion-like beliefs, reduced the psychiatric focus of the measure (and presumably stigma associated with endorsing such items). One area where further study would be beneficial, however, would be quantifying the extent to which stigma influences participants' responses on these

types of questionnaires, and whether this does differ between groups (as has been suggested in other areas: Ray & Lovejoy, 2003; Thomsen et al., 2005), which may play some role in the various demographics reported to be associated with delusions and DLB (see van Os et al., 2009).

8.3 Prevalence of anomalous beliefs and experiences

By developing a new measure of delusion-like beliefs, designed to reduce stigma, employ a single consistent term ('believe'), and embed questions addressing DLB within a wider range of beliefs, it was predicted that reported levels of DLB would increase over previous estimates. Indeed, the results suggest that it is not unusual for members of a non-clinical sample to hold DLBs. Chapter 5 showed that 38% of a large British sample reported holding one or more DLB strongly and approximately 90% reported one or more at any strength. Moreover, by including a range of bizarre DLB, it is clear that these kinds of beliefs are also often endorsed in the general population (26% endorsing one or more of these items strongly). This is especially significant, given that the DSM has fewer requirements for diagnosis of schizophrenia if a bizarre delusion is present.

Overall, these findings support the growing consensus that endorsing or holding certain content-specific beliefs is by no means sufficient to characterise a delusion (Bell, Halligan & Ellis, 2006b; Johns & van Os, 2001; Peters et al., 2004; van Os et al., 2009). Furthermore, the higher prevalence found in the studies questions assumptions regarding the unusualness of DLBs in the general population. These findings provide further support for the continuum hypothesis (alongside those of Chapter 6, which indicated that almost a quarter of participants in the same large sample of the general public endorsed items relating to hallucination-like

experiences). As these psychotic-like phenomena are commonly found in the general population, the implication is that there is nothing inherently unusual about content-specific delusions (or hallucinations). As such, the results suggest that it may be possible, and perhaps more interesting, to elaborate on what causes delusions to be distressing or preoccupying for some individuals but not for others (i.e., compare groups of people with strongly held DLB (but without distress or preoccupation) to those with distressing and preoccupying delusions of a similar content).

In addition, the CBQ has the potential to be employed as a screening instrument for psychosis (although this is likely to need further development). Although other measures of schizotypy or psychotic symptoms (e.g., O-LIFE, PSQ) have been developed for this purpose, given the CBQ's unique focus on reducing stigma, and inclusion of a range of other beliefs, it may be able to provide a better indication of individual's beliefs and experiences. As such, it may be beneficial to investigate the beliefs reported on the CBQ using a longitudinal design, to see if there is an increased risk of developing psychotic disorders for high DLB or AE groups. Moreover, given that holding very low numbers of SCB was as unusual as holding high numbers of DLB, it would be interesting to see how individuals falling into this category progress over time. Indeed, it might be interesting to further investigate a low SCB group, to establish whether these individuals have particular cognitive biases or other factors that contribute to their lack of belief.

Although the high levels described in the current study suggest that DLB are reported in the general population, there are clearly some limitations inherent in conducting self-report studies into phenomena of this nature. The main difficulties are summarised in turn below.

Potential for misinterpretation

Although the CBQ is a reliable and useful instrument, it shares some limitations with all research studies using self-report assessments. One such limitation is that researchers may not fully determine how individuals understand/interpret the questions being asked. This issue can be mitigated to some extent by extensive piloting and taking account of participant feedback. Moreover, by requiring that all participants completed the characteristics of belief section prior to answering the CBQ questions proper, it is reasonable to assume that participants had a better understanding of what constituted a belief before commencing the CBQ. Although the final version of the CBQ had gone through 3 iterative developments and included respondent feedback, it is not possible to say for certain that all individuals addressed items fully and appropriately given the potential for differential interpretation of the questions.

Plausibility of delusion-like items

As briefly highlighted in Chapter 4, another issue with this type of research is that the basic themes for many of the non-bizarre delusion-like beliefs (persecution, grandeur, somatic, erotomania, reference, nihilism) are by definition all potentially or partially plausible (i.e., they could be objectively true). Given that participants' responses rely on self-report and there were only a limited number of generic questions covering a belief content theme, it was not possible to determine the veracity of all endorsed beliefs. This is not to imply that participants were being economical with the truth, but rather that the relative subjective salience of events and evidence that might lead to such an endorsement (e.g., of a persecutory belief that someone is out to harm one) may be different for different subjects. Responses to questions will always mirror the

reality of events being interpreted. This limitation clearly affects all such questionnaires in the field, and extends to all interview-based studies, including formal clinical psychiatric interviews.

Cultural explanation

As well as being unsure as to the veracity of certain DLB responses, there may be some cultural or personal justification informing a participant's responses that is not identified in this study. For example, many participants in this study endorsed the belief relating to ideas of reference ('Do you believe that people say or do things that contain special messages for you?'). This was highly correlated with participants' self-ratings of religiosity, however, and, as religious beliefs are not considered delusional by clinical definition, this belief could be viewed differently in a religious context.

Other aspects of psychotic symptoms

A further limitation remains the relative focus of the CBQ questions on content and conviction. There is good evidence that other dimensions, such as distress and preoccupation, may differentiate clinical from non-clinical beliefs (Myin-Germeys et al., 2001; Strauss, 1969). Indeed, such features have been implicated as playing a vital role in the assessment of delusions and anomalous experiences (Bell et al., 2008; Peters et al., 2004). An improved version of the CBQ might include such dimensions; however, such questions would have to be worded carefully so as not to unintentionally highlight negative consequences (e.g., distress) for specific beliefs that had been previously considered positively by participants. Indeed, it would be

interesting to establish whether any of these beliefs in fact had a positive impact on participants' lives, given that emotionally positive psychotic symptoms do occur (e.g., the protective angel of patient FR) and hallucinations in the general population tend to be more positive (Honig et al., 1998).

These limitations provide an impetus for further research in this area. As already highlighted, the extent to which a belief is based on evidence that would be objectively credible is not known. Overvalued ideas, such as those found in anorexia, are another way of investigating beliefs in patient versus healthy samples. These types of belief are extremely common in young people (e.g., Johns & Swift, 2009; Paxton et al., 1991). Moreover, some beliefs in eating disorders have been considered as having delusional intensity (Munro, 1999). Such beliefs could provide an objective way of looking at the degree to which the belief is appropriate, by considering an anthropometric measure, such as body mass index. By comparing the same types of belief (e.g., 'I need to lose weight') across individuals (e.g., overweight, healthy and underweight), and also gaining an idea of the actions they take following this belief and their attitudes towards the causes of weight gain/loss, it may be possible to build upon belief models by using data from this area. In particular, it may also provide an assessment of the degree to which 'false' beliefs occur in the general population, albeit with the extent of 'falsity' varying throughout the sample.

A further area of interest would be to examine the beliefs reported on the CBQ in greater detail. By interviewing individuals with high DLB scores, it would be possible to establish with greater accuracy the nature of the reported beliefs, and perhaps estimate the likely effects of misinterpretation, plausibility or cultural explanation.

8.4 Relationships with theoretical correlates

Following on from the findings relating to delusion-like beliefs, the relationships between beliefs and experiences are particularly interesting, given the longstanding view of beliefs offering explanations for experiences (dating back to the philosopher Locke). This relationship was prominent in studies of delusions and hallucinations, and was similarly expected to carry over and be evidenced in psychotic-like symptoms. Indeed, this was generally supported, with findings suggesting a strong relationship between AB and AE, which held for the majority of participants. However, several participants did endorse high AB in the absence of AE or vice versa. This questions previous accounts that postulate a one-to-one correspondence between an AE and an AB. Instead, these results tie in better with studies suggesting that AE are not a necessary condition for delusion formation (e.g., Bell, Halligan & Ellis, 2006c). However, such conclusions are still limited by the difficulties with ruling out other or forgotten experiences. In particular, the cross-sectional nature of the majority of studies to date makes it difficult to tease apart the correlation between AE and AB. A longitudinal study using the CBQ or similar measures would help to address some of these limitations.

8.5 Meta-beliefs

One additional characteristic of the CBQ, which distinguishes it from other current measures, was the inclusion of a range of brief meta-beliefs, designed to evaluate participants' assessments of their dispositions towards their own beliefs. Findings suggested that those who rated themselves as superstitious, religious or generally having a propensity to believe in things had significantly higher paranormal and

religious belief scores. In addition, those who rated themselves as superstitious or as having a high propensity to believe in things had significantly higher delusion-like belief and anomalous experience scores. This suggests that participants can have insight into how their beliefs are likely to be objectively viewed, and are capable of judging their likeliness to report anomalous beliefs and experiences. Indeed, given that this was a general population sample and that they had been “primed” by answering questions on their beliefs and experiences prior to completing these items, this was reassuring. Further investigation of the usefulness of these measures may be beneficial, to establish if they would provide a quick yet reliable indication of participants’ dispositions to believe or experience these types of phenomena.

8.6 Comparing characteristics of ‘normal’ belief and delusion

A final major strand of research ties back in with the discussion regarding the definition of delusion at the start of this chapter. The findings from the characteristics of belief study (Chapter 3) fit with intuitions that have in part led to the questioning of delusions as beliefs, whereby researchers concur (albeit in the absence of empirical evidence) with the general public opinions that beliefs should lead to actions, have conviction, etc. (e.g., Berrios, 1991; Currie, 2000; Sass, 1994). However, notwithstanding arguments that such conditions do not hold for all delusions, it had not been empirically established as to how far delusions are representative of beliefs in general (given the range of conviction with which a belief could be held, etc.). Certain features of belief were subsequently addressed in this thesis, including the stability and the degree to which beliefs can be circumscribed (i.e., separated from the other beliefs held by an individual). Furthermore, in Chapter 5 the particular problem with the DSM definition’s reliance on distinguishing delusion from other beliefs (e.g.,

religious beliefs) based almost entirely on the number of people holding the belief was subject to empirical testing.

8.6.1 Range of beliefs

In terms of the range of beliefs held by individuals, most previous work has focused on one particular type of belief rather than assessing and comparing reports by means of a single measure (and a similar approach has been taken with experiences). By including a range of beliefs and experiences in the CBQ, the importance of placing endorsements of psychotic-like beliefs and experiences in the context of other beliefs/experiences (including some that have also been considered unusual) was highlighted. Indeed, this is especially significant as the DSM offers no formal guidelines as to what proportion of people (from one culture) need to hold a belief such that it is no longer appropriate to consider this a delusion. The findings reported in Chapter 5 suggest that this important criterion in the DSM definition can be questioned, as paranormal and religious beliefs could not be distinguished from DLB when considering the proportion of people assumed to hold them. Furthermore, results from factor, correlational and coherence analyses all supported the case that delusion-like and paranormal and religious beliefs showed considerable overlap. In addition, similar results were found for psychotic-like and paranormal experience items, indicating that the boundaries between these types of experiences are relatively porous, despite one content type being more associated with clinical symptoms than the other.

8.6.2 Stability of belief

A second feature of belief highlighted by the DSM definition was the idea of a ‘fixed’ (i.e., stable) belief. Chapter 7 presented findings suggesting that stability in fact varied depending on the type of belief. In particular, delusion-like beliefs in the general public seem to be held with less tenacity than other types of belief, perhaps reflecting a distinguishing feature from a clinical delusion (i.e., one reason that these DLB are not clinically relevant may stem from their fluctuating and perhaps less intense nature). This study also highlighted the uncertainty of using test-retest measures, in that an overall measure may not accurately reflect the entire questionnaire, and furthermore, questioned the appropriateness of applying these criteria to such measures. If a proportion of DLBs represent unstable ideas held weakly by some members of the general population, then it may not be helpful to use a benchmark for these measures that emphasises consistency over time. Instead, concentrating on internal consistency measures may be more appropriate.

8.6.3 Coherence of belief

The second related set of investigations presented in Chapter 7 described preliminary attempts to develop a better understanding of what belief coherence might constitute. Following suggestions that beliefs need to cohere with other beliefs held by the same individual (predominantly an idea developed from philosophy: e.g., Quine & Ullian, 1970), the presence of seemingly circumscribed delusions appeared unusual. However, results from the coherence studies indicate that participants do indeed sometimes endorse lone beliefs, although the CBQ is clearly not a fully comprehensive list of beliefs. Furthermore, a significant proportion (35%) reported inconsistent belief pairs, in contrast to the theoretical accounts previously proposed.

This highlights the importance of investigating (sometimes long-held) assumptions regarding the definition of common terms. That said, such discrepancies were in the minority. Indeed, the further studies of coherence showed support for the idea that in general, people's beliefs often group together. Moreover, the results indicated that beliefs that fall into paranormal and religious or delusion-like categories tend to co-occur (i.e., that there is more than a random occurrence of beliefs, as endorsing one paranormal or religious belief generally makes it more likely that the same person will endorse another from the group). Thus, while in general there does appear to be the predicted consistency between beliefs, it also seems possible for non-clinical subjects to hold inconsistent beliefs. As such, this raises doubts regarding both the theoretical emphasis on consistency for all beliefs and the differentiation of circumscribed delusion from 'normal' belief.

In summary, this element of the thesis demonstrated that several assumptions regarding differences between delusions and 'normal' beliefs require further investigation, as there is considerable variation in the properties of the beliefs reported in the general population.

8.7 Patients

Finally, data were also presented from a small patient group, which allowed for a tentative comparison with a group of healthy age- and gender-matched controls, focusing on the number and strength of the different belief types and also the number and frequency of anomalous experiences. Interestingly, while there was a range of scores, which was to some degree accounted for by the range in illness severity, most patients were not distinguishable from healthy controls on the basis of either the

number or strength of their beliefs. Patients' experiences, however, were somewhat more distinct from healthy controls', with the majority of patients reporting more and/or more frequently occurring anomalous experiences, but again this was not a universal feature. This comparison provided tentative evidence in support of the idea that the content, and to some extent conviction, of a belief are not sufficient criteria on which to base a diagnosis of delusion.

One area for future research would be to build on this pilot study, using a larger sample to again evaluate the range of beliefs and experiences, but to also look at the coherence and stability of beliefs for this group longitudinally. This would provide a direct comparison with the data already collected for healthy participants, and allow us to further evaluate the extent to which these attributes differ (if at all) between delusions and other beliefs, as well as whether other beliefs held by patients have similar qualities to delusions. In particular, it would be interesting to compare coherence between patients with circumscribed delusions and those with a number of delusional beliefs.

8.8 Summary

Overall, this thesis has explored a range of questions addressing the nature, processes and products of belief and delusion formation. The findings discussed here have implications in particular for: *(1) belief and delusion definition, (2) comparisons between these two concepts, (3) the methodology appropriate for assessing beliefs, (4) the continuum approach and (5) the role of anomalous perceptual experiences.* In addition, preliminary data have explored participants' insight into their propensity to report certain types of beliefs and experiences. Pilot data have also allowed comparisons between responses of patients with delusions and healthy controls on the

CBQ. Nevertheless, given the multidimensional and dynamic nature of belief processes, it is clear that there are many questions left unanswered.

In particular, future research questions highlighted by this thesis include:

- Examining the prevalence of 'positive' and 'negative' DLBs in the general population
- Examining beliefs where a more objective measure of the validity of the belief is possible, to determine the degree to which 'false' beliefs are present in the general population
- Establishing the coherence and stability of patients' beliefs (both delusional and non-delusional), to empirically test assumptions surrounding delusions

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APPENDICES

Appendix I: Believing, Thinking and Feeling Questionnaire

Appendix II: Script for telephone interviews (CBQ)

Appendix III: Tables of revisions for Cardiff Belief Questionnaire items

- (i) *Delusion-like beliefs*
- (ii) *Paranormal and religious belief*
- (iii) *Societal/cultural beliefs*
- (iv) *Experiences*
- (v) *Meta-beliefs*

Appendix I: Believing, Thinking and Feeling Questionnaire

Believing, Thinking and Feeling

This questionnaire presents you with a series of statements or propositions. After carefully reading each, please indicate the extent to which each of three responses represents your position towards the given proposition/statement:

'I believe this'

'I feel this'

'I think this'

Please note that the order in which these options are presented will vary between questions.

For the study to be useful, it is important that you answer the following questions **honestly** and **quickly**.

Please attempt all questions, unless you feel uncomfortable about a question, in which case please leave it blank.

Please complete the following items:

Key code: 2008 - _____

Gender: Male / Female

Age: _____

For the following statements, please circle the response which best represents your position for each of the three options, as in the example below.

Illustrative Example

A. Some houses are haunted

'I believe this' Yes No

'I feel this' Yes No

'I think this' Yes No

If you have any questions or concerns at any stage, please feel free to contact either of the researchers: Rachel Pechey (pecheyrk@cf.ac.uk) or Prof. Peter Halligan (halliganpw@cf.ac.uk) at the School of Psychology, Cardiff University, Tower Building, Park Place, Cardiff, CF10 3AT

STATEMENTS

The following statements were presented with response options as with the example above. Response options were rotated.

1. I have free choice or free will
2. Abortion is right
3. The position of the stars and planets affects or determines my life
4. My body or part of my body is misshapen or ugly
5. Human activities cause significant global warming
6. I am an exceptionally gifted person that others do not recognise
7. The soul or spirit survives death
8. Certain people are out to harm or discredit me
9. Some people are possessed by evil spirits
10. It is right to use the death penalty for serious crimes
11. Certain people or places are duplicated, i.e. are in two different locations at the same time
12. When I die my soul will be reborn in another body
13. People say or do things that contain special messages for me
14. There is extra-terrestrial life
15. The reflection in the mirror is sometimes not me
16. Black magic and/or witchcraft exists
17. I am infested by parasites
18. There is a god or gods
19. Some well-known celebrity is secretly in love with me
20. Democracy is the best system of government
21. Part of my body doesn't belong to me
22. Euthanasia (ending the life of a person who is incurably ill in order to limit suffering) is right
23. Some people change into werewolves
24. People I know disguise themselves as others to manipulate or influence me

25. The complexity of the world suggests that it was purposefully designed by an intelligent creator
26. My thoughts or actions are not fully under my control
27. Same sex relationships are right
28. There is another person who looks and acts like me
29. Organised religion is one of the main sources of human strife
30. Some people communicate with the dead
31. The world is about to end
32. It is right to use animals for medically related research
33. My relatives or close friends are sometimes replaced by identical-looking impostors
34. The theory of evolution is correct
35. I am dead and/or do not exist
36. There are demons or evil spirits
37. Positive thoughts and attitudes improve my physical wellbeing

Finally, consider for a moment how you commonly use each of the qualifying terms (believe, think and feel) and rank these in terms of the typical strength of personal endorsement they imply for you when you use them

	<i>Very strong endorsement of a statement</i>			<i>Very weak endorsement of a statement</i>	
'I think X'	5	4	3	2	1
'I believe X'	5	4	3	2	1
'I feel X'	5	4	3	2	1

Thank you for completing this questionnaire

APPENDIX II: SCRIPT FOR TELEPHONE INTERVIEWS

(Sections 2-4 comprise items from the Cardiff Belief Questionnaire)

SCREENING

S1 Good morning/afternoon/evening. My name is _____ from **mruk** research. We have been commissioned by Professor Halligan at Cardiff University to carry out a survey amongst the population of the UK about the nature and range of beliefs and experiences in everyday life. You have been selected at random for this survey, and I wonder if I could ask you some questions?

This interview will be conducted within the Code of Conduct of the Market Research Society. In accordance with the Data Protection Act (1998), any information you provide will be held anonymously and treated in the strictest confidence, and will only be used by researchers at Cardiff University. We would appreciate if you answered all questions but you may choose not to answer questions if you feel uncomfortable. You are free to review your responses or withdraw at any point during the interview. The study includes a wide range of beliefs and experiences that some people may find unusual but which are more common than most people realise

The interview takes about 15 minutes and everything you say will be treated in the strictest confidence

S3 Gender [INTERVIEWER DO NOT ASK]:-

Male
Female

S4 Which of the following age categories do you fall into?

18 to 29
30 to 44
45 to 59
60+

S5 What is your current working situation?

Employed (e.g. full time, part time, self-employed)
Not employed (e.g. retired, student, caring for home/family)

Is the respondent capable of understanding the questions?

SECTION 1: NATURE OF BELIEF

READ OUT: “In this part we want to get a better idea of what you mean by the word ‘belief’.

“We have broken the idea of belief into 14 different characteristics. Please consider each of the following characteristics carefully, and rate the extent to which each is an accurate description of belief using the scale not at all, partly and totally.”

INTERVIEWER INSTRUCTION: ROTATE ORDER OF QUESTIONS (Q1-Q14)

Answer scales were read out after each question. Response options were:

- Not at all
- Partly
- Totally
- Don't know/refused

Q1 To what extent does ‘belief’ describe or refer to a *strongly held conviction*?

Q2 To what extent are ‘beliefs’ a *personal interpretation about events, or the nature of the world*?

Q3 To what extent do *beliefs influence your thoughts*?

Q4 To what extent do beliefs provide a *framework for explaining how things are or should be*?

Q5 To what extent do beliefs *shape or colour your attitudes and decisions*?

Q6 To what extent are beliefs *more than a passing thought or feeling*?

Q7 To what extent are beliefs *relatively permanent across time and different situations*?

Q8 To what extent do beliefs *influence the way you feel*?

Q9 To what extent are beliefs more than *memories or facts*?

Q10 To what extent are beliefs *resistant to change*?

Q11 To what extent are beliefs *true and/or right*?

Q12 To what extent do beliefs *influence your behaviour*?

Q13 To what extent are beliefs something you would *acknowledge or talk about publicly*?

Q14 To what extent are beliefs a *significant part of your personal core values*?

SECTION 2: BELIEFS

READ OUT: “Now I would like to ask you about some beliefs and experiences that you MAY or MAY NOT have.”

You may consider some of these slightly strange but it is important that you answer these carefully.”

“In addition, for the study to be useful for our research, it is IMPORTANT that you answer the questions honestly and quickly.”

“Please DON’T include any experiences or beliefs you may have had under the influence of drugs or alcohol.”

Answer scales were read out after each question. Response options were:

- Do not believe
- Weakly believe
- Moderately believe
- Strongly believe
- No opinion
- Don’t know/refused

Q15 To what extent do you believe that people should help those less fortunate than themselves?

Q16 To what extent do you believe that humans cause significant global warming?

Q17 To what extent do you believe in astrology (i.e. that the position of the stars and planets affects or determines your life)?

Q18 To what extent do you believe that your body or part of your body is misshapen or ugly?

Q19 To what extent do you believe that euthanasia is right?
[INTERVIEWER NOTE: If asked, define ‘euthanasia’ as ‘ending the life of a human or animal who is incurably ill in order to limit suffering’]

Q20 To what extent do you believe that you are an exceptionally gifted person that others do not recognise?

Q21 To what extent do you believe that democracy is the best system of government?

Q22 To what extent do you believe that certain people are out to harm or discredit you?

Q23 To what extent do you believe in a god or gods?

Q24 To what extent do you believe that certain places are duplicated, i.e. are in two different locations at the same time?

Q25 To what extent do you believe in extra-terrestrial life?

Q26 To what extent do you believe that people say or do things that contain special messages for you?

Q27 To what extent do you believe that the soul or spirit survives death?

Q28 To what extent do you believe you have fundamental human rights that cannot be taken from you?

- Q29** To what extent do you believe in black magic or witchcraft?
- Q30** To what extent do you believe that the reflection in the mirror is sometimes not you?
- Q31** To what extent do you believe that abortion is right or wrong?
- Q32** To what extent do you believe in demons or evil spirits?
- Q33** To what extent do you believe that you are infested by parasites?
- Q34** To what extent do you believe in “intelligent design” (i.e. that the complexity of the world suggests that it was purposefully designed by an intelligent creator)?
- Q35** To what extent do you believe that you are not in control of some of your actions?
- Q36** To what extent do you believe that organised religion is one of the main sources of human strife?
- Q37** To what extent do you believe that some people communicate with the dead?
- Q38** To what extent do you believe that humans share a common ancestor with apes?
- Q39** To what extent do you believe that some well-known celebrity is secretly in love with you?
- Q40** To what extent do you believe in the death penalty for serious crimes?
- Q41** To what extent do you believe that earth has been visited by aliens from other solar systems?
- Q42** To what extent do you believe that some people are duplicated, i.e. are in two places at the same time?
- Q43** To what extent do you believe in the theory of evolution?
- Q44** To what extent do you believe that the world is about to end?
- Q45** To what extent do you believe that same sex relationships are right or wrong?
- Q46** To what extent do you believe that people you know disguise themselves as others to manipulate or influence you?
- Q47** To what extent do you believe in reincarnation (i.e. that when you die your soul is reborn in another body)?
- Q48** To what extent do you believe that your thoughts are not fully under your control?
- Q49** To what extent do you believe it is right or wrong to use animals for medically related research?
- Q50** To what extent do you believe that there is another person who looks and acts like you?
- Q51** To what extent do you believe that the earth is the centre of the universe?

- Q52** To what extent do you believe that part of your body doesn't belong to you?
- Q53** To what extent do you believe some people transform into werewolves?
- Q54** To what extent do you believe that young children (under 6) are capable of holding beliefs?
- Q55** To what extent do you believe that relatives or close friends are sometimes replaced by identical-looking impostors?
- Q56** To what extent do you believe that you have free choice, or free will?
- Q57** To what extent do you believe that you are dead and/or do not exist?
- Q58** To what extent do you believe that animals have beliefs?
- Q59** To what extent do you believe that some people are possessed by evil spirits?
- Q60** To what extent do you believe that positive thoughts and attitudes improve your physical wellbeing?

SECTION 3: EXPERIENCES

READ OUT: "Now I'm going to ask you about some behaviours and experiences"
 "Please only tell me about experiences you have had as an adult, even though the questions include past experiences."

Answer scales were read out after each question. Response options were:

- Often
- Sometimes
- Rarely
- Never
- Don't know/refused

- Q61** How often do you attend religious services (other than weddings, funerals, etc.)?
- Q62** How often have you seen or sensed a ghost?
- Q63** How often have you felt that familiar objects appeared different even though you knew they hadn't changed?
- Q64** How often have you had an out-of-body experience (e.g. felt as though you were looking down on your own body from above)?
- Q65** How often have you sensed when a friend or family member was in trouble?
- Q66** How often have you seen things which other people cannot?
- Q67** How often have you had premonitions of events that have yet to take place?
- Q68** How often have you heard voices when no-one is around?
- Q69** How often have you felt that familiar people all seem colder or more distant than before?

SECTION 4: INSIGHT

READ OUT: “Finally, I’d like to ask you about some beliefs you may hold about yourself”

Q70 To what extent do you consider yourself a religious person?

Not at all religious
Quite religious
Very religious
Don’t know/refused

Q71 To what extent do you consider yourself superstitious (i.e. likely to believe certain events occur through mysterious or magical means)?

Very superstitious
Quite superstitious
Not at all superstitious
Don’t know/refused

Q72 To what extent do you consider yourself likely to believe in things that others do not?

Not at all likely
Quite likely
Very likely
Don’t know/refused

Q73 To what extent do you consider yourself tolerant of people with different beliefs?

Very tolerant
Quite tolerant
Not at all tolerant
Don’t know/refused

SECTION 5: DEMOGRAPHICS

READ OUT: “Finally, a couple of questions about yourself, so that we can make sure we have spoken to a good mix of people”

N.B. D1 and D3 were split into smaller questions in the interviews but are combined for succinctness here

D1 Which of these BEST describes the sort of work you do/did?

Modern professional occupations

Such as: teacher, nurse, physiotherapist, social worker, welfare officer, artist, musician, police officer (sergeant or above), software designer

Clerical and intermediate occupations

Such as: secretary, personal assistant, clerical worker, office clerk, call centre agent, nursing auxiliary, nursery nurse

Senior managers or administrators

(Usually responsible for planning, organising and co-ordinating work and for finance). Such as: finance manager or chief executive

Technical and craft occupations

Such as: motor mechanic, fitter, inspector, plumber, printer, tool maker, electrician, gardener, train driver

Semi-routine manual and service occupations

Such as: postal worker, machine operative, security guard, caretaker, farm worker, catering assistant, receptionist, sales assistant

Routine manual and service occupations

Such as: HGV driver, van driver, cleaner, porter, packer, sewing machinist, messenger, labourer, waiter / waitress, bar staff

Middle or junior managers

Such as: office manager, retail manager, bank manager, restaurant manager, warehouse manager, publican

Traditional professional occupations

Such as: accountant, solicitor, medical practitioner, scientist, civil / mechanical engineer

None of these/other

Refused

D2 What is the highest educational qualification you've achieved to date?

Secondary/high school/NVQ 1-3

University degree or equivalent professional qualification/NVQ4

Higher university degree/Doctorate/MBA/NVQ 5 or equivalent

None of these/other

Refused

D3 What is your ethnic group?

Indian

Pakistani

Bangladeshi

Any other Asian Background

Black and Black British – Caribbean

Black and Black British – African

Any other Black background

Chinese

Mixed – white and black Caribbean

Mixed – white and black African

Mixed – white and Asian

Any other mixed background

White – British

White – Irish

White – Welsh

White – English

White – Scottish

Any other white background

Other ethnic group

Refused

D4 Which of the following best describes your household? (**MULTIPLE OPTIONS ALLOWED**)

- Live alone
- Live with partner
- Live with children
- Live with parent(s)
- Live with other relative(s)
- Live with friend(s)
- Live with housemate(s)
- Refused

D5A Do you have a longstanding physical or mental condition?

- Yes *ASK D5B AND D5C*
- No *GO TO D6*
- Refused *GO TO D6*

D5B Does this have a substantial adverse effect on your ability to carry out day-to-day activities?

- Yes
- No
- Refused

D5C Are you currently taking medication for this condition?

- Yes
- No
- Refused

D6 Which, if any, organised religion do you belong to?

- Christianity
- Hinduism
- Islam
- Judaism
- Sikhism
- Other
- None
- Refused

D7 Which hand do you write with?

- Left
- Ambidextrous/both
- Right
- Refused

INTERVIEWER READ OUT: “Thank you very much for taking part in this survey. ALL INFORMATION PROVIDED BY YOU TODAY WILL BE HELD ANONYMOUSLY. These results will give us a better understanding of the range and influence of beliefs and experiences in everyday life.”

“The study includes a wide range of beliefs and experiences that some people may find unusual but which are more common than people realise. Hopefully, none of these questions give rise to concern. However, if you are concerned and would like help, support or further information, you may wish to speak with your GP.”

“If you would like further information about the study, please contact Prof. Halligan at the School of Psychology, Cardiff University, by emailing him at halliganpw@cardiff.ac.uk, or phoning on 02920 876 911.”

“If you have any concerns about the way this survey has been conducted, please direct your comments to the Cardiff School of Psychology Ethics Committee Secretary, psychethics@cf.ac.uk or 02920 874 007”

“I would like to thank you again for the time and help you've given me today.”

Appendix III: Tables of revisions for Cardiff Belief Questionnaire items

- (vi) Delusion-like beliefs
- (vii) Paranormal and religious belief
- (viii) Societal/cultural beliefs
- (ix) Experiences
- (x) Meta-beliefs

Table (i): Delusion-like beliefs

	<i>Version 1</i>	<i>Version 2</i>	<i>Version 3</i>	<i>Version 4</i>
Delusion item based on	<i>Do you believe, or have you believed...</i>	<i>Do you believe...</i>		<i>To what extent do you believe...</i>
Persecution	... that people are out to harm or discredit you?*		... that certain people are out to harm or discredit you?	
Grandeur	... that you are an exceptionally gifted person whom other people do not recognise?	... that you are an exceptionally gifted person that other people do not recognise?	... that you are an exceptionally gifted person that others do not recognise?	
Delusions of reference	... that programmes on TV or the radio, or articles in magazines have been specifically created for you?		... that people say or do things that contain special messages for you?	
Body dysmorphia	... that a part of your body is misshapen or ugly?*			... that your body, or part of your body, is misshapen or ugly?
Delusional parasitosis	... that you have been infested by parasites?		... that you are infested by parasites?	
Erotomania	...that some well-known celebrity is secretly in love with you?			
Thought insertion/ withdrawal/ broadcasting	... that someone else's thoughts can be inserted into your mind?	... that your thoughts are under someone else's control?*	... that your thoughts are not under your control?	... that your thoughts are not fully under your control?
Controlled actions	... that another person or entity can be in control of your actions?	... that someone else is in control of your actions?		... that you are not in control of some of your actions?
Mirrored-self misidentification	... that when looking in the mirror the reflection is not really you?	... that the reflection in the mirror is not really you?		... that the reflection in the mirror is sometimes not you?

Frégoli syndrome	... that people you know may disguise themselves as others to influence you?	... that people you know disguise themselves as others to manipulate you?	... that people you know disguise themselves as others to manipulate or influence you?	
Reduplicative paramnesia (of place)	... that a place can be in two different locations at the same time?	... that some places are in two different locations at the same time?	... that certain places are in two different locations at the same time?	... that certain places are duplicated, i.e. are in two different locations at the same time?
Reduplicative paramnesia (of person)	... that someone can be in two places at the same time?	... that somebody is in two places at the same time?	... that certain people are in two places at the same time?	... that some people are duplicated, i.e. are in two places at the same time?
Capgras syndrome	... that your relatives have been replaced by similar looking people?		... that your relatives are sometimes replaced by identical-looking imposters?	... that relatives or close friends are sometimes replaced by identical-looking imposters?
Cotard syndrome	... that you are dead?		... that you are dead or do not exist?	... that you are dead and/or do not exist?
Nihilism	-		... that the world is about to end?	
Subjective doubles	-		... that there is another person who looks and acts like you?	
Somatoparaphrenia	-		... that part of your body doesn't really belong to you?	... that part of your body doesn't belong to you?

* Asked in a separate question as well on version 2, in the form 'Have you ever believed...?'

Table (ii): Paranormal and religious beliefs

<i>Version 1 (n=5)</i>	<i>Version 2 (n=8)</i>	<i>Version 3 (n=9)</i>	<i>Version 4(n=10)</i>
<i>Do you believe, or have you believed...</i>	<i>Do you believe...</i>		<i>To what extent do you believe...</i>
... that it is possible to communicate with people who have died?	... that some people communicate with the dead?		
... in fate or destiny?	-		
... in astrology (i.e. that the position of the stars and planets can affect or determine people's lives)?	... in astrology (i.e. that the position of the stars and planets can affect or determine your life)?	... in astrology (i.e. that the position of the stars and planets affects or determines your life)?	
... in karma (i.e. good thoughts/actions lead to good fortune; bad thoughts and actions to bad luck)?	-		
... that people can be possessed by evil spirits?	... that some people are possessed by evil spirits?		
-	... in a god or gods?*		
-	... in the soul (i.e. a spirit or force that exists within yet goes beyond the body)?	... in the soul (i.e. a spirit or force that exists beyond the body)?	...that the soul or spirit survives death?
-	... in intelligent design (i.e. that the complexity of the world suggests that it was purposefully designed by an intelligent creator)?		
-	... in witchcraft?	... in black magic or witchcraft?	
-	... in reincarnation (i.e. that when people die their souls are reborn in another body)?	... in reincarnation (i.e. that when you die your soul will be reborn in another body)?	... in reincarnation (i.e. that when you die your soul is reborn in another body)?
-	... some people transform into werewolves?		
-	... in demons or evil spirits?		

* Asked in a separate question as well on version 2, in the form 'Have you ever believed...?'

Table (iii): Societal/cultural beliefs

<i>Version 1 (n=6)</i>	<i>Version 2 (n=10)</i>	<i>Version 3 (n=12)</i>	<i>Version 4 (n=19)</i>
<i>Do you believe, or have you believed...</i>	<i>Do you believe...</i>		<i>To what extent do you believe...</i>
... in 'an eye for an eye'?	-		
... that people should not eat meat?	-		
... in evolution?	... in the theory of evolution?		
... that animals should be used for medical research?	... in using animals for medical research?	... it is right or wrong to use animals for medically related research?*	
... in democracy?	...that democracy is the best system for governing people?	... that democracy is the best system of government?	
... in free will?	-	... that you have free choice, free agency or free will?	... that you have free choice, or free will?
-	...that human activities are causing significant global warming?	... that humans cause significant global warming?	
-	... that euthanasia is right?	... that euthanasia is right or wrong?*	
-	... that abortion is right?	... that abortion is right or wrong?*	
-	... in having the death penalty for serious crimes?	... in the death penalty for serious crimes?	
-	... that it is right that people help those less fortunate than themselves?	... that it is right or wrong that people help those less fortunate than themselves?***	

-	... that the Apollo moon landings actually took place?	-	
-	... that positive thoughts and attitudes improve wellbeing?	... that when you have positive thoughts and attitudes your physical wellbeing improves?	... that positive thoughts and attitudes improve your physical wellbeing?
-		... that you have certain rights as a person that cannot be taken from you?	... you have fundamental human rights that cannot be taken from you?
-		... in extra-terrestrial life?	
-			... that organised religion is one of the main sources of human strife?
-			... that humans share a common ancestor with apes?
-			... that the earth is the centre of the universe?
-			... that young children (under 6) are capable of holding beliefs?
-			... that animals have beliefs?
-			... that same sex relationships are right or wrong?*
-			... that earth has been visited by aliens from other solar systems?

* In telephone interviews, asked 'are right' rather than 'right or wrong'

** In telephone interviews, asked using 'should' to avoid changing response items.

Table (iv): Experiences

Category	Version 1 (n=11)	Version 2 (n=9)	Version 3 (n=8)	Version 4 (n=8)
	Have you ever...			How often have you...
Hallucination-like experiences	... heard sounds when there's nothing around to explain them?	... heard sounds when there is no adequate explanation for them?	-	
	... heard voices when you know no-one's around?	... heard voices when no-one's around?	... heard voices when no one is around?	
	... seen things which other people don't appear to see?	... seen things which other people cannot?		
Paranormal experiences	... seen a ghost?	... seen or sensed a ghost?		
	... had premonitions of events that have yet to take place?			
	... sensed when a distant loved one is in trouble?	... sensed when a friend or family member was in trouble?		
	... felt as though you are looking down on your own body?	... had an out-of-body experience (e.g. felt as though you were looking down at your own body from above)?		
	... felt you could read other people's thoughts?	-		
	... tried to move objects using the power of your mind?	-		
	... felt you know who's ringing before you answer the phone?	-		
	... seen another person's aura?	... seen an aura (i.e. a unique cloud of colours and light that surrounds a person or thing)?	-	
-	... seen or sensed an extra-terrestrial being?	-		

Experiences of unfamiliarity	-	...felt that familiar people all seem colder or more distant than before?
	-	... felt that familiar objects appeared different even though you knew they hadn't changed?

Table (v): Meta-beliefs

<i>Version 1</i> (n=2)	<i>Version 2</i> (n=4)	<i>Version 3</i> (n=4)	<i>Version 4</i> (n=4)
<i>Do you consider yourself...</i>		<i>To what extent do you consider yourself...</i>	
... a superstitious person?	... superstitious (i.e. likely to believe certain events occur through mysterious or magical means)?		
... religious?	... a religious person?		
-	... tolerant of people with different beliefs?		
-	... likely to believe in things that others do not?		

