The Experimental Investigation of Religious Cognition

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To my parents, Jim and Lizzie, with love and gratitude.

That's the whole problem with science. You've got a bunch of empiricists trying to describe things of unimaginable wonder.

— Calvin and Hobbes (Bill Watterson)

Declaration

This dissertation is the result of my own work and includes nothing that is the outcome of work done in collaboration. No part of it has been submitted for any other degree or qualification. The length of this dissertation is 78,935 words, including footnotes, references, and appendices, but excluding bibliography.

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It was no great surprise to me when the experiments in this thesis revealed judgement speed to be a sensitive measure of the accessibility of people's God schemas—after all, it was a personal experience of a slow response to a question about God that planted the seed for this research. Some years ago, during a midweek meeting of about one hundred students at St Aldate's Church, Oxford, Andy Buckler (curate at the time) asked us all, "Who thinks God loves you?" Without hesitation, we all raised our hands. "That's great," he said, "now—who thinks God likes you?" This time we weren't so sure! Plenty of uncertain glances were traded before eventually only five of people put their hands up. Right away we realised that there was a discrepancy between what we said we believed about our relationship with God (that he loved us) and the beliefs about our relationship with God that guided our thoughts, feelings, and behaviour (that he probably didn't much like us). These two questions and the reactions they elicited seemed to encapsulate the distinction between head-knowledge and heart-knowledge of God, a distinction that has intrigued me ever since. Why was this group of intelligent, committed believers able to answer one question about the way God related to them so quickly, yet unable to answer a similar question that probed at a more emotional level? I was, and still am, determined to find out.

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Abstract

Religious cognition may be defined as the cognitive processes and representational states involved in religion-related knowledge, beliefs and attitudes, behaviours, and experience. Religious content and information processing occurs both at an intellectual, propositional level and also at an affect-laden, implicational level. Many questions are unanswered in our understanding of religious cognition, but fundamental to them all is the question of how religious cognition can be measured. Psychology of religion has primarily used questionnaires to measure religious belief, but many limitations suggest the need for new methods that can tap into implicational religious cognition, such as God schemas, as well as propositional religious cognition, such as God concepts. The purpose of this investigation was to explore which experimental paradigms most successfully tap into implicational religious cognition, and thereby add a new set of measurement tools to those available to the psychologist of religion. A consideration of research into the schematic representation of self and other persons suggested multiple hypotheses that could be tested using experimental paradigms adapted from the social cognition and cognition and emotion literatures. I present findings from a series of five experiments that measured cognitive biases in attention, memory, and judgement speed that were hypothesized to result from implicational religious cognition.

Two experiments adapted the emotional Stroop paradigm to explore the possibility of a religious Stroop effect. While evangelical Christians, non-evangelical Christians, and atheists did not differ in interference when colour-naming emotionally valent religious material, in a subsequent unexpected recall test evangelicals showed enhanced recall for religious but not control material. Three experiments adapted the self-reference effect paradigm to investigate the accessibility and centrality of God schemas relative to self-schemas. Though evangelical and non-evangelical Christians had relatively similar propositional beliefs about the character of God, the pattern of evangelicals' speed in making God-referent judgements and subsequent recall of God-referent material suggested that their God schemas were better-elaborated, more efficient, and more affect-laden than those of non-evangelicals. Atheists were able to draw consistently on two different concepts of God, but did so slowly and with poor subsequent recall, indicating that their God schemas were poorly elaborated, inefficient, and affect-free.

Though much research exploring these biases is still to be done, the findings of the current investigation suggest that incidental memory and judgement speed paradigms are successful in tapping into implicational religious cognition and can reveal differences not otherwise observable through more direct measurement.

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Chapter 1: Religious cognition: Connecting strands from diverse literatures

1.1 Definitions

1.1.1 Religion

Psychologists of religion, like psychologists investigating emotion, often have a certain intuitive sense of what it is they are investigating that does not translate well into a precise definition. Consequently, definitions of religion are cheap to come by. Even as early as 1912, James Leuba was able to collect forty-eight different definitions from various writers, and many more have been added over the last century. This should not be a matter for great concern, however, because it is not clear that much stands or falls theoretically if one definition is chosen in preference to any other. Rather, definitions tend to be descriptive in intent—either ambitiously attempting to delimit what is religion from what is not, or else simply delimiting the focus of a given investigation.

William James (1902/1997) began his *Varieties of Religious Experience* by suggesting that definitions of religion are so numerous and varied that *religion* “cannot stand for any single principle or essence, but is rather a collective name” (p. 39). Nevertheless James produced a working definition of religion for the purposes of his lectures: “Religion ... shall mean for us the feelings, acts, and experiences of individual men in their solitude, so far as they apprehend themselves to stand in relation to whatever they may consider the divine” (p. 42). In doing so he explicitly excludes those aspects of religion concerned with corporate ritual, ecclesiastical organization, and “systematic theology and the ideas of the gods themselves” (p. 41). While James has been criticized for this experientially biased definition of religion (for review see Wulff, 1997, chap. 11), he nevertheless circumscribed the topic appropriately for the purposes of his investigation. However, given that the current investigation concerns cognition about “systematic theology and the ideas of the gods themselves”, James’ definition of religion is clearly too narrowly focused to be applied here. Robert ‘Thouless’ (1924/1961) definition comes closer: “Religion is a felt practical relationship with what is believed in as a superhuman being or beings” (p. 4). Thouless echoes James in including a mode of behaviour and a system of feelings, but broadens his

definition in a more cognitive dimension by incorporating a system of intellectual beliefs as an essential element.

While such a definition as 'Thouless' may suffice for the current investigation, some psychologists of religion have challenged use of the word *religion* and its derivatives (e.g., Wulff, 1997, p. 4), while others have avoided defining religion altogether (e.g., Coe, 1916; Argyle, 2000). An alternative approach is that followed by sociologists Glock and Stark (1965), who empirically explored the dimensions of religiosity and observed five separate facets: the ideological (beliefs), the ritualistic (practices), the experiential (feelings), the intellectual (knowledge), and the consequential (effects). At root, however, what connects these dimensions is an orientation toward the transcendent, consistent with James' (1902/1997) definition. Given this, it will suffice that in this investigation my use of the words *religion* and *religious* refers to the domain of human experience concerned with the transcendent.

Two qualifications to my use of the word *religious* are in order. The first is in regard to its overlap with the term *spiritual*. Peter Hill and colleagues (Hill et al., 2000) provide a useful review of the two terms in which they caution against considering religion and spirituality as incompatible opposites. While acknowledging that some people identify themselves as "spiritual but not religious" (e.g., Zinnbauer et al., 1997), Hill et al. (2000) also note that many "appear to integrate both constructs into their lives" (p. 72). The lowest common denominator in religion and spirituality, it is argued, is a "sense of the sacred" (p. 66), where *sacred* refers to "a divine being, divine object, Ultimate Reality, or Ultimate Truth as perceived by the individual" (p. 66). In spirituality, this sense of the sacred is manifested as "the feelings, thoughts, experiences, and behaviors that arise from a search for the sacred" (p. 66). In religion, the sense of the sacred may similarly constitute a search for the sacred, or, alternatively (or additionally) may constitute "a search for non-sacred goals (such as social identity, affiliation, health, or wellness) in a context [i.e., a place of worship] that has as its primary goal the facilitation of the search for the sacred" (p. 68). These two approaches to the sacred within religion are akin to Allport and Ross' (1967) intrinsic and extrinsic religiosity, where intrinsic religiosity represents religion as an end in itself, and extrinsic religiosity represents religion as a means to some other end. In addition to these two criteria, either of which is sufficient, a further required criterion for the definition of religion proposed by Hill et al. (2000) is a set of behaviours or practices that facilitate the search for the sacred and are validated and supported within an identifiable group formed on the basis of the search itself. In these definitions it is not clear, however, whether any distinction should be made between *religious cognition* and *spiritual cognition*. An argument could be made for differences in

content along the lines of the definitions above, but the extent of individual variation in content in either instance would likely render any distinction along these lines pointless; and unless unhelpfully narrow definitions are made of each type of cognition, they are likely to overlap in terms of process.¹ Rather than referring to *religious and spiritual cognition* throughout this study, therefore, I will simply refer to *religious cognition*.

The second qualification regarding my use of the word *religious* is in regard to the ontological status of religious concepts within the psychology of religion. Watts and Williams (1988) argue that “we are not, as psychologists, commenting on whether or not religious beliefs are correct, whether they are justified by rational argument and empirical evidence. Our concern is rather with *how* people arrive at what they take to be religious knowledge” (p. 4). This approach typifies the near unanimous avoidance of ontological issues within psychology of religion noted by Hood (1989), who argues persuasively that the issue of God’s existence is relevant for the study of religious experience:

Among psychologists seeking scientific respectability and status for the field of the social scientific study of religion, it is not surprising to find a widely shared implicit stance of ‘methodological atheism’—a refusal to entertain seriously the possibility of using theological referents even as background material for empirical hypothesis testing. ... This is Bowker’s (1973) point ... that if one assumes up front that God can play no role in scientific theorizing (even about the sense of God) then the theologically obvious point that part of the sense of God comes from God is excluded by fiat. (pp. 336-337)

While I have no wish to exclude the possibility that God may be involved in how people arrive at what they take to be religious knowledge, and indeed while I would argue that thoughtful dialogue on the interface of psychology and theology may prove fruitful for both disciplines (see for example Watts, 2002), I do not propose to contribute directly to that dialogue in this study. Rather, my purpose is to discuss how what people take to be religious knowledge may be investigated using the methodology of experimental psychology, and as such I make no comment here on the origin of that knowledge.

¹ An argument could however be made for a distinction between *religious cognition* and *mystical cognition* in both content and process (see d’Aquila & Newberg, 1999; Spilka, Hood, Hunsberger, & Gorsuch, 2003, chap. 10).

1.1.2 Cognition

Cognition refers to the processes and representational states involved in mental faculties such as reasoning, language, perception, learning, and memory. Historically, the investigation of cognition by means of introspection was central to the work of early empirical psychologists. When introspective methods were rejected in favour of measuring publicly observable external events, the study of cognition was left neglected (along with the psychological study of religion); but the inability of stimulus-response behaviourism to account for complex phenomena such as language (e.g., Chomsky, 1959) and the advent of computational models of mental operations (e.g., Broadbent, 1958) gradually shifted experimental psychologists' interests back to cognition. Description of cognitive processes in computational terms, involving models of the flow and transformation of information, has now become the dominant approach within cognitive psychology.

Cognitive psychologists use five main methods to investigate human cognition (see e.g., Eysenck & Keane, 2000). First, everyday skilled performance can be recorded and analyzed for naturally occurring errors. Second, laboratory experiments on normal participants can measure speed or accuracy of performance on specific tasks carried out under controlled conditions, potentially in conjunction with physiological measures such as galvanic skin response or eye-tracking. Third, studying the pattern of impaired and intact capabilities of patients with acquired brain damage allows conclusions to be drawn about cognitive processes in the normal mind and brain. Fourth, the construction of computational models of specific cognitive abilities allows the testing of theories of cognitive processing. Finally, brain-imaging and single-unit recording techniques can provide clues about the time course and location of different cognitive processes in the brain. The investigation of religious cognition described in the current study is limited to non-physiological methods within the second of these five categories, though all could be applied in principle.

Use of these methods has revealed a number of important concepts characterizing the information-processing paradigm; these concepts are reviewed by Williams, Watts, MacLeod, and Mathews (1997, chap. 2) and summarized here. First, there are limits on the mind's ability to process information. Such capacity limitations are most powerfully formulated as both resource-based and structurally based, though they have also been characterized in terms of limitations in the parallel co-ordination of multiple cognitive processes. However these capacity limitations are conceptualized, they can cause bottlenecks requiring selectivity in processing, a concept known

as selective attention. Selective attention is likely to be pervasive throughout the processing continuum and is accomplished either by the preferential activation of selected mental representations or by the inhibition of competing mental representations. Second, information-processing models attempt to reduce complex mental operations to component stages of processing. The principle that cognitive processing takes time allows the determination of these component sub-processes through sophisticated use of additive factors and subtraction methods in conjunction with brain-imaging techniques. However, processing stages are not necessarily discrete sub-processes carried out in serial: more complex information-processing models allow for continuous processing in which each sub-process uses whatever output is available from prior sub-processes, and in which multiple sub-processes are carried out in parallel rather than sequentially. Third, cognitive scientists have not as yet agreed on a single account of cognitive architecture. Classically, information-processing models have conceptualized cognition as a symbol manipulation process, where symbols correspond to specific mental representations. A more recent innovation is massively parallel computational models, known as parallel distributed processing (PDP) or connectionist models, which do not require symbols or rules to manipulate them but instead represent information as a profile of activation distributed across weighted connections among a richly interconnected network of nodes. There is a general consensus that information flow in a system, whether construed in symbolic or connectionist terms, is unlikely to occur in a bottom-up direction only; and thus many models include feedback loops or allow for higher order representations to exert a top-down influence on more basic processes. In larger terms, human cognition is likely to be organized hierarchically into specialized cognitive subsystems, with processes operating at higher levels controlling those at lower levels. Finally, qualitative differences in processing strategies both within and between individuals can be found, indicating that certain aspects of information processing can be flexibly and strategically adapted to meet specific processing goals. However, other lower-level and certain well-learned processes can occur automatically, neither requiring attentional resources nor requiring deliberate conscious performance. Such strategic processes and automatic processes are sometimes referred to as explicit processes and implicit processes, respectively.

Another important concept in cognitive psychology is the distinction between “hot” and “cold” cognition. Misapplication of the computer metaphor to the human mind may lead to the erroneous conclusion that all cognition is carried out in a cold, logical, dispassionate, and rational manner. While people are capable of reasoning logically under certain restricted circumstances, this need not be the only—or the preferred—sort of processing that people carry out. Numerous

researchers distinguish between two modes of information processing: the first an elaborate, systematic, analytic, reasoned mode, and the second a more intuitive, automatic, affect-influenced mode (for reviews see Epstein, 1994; Williams et al., 1997, chap. 11; see also Pyysiäinen, 2004). Epstein (1994) reviews evidence from everyday life and from multilevel theories of cognition in support of the existence of these two modes. Everyday experience suggests, for example, that emotions can exert considerable influence on thinking, that the interpretation of events can affect what emotions are felt, that intellectual knowledge and insight differ, that irrational fears are maintained despite intellectual recognition of their irrationality, and that nonverbal or narrative messages can be more persuasive than verbal or abstract messages. Epstein (1994) also reviews multilevel processing theories across a variety of areas within psychology, including Bucci's (1997) psychoanalytic theory involving separate verbal and nonverbal information systems, the distinction noted above between controlled or explicit processes and automatic or implicit processes within cognitive psychology, and his own distinction between rational and experiential modes of information processing.

The mode in which information processing proceeds is dependent both upon people's mood-state and upon their personal goals and desires (see Kunda, 1999, chap. 6). For example, depressed mood tends to generate more elaborate and systematic processing, whereas elevated mood tends to generate more intuitive, heuristic processing (see also Williams et al., 1997). Mood effects, however, can be modulated by motivation: happy people will engage in elaborate reasoning if doing so is expected to bring about reward. More generally, judgement can be influenced by desire to reach a particular conclusion (e.g., through self-serving bias, Miller, 1976), by motivation to arrive at the most accurate conclusion, or by motivation to reach or avoid a clear conclusion:

Goals may influence which beliefs and rules we access and apply to the judgment at hand, and may also influence the amount of time and effort we devote to the judgement. As a result people with different goals may arrive at very different judgments, and the same individuals may find themselves drawing different conclusions from the same information as their goals shift. (Kunda, 1999, pp. 245-246)

As Epstein (1994) notes, these two modes of information processing are also evident in terms of ways of knowing. People talk about knowing something "in their head" versus knowing something "in their heart"; for example, a person who has just failed an exam may say something like, "I know I'm not stupid, but that's not what I believe emotionally." In this instance the person's automatic thoughts are affect-laden, and both in conflict with and qualitatively distinct

from a second set of non-affective, propositional beliefs (Teasdale & Barnard, 1993). This distinction is so self-evident that many languages use different words to distinguish between these ways of knowing, though English curiously does not.² While James (1890) described these as “knowledge-about” and “knowledge of acquaintance” (p. 221), subsequent psychologists have largely ignored these terms, variously relabelling them, on the one hand, as analytical, deliberative, verbal, rational, propositional, explicit, conceptual, or reflective and, on the other, as intuitive, automatic, non-verbal, experiential, implicational, implicit, or schematic.

To account for these differences between hot and cold cognition, Williams et al. (1997) argue that a multilevel theory of cognition is essential. One highly specified and tested model is that of Interacting Cognitive Subsystems (ICS) (Barnard & Teasdale, 1991; Teasdale & Barnard, 1993). ICS is an overall cognitive architecture consisting of nine subsystems: three sensory and proprioceptive subsystems (*acoustic*, *visual*, and *body-state*), two intermediate structural description subsystems (*morphonolexical*, *object*), two meaning subsystems (*propositional*, *implicational*), and two effector subsystems (*articulatory*, *limb*). The two meaning subsystems are of specific interest here: the propositional level corresponds to intellectual belief, to “knowing something ‘with the head’”, while the implicational level corresponds to an affective, “holistic, intuitive, or implicit sense of knowing something ‘with the heart’ or ‘having a gut feeling for it’” (Barnard & Teasdale, 1991, p. 24). The model allows for discrepant meanings between the two levels, consistent with the common experience of conflict between “head” and “heart”.

1.1.3 Religious cognition

Following from the above definitions, I define religious cognition as *the cognitive processes and representational states involved in religion-related knowledge, beliefs and attitudes, behaviours, and experience*. It is worth noting that *religious cognition* is not a well-used term within the psychology of religion; indeed a search of the PsycINFO database covering the period 1985-2005 returned only three journal articles, one book chapter, and one dissertation that included the phrase in their title or

² The differentiation between these two basic kinds of knowing is almost lost in contemporary English (left only in the archaic *to wit* and *to ken*), but is retained in both German (*wissen* and *kennen*; German has an additional verb for procedural knowledge, *können*), and the Romance languages (e.g., *savoir* and *connaître* in French; *saber* and *conocer* in Spanish). *Wissen*, for example, implies knowledge of specific information; it is knowledge gained through observation rather than participation. *Kennen*, by contrast, has an aesthetic component absent in *wissen*; *kennen* implies acquaintance with a person, knowledge acquired by direct experience or participation with a person, object, or situation. The difference between *wissen* and *kennen* is the difference between knowledge about George W. Bush gained from reading about him in the newspaper versus knowledge about George W. Bush gained from being married to him.

abstract. A similar search on *religious knowing*, the more limited term selected by Fraser Watts and Mark Williams for their *The Psychology of Religious Knowing* (1988), found no further publications; whereas—for comparison value—a search on *religious experience* for the same period revealed 276 journal articles, 93 book chapters, 65 books, 55 dissertations, three book reviews, and two encyclopedia entries. The reasons for the under-use of the term *religious cognition* seem threefold. First, the impact of James' (1902/1997) *Varieties of Religious Experience* continues to be felt and has ensured the long-term prominence of the term *religious experience* despite much variation over the years in what the term actually signifies. Second, *religious experience* is the broader term: for example, in compiling the *Handbook of Religious Experience*, Hood (1995) defined experience as “an encompassing phenomenon, broader than merely behavior, affect, or cognition” (p. 4). Third and perhaps most significantly, although a growing body of research into religious cognition exists, it is fragmented across a variety of disciplines within psychological and cognitive science, including developmental psychology, social psychology, clinical psychology, cognitive anthropology, and cognitive neuroscience. Much work has already been done to explore the development of concepts of God in children, attributions made toward God, the correlates of propositional concepts of God, attachment to God, the naturalness of religious ideas, and the neurological systems involved in religious cognition. Sadly, however, workers in these areas tend to be isolated within their own disciplines and have therefore taken insufficient account of parallel work by colleagues in these other disciplines. As a result our understanding of how these different elements fit together is impoverished, and there is little sense of a global conception of the ways in which religious cognition functions.

Before reviewing research in these different areas, I must make some further general comments about religious cognition. Many psychologists of religion have assumed that religious cognition uses everyday cognitive processes and is not special in any way. For example, in 'Thouless' (1924/1961) defence of his bypassing ontological issues, he states:

The psychology of religion ... makes the reasonable assumption ... that a man's mind works in the same way in his religion as it does in his other activities. ... Whatever the origin of the mental states of religion, we assume that once they are in a man's mind they will obey ordinary mental laws. (pp. 6-7)

However, key to consideration of this argument is what constitutes “ordinary mental laws”. It may be helpful to distinguish for a moment between the *content* of religious cognition, and the *processes* that underlie religious cognition. With regard to the content, James (1902/1997) is quick to dismiss any possibility of any psychologically specific set of religious emotions, arguing that

emotions such as religious awe or religious love are simply the natural emotions of awe or love directed toward a religious object. However, James also acknowledges that the conjunction of an emotional feeling and a religious object does lead to something psychologically specific: “as concrete states of mind, made up of a feeling *plus* a specific sort of object, religious emotions of course are psychic entities distinguishable from other concrete emotions” (p. 40). That religious cognition will be constrained by the conceptual framework within which experiences are interpreted is uncontroversial (Proudfoot & Shaver, 1975; Rottschaefer, 1985; Watts, 2002, chap. 7), but this leaves open the question of whether the cognitive processes involved in religious “states of mind” differ from those involved in other situations. Clearly there is no reason to argue that religion-related information processing should proceed any differently at the level of the general principles of cognition described by Williams et al. (1997) and outlined above. However, it is also clear that at higher levels of description, information processing within certain domains of human cognitive functioning operates according to principles unique to that domain and that specific brain areas need to be intact for this processing to take place; for example, as in language (e.g., Gleitman & Liberman, 1995). It is not unreasonable, then, to consider the possibility that there are aspects of religious cognition not shared by other cognitive domains, or even that specific areas of the brain might be implicated in religious cognition. Not all researchers seem to have considered this possibility however. One of the flaws of the burgeoning cognitive science of religion literature (reviewed below) is an unnecessarily reductionistic view of religion in which it is assumed that all religious cognition piggy-backs off other cognitive processes and knowledge structures. For example, Barrett (2000) summarizes the field thus:

The new cognitive science of religion ... differs from previous approaches to the study of religion by insisting that much of what is typically called ‘religion’ may be understood as the natural product of aggregated *ordinary* cognitive processes. This perspective may be called the ‘naturalness-of-religion thesis’. (p. 29)

One reason for this approach within the cognitive science of religion is a desire to formulate a theory of how evolutionary pressures interacted with existing cognitive structures to give rise to religion as a cultural construct. Though any such theories are difficult to prove or disprove empirically (as with much of the evolutionary psychology endeavour), the assumption that religious cognition has no psychologically specific qualities deserves further consideration (see Gillihan & Farah, 2005, for a similar debate with regard to the special status of the self).

Leaving this debate to one side, there is merit in exploring the similarities between religious cognition and other sorts of cognition. Watts and Williams (1988) engage in just such an exercise

in their consideration of religious knowing. Describing religious knowing as consisting neither simply of intellectual propositions nor simply of emotional feelings, they go on to draw comparisons with several analogous ways of knowing. Aesthetic knowing, for example, requires a certain distancing of oneself from the object of interest: discursive thought about the object must be suspended in preference of a contemplative but restrained emotional perception, all while remaining centred in the present. A similar non-judgemental perceptual style is found in meditative prayer, and, as in aesthetic appreciation, can lead to sudden insight into or apprehension of the to-be-known object, after which it is seen in a different way. However, religious knowing can differ from aesthetic knowing in several important ways. First, religious to-be-known objects tend to be intentional agents (i.e., animate beings with beliefs, goals, and desires) rather than inanimate objects. As is discussed below, this has important implications for the overlap of religious cognition with social cognition. Second, and acknowledged by Watts and Williams (1988), it may not be possible to collect any data at all about the religious to-be-known object directly through the perceiver's senses. This too has implications for the sorts of cognitive processes likely to be going on during religious knowing. Finally, whatever moral or behavioural consequences may follow from aesthetic knowing are of a different order and quality to those following from religious knowing.

A more helpful analogue described by Watts and Williams (1988) is that of personal insight, especially that occurring within a psychotherapeutic context. Genuine psychotherapeutic insight is not merely propositional in nature, but has an emotional quality to it and has implications for behaviour and cognition. Similarly, religious believers often distinguish between “head knowledge” and “heart knowledge” of God (cf. Watts, 1998). For example, in theologian Packer's (1975) *Knowing God*, he argues that one can “know a great deal about God without [having] much knowledge of Him” (pp. 22-23). Knowledge *about* God can be defined as a set of theological propositions about the nature of God, whereas knowledge *of* God, by contrast, arises from a set of experiences that the believer attributes to personal experience of God. Watts and Williams (1988) describe the relation between personal insight and religious insight:

If a client claims to have had a personal insight but finds it makes no difference at all to how he or she reacts in thoughts, feelings or behaviour in a previously upsetting context, the therapist would be inclined to doubt whether a genuine personal insight had been obtained. ... Similarly, it is a recurrent strand in all religious teaching that anyone who claims to know and love God, but shows no evidence of this in his life, is a charlatan. ... The contrast is between insight that is merely intellectual or neutral and a second type of insight that has been variously described as true, effective, dynamic or emotional. ... Religious insight that, like therapeutic insight, has been

chiselled out of experience will have more personal consequences than merely intellectual or 'notional' religious insight. Emotional and behavioural reactions are more likely to be congruent with beliefs that have been formed in this way. Even a casual experience of contemplative religious literature would reveal the extent to which an insight into the nature of God and a passionate love of God are bound together. Also, the behavioural consequences of religious experience can be very marked and lead, either suddenly or gradually, to a transformation of lifestyle and personality. All this follows straightforwardly from the analogy with therapeutic insight. (pp. 71-74)

Although psychotherapeutic insight as an analogue of religious knowing is still somewhat limited in that the self does not share God's ineffable or supernatural attributes, it is nevertheless attractive because it involves both the hot and cold information processing systems described in the previous section and clearly highlights the need for a multilevel model of religious cognition.

Several such theories have been posited. D'Aquili and Newberg (1999) approach from a neuroscientific perspective, and describe brain functions in terms of multiple cognitive operators that subserve cognitive function. Of these, two are especially—though not exclusively—involved in religious cognition: the causal operator, involved in attributing cause to God; and the holistic operator, involved in feelings of unity and connectedness. As Watts (2002, pp. 123-127) points out, however, d'Aquili and Newberg's theory can deal well with mystical experience but is less well suited to the breadth of religious belief, practice, and experience. Other theorists have noted the absence of affect within psychological theories of religion, despite its central role within religious experience (Hill, 1994, 1995; Hill & Hood, 1999a; Watts, 1996), and have borrowed existing multilevel models of cognition from elsewhere in psychology and applied them to religious cognition (see also Pyysiäinen, 2004). One such theory is Epstein's (1973, 1994) psychodynamics-influenced Cognitive-Experiential Self-Theory (CEST) model. CEST involves two information processing systems: a rational system, which proceeds at a conscious level and involves analytical and logical reasoning; and an experiential system, which proceeds below the level of consciousness and is characterized by intuitive, holistic, affect-laden processing. In response to Epstein's (1994) own assertion that religion is a function of the experiential system, Hill and Hood (1999a) have advanced CEST as a potentially useful theoretical framework for the investigation of the affective and unconscious aspects of religion, and Watson, Morris, Hood, Miller, and Waddell (1999) have provided initial data linking healthy functioning of the experiential system to an intrinsic religious orientation. Watts (1998, 2002, chap. 6; 2005), meanwhile, argues for application of Barnard and Teasdale's (1991; Teasdale & Barnard, 1993) ICS model to religion, most recently illustrating how ICS may be applied as an integrative

framework across psychology of religion. Finally, Hall (2003, 2004) has drawn on Bucci's (1997) multiple code theory in proposing what he calls a theory of implicit relational representations. Multiple code theory is a psychoanalytically based model of emotional processing that includes three levels: subsymbolic emotional processing, nonverbal symbolic emotional processing, and verbal symbolic processing. It is too early yet to say which of CEST, ICS, or multiple code theory will prove the more appropriate as a cognitive framework for religious cognition, or indeed whether they generate conflicting predictions, but it is clear that a multilevel model of some sort is needed.³ For ease of reference I will adopt ICS terminology, and will refer to intellectual and doctrinal level religious knowledge as propositional religious cognition and experiential and affect-laden religious knowledge as implicational religious cognition.

1.2 Universal characteristics of religious cognition

As mentioned previously, research into religious cognition is currently scattered across a diverse array of literatures. A thorough integration of these literatures is beyond the scope of the current study, but it is instructive to review the main findings and approaches used in each area. Doing so will reveal that the methods used and the conclusions reached are critically dependent not just on the theoretical perspective, but also on the kinds of research questions being asked. The different literatures can be broadly divided into those that are concerned with individual variation in the content and operation of religious cognition, which will be considered in the subsequent section, and those that are concerned with universal characteristics of the content and operation of religious cognition, which are considered in the current section.

Several research areas have focused upon how certain overarching aspects of human cognition govern the way in which religious cognition proceeds and develops, and, in the instance of the cognitive science of religion, puts constraints on the content of religious cognition. The areas explored here include research by developmental psychologists into the limitations people have at various stages of development, research by cognitive scientists of religion investigating how and why people believe in supernatural agents and what properties those agents have, and research by cognitive neuroscientists into brain mechanisms and regions that may be associated with religious cognition.

³ In fact many such models exist in addition to those mentioned above (for review, see Power & Dalgleish, 1997), and it will be necessary for psychologists of religion to follow the cognition and emotion literature for developments.

1.2.1 Propositional religious cognition is limited by stage of cognitive development

The central theme in most theories of religious development is that children initially conceptualize God in a crude anthropomorphic fashion, but that through development this concept becomes more abstract (Barrett, 2001). Researchers, many of them educationalists, have converged on this view by using an unusually wide variety of methods, both qualitative and quantitative, and by largely working within a Piagetian framework for cognitive development (Piaget, 1929; for review see Goswami, 1998). Piaget's theory of cognitive development is stage-based, relying on qualitative changes in cognition for the onset of each new stage. Development occurs, Piaget argued, when new knowledge can no longer be assimilated in terms of current conceptual schemes and instead these schemes must be restructured to allow the new knowledge to be accommodated. Such restructuring was thought to occur three times during development: first, around age 2 at the end of the sensorimotor stage; second, around age 7 as the child begins to be able to make logical judgements about concrete phenomena; and third, around age 11 or 12 when formal operational reasoning becomes available.

This approach to religious development is best exemplified by the work of Ronald Goldman (1964, 1965), who looked at how children aged between 6 and 17 interpreted three religious pictures and three Bible stories. Goldman concluded that there are three stages of maturity of God concepts during childhood and adolescence that correspond directly to Piaget's pre-operational, concrete, and formal stages of cognitive development. Goldman named these stages intuitive (up to age 7/8), concrete (age 7/8 to 11/12), and abstract (from age 11/12), and suggested that a child's concept of God is anthropomorphic up to the age of 10 or 11, but that after this age the child can think about God and his actions symbolically (for example by interpreting the crossing of the Red Sea, one of his three Bible stories, as symbolic in some way).

Other researchers have come to similar conclusions by using different methods, just a few of which are mentioned here (see Tamminen & Nurmi, 1995, for a review). An examination of children's drawings and paintings by Harms (1944) resulted in the postulation of three different stages of religious experience in children: the fairy-tale, the realistic, and the individualistic. Deconchy (1965) used a free association task on children and teenagers and found stages paralleling Piaget's concrete and formal operations levels. Heller (1986) investigated children's God concepts in an extended interview format that involved children drawing a picture of God, telling a story about their picture, play-acting God in relation to a doll family, answering

structured questions about God, and writing a letter to God. One of the many themes identified by Heller was a shift with age from concrete to abstract conceptualizations of God. W. C. Nye and Carlson (1984) used a clinical-interview format to test children and found support for Goldman's view that "children under 10 or 11 years of age are unable to formulate an abstract conceptual framework demanded for an adequate concept of God" (p. 141). W. C. Nye and Carlson conclude that "the understanding of the concept of God is limited by the child's level of cognitive growth" (p. 142).

Though all of these studies point to predictable limitations in development of religious concepts, there are several problems with this approach and the ways in which it has been applied. First, the methods used in researching the God concepts of children have been criticized for biasing children toward anthropomorphic views of God, thus providing an alternative explanation for the apparent concrete to abstract shift (Barrett, 2001; Petrovich, 1997). Second, Goldman's (1964, 1965) theory was coloured by his own liberal theological views, which held that a symbolic understanding of God and the Bible is the end goal of religion. This led to his controversial suggestion that children should not receive formal Bible instruction before the age of 10 or 11 because religious thinking is too abstract for a younger child's cognitive abilities. Recent research by developmentalists within the cognitive science of religion has countered this suggestion with evidence that God's supernatural attributes are quite intuitive to young children (Barrett, Richert, & Driesenga, 2001; Barrett, Newman, & Richert, 2003; Barrett & Richert, 2003). Third, these findings conflict with anecdotal evidence from religious educators and parents who report that young children are quite capable of having a well-developed God concept and a rich spiritual life. Such evidence is validated by a body of qualitative work revealing a high degree of spiritual interest and insight in the way children reflect on their lives and relationships (Hay & Nye, 1996, 1998; R. Nye, 1996, 1999). Fourth and related, an over-reliance on the Piagetian framework has led to an unhelpful focus on the propositional understanding of God, ignoring the claims of some believers to *relate* to God (cf. Buber, 1970; Hill & Hall, 2002). Although the Piaget's stage-based theory has been applied to moral development (Kohlberg, 1969, 1976), Piaget largely ignored (or at least made subservient to cognitive factors) the roles of emotion and relationality in cognitive development. Indeed, for a description of emotional and relational development one must turn to the object relations development and attachment literatures (reviewed below), which emerged from psychodynamic theories. Essentially, then, researchers concerned with religious development and working within a Piagetian framework are describing the development

in propositional religious cognition, and largely ignoring the more affective implicational aspects of religious cognition.

1.2.2 Representation and transmission of religious concepts is limited by natural cognitive constraints

Cognitive science of religion emerged as a subfield around 1990, and since then has grown rapidly with an array of interdisciplinary conferences, the launch of a dedicated journal and book series, and multiple monographs and edited volumes (e.g., Lawson & McCauley, 1990; Boyer, 1994; Rosengren, Johnson, & Harris, 2000; Whitehouse, 2000; Andresen, 2001b; Boyer, 2001; Atran, 2002; Pyysiäinen & Anttonen, 2002; Pyysiäinen, 2003; Barrett, 2004; Whitehouse & McCauley, 2005). A brief introduction to the area is provided by Barrett (2000), who summarizes the three main questions in the field: (a) How do people represent concepts of supernatural agents? (b) How and why do people acquire these concepts? (c) How do they respond to these concepts through religious actions, such as ritual? Of these three questions, only the first two will be explored in more detail below; see the work of Whitehouse and McCauley (2005) for a detailed review of cognitive theories of religious rituals.

In a landmark set of experiments, Justin Barrett (1998; Barrett & Keil, 1996; Barrett & VanOrman, 1996) used a narrative processing paradigm to investigate how people represent concepts of supernatural agents. In comprehending a narrative the reader's conceptual knowledge is used to draw inferences that are not made explicit in the text (Bransford & McCarrell, 1974), and Barrett used this principle to demonstrate that in understanding stories about God adults often used an anthropomorphic concept of God that was inconsistent with their stated beliefs about three of God's supernatural attributes: omnipresence, omniscience, and omnipotence. So, for example, a participant might state in a questionnaire that God is everywhere simultaneously, but subsequently mistakenly recall a narrative featuring God as though God could not simultaneously be in two places. Barrett concluded that adults have two different concepts of God: one that is an explicit and accessible "theologically correct" representation, and another that is used in a more everyday, automatic, and inferential fashion and that may yield conclusions that are "theologically incorrect". This latter concept relies on believers' processing supernatural agents as though they were members of the ontological category of natural intentional agents, and thereby anthropomorphizing God during automatic processing.

A second strand of research within the cognitive science of religion literature concerns the memorability and transmission of religious concepts. Here the work of Pascal Boyer (1994) has been most influential: he argues that all supernatural concepts are classified into one of five intuitive ontological categories (person, animal, plant, artefact, natural non-living object), and that concepts that minimally violate the intuitive expectations associated with their given category are more memorable. So, for example, a carpet that can fly is minimally counterintuitive in that the physical properties expected for an artefact have been violated, and is therefore naturally more memorable and transmissible than a concept that satisfies categorical assumptions (e.g., a carpet made of wool), than a concept that only violates basic-level assumptions (e.g., a carpet made of paper), and than a concept that violates multiple assumptions (e.g., a carpet that can eat rats, can breathe water, can talk to people, is invisible, can be in two places at once, and can fly). Boyer's theories have subsequently received empirical support (Barrett & Nyhof, 2001), though theories regarding the origin of these concepts are more difficult to substantiate. Guthrie (1993), for example, argues for an evolutionary adaptive propensity to detect intentional agency—even where none is present—that may be used to attribute otherwise inexplicable events to supernatural agents.

Although much of the grand theorizing in cognitive science of religion seems to be receiving empirical support, the endeavour is not without difficulties. The most marked problem is the conspicuous absence of emotion in most cognitive theories of religion; for example Barrett (2000) defines religion as a “shared system of beliefs and actions concerning superhuman agency” (p. 29). The omission of an emotional component to this definition is telling, and reflects a bias in researchers throughout the area toward reducing religion to cold cognition about God's supernatural attributes. For example, Barrett and Keil (1996) considered God's omnipresence, omniscience, and omnipotence, but none of God's moral attributes (i.e., those relating to God's character, such as holiness, love, mercy, justice; cf. Grudem, 1994). While asking “Why would anyone believe in God?” (Barrett, 2004) is certainly a legitimate endeavour for research into religious cognition, for the religious believer the more pertinent question is “What is the god that I believe in like?” Sadly, this question is not often investigated by cognitive scientists of religion, even though it would surely have a bearing on some of the evolutionary theories under discussion. For example, Atran (2002; see also Atran & Norenzayan, 2004) has made some attempt to involve emotion by hypothesizing that concepts of supernatural agents emerged during evolution to deal with the existential fears that accompanied more sophisticated cognition. However, in such an instance, the personality of such an agent is of more importance

than its given supernatural powers: an all-powerful god who loves humans will be of more existential comfort than an all-powerful god who is indifferent towards humans or who hates humans. In a similar vein, Boyer and Walker (2000) list five domains of representations of religion:

(i) the existence and specific powers of supernatural entities, (ii) a particular set of moral rules, (iii) notions of group identity ('our' religion is not 'theirs'), (iv) types of actions (rituals but also daily routines or avoidances), and, sometimes, (v) particular types of experience and associated emotional states. (p. 130)

It is not clear where in these five domains people's engagement with the *natural* properties of supernatural agents—for example, how people engage with the character and intentions of God, as opposed to his supernatural attributes—would fit.

An exception to this general trend to omit emotion is the work of Ilkka Pyysiäinen (2001, 2003, 2004). Pyysiäinen (2003) draws particularly on the work of Damasio (1995, 1999) and LeDoux (1998) to distinguish between the symbolic cold cognition involved in formal doctrinal religious belief and the hot cognition involved in emotion-laden religious experience. Though he does not cite the work of Watts (Watts & Williams, 1988; Watts, 1996, 1998) or of Teasdale and Barnard (1993), there is a shared recognition of the need for a multilevel model of cognition, and by extension, of religious cognition. In Pyysiäinen's fullest expansion of his theory thus far (Pyysiäinen, 2004), he compares a conglomeration of the many dual process theories in cognitive science with the dual level theories of religion advanced by Boyer (1994), Barrett (Barrett & Keil, 1996; Barrett, 1998, 1999), and Whitehouse (2000). So, for example, Barrett's conclusion that adults have two different concepts of God, one theologically correct and the other more intuitive and used in automatic online processing, is mapped onto two cognitive systems that approximate Teasdale and Barnard's (1993) propositional and implicational subsystems. It is far from clear however that the role of affect in the implicational subsystem (or A-system, as Pyysiäinen refers to it) has been fully acknowledged. As J. L. Barrett (personal correspondence, March 1999) agrees, while the theologically correct concept probably corresponds to the propositional subsystem, the anthropomorphic concept used in understanding stories is unlikely to correspond to implicational cognition. While Pyysiäinen (2004) should be applauded for attempting to integrate current data in the cognitive science of religion with current theories of cognition and emotion, it is probably too simplistic to try to aggregate twelve different dual process models of cognition in the process of doing so.

If Barrett's hypothesized anthropomorphic God concept used in online processing of narratives does not correspond to the implicational subsystem, the question remains as to what sort of concept it is. An alternative interpretation of Barrett's data is that although participants mistakenly reconstructed narratives in a way that anthropomorphized God, this may reflect cognitive constraints (or preferences) in processing rather than the existence of two functionally separate representations of God. A considerable literature within social cognition and behavioural economics has been built around the finding that people make use of heuristics (shortcuts) in online social processing and decision making (Tversky & Kahneman, 1974; Kahneman & Tversky, 1982), and it may be that the anthropomorphization of supernatural agents represents another type of heuristic. Indeed, this conclusion seems all the more likely when one considers that many of Barrett's participants believed in a Trinitarian God, that is, in God the Father, in Jesus the incarnate Son of God, and in the Holy Spirit, and that it is a common experience for Christian believers to be encouraged to develop Christ-like character or to emulate God's behaviour (e.g., "Be holy because I, the LORD your God, am holy", Leviticus 19:2), both of which are likely to predispose believers to an anthropomorphic view of God. That Jesus was believed by Barrett's participants to be both fully God and fully man makes determination of God's ontological category a non-trivial problem; it is possible that gods may transcend natural ontological categories or be conceptualized in a more fluid and flexible manner than natural agents.

Clearly an increased dialogue between workers in cognitive science of religion and psychology of religion would prove fruitful for both disciplines. Cognitive science could come closer to modelling the phenomenology of religious cognition if it will take emotion and relationality into account, while some of the philosophical, cultural, and conceptual rigour of cognitive science would help advance theory within psychology of religion. For example, most psychological theories about people's attributions or attachment toward God have ignored God's supernatural attributes, considering only God's personality. This is clearly psychologically inadequate: as J. L. Barrett (personal correspondence, March 1999) has argued, how one thinks about the supernatural properties of God should (in theory) affect how one goes on to think about God's character.

1.2.3 Religious cognition has neurological correlates

Just as neural correlates have been found for other cognitive processes, so too have researchers attempted to locate areas of the brain that are implicated in religious cognition. Though some studies have taken a more general approach (e.g., Ash, Crist, Salisbury, Dewell, & Boivin, 1996), two brain regions have received particular attention: the part of the temporal lobes involved in epilepsy, and the frontal lobes.

Epilepsy has a long history of being associated with heightened religiosity (Devinsky, 2003; Andresen, 2001a), though the precise nature of the relationship, if indeed there is one, remains controversial. A typical psychiatric study describing religious epileptics is that of Dewhurst and Beard (1970), who describe 6 patients (out of 69) with temporal lobe epilepsy (TLE) who had undergone sudden religious conversions following the onset of their illness. Other researchers urge caution in extrapolating this link into a neurological theory of religious experience: for example, Spilka, Hood, Hunsberger, and Gorsuch (2003, p. 61) describe a study by Ogata and Miyakawa (1998) in which only 3 out of 234 TLE patients had religious experiences during epileptic seizures, while Watts (2002, p. 121) describes studies by Tucker, Novelly, and Walker (1987) and Fenwick (1996) that failed to find unusual religiosity in TLE groups when appropriate comparison groups were used. Persinger (1987) has claimed that religious experiences in normal (non-epileptic) people may be the result of transient microseizures within the temporal lobe's limbic system, and has supported this suggestion by showing a correlation between experiences resembling temporal lobe epilepsy and mystical, religious, or paranormal experiences (Persinger & Makarec, 1987). As is pointed out by Jeeves (1997, pp. 72-74), however, the questions measuring these two types of experience overlapped sufficiently that a correlation was inevitable. More recently Persinger (Cook & Persinger, 1997; Persinger & Healey, 2002) has experimented with inducing what he terms *sensed presence*—the feeling of a proximal sentient being—through pulsed transcranial magnetic stimulation. Participants with fields applied to the right temporoparietal region reported more experiences of nearby presences than did participants with sham fields or fields applied to the left temporoparietal region. Other suggestive evidence of the role of the limbic system in religious experience is provided by Ramachandran and colleagues (see Ramachandran & Blakeslee, 1998, chap. 9) who demonstrated enhanced galvanic skin response to religious images in two religiously focused epileptic patients; however the lack of suitable controls makes interpretation of this data difficult. The primary issue with this approach, however, is that neither Persinger's sensed presence nor the mid-seizure experiences of a

minority of epileptics bear much resemblance to the everyday religious cognition of normals. While the temporal lobe may be in some way involved in certain religious experiences, it is unlikely to form the basis of a global theory of religious experience.

More recently, the frontal lobes have been the focus of theorizing and exploratory empirical work regarding their potential role in religious cognition. The frontal lobes deal with a variety of integrated brain functions, and McNamara (2001) has argued that frontal functions such as theory of mind, emotional processing, empathy and moral insight, self-awareness, and belief-fixation are all necessary components for religious cognition. Empirical evidence for frontal activation during religious cognition is thus far sparse, but suggestive that further research would prove fruitful. For example, Newberg and d'Aquili and colleagues (Newberg et al., 2001; Newberg, Pourdehnad, Alavi, & d'Aquili, 2003) have observed changes in cerebral blood flow in the prefrontal and frontal areas of meditating Buddhists and praying Franciscan nuns, and Azari and colleagues (Azari et al., 2001) observed changes in cerebral blood flow in prefrontal, frontal, and parietal areas of religious participants but not non-religious participants during recitation of Psalm 23. Notably however Azari et al. did not observe any limbic activation, and concluded that their participants' "religious experience was not an emotional experience" (p. 1652). It is possible that other inductions may allow the correlates of affective religious cognition to be observed.

Whatever brain areas are shown to be universally implicated in religious cognition, it is clear that individual differences in religious schemas will ultimately guide the way in which religious cognition proceeds. Different people will interpret the same experience using the schemas they have available (Azari & Birnbacher, 2004; Proudfoot & Shaver, 1975), and so it is to these individual differences that we now turn.

1.3 Individual variation in religious cognition

In contrast with the emphasis of some researchers on the universal characteristics of religious cognition, psychologists of religion working from psychodynamic and social psychological approaches have tended to focus on how religious cognition varies from individual to individual. Characteristic content and styles of religious cognition develop within an individual's life history and can be investigated from multiple perspectives. The areas surveyed here include research by sociologists and social psychologists into the covariates of people's God concepts, research by object relations theorists into the relationship between young children's understanding of God and their understanding of their parents, research by clinical psychologists into God's function as

an attachment figure, and research by social psychologists into the way people make religious attributions.

1.3.1 Survey-based measures of God concepts suffer serious limitations

A long-standing approach to researching religious cognition has been the use of survey methods to measure God concepts. Psychologists of religion seem infatuated with questionnaires, and indeed an entire section of Hill and Hood's (1999b) *Measures of Religiosity* is devoted to instruments developed for the measurement of God concepts. Such studies vary in their sophistication, and include adjective checklists, (e.g., Gorsuch, 1968), semantic differentials (e.g., Benson & Spilka, 1973), and Likert-scale responses to a series of items (e.g., Lawrence, 1991, 1997). Occasionally these studies are carried out in an attempt to elucidate the structure of God concepts by using sophisticated statistical methods (e.g., Kunkel, Cook, Meshel, Daughtry, & Hauenstein, 1999), but most of these studies are looking for correlations between God concepts and other variables of interest, including education, political preferences, and religious denominations (e.g., Greeley, 1989; Piazza & Glock, 1979; Roof & Roof, 1984), self-esteem and locus of control (e.g., Benson & Spilka, 1973), perfectionism, coping style, and vocational burnout (e.g., Corrigan, 1998), parental projection and culture (e.g., Vergote et al., 1969), gender identity (e.g., Mollenkott, 1984; Nelson, Cheek, & Au, 1985), and family environment (e.g., Dickie et al., 1997). A typical conclusion from one of these studies is that of Benson and Spilka (1973): on finding that self-esteem is positively related to loving, accepting God images, and negatively related to rejecting images, they concluded that self-esteem may be a major determinant of God images. While survey-based measures have proved useful in the measurement of many religious dimensions (for review see L. B. Brown, 1987, chap. 4), it is difficult to say how much studies employing these methods actually tell us about religious cognition: almost without exception, extant research applying survey methods to the study of God concepts suffers from three serious limitations.

First, correlative use of survey methods provides little indication of the organization of God concepts in relation to the rest of a person's cognitive functioning. Even where we can demonstrate a correlation between God image and some other variable, we are no wiser with regard to the causal links between the two. So, for example, it is difficult to agree with Benson and Spilka (1973) in their conclusion that self-esteem may be a major determinant of God image: it is equally conceivable that high self-esteem is one product of a positive God image, or that

some third intercorrelated variable, such as attachment style, might mediate both self-esteem and God image.

A second limitation of survey methods concerns the selection of religious attributes for investigation. Most researchers have used attributes of their own selection, terms of biblical origin, or terms from previous lists to attain some sort of comparison value between studies. For example, Lawrence (1991, 1997) constructed a 156-item inventory with eight subscales designed to measure different aspects of a respondent's God image. Unfortunately, such an approach can ignore important aspects of people's God images. Objective research into the way people actually conceptualize God cannot be bounded either by theological prescriptions of what God is like or by the investigator's presuppositions of what God is supposed to be like. Indeed, a factor analysis of Lawrence's inventory yielded ten factors, of which seven contained items from at least two of his theoretical eight scales. One attempt to overcome this problem has been to use sophisticated statistical techniques to codify descriptions of God that people generate, such as cluster analysis (Hutsebaut & Verhoeven, 1995), multidimensional scaling (Krejci, 1998), and concept mapping (Kunkel et al., 1999). However, these methods still suffer from the other limitations mentioned here, but with the added problem that it is more difficult to use these techniques to compare groups of participants or in a way that applies to specific individuals. We should expect that people will vary in their images of God, yet this is not always reflected by the research. For example, Kunkel et al. (1999) do not even mention whether or not their 20 participants actually *believe* in God, and it is difficult to say whether the concept map they report represents any more than an averaged schema of propositional beliefs about God.

Third, studies using survey methods tend to assume that people hold a unitary concept of God that is without internal conflict and that is used at all times and in all situations. These are clearly poor assumptions on a number of grounds. Just as people can distinguish between *actual self* and *ideal self* (see Higgins, 1987, 1989) and may view themselves in terms of multiple roles (see Linville, 1985, 1987), believers and non-believers are likely to have multiple concepts of God on which they can draw, depending on the context (see Section 2.3.4). While instructional variations may be able to distinguish among different concepts (e.g., Gibson, 1999) few studies have acknowledged that any distinctions are even necessary. As Batson, Schoenrade, and Ventis (1993) remark, there is a need to distinguish among what individuals *say* they believe, what they honestly *think* they believe, and what they *actually do* believe. Related, the assumption that concepts of God are without internal conflict ignores the distinction outlined earlier between propositional and implicational concepts of God. As Rizzuto (1979) and Watts and Williams

(1988) have acknowledged, an individual's God concepts at these two levels can be in conflict, yet empirical researchers so far seem to have ignored this possibility. Finally, the assumption that the same God concept is used at all times and in all situations is also problematic: it is far more likely that people employ a dynamic concept of God that depends on spiritual development and situational constraints (Thurston, 1994; Hill & Hall, 2002). It seems most likely that however much care is taken to avoid the social desirability response set, survey methods as used tend to measure only what people say they believe about God, thus tapping only a limited kind of propositional religious cognition.

1.3.2 Object relations approaches emphasize influence of parental images on God images

In contrast to cognitive developmentalists' work on the cognitive limitations people have at various stages of development, object relations approaches deal with the development of how people represent God relationally. Object relations theory emerged as a separate school of thought from classical psychoanalytic theory, and is concerned with the internal representation of the relationships between the self and external objects. *Object* is used here in a technical sense, meaning a person, thing, or part of a person or thing that in some way is the target of relational desires. According to object relations theorists such as Melanie Klein, William Fairburn, and Donald Winnicott, ways of relating to objects learned in the first two years of life become a template for future relationships and thus inform the entire development of personality. As such, these internal representations are affect-laden cognitive schemas that it may not be possible to verbalize, most likely existing at the implicational level of knowledge.

A variety of interpretations of religion have been provided by object relations theorists (see Beit-Hallahmi, 1995, for a review), but the most important for the current investigation is Ana-Maria Rizzuto's (1979) compelling theory of how a child's representation of God is shaped and formed by parental images. Her theory is based on an in-depth clinical study involving more than 20 hours of psychodynamic evaluation of each of 20 hospitalized patients (10 M, 10 F), from which she was able to delineate a clear profile of each patient's representation of God. Use of clinical patients is not unusual in researchers taking a psychodynamic approach, and Rizzuto justifies her methodology with reference to some early correspondence of Freud: "Freud wrote to Fliess in 1895 that he hoped 'to extract from psychopathology what may be of benefit to normal psychology' (Freud, 1887-1902, p. 123). I entertain the same hope" (p. 181); further she states

that in pilot work she studied five members of staff at her hospital and that she “found no differences of any significance between the members of the staff and the patients in their way of relating to God” (p. 181), though she does not provide any further detail.

Making use of Winnicott’s (1953) theory of transitional phenomena, Rizzuto (1979) presents four in-depth case studies in support of her theory that “in the course of development each individual produces an idiosyncratic and highly personalized representation of God derived from his object relations, his evolving self-representations, and his environmental system of beliefs” (p. 90). This representation may be positive or negative, and exists as a special kind of transitional object, alongside other objects like teddy bears or blankets that have “powerful real illusory lives” (p. 177). Rizzuto summarizes the origin of the God representation thus:

“I postulate that constant dialectic processes between primary object representations and the sense of self bring the pre-oedipal child to form some representation of a being ‘like’ the parents (or the mother or the father) who is ‘above all’ and bigger and mightier than anyone else. That being becomes a living, invisible reality in the child’s mind. The fact that parents mention him frequently to the child, send the child to Sunday or Hebrew school, and beyond that, worship such a being themselves, produces a profound impression on the child, for whom his parents are the biggest visible beings. All these factors contribute to the creation of a sense of God’s reality which inevitably becomes linked with the reality of the parents and their personalities. Moreover, this God is presented as the common ‘superego’ and lawmaker to whom parents and child alike must submit. For a small child it is a most impressive experience to see his father and mother kneeling, showing respect, standing, and addressing this invisible being with respectful devotion. Thus the reality of the parents and their actions bestows a powerful sense of reality to that nonvisible being. The consensus of the worshipping community of adults gives the child the sense that the natural order of things includes the existence of this being to whom all adults come with weekly solemnity or at least at times of major events—weddings, births, deaths—in order to submit to his wishes.” (p. 50)

Rizzuto’s observation of a connection between an individual’s representation of God and representations of parents is supported by an impressive body of evidence from a variety of methods, including other psychoanalytic interviews (e.g., Saur & Saur, 1992), semantic-differential scales (e.g., Vergote & Tamayo, 1981), linguistic analysis (Justice & Lambert, 1986), and the Q-sort technique (Strunk, 1959). Brokaw and Edwards (1994) tested Rizzuto’s (1979) theory more generally, and showed a correlation among Protestant Christians between positive God images and level of object relations development, although the significance of this correlation depended on how object relations development was measured. Brokaw and Edwards conclude that “the many studies relating God images to parental images have shown that indeed

both parents influence children's God concepts, as would be expected from an object relations perspective" (p. 355). It is less clear, however, that this conclusion—along with Rizzuto's theory of God image development—can be justified from the current data: all of it is correlational, and all of it relies on adults' memories of childhood and conscious, verbalized descriptions of God. Notably Brokaw and Edwards failed to find a correlation between God concept and projective measures of object relations development, and there is mounting evidence that some believers' concepts of God may compensate for negative parental images, rather than correspond with them (e.g., Cutland, 2000; Kirkpatrick, 1997).

Rizzuto's (1979) theorizing about atheists is in need of empirical support also. Here, she makes the bold and as yet unverified claims that "there is no such thing as a person without a God representation" (p. 47) and that "no child arrives at the 'house of God' without his pet God under his arm" (p. 8). In Rizzuto's view, the non-believer has chosen—consciously or unconsciously—not to believe in a God whose representation he has; she accounts for this by suggesting that "some people cannot believe [in God] because they are terrified of their God" (p. 47). However, the presence of unconscious concepts is difficult to prove or disprove unless they can be shown to influence some measure of implicit cognition. Interestingly, Brokaw and Edwards (1994) describe work by Spear (1994) that found no relationship between God image and level of object relations development in non-believers, regardless of whether self-report or projective measures of object relations were used. It is not clear, then, how far Rizzuto's theories can be generalized beyond believers in a Judeo-Christian God.

Nevertheless, there is much in Rizzuto's approach that should be emulated by future researchers. By taking a qualitative approach she was able to use her patients' vocabulary in trying to understand their beliefs. By contrast, many empirical studies of God concepts (described above) are so prescriptive that they do not allow an understanding of people's personal and specific image of God. Rizzuto's case studies, however, like Rebecca Nye's (1996, 1999; Hay & Nye, 1996, 1998) qualitative work on children, allowed a richer, more authentic picture of religious experience to emerge, one rather more consistent with everyday experience than the cognitive approach described above. Whereas the former conceptualized one's representation of God on a purely propositional level, as a set of beliefs to be learned and understood, for Rizzuto one's representation of God is tied up with experience, personal meaning, and emotion.

1.3.3 Attachment theory predicts images of God are affected by attachment style

Kirkpatrick (1995) argues that psychodynamic approaches to religion, such as the object relations work described above, are strong theoretically but weak on data, whereas empirical approaches, such as the correlational efforts also described above, tend to be strong on data but weak on theory. The solution he puts forward is to investigate religion from the perspective of attachment theory, which has psychodynamic roots but is grounded in an empirical research base. It is to this endeavour that I turn now.

The concept of attachment emerged from John Bowlby's (1969, 1973, 1980) hypothesis of a behavioural system dedicated to maintaining proximity between infants and their caregivers so as to increase infants' chances of survival. Through experience with adult caregivers, an infant develops a mental model of attachment figures, the effects of which can be observed in the infant's behaviour in novel social situations (Ainsworth, Blehar, Waters, & Wall, 1978). When caregivers are attentive, responsive, approving, and proximal, infants develop a *secure* attachment style, characterized by exploratory behaviour, potential anxiety during separation from caregiver, but effective reassurance during reunion. If, however, caregivers are inconsistent—sometimes affectionate and sometimes rejecting—then infants develop an *anxious/ambivalent* attachment style, characterized by minimal exploratory behaviour, distress during separation, and a mixture of demands for closeness and angry resistance on reunion. Finally, where caregivers are consistently rejecting or unresponsive then infants develop an *avoidant* attachment style, characterized by minimal contact with the caregiver, detached exploratory behaviour, and little externally displayed distress during separation or reunion. Hazan and Shaver (1987) demonstrated a similar set of attachment styles in adult romantic relationships (for review see Feeney, 1999), and evidence has since grown for the mental models of affective relationships formed during childhood having considerable influence on romantic and child-rearing relationships in adult life (Berlin & Cassidy, 1999).

Lee Kirkpatrick (1995, 1999, 2005) has applied attachment theory to believers' relationships with God, acknowledging in so doing that religious belief has an affective, relational aspect in addition to a propositional, doctrinal aspect (cf. Hill & Hall, 2002; Hall, 2003). Though attachment to God does not share all of the features of adult romantic relationships, Kirkpatrick (1999) nevertheless argues that for many believers their relationship with God meets all of the defining criteria of a true attachment relationship. So far, researchers have focused on relating various

factors with different attachment styles to God, such as childhood attachment patterns, adult romantic attachment styles, God concept, religious commitment, religious conversion, and measures of mental health. For example, Kirkpatrick and Shaver (1992) found that participants who reported a secure adult attachment style described God as more loving and less controlling and also reported greater religious commitment than those with avoidant or anxious/ambivalent adult attachment styles. However, evidence for a connection between adult or childhood attachment styles and attachment to God is less clear cut. Kirkpatrick and Shaver (1990) have suggested that people with secure early attachment relationships may go on to form corresponding secure attachments to God, whereas people with insecure childhood attachments may compensate by turning to God. This would be consistent with clinical evidence from Cutland (2000), who presents several patients reporting a therapeutic relationship with God in which God became an ideal parent, and has received further support elsewhere (Kirkpatrick, 1997; Granqvist, 1998; see also Granqvist & Kirkpatrick, 2004). In such instances it may be that an initially negative image of God is modified through some means in order to compensate for an abusive parent.

This line of research represents a promising way forward for empirical research into religious cognition. For example, Hill and Hall (2002) make a number of predictions regarding differences in God concepts according to whether God has become an attachment figure via a corresponding or compensatory route. However, there are several issues that must be considered if this approach is to be most fruitful. First, as with much empirical research into religion, measurement issues need to be considered carefully (Gorsuch, 1984, 1990; Hill & Pargament, 2003; Hill, in press; Slater, Hall, & Edwards, 2001). Studies in this area often operationalise attachment in quite a primitive fashion, such as categorizing participants on the basis of three or four short paragraphs portraying representative features of a given attachment style, rather than by using continuous measures.⁴ With regard to attachment to God there is little sense that this attachment may be dynamic in nature, and measures of God concept (also assumed to be static) are limited to pencil-and-paper measures of the type criticized above. Second, insecure attachment to God has not yet been well-conceptualized: despite observing that some religious believers report avoidant or anxious/ambivalent attachment relationships with God (e.g., Kirkpatrick & Shaver, 1992), as yet there is no satisfactory account as to how this insecure

⁴ The object relations scale of the Ego Function Assessment Questionnaire-Revised (Hower, 1987) described by Brokaw and Edwards (1994) may be a more useful measure of attachment style.

attachment to God might come about. Kirkpatrick on the one hand acknowledges that “not everyone views his or attachment relationship with God as a *secure* one” (Kirkpatrick, 1995, p. 454), but also argues that “once God has taken a place in an individual’s hierarchy of attachment figures, the answer to the critical question [‘Is the attachment figure sufficiently near, attentive, responsive, approving, etc.?’] at any given point in time is more likely to be ‘yes’” (p. 455). Kirkpatrick goes on to cite theologian Gordon Kaufman (1981, p. 67) in saying “The idea of God is the idea of an absolutely adequate attachment figure. ... God is thought of as a protective and caring parent who is always reliable and always available to its children when they are in need.” The problem here is that Kirkpatrick is replacing psychological data with assumptions drawn from theology: clearly Kirkpatrick’s own data has shown that not everyone does experience God as “a protective and caring parent”. Further, in discussing the stability of a believer’s relationship with God, Kirkpatrick seems to ignore any effect the believer’s attributions toward God may have on the relationship:

Perceived relationships with God ... are presumably not influenced directly by God’s ‘actual’ behavior; nor is God’s behavior influenced by that of the worshiper. A perceived relationship with God characterized by the desired level of intimacy can be maintained over time without being undermined by either ‘partner’s’ behavior. (1995, p. 455)

Presumably the believer does not take as dim a view as Kirkpatrick of her influence on God’s behaviour or of the effects of what she perceives to be God’s behaviour, or else it would be difficult to define her relationship with God as a relationship in any usual sense of the word. To further consider this we need to turn to research on attribution theory and religious cognition.

1.3.4 Attributions to God are unlike other causal attributions

The application of attribution theory to religious cognition has generated surprisingly little research in the last thirty years, given the enormous impact that it has had on social cognition research during the same period (Fiske & Taylor, 1991). An initial attributional account of religious experience was given by Proudfoot and Shaver (1975), and later expanded into a more general theory by Spilka, Shaver, and Kirkpatrick (1985); subsequent work has largely been theoretical (e.g., Spilka, 1989; Spilka & McIntosh, 1995) with the notable exceptions of a body of rarely cited work by Lupfer and colleagues (Lupfer, Hopkinson, & Kelley, 1988; Lupfer, Brock, & DePaola, 1992; Lupfer, DePaola, Brock, & Clement, 1994; Lupfer & Layman, 1996; Lupfer, Tolliver, & Jackson, 1996; Weeks & Lupfer, 2000) and some preliminary consideration of

whether God should be more appropriately considered an internal or external source of control on locus of control scales (Gabbard, Howard, & Tageson, 1986; Welton, Adkins, Ingle, & Dixon, 1996). Before discussion of this work, a more general description of attribution theory is required.

Attribution theory covers a set of social psychological theories about how people explain behaviour and events in terms of their underlying causes (Kelley, 1967; Jones et al., 1971; Fiske & Taylor, 1991). People's behaviour (including the attributor's own) can have more than one cause, so people may need to choose among several candidate causes. For example, attributions may be made to internal factors, such as the personality, emotions, or motivations of the person who carried out the to-be-explained behaviour, or to external factors, such as the environment or situation in which the to-be-explained behaviour or event took place. The choice between attributing cause to internal or to external factors may depend on whether the cause is another person: people tend to attribute behaviour in others to internal dispositional factors but are more likely to see their own behaviour as dependent on external situational factors (Jones & Nisbett, 1971). More generally, as Spilka et al. (1985) argue, the choice of causal attribution will vary as a function of the characteristics of the attributor, the context in which the attribution is made, the characteristics of the event being explained, and the context of the event being explained.

People make causal attributions in order to fulfil their needs to predict or control events (Fiske & Taylor, 1991). In Spilka et al.'s (1985) theoretical consideration of how attribution theory may be applied to religious cognition they add two further motivating factors for the attribution process: "a need or desire to perceive events in the world as meaningful, and ... a need or desire to protect, maintain, and enhance one's self-concept and self-esteem" (p. 3). Regarding the first, it is not clear that people's propensity to understand behaviour and events within broad cognitive schemas (what Spilka et al. call a *meaning-belief system*) is an end in itself; it is more likely that this is a feature of normal human information processing driven by the need to predict and control events. While this is an empirical question, teasing means and end apart is unlikely to be simple. The second proposed motivating factor needs qualification in the light of cognitive data from clinical research: while in healthy individuals, attribution does indeed normally function in such a way as to maintain and enhance self-esteem, depressed individuals may make attributions in such a way as to maintain and enhance *negative* views of the self (e.g., Beck, 1976).⁵ Unfortunately the

⁵ A similar expectation of individual variation in motivation to form causal attributions may be applied to the need to predict or control events: causal attribution need not necessarily take place in conscious cognition (Nisbett & Wilson, 1977), and people will vary in the level of control they feel they need to exert on their environment.

rest of Spilka et al.'s (1985) general attribution theory for the psychology of religion is built on all three of these motivating factors, making their theory inappropriate for generalizing to clinical populations or research into religion and mental health. For example, they argue that “attributional processes are initiated when events occur that (1) cannot be readily assimilated into the individual's meaning-belief system, (2) have implications regarding the controllability of future outcomes, and/or (3) significantly alter self-esteem either positively or negatively” (p. 6), and that “once the attribution process has been engaged, the particular attributions chosen will be those that best (1) restore cognitive coherence to the attributor's meaning-belief system, (2) establish a sense of confidence that future outcomes will be satisfactory or controllable, and/or (3) minimize threats to self-esteem and maximize the capacity for self-enhancement” (p. 6). These assumptions also are questionable in the light of clinical data. For example, rather than maximizing confidence about—and controllability of—the future, attributions about bodily sensations during anxiety can be catastrophic and culminate in a panic attack (Clark, 1986), and attributions in depressed cognition can work to maintain a sense of helplessness about the future (Abramson, Seligman, & Teasdale, 1978). In these respects, Spilka et al.'s (1985) theory represents a normative model, rather than a descriptive model, of the way in which people make causal attributions.

A more serious conceptual flaw in Spilka et al.'s (1985) general description of attribution theory is with regard to its specific application to religion. It is explicitly assumed that attributors must choose between “religious and non-religious meaning-belief systems” (p. 9) in deciding how to explain an event. What is unclear is how Spilka et al. conceptualise these two broad schemas, as I shall refer to them (cf. McIntosh, 1995). Certainly phrases such as “It is clear ... that events can be attributed either to religious or to naturalistic (i.e., non-religious) causes” (p. 8), “The likelihood of choosing a religious rather than a non-religious attribution for a particular experience or event is determined in part by dispositional characteristics of the attributor” (p. 11), and “For people with highly available religious and naturalistic meaning-belief systems, [the assimilation of new information] is expedited because they have a choice of two sets of beliefs into which new data may be assimilated” (p. 13) invite the interpretation that people will tend to have two compartmentalized and unrelated sets of causes from which to choose. Though some people may indeed categorize causes in such a fashion, for many religious believers and non-believers no such neat bifurcation can be assumed. Stated another way, for many people, especially those from non-Western cultures, the distinction between religious and non-religious—or between natural and supernatural—causes is simply not meaningful (e.g., Saler,

1993; Winch, 1964). Spilka et al. (1985) seem to assume that religious explanations form a discrete set of causes that can be bolted on to a second set of natural, non-religious explanations, but there is no reason to think that this is the case. Indeed, work by Lupfer and colleagues (e.g., Lupfer & Layman, 1996; Weeks & Lupfer, 2000; see also Miner & McKnight, 1999) suggests that religious explanations are often invoked in conjunction with—rather than as an alternative to—natural explanations: proximal causes are conceived in natural terms, while distal causes may be conceived in religious terms. This is as would be expected from Christian thought, as Watts, Nye, and Savage (2002) point out: “From a theological point of view, it is important to be clear that God is not the same kind of cause of events as other natural causes. Furthermore, God is not an alternative to natural causes but a supplementary cause of a different kind” (p. 10).

These criticisms of Spilka et al.’s (1985) approach notwithstanding, there is much to be gained from considering attribution theory within the psychology of religion. One fruitful avenue of social cognition research has been to consider individual differences in attributional tendencies. For example, Rotter (1966, 1990) has described a spectrum of beliefs regarding the source of control in people’s lives; those tending to see themselves as in control of their own destinies and of events around them are said to have an *internal locus of control*, while those tending to perceive events as due to luck, chance, or powerful other individuals are said to have an *external locus of control*. Locus of control can be measured by Rotter’s (1966) Internal vs. External Control Scale. When applied to religious individuals, however, several concerns became relevant. Gabbard et al. (1986) questioned the validity for religious individuals of a minority of items on Rotter’s (1966) scale that invoke luck-related terminology. Gabbard et al. constructed a revised version of Rotter’s scale, substituting references to chance with references to God control, and found that religious individuals’ scores reflected a more external locus of control when using the revised version than when using the original version. Despite consistency with their hypothesis that luck-related terminology may have biased religious individuals’ scores away from endorsing external items, Gabbard et al.’s approach to dealing with God control is not one that should be encouraged on two counts. First, locus of control is more appropriately considered as a number of control-related beliefs rather than as a single dimension: perceived mastery over one’s own life, belief in chance, and expectancy for control by powerful others emerge as separate factors in factor analysis (Levenson, 1974). Second, it is not clear that God is most appropriately considered an external source of control. Watts and Williams (1988) argue that attributions to God do not function in the same way as attributions toward chance:

“God may function as a hybrid attribution of a unique kind; not quite internal, but not wholly external. ... People with positive self-regard tend selectively to attribute their successes rather than their failures to themselves. In a similar way, religious people with positive self-regard are more likely to see God as responsible for their successes than their failures.” (p. 119)

Welton and colleagues (1996; see also Wallston et al., 1999) argued that God control represented an additional control construct to those observed by Levenson (1974). Indeed, they found that God control was independent of belief in chance and powerful others control; furthermore, God control was found to be positively related to well-being, benefits normally only associated with internal control (Diener, 1984; Myers & Diener, 1995). When conceptualized appropriately, then, God control may prove an important key to understanding the connections between religion and mental health (Koenig, McCullough, & Larson, 2001). More generally, systematic study of individual variation in the ways people make attributions, both positive and negative, toward God and other supernatural agents would considerably advance our understanding of religious cognition.

1.4 Summary

Religious cognition may be defined as the cognitive processes and representational states involved in religion-related knowledge, beliefs and attitudes, behaviours, and experience. Religious content and information processing occurs both at an intellectual, doctrinal level and also at an experiential, affect-laden level. This suggests that religious cognition is best understood in terms of a multilevel cognitive theory such as CEST or ICS. Research into religious cognition has so far been piecemeal and unintegrated, but can broadly be divided into work considering (a) universal characteristics of religious cognition, such as its neurological basis or the limits imposed by cognitive development and natural cognitive constraints, and (b) individual variation in religious cognition, such as the influence of parental images, attachment style, and attributional style on concepts of God. The next chapter outlines a new approach to the study of religious cognition, making use of techniques for the investigation of cognition and emotion available within experimental psychology.

Chapter 2: The representation and measurement of religious cognition

2.1 Measurement in the psychology of religion

As is indicated by the literature review in Chapter 1, many questions remain unanswered regarding religious cognition. How are religious representations structured in the mind? How does religious cognition relate to other cognitive domains? How is religious knowledge acquired and modified? When do people make use of religious knowledge? Why do some religious beliefs and attitudes have behavioural, motivational, and emotional implications while others do not? Which brain areas are used in everyday religious cognition? What factors cause individuals to differ in respect to the structure, function, and use of religious cognition? Progress in answering these questions would certainly be faster if researchers in the various subfields of psychology of religion spent more time in dialogue with each other. A more fundamental question must be answered, however, if research into religious cognition is to advance much beyond its current state, and that question is the focus of the current investigation: *How can religious cognition be measured?*

Religious cognition does not easily lend itself to scientific investigation: it is influenced and modulated by emotion, mood, motivation, and arousal; it proceeds dynamically and is affected by context; and it occurs at both a conscious level and an unconscious level. Rather than investigating religious cognition by the systematic and experimental manipulation of these variables, psychologists of religion have—with few exceptions—focused on questionnaire-driven measurement of religious attitudes, beliefs, and behaviours (L. B. Brown, 1987; Gorsuch, 1988; Emmons & Paloutzian, 2003; Hill, in press). Psychometric instruments, when reliable and valid, have certainly proved their worth in the measurement of certain religious constructs (Gorsuch, 1984; Hill & Hood, 1999b), but it is doubtful that self-report measures are suitable for the measurement of all aspects of religious cognition, as indicated in the previous chapter. More generally, critical reviews of measurement issues in psychology of religion have regularly mentioned problems with survey methods such as ceiling effects within certain samples, bias toward specific populations, the effects of a social desirability response set, limitations with what

can be measured with closed-ended questions, and the requirement of adult-level reading abilities (Batson et al., 1993; Gorsuch, 1990; Hill & Pargament, 2003; Slater et al., 2001).

Though Richard Gorsuch's (1984) plea for an abatement of the development of new measures without due cause has been oft-cited, it is clear that this suggestion is limited to psychometric instruments. Indeed, Gorsuch has also argued in favour of the development of alternative measures so as to reduce dependence on survey methods: "To the classical reliance upon attitude questionnaires, we need to add measurements of values and of spontaneous accessibility of one's beliefs, affects, and values" (Gorsuch, 1990, p. 90). Gorsuch is not alone in requesting new measurement techniques (Batson et al., 1993; Hill, in press; Hill & Pargament, 2003; Slater et al., 2001), nor was he the first to make such comments. Strunk's (1966) comments of four decades ago could as easily have been published today:

Since the very beginning, a lack of methodological sophistication has plagued the psychology of religion. ... Despite the fact that every behavioral scientist knows the severe limitations of paper-and-pencil instruments, they continue to be the dominant method employed in the psychological study of religious phenomena. Probably it is not an exaggeration to say that most of our generalizations about religious behavior are based wholly, or mostly, on results obtained from various pencil-and-paper tests. Certainly it is apparent to all that a degree of self-deceit and desire for social approval permeates most of our studies based on self-reports. Even thoroughly reliable and validated paper-and-pencil tests suffer from the unavoidable shortcomings of subjects lacking self-insight, having self-delusions, or—especially in our day—wishing to say the personally and socially desirable thing. What is needed is some technique that can subject the 'yes' and 'no' unqualified scores of such tests to a critical examination at the moment of their being obtained. (Strunk, 1966, p. 121)

Unlike many of the critics, Strunk (1966) actually suggested a methodological alternative, that of timed cross-examination (A. R. Gilbert, 1963). This technique involves recording the speed in which judgements are made to a modified version of any existing paper-and-pencil instrument in an effort to reveal "emotional blocks". I am unaware of any researcher having taken this suggestion. Hill (1994) has made a similar proposal to measure judgement speed, though grounding it in Fazio, Sanbonmatsu, Powell, and Kardes' (1986) theory regarding attitude accessibility. According to this theory, strong attitudes can be accessed more quickly and therefore allow more rapid judgements than weaker attitudes. Until a few years ago only a handful of studies using judgement speed measures of religion existed, none of which have been published (Hill, Jennings, Haas, & Seybold, 1992; Lechner, 1989; Spencer & McIntosh, 1990). More recently however Wenger has used timing techniques as part of a programme of research

into implicit religious cognition and its relation to religious orientation (Wenger, 2004, 2005; Wenger & Yarbrough, 2005; Wenger & Daniels, 2005),⁶ and a convergence of researchers in the theoretical literature has agreed that timed judgement paradigms represent a fruitful avenue for exploration (Hill, 1994, 1995, in press; Hill & Pargament, 2003; Slater et al., 2001; Watts, 2005).

If measurement of judgement speed may prove useful, then it is possible that other experimental paradigms could also be profitably applied to the study of religious cognition. What is needed here is a research programme⁷ grounded in a clear theoretical understanding of the cognition and emotion and social cognition literatures. The remainder of this chapter therefore attempts to ground religious cognition research in terms of existing psychological theory derived from cognition and emotion and social cognition research. I argue that religious cognition functions in schematic fashion, and I propose, therefore, that experimental paradigms measuring biases not just in judgement but also in attention and memory—already well established for the investigation of emotional and social cognition (Fiske & Taylor, 1991; Williams et al., 1997)—are appropriate for the investigation of religious cognition.

2.2 Propositional and implicational representations of religious cognition

Cognition was defined in the previous chapter as a dual aspect term, referring both to the *content* of mind and to the *processing* of that content. The current investigation is primarily concerned with the former, that is, with the representation of religious cognition. Given that I have also argued that a multilevel theory of cognition is necessary for an adequate description of religious cognition, it is now necessary to consider what differences there may be in the representation of religious meanings at the propositional and implicational levels. This is best done in the context of a more full exposition of the Interacting Cognitive Subsystems (ICS) (Barnard & Teasdale, 1991; Teasdale & Barnard, 1993) approach introduced in the previous chapter.

⁶ One of the paradigms used by Wenger is the Implicit Association Test (IAT, Greenwald, McGhee, & Schwartz, 1998). The IAT has formed the basis of a considerable number of recent studies exploring people's implicit attitudes, and particularly those toward prejudice. As such, several other studies have included religious populations in studies investigating racial prejudice (Rowatt & Franklin, 2004; Rudman, Greenwald, Mellott, & Schwartz, 1999) or bias against gay and lesbian persons (Bassett, Angelov, Mack, & Monfort, 2003). Religious cognition as such is not the focus of these investigations, however, and they are therefore not considered further here.

⁷ Indeed, another prominent theme in critiques of the state of psychology of religion research is this need for theory-driven research characterized by thorough and systematic analysis of an area rather than piecemeal studies (Gorsuch, 1990; Hill, in press), though this is of course dependent on the availability of resources and funding.

As an attempt to provide a comprehensive account of human information processing, the ICS framework is concerned both with the storage of information in different mental codes and with the transformation of this information from one code into another. Each of the nine cognitive subsystems composing the model is specialized for the storage and transformation of a single type of information, with each type of information qualitatively different from every other. Each type of information corresponds to a different aspect of subjective experience. So, for example, the body-state subsystem encodes somatosensory and proprioceptive information subjectively corresponding to bodily sensations of touch, pressure, pain, and the position, orientation, and movement of the body and its parts. Only two of the cognitive subsystems are concerned with the representation of meaning: the propositional subsystem and the implicational subsystem. Information encoded in propositional code represents “semantic entities (concepts) and the relationships between them ... at the level of statements that assert specific relations that ... can be assessed as true or false” (Teasdale & Barnard, 1993, pp. 52-53). Though propositional meanings may be readily articulated, they may also be readily imagined, so should not be considered primarily linguistic in formulation: propositional code can be directly transformed into both morphonolexical code (subjectively, what we “hear in the head”, p. 52) and object code (subjectively, what we see in our mind’s eye), processed in two intermediate structural description subsystems respectively analogous to the verbal and non-verbal (imagistic) subsystems of Paivio’s (1986, 1991) dual coding theory. For articulation to proceed, propositional meaning must be transformed first into morphonolexical code and subsequently into articulatory code. In contrast to the conceptual quality of propositional meaning, implicational meaning is best described as schematic in nature (cf. Leventhal, 1984). Implicational meanings are derived from the extraction and integration of recurring co-occurrences of information encoded in propositional and sensory subsystems and are represented at a higher-order holistic level. Implicational meanings can be transformed into propositional meanings, and articulation can only proceed via this route. More generally Teasdale and Barnard (1993) argue that that “reciprocal interaction between the specific information handled by the propositional subsystem and the model-level information handled by the implicational subsystem constitutes the ‘central engine’ of cognition” (p. 82). The implicational subsystem is also critical to the experience of emotion. In addition to outputting to the propositional system, implicational code is transformed into somatic and visceral effector codes, which directly control posture, muscle tension, facial expression, and autonomic and endocrine systems. These bodily effects are subsequently perceived subjectively through the body-state subsystem. Emotional experience, then, is made up of a combination of the felt effects of the

body-state subsystem and holistic feelings generated directly from the implicational subsystem, and it is modulated by attributional processing occurring in the propositional subsystem in response to input from the implicational subsystem. Representations at the propositional level, then, are conceptual in nature and do not have affective consequences except in as much as they interact with corresponding schematic representations at the implicational level.

The contrasting nature of conceptual and schematic representations will be considered in more detail below, but first it is worth reflecting on existing formulations of the representation of religious ideas in the light of ICS theory. In particular, the representation of God in mind, variously termed the *God concept*, *God image*, or *God representation*, has been central to research into religious cognition. However, there is little consensus—and seemingly little consideration—by many researchers regarding what these terms signify. Some psychologists of religion use all three terms interchangeably (e.g., Hill & Hall, 2002), while others make explicit distinctions between them. Object relations theorist Rizzuto provides the fullest exposition:

It is important to clarify the conceptual and emotional differences between the concept of God and the images of God which, combined in multiple forms, produce the prevailing God representation in an individual in a given individual at a given time. The concept of God is fabricated mostly at the level of secondary-process thinking. This is the God of the theologians ... But this God leaves us cold. ... This God is only the result of rigorous thinking about causality or philosophical premises. Even someone who believes intellectually that there *must* be a God may feel no inclination to accept him unless images of previous interpersonal experience have fleshed out the concept with multiple images that can now coalesce in a representation that he can accept emotionally. This God provides and evokes a multitude of feelings, images, and memories ... In the believer, the battle between a more conceptually based type of God and the more experientially enmeshed God representation ... may collide and create conflict. (Rizzuto, 1979, pp. 47-48)

'Representation' does not refer to a mental content, an idea, or a feeling. The term is meant to include the totality of experiential levels gathered in the course of growing up under a given name, whether it be father, mother, self, or God. (Rizzuto, 1988, p. 359)

It is reasonably clear that the God concept and God representation can be mapped onto propositional level meaning and implicational level meaning respectively. The various God images are less easy to assign, though may be distributed across multiple subsystems as stored information, depending on the nature of the experiences from which the images derive.

While Rizzuto's definitions may be adequate for theoretical work within an object relations perspective, the multiplicity of God images and the fluidity of the God representation are not easily operationalized for empirical study. As a consequence, other workers have simplified Rizzuto's structure and talk instead of a God concept and a single God image (e.g., Hoffman, 2004, 2005; Hoffman, Jones, Williams, & Dillard, 2004; Lawrence, 1991, 1997; see also Section 1.3.1). In such cases the God concept is defined similarly to Rizzuto, as an intellectualized, theological, or cognitive understanding of God. The God image, however, receives an inconsistent treatment. Despite drawing directly on Rizzuto's distinctions, Lawrence (1997) uses *God image* and *God representation* interchangeably, though with a preference for the former:

The God image is a psychological working internal model of the sort of person that the individual imagines God to be. This model is not an internal reification, a thing within the mind, as some less nuanced uses of object relations language would seem to imply, but a 'compound memorial process' aggregating memories from various sources and associating them with God. (p. 214)

Hoffman (2004) meanwhile does not refer to a *God representation* at all, and defines the *God image* as "a person's emotional experience of God" (p. 2), the content of which may be undifferentiated and at an unconscious level. Again it is clear from these various definitions that researchers are trying to find ways to refer to "head knowledge" and "heart knowledge" of God, that is, to propositional knowledge and implicational knowledge of God. Hall, Tisdale, and Brokaw (1994) make a similar attempt when dividing questionnaires into those that measure what they call *God concept* (e.g., Religious Concept Survey, Gorsuch, 1968; Loving and Controlling God Scales, Benson & Spilka, 1973) and those that measure what they call *personal experience of God* (God Questionnaire, Rizzuto, 1979; God Image Inventory, Lawrence, 1991). Unfortunately it is far from clear that measures in this latter category actually tap into implicational knowledge of God: Hoffman et al. (2004), for example, failed to find a hypothesized empirical distinction between the God concept (as measured by the Religious Concept Survey, Gorsuch, 1968) and the God image (as measured by the God Image Scales, Lawrence, 1997). All of this underscores the need for further work on the theory and measurement of religious knowledge.

In terms of the language used to describe propositional and implicational representations of religious cognition, *God concept* is usefully retained to refer to propositional level knowledge. Inconsistent use of the terms *image* and *representation* together with the potential confusion created through lack of awareness of their technical senses within particular psychological subdisciplines suggests that these terms could helpfully be abandoned within the psychology of religion altogether except in their general sense; talk of *images* in particular is open to misinterpretation,

suggesting literal pictorial images. Given the schematic nature of implicational representations, it would seem most sensible to follow the majority of social and cognitive psychologists working within the dominant information processing paradigm in using the alternative term *schema*. The following section describes the functioning of social-cognitive schemas and considers what implications research into schemas has for our understanding of the representation of God and religion in mind.

2.3 Cognitive schemas

2.3.1 Definition

Fiske and Taylor (1991) define a schema as “a cognitive structure that represents knowledge about a concept or type of stimulus, including its attributes and the relations among those attributes” (p. 98). Schemas provide conceptual frameworks that exert top-down influence on the organization of experience and knowledge: they control attention, influence the way new information is encoded, affect what information is retrieved from memory, and influence the way judgements are made. To function in this way, schemas are relatively stable constructs: people try to make new data fit an appropriate schema through assimilation rather than alter the schema to fit the data through accommodation (Neisser, 1976). While all schemas have similar properties in terms of function, Fiske and Taylor (1991) distinguish among several types of social schemas in terms of content, including schemas for persons, the self, social roles, and events, alongside content-free rule-based schemas such as causal schemas; Baldwin (1992) has added relational schemas to this list. Person schemas, self-schemas, and relational schemas are of particular interest to the current study, because they are likely to share many of the same properties as God schemas: McIntosh (1995) has suggested that “a God schema might include, for example, assumptions about the physical nature of God, God’s will or purposes, God’s means of influence, and the interrelations among these beliefs” (p. 2).

The precise cognitive structure of a social schema is as yet unclear, but has aspects both of a collection of exemplars, and of generalizations abstracted across a number of specific instances of whatever the schema represents (Fiske & Taylor, 1991; Park, 1986; Sherman & Klein, 1994). In this respect schemas are structured in a similar fashion to concepts and categories (Eysenck & Keane, 2000, chap. 10). Schemas themselves, as with categories, are organized into loose hierarchies in which the relations among schemas at one level form a part of the superordinate

schema (Fiske & Taylor, 1991). So, for example, an individual might have a schema for fundamentalist religion, which may contain a schema for persons who are religious fundamentalists, which may itself contain a schema for the trait of religious fundamentalism.

When it comes to schemas relating to the self, then, it is important to distinguish between *self-schemas* and the self as a schema. For Markus (1977), who coined the former term,⁸ self-schemas are representations of specific aspects of the self at the trait level; she defines self-schemas as “cognitive generalizations about the self, derived from past experience, that organize and guide the processing of self-related information contained in the individual’s social experiences” (p. 64). Under this definition people are said to be *schematic* for a particular trait, such as independence, if they consider themselves as extreme on that dimension (in either direction) and also consider the dimension as personally important; people who have a less clear conception on the same dimension are said to be *aschematic*, considering themselves less extreme and finding the dimension less personally important. Markus found that, relative to aschematics, people who are schematic for a particular dimension are faster to make judgements about information relevant to that dimension, can more easily recall behavioural evidence in support of the self-descriptiveness of the dimension, are more likely to predict future behaviour consistent with the dimension, and resist counter-schematic information about themselves more strongly. Depending on the self-schemas one holds, then, a given trait may be more or less salient, central, and meaningful in one’s self-understanding.

The same year as Markus’ (1977) seminal paper, Rogers, Kuiper, and Kirker (1977) suggested that the self-schemas posited by Markus are organized into a well-structured superordinate schema for the self. Rogers and colleagues tested this hypothesis by adapting an incidental recall paradigm from a study by Craik and Tulving (1975). Participants made a series of *yes/no* ratings regarding either the structural (i.e., *Big letters?*), phonemic (i.e., *Rhymes with ____?*), semantic (i.e., *Means same as ____?*), or self-referent (i.e., *Describes you?*) characteristics of each of a set of adjectives; an unexpected recall test for the adjectives followed the rating task. Rogers et al. (1977) found that self-referent encoding produced recall superior to any other type of encoding and came to the following conclusion:

⁸ Markus (1977) actually referred to *self-schemata*. Given that the Oxford English Dictionary (1989) gives both *schemata* and *schemas* as correct plural forms of *schema*, I have chosen to follow the general trend within the psychological literature toward increasing use of *schemas*.

In order for self-reference to be such a useful encoding process, the self must be a uniform, well-structured concept. During the recall phase of the study, subjects probably use the self as a retrieval cue ... In order for this to be functional, the self must be a consistent and uniform schema. (p. 686)

There are several comments to make about this important paper. First, Rogers et al. (1977) dubbed the recall advantage for self-referent material the *self-reference effect* (SRE), and spawned a considerable literature exploring its causes (see Symons & Johnson, 1997, for a review). The SRE is key to several of the experiments in the current study (see Chapter 4), and is considered in more detail below. Second, the literature has not settled on a consistent term for the superordinate schema for the self put forward by Rogers et al. (1977). Though Rogers et al. never explicitly refer to this schema as the *self-schema*, they do refer to Markus' (1977) self-schemas as *subschemas*, perhaps in the hopes of redefining *self-schema*, but Markus' terminology and definition have mostly stuck. Instead subsequent referents to this overarching schema have confusingly included *self-as-schema*, the *self-concept*, simply *the self*, or—in spite of Markus' definition—the *self-schema*. A final point to note is that Rogers et al.'s (1977) paper triggered a vigorous debate about whether or not the self was indeed a “uniform, well-structured schema” as they had proposed. It is to this debate that we turn next.

2.3.2 Is the self special?

Much of the research using the SRE paradigm has been carried out in an effort to determine whether or not the self is a special construct in mind (for reviews see Gillihan & Farah, 2005; Greenwald & Banaji, 1989; Greenwald & Pratkanis, 1984; Higgins & Bargh, 1987; Kihlstrom et al., 1988; Markus & Wurf, 1987; Symons & Johnson, 1997). The literature explores two possibilities in this respect: in its strongest form, that the self is a unitary construct in mind, and in its weaker form, that the self is unique in terms of the processing advantage conferred on self-related material. Numerous studies have replicated the SRE in memory, and Symons and Johnson (1997) provide a helpful review and meta-analysis of 129 experiments. However, as Williams et al. (1997) argue, “the evidence on self-referent recall does not necessarily tell us much about the structure of self-knowledge, as opposed to its use as a category in encoding or retrieval” (p. 222), nor does it “show that all self-information is structured as a ‘self-schema’ having a consistent internal structure, nor that it has generic content, or is typically activated as a modular unit” (p. 223).

If SRE research can shed little light on the structure of self-knowledge, three other strands of research provide evidence contrary to a unitary self construct, despite the subjective experience of such. Linville (1985, 1987) introduced the idea of *self complexity*: some individuals view themselves in terms of multiple roles (e.g., professor, wife, daughter, violinist) while others in terms of only one or two principal roles. Multiple roles have been shown to act as a protective buffer against negative life events (Niedenthal, Setterlund, & Wherry, 1992) and suggest that those with a high degree of self complexity may have a more compartmentalized organization of self-knowledge than a unitary self construct would allow. A related idea is that of *working self-concepts* (Markus & Kunda, 1986). Only a portion of one's self-knowledge is accessible or salient at any given moment, and changes in mood or situation can trigger shifts in this working self-concept. While this finding does not rule out the possibility of an underlying unitary self construct on the implicational level, it does however question the subjective experience of a single, consistent, and stable self. Finally, various researchers have investigated possible future selves (Markus & Nurius, 1986; Oyserman & Markus, 1990). Higgins (1987, 1989, 1998) has investigated two specific potential future selves, the *ideal self* and *ought self*, and distinguished these from the *actual self*. Focus on the ideal self leads to regulation of the self by the promotion of positive goals, whereas focus on the ought self leads to self regulation by the prevention (avoidance) of potential negative outcomes. A discrepancy between actual self and ideal self can therefore lead to feelings of loss, sadness, and dejection; whereas a discrepancy between actual self and ought self can lead to feelings of anxiety, guilt, and agitation (Higgins, Bond, Klein, & Strauman, 1986). In either instance such feelings emerge only where the discrepancy is salient (Higgins, Shah, & Friedman, 1997). The ability to compare one's actual self with potential future selves again suggests that more than one schema is involved in the representation of self, and the affect-related nature of the additional schemas in each of these research strands suggests that these multiple schemas are represented at least partially within the implicational subsystem.

Gillihan and Farah (2005) took a different approach to the question of whether or not the self is special, arguing that, in its strongest form, a claim for the self to be special involves four criteria: (a) involvement or necessity of distinct brain areas in self-related information processing; (b) functionally unique processing of self-related information; (c) the functional independence of cognitive systems processing self-related information from other cognitive systems; and (d) species specificity. Recognising that many reviews of self-related processing have focused on a single processing domain, Gillihan and Farah reviewed experimental and neuroimaging research across multiple domains, including aspects of the physical self such as face recognition, body

recognition, and recognition of one's own agency, and aspects of the psychological self, such as one's personal traits (including research on the SRE), autobiographical memory, and first-person perspective. They concluded that as yet there is little evidence for a unitary self system: "Neither the imaging nor the patient data implicate common brain areas across different aspects of the self. This is not surprising because there is generally little clustering even within specific aspects of the self" (Gillihan & Farah, 2005, p. 94).

Even evidence previously thought to support the hypothesis that the self is unique in terms of the processing advantage conferred on self-related material has been called into question. Bower and Gilligan (1979) found a memory enhancement for self-referenced material when compared against material encoded in reference to a familiar but non-intimate other, but found that mother-referenced material was similarly memorable to self-referent material, leading them to suggest that any well-differentiated cognitive structure may serve as a context for remembering. Indeed, Symons and Johnson's (1997) meta-analysis confirmed that encoding material in reference to intimate and familiar others (such as mother) confers a similar recall advantage to self-referent material, but that encoding material in reference to familiar but non-intimate others (such as Tony Blair) does not. Despite early commentators (e.g., Greenwald & Pratkanis, 1984), then, a general consensus has emerged in the literature that the self is a highly efficient and elaborated mnemonic device, but thoroughly ordinary:

The self is one of the most highly articulated, differentiated, and rich constructs that any given individual has, and as such, it is clearly important, though not necessarily unique, in producing reliable effects on processing. (Fiske & Taylor, 1991, p. 194)

Our evidence suggests that [self reference] is a uniquely efficient process; but it is probably unique only in the sense that, because it is a highly practised task, it results in spontaneous, efficient processing of certain kinds of information that people deal with each day—material that is often used, well organized, and exceptionally well elaborated. (Symons & Johnson, 1997, p. 392)

After reviewing the data concerned with the idea of a self-schema, we have concluded that, although self-knowledge emerges as a very extensive and well-elaborated base, we are not forced by this evidence to think of it as being structured as a consistent, generic, and modular schema. Rather we would propose that self-knowledge can be selected and variously structured at different times, depending on current events, situations, and moods. (Williams et al., 1997, p. 227)

2.3.3 Person schemas and relational schemas

The self-schema is a rather better specified construct in the social psychology literature than the person schema, but the significant body of research on person perception and impression formation can shed some light on the content of person schemas. In broad terms, person schemas contain information about the traits and goals of specific individuals (Fiske & Taylor, 1991). In an early application of schema theory to person perception, Asch (1946) demonstrated that people make use of discrete pieces of information to form overall impressions about individuals. It is now generally agreed that person schemas consist not only of specific episodes but also of overall impressions incorporating traits and goals that are inferred from the person's appearance and behaviour in specific instances (e.g., Srull & Wyer, 1989); these impressions are formed using the causal attribution processes described in the previous chapter. Trait information within impressions is typically organized along dimensions of social desirability and competence according to an implicit personality theory (D. J. Schneider, 1973).

As with self-schemas, person schemas can be considered both on a whole-person level and on a trait level. While information about people can be organized in other ways, organizing social memories by person is most efficient (Herstein, Carroll, & Hayes, 1980; Mueller, Thompson, & Davenport, 1986; cf. Cantor & Mischel, 1977, 1979); in particular information about familiar others is likely to be organized according to person (Sedikides & Ostrom, 1988). As has been noted above, relating material to schemas for intimate others can have as powerful a mnemonic effect as relating material to self (Symons & Johnson, 1997), again emphasizing the schematic nature of person perception. However, a considerable body of evidence indicates that while social information can be organized according to person, these representations are not necessarily discrete. Rather, information about other persons is held in a rich overlapping schematic network centred on the self and significant others. Multiple strands of research have indicated that the way we process information about other people is influenced by our self-schemas (see Markus, Smith, & Moreland, 1985, for review). For example, self-schemas affect the behaviours people notice in others (R. C. Anderson & Pichert, 1978) and influence the inferences people make about others (Catrambone & Markus, 1987). The reverse is also true: self-schemas can be derived from interactions with other people (Deutsch & Mackesy, 1985), and self-referent trait word decisions are made more quickly when the trait words are descriptive both of spouse and of self than if descriptive of one partner but not the other (Aron, Aron, Tudor, & Nelson, 1991).

More recently, researchers have considered the cognitive representation of self and other in relationship, rather than in isolation, and have developed ingenious experimental paradigms for the investigation of these relational schemas. Susan Andersen and colleagues have shown strong evidence for the occurrence of transference in everyday non-pathological functioning (cf. Freud, 1912/1958), whereby mental representations of a significant other can be activated and used in interpersonal encounters with other persons (for reviews, see Andersen & Berk, 1998; Andersen & Chen, 2002; Andersen, Chen, & Miranda, 2002; Andersen & Cole, 1990; Andersen & Glassman, 1996; Chen & Andersen, 1999). In Andersen's thinking, representations of significant others are linked to the self through affect-laden *relational selves* that represent a working model of the relationship patterns experienced between self and other. Activation of these relational selves (or relational schemas) can trigger shifts in perceptions of others and of the working self-concept and can thereby result in powerful transference effects, even with complete strangers. Baldwin has proposed a more general account of the existence of relational schemas as consisting of self and other representations together with an interpersonal script for typical patterns of interaction generalized from past experience (for reviews, see Baldwin, 1992, 1999, 2001).

2.3.4 God schemas and religion-as-schema

Because schemas are represented hierarchically, it is likely that God schemas are part of a larger more general schema for religion, an idea already advocated by McIntosh (1995). Religious beliefs and attitudes are likely to be stored in memory in an organized fashion alongside episodic and generalized memories of specific religious behaviours, rituals, and experiences. As McIntosh points out, religious schemas will differ among individuals not simply in content but also in structure, degree of organization, and personal relevance (affect-ladenness):

Some cognitive organizations of religious beliefs might be highly structured and hierarchical, whereas others might be simple, abstract, and vague. ... Another important difference may be in whether [a person's] religious schema is salient or central—or whether it is connected to the self (cf. Markus, 1977). Two people may have very complex religious schemas. If one of these people is an important part of the self for this person, then his or her religious schema is likely to be activated often—perhaps chronically—and thus will have more influence in life than will the other person's schema. (McIntosh, 1995, p. 13)

Where a schema for religion is activated chronically, it may well function as a *Weltanschauung*, or worldview (see Naugle, 2002; Sire, 2004), in effect providing a lens with which to interpret the world. Paloutzian and Smith (1995) have criticized the application of schema theory to

psychology of religion on the grounds that “the available data are not compelling” (p. 17). It is difficult to understand this criticism, given the paucity of research providing available data in the first place. Furthermore, their criticism is based on an impoverished conception of schemas, limiting the schema to “a midlevel of abstraction” (p. 21).⁹ Such a conception cannot deal with global schemas or their chronic activation, as for example in depression (Beck, 1976) or attachment (Baldwin, Keelan, Fehr, Enns, & Koh-Rangarajoo, 1996). I contend that the idea of cognitive schemas provides a powerful conceptual framework for the understanding of religious cognition, and generates numerous testable hypotheses. The above summary of research into cognitive schemas suggests several hypotheses (only one of which is directly tested in the current study) concerning the representation of God and religion in mind:

1. Just as schemas for other persons can vary in the mnemonic advantage they provide according to how intimate the other person is (Symons & Johnson, 1997), so too *God schemas vary in the mnemonic advantage they confer according to how intimate God is to a person*. God is familiar to everyone, but intimate only to some, so an advantage of self-referent recall over God-referent recall ought to be observable only in those for whom God is not intimate. This also tallies with Ozorak’s (1997) suggestion that “the person whose religious schemas are constantly primed will notice, remember, and reinterpret religious information more than the person not thus primed” (p. 198).
2. Just as people differ in self complexity (Linville, 1985, 1987), so too *people differ in the complexity of their God schemas*. Such differences are easily observed by comparing faith traditions; for example, a Jewish individual may conceive simply of YHWH, a Christian may view God in terms of the multiple persons within the Trinity of Father, Son, and Holy Spirit, and a Hindu may view Brahman in terms of multiple aspects, such as Devi, Vishnu, Ganesh, and Siva. However, individuals are likely to differ in the complexity of their God schemas even within a given tradition: one Christian, for example, may view Jesus in terms of multiple roles (e.g., saviour, friend, king, judge, lover, creator, Son of God), whereas another Christian may view Jesus in terms of just one or two principal roles (cf. Roof & Roof, 1984).

⁹ Paloutzian and Smith (1995) seem to struggle with the idea not just of a hierarchy of schemas but of a hierarchy of theories; for example, they argue that McIntosh (1995) is trying to “supplant other models of religion” (p. 17), such as that of intrinsic and extrinsic religious orientation (Allport & Ross, 1967). If these theories are considered as approaching religion from different levels of analysis then their mutual compatibility can be straightforwardly conceptualized.

3. Just as people have been shown to have schemas for possible future selves such as *ideal self* and *ought self* in addition to *actual self* (Higgins, 1987, 1989; Markus & Nurius, 1986), so too *people hold multiple schemas for God*. These may include *the God I believe in* (or *the God I don't believe in*), *the God I'm supposed to believe in*, *the God I wish existed*, *the God my friend believes in*, *the Christian God*, *the Muslim God*, *the Bearded Old Man Who Lives in the Clouds*, and so on. Where multiple schemas are held, each is likely to vary in complexity and degree of elaboration.
4. Related to (2) and (3), just as people hold a working self-concept (Markus & Kunda, 1986), so too *people use a working God schema, the focus of which is susceptible to changes triggered by situational and mood constraints*. A charismatic worship service, a Bible study, and sitting in a foxhole while under fire are each likely to activate different God schemas.¹⁰
5. Following from (3) and (4), just as salient discrepancies between, for example, *ideal self* and *actual self* lead to feelings of loss, sadness, and dejection (Higgins et al., 1986; Higgins et al., 1997), so too *discrepancies between God schemas, if made salient, will lead to specific emotions*. Precisely which emotions obtain will depend in a complex way on motivational goals: for example, a salient discrepancy between *the God I'm supposed to believe in* and *the God I actually believe in* may lead to feelings of doubt, skepticism, or challenge, depending on whether the individual noticing the discrepancy is a struggling believer, an apostate, or a seeker.
6. Just as schemas for self and significant others overlap in relational schemas (Baldwin, 1992, 1999, 2001), so too *God and self are represented together in relational schemas that include interpersonal scripts for typical patterns of interaction generalized from past experience*. Hill and Hood (2002) have also suggested this possibility, noting that one example of an internal script is an individual's attachment style (cf. Kirkpatrick, 1999).
7. Related to (6), just as schemas for significant others can be activated and used in interpersonal encounters with other persons through transference (e.g., Chen & Andersen, 1999), so too *schemas for significant others may influence God schemas through the mechanism of transference*. A significant body of research reviewed in Chapter 1 has already indicated a connection between representations of God and representations of parents (e.g., Justice & Lambert, 1986; Rizzuto, 1979; Saur & Saur, 1992; Strunk, 1959; Vergote

¹⁰ Note that the alternative account given in Section 1.2.2 for the anthropomorphic God concept proposed by Barrett and Keil (1996) is fully compatible with this hypothesis.

& Tamayo, 1981). Transference, in conjunction with relational schemas, then, provides a mechanism for correspondence between parent schemas and God schemas, although it cannot so easily explain positive God schemas that compensate for negative parental schemas (e.g., Kirkpatrick, 1997).

Testing these hypotheses rests on our ability to measure the processing advantage conferred by the presence of implicational-level schemas, and the following section describes some of the available methods.

2.4 The measurement of implicational cognition

The desire of psychologists of religion for attitude and belief measures that avoid problems such as social desirability is shared by social psychologists in general, and there are now multiple experimental methods available with potential for tapping into implicational cognition. All of these techniques find their origin in the work of cognitive psychologists, who developed experimental paradigms measuring participants' behaviour on different tasks in an effort to deduce the structures and processes involved in human cognition. Such paradigms typically provide data in terms of speed or accuracy in task performance. While I am unaware of any systematic review of the available experimental paradigms (a handbook of such methods is sorely needed), Eysenck and Keane (2000) describe many of the techniques in use in their review of cognitive psychology, and Puff (1982) reviews some of the methods available specifically for use in memory research. Clinical researchers have adapted many of these paradigms to investigate the cognitive processes involved in emotional disorders and in the relationship between cognition and emotion (for reviews of their use, see Dalgleish & Power, 1999; Power & Dalgleish, 1997; Williams et al., 1997). Social psychologists adapting these paradigms have done so either with the aim of understanding the cognitive structures and processes involved in social cognition, as for example in Rogers et al.'s (1977) adaptation of Craik and Tulving's (1975) depth of processing task, or with the aim of providing an indirect method for the measurement of social attitudes, as for example in Fazio et al.'s (1986) adaptation of primed lexical decision tasks (see W. Schneider & Shiffrin, 1977; Shiffrin & Schneider, 1977; see Musch & Klauer, 2003, for a general review of some of the methods used in attitude research). The current study investigates the cognitive representations and processes involved in religious cognition by adapting experimental paradigms from the cognition and emotion literature and the social cognition

literature designed to measure cognitive biases in attention, memory, and judgement speed. We now turn to a consideration of these biases.

2.4.1 Attentional biases

Attentional bias may be defined as an involuntary and discrete shift in attention such that something that was peripheral becomes central to awareness (Williams et al., 1997). A variety of techniques can be employed to measure the facilitation or disruption in performance caused by such shifts in attention. Facilitated performance can be measured through lowered auditory thresholds, for example by looking for enhanced sensitivity to stimulus material during a dichotic listening task, or through lowered visual thresholds, for example by looking for enhanced sensitivity to stimulus material presented for successively increasing intervals. The visual dot probe paradigm (see C. MacLeod, Mathews, & Tata, 1986) measures facilitation and disruption simultaneously: a target word and a control word are presented, one in the upper half of the display and the other in the lower half. Participants are measured for the speed with which they can detect a dot that replaces one of the words on critical trials; judgement speeds are faster if the probe replaces the attended stimulus. The simplest, most robust, and most widely used attentional paradigm in research on cognition and emotion, however, is the *emotional Stroop*, an adaptation of Stroop's (1935) task measuring disruption in colour-naming performance. The current investigation explores an adaptation of the emotional Stroop paradigm designed to measure biases in attention to religious stimuli.

In the regular Stroop task, participants name the colour of the ink in which words are written while ignoring the meaning of the word. Impairment of colour-naming is proportional to the word's semantic association to the concept of colour (C. M. MacLeod, 1991a). The emotional Stroop is a modified form of this task in which the words to be colour-named are negatively valenced emotive or threat words. The well-validated finding is of increased latency in colour naming negative words versus neutral control words for clinically and subclinically anxious participants but not for controls (Williams, Mathews, & MacLeod, 1996).

Though there are exceptions, attentional bias is generally observed for material congruent with participants' emotional concerns, particularly but not necessarily those that are anxiety related (Williams et al., 1997, chap. 4). For example, Riemann and McNally (1995) found that non-clinical participants were impaired in the colour-naming of positive and negative words associated with participants' current concerns but not at colour-naming neutral or emotionally

valent words unrelated to current concerns. Other studies have demonstrated similar selectivity in information processing in participants with emotional pathologies: for example, spider phobics are severely retarded at colour-naming spider words but not more general threat words (Watts, McKenna, Sharrock, & Trezise, 1986); anorexics and bulimics are significantly retarded at colour-naming food words but not control words (Ben-Tovim, Walker, Fok, & Yap, 1989); social phobics exhibit interferences for social threat words but not for physical threat words (Hope, Rapee, Heimberg, & Dombeck, 1990). The content-specific nature of attentional bias is not limited to the emotional Stroop paradigm: Westra and Kuiper (1997), for example, found content-specific selective attention effects on a visual dot probe task among tightly defined groups of undergraduates scoring selectively highly on measures of depression, anxiety, or bulimia.

Although the basic emotional Stroop phenomenon is firmly established, the reasons why it occurs are still not entirely clear. Williams et al. (1997) consider this question on two levels: first, what are the cognitive mechanisms that are disrupted in the emotional Stroop; and second, what causes these mechanisms to be disrupted? A consideration of this first question is beyond the scope of the present study, and Williams et al. (1997, chap. 5) provide a review. Researchers have investigated the second question by exploring the effect of two factors on emotional Stroop interference: the interaction between trait and state emotion, and emotional valence versus relatedness to current concern. It is helpful to consider both of these in turn.

First, emotional Stroop interference varies with trait emotion, though activation by state emotion may be necessary for interference to be observed. More generally, manipulation of the environment to make a particular concern more salient results in a greater degree of interference of colour-naming concern-related words (e.g., Mogg, Mathews, Bird, & MacGregor-Morris, 1990).

Second, claims have been made both for interference due to the relatedness of words to current concerns and for interference due to the emotional valence of Stroop stimuli. Mathews and Klug (1993), for example, found that it was the *relatedness* of words to anxiety and not the emotional valence of the words that accounted for the patterns of colour-naming interference. However, other studies have found negative trait adjectives to be more disruptive to colour-naming than positive trait adjectives for depressives (e.g., Segal, Truchon, Horowitz, Gemar, & Guirguis, 1995). Segal and his colleagues suggest that this effect reflects expertise in processing such information, but evidence for this assertion is limited. Mogg and Marden (1990) found no

interference for rowing-related stimuli (e.g., *sculling*) versus unrelated words (e.g., *teacup*) among a group of college-level rowers. There is some question, however, as to whether this group truly constituted experts. By contrast, Dalglish (1995) found significantly more interference in the processing of rare bird-names versus musical instrument words for a group of ornithologists but not for non-experts. Williams et al. (1997) point out that genuine experts are likely to be emotionally involved with their topic of interest, however, meaning that expertise may only indirectly cause interference. This conclusion is strengthened by Watts et al.'s (1986) finding of a reduction of interference for spider-related stimuli among spider phobics after a treatment intervention. Although the authors acknowledge that this may have been due to practice effects, a comparable study of social phobics found a reduction in interference for treatment responders but not for treatment non-responders (Mattia, Heimberg, & Hope, 1993). Given that colour-naming latency can be reduced coincident with reduction in emotional salience of phobic stimuli, Williams et al. (1997) conclude that “frequency of usage or intercategory association due to expertise cannot provide a complete explanation of Stroop interference in emotional disorders” (p. 103).

Just as the emotional Stroop can be used to measure attentional bias to specific domains of concern among emotionally disordered individuals, it is hoped that a religious Stroop could be used to distinguish among religious believers those for whom belief is a central preoccupation and those for whom it is not. Given the affective component of implicational cognition, a successful religious Stroop paradigm could provide an initial way into the indirect measurement of implicational religious cognition.¹¹ Attentional biases are explored in experiments 1 and 2.

2.4.2 Memory biases

The literature for memory biases is more extensive than that for attentional biases, and focuses especially on implicit memory in persons with depression. The general finding is that material that is relevant to the self or is congruent with mood at the encoding stage is subsequently better remembered in an unexpected recall or recognition test (for review, see Williams et al., 1997). Though other experimental paradigms involving memory biases may prove useful in the investigation of religious cognition, I limit description here to the self-reference effect (SRE) in memory already introduced earlier this chapter.

¹¹ Given John Ridley Stroop's own deep religious convictions (C. M. MacLeod, 1991b), it seems apt that an adapted Stroop task might be used to probe for deep religious processes.

The usual format for a SRE study involves asking participants to make a series of trait word decisions regarding the targets of interest. Each trial consists of a question mentioning one of the targets (e.g., *Describes you?*) followed by an adjective (e.g., *humble*), to which the subject must answer *yes* or *no* by pressing a button. *Self* is always one of the targets (though *actual self* and *ideal self* can be rated as separate targets, e.g., Mueller & Grove, 1991), and other typical targets can vary along dimensions of familiarity and intimacy. A highly familiar target of high intimacy might be *mother* or *best friend*; a highly familiar target of low intimacy could be a contemporary figure with a high media profile (such as Tony Blair or David Beckham); and an unfamiliar target, necessarily of low intimacy, might be the experimenter. The dependent variables are judgement speed for the trait word decisions (see Section 2.4.3) and/or subsequent memory for the judged trait words in a subsequent unexpected recall or recognition test. As has been noted, memory for trait words encoded during self-referent encoding is generally superior to that for trait words encoded during other-referent encoding (see Symons & Johnson, 1997, for a review). The mnemonic effect of relating material to the self is conferred both by elaboration of the material (making associations between the novel material and existing material in memory) and by organization of the material (making associations among the to-be-remembered material) (Klein & Loftus, 1988). However, as has also been noted, Symons and Johnson's (1997) meta-analysis also indicates that encoding material in reference to highly intimate others can produce a mnemonic effect equivalent to that of self (see also Czienskowski, 1997; Czienskowski & Giljohann, 2002). The reasons for this other-reference effect may be understood in the same terms as the SRE in memory, as Symons and Johnson (1997) summarize:

It is logical to assume that some of the same mechanisms that govern a self-reference task may operate in any person-reference task. A person-reference task probably provides a potential for recognition of an obvious category label, a task that is frequently practiced, and the potential for the development of an organized domain in memory around that person because the task is frequently practiced. As an application of this logic, the difference between self-reference and other person reference is, of course, one of degrees. In other words, information about certain specific people (your mother, best friend, or worst enemy) is more frequently processed than information about other people (Johnny Carson or the experimenter at your study). People who are more often part of the information-processing environment are likely to be more accessible. Certainly, a participant who has engaged in an encoding task involving questions about himself or herself and about another person still has that information accessible in memory when asked to retrieve it. However, the more well known the person referenced is, the more organized and elaborated the information about the person in memory is and the more accessible the person category is. (p. 388)

Greenwald and Pratkanis (1984) have emphasized the affective nature of the self, arguing that it is legitimate to view the self as an attitude object. We would anticipate therefore, that recall for self- and other-referent judgements would be influenced by the desirability and emotional valence of the traits involved in a similar fashion to that of attitudes (cf. Judd & Kulik, 1980; see also Hill, 1995). We would also anticipate that such differences would be influenced by participants' self-esteem or by depressed mood. This hypothesis has received strong support. Initial research by Davis (1979) found that depressives had significantly weaker recall of trait words encoded during a self-reference task as compared to non-depressives, though recall of adjectives under alternative encoding conditions (such as a semantic encoding task) was unaffected. However, as Derry and Kuiper (1981) point out, Davis (1979) used non-depressed content adjectives, which did not tap into the content of depressives' self-schemas. Studies using depressed and non-depressed content adjectives (i.e., negatively and positively valent adjectives, respectively) have consistently revealed that normal and non-depressed psychiatric controls have a recall bias for positive self-referent material, whereas depressives have a recall bias for negative self-referent material; in contrast, other-referent encoding in both depressives and non-depressives shows the usual bias for positively valent material (Bradley & Mathews, 1983, 1988; Derry & Kuiper, 1981; Kuiper & Derry, 1982; Kuiper & MacDonald, 1982; Kuiper, Olinger, MacDonald, & Shaw, 1985). Non-depressives can also show biases in memory toward negative self-referent content under certain conditions. Mueller and Grove (1991), for example, asked participants to make trait-word decisions for both actual self and ideal self, thereby presumably making discrepancies salient (cf. Higgins et al., 1997); they found that participants had better recall for undesirable trait words descriptive of actual self and for desirable trait words descriptive of ideal self. Participants' mood at the time of encoding has also been found to affect memory bias: depressed mood induction biases self-referent recall toward negatively valenced traits, as compared to participants receiving a happy or neutral mood induction (J. D. Brown & Taylor, 1986; Sutton, Teasdale, & Broadbent, 1988).

Research into trait desirability and emotional valence has focused on self-referent recall, so our understanding of variation in recall patterns for emotionally valent material encoded in other-referent conditions according to the other's familiarity, intimacy, and likableness are as yet incomplete. Nevertheless, the content specificity of paradigms measuring biases in memory suggests that they are likely to prove fruitful in our understanding of religious cognition.¹² For

¹² The SRE in memory has been used once before in a study on religious cognition. McCallister (1988, cited in McCallister, 1995) compared incidental recall for non-religious trait words in Baptists and Catholics in a trait word

example, just as self-reference produces superior recall compared to other encoding tasks, there seem likely to be similar effects on memory of asking people whether or not attributes describe God. However, it is likely to do so rather selectively, and only in those who have well-developed God schemas. Memory biases are explored in experiments 2 and 4.

2.4.3 Judgement speed biases

As has been noted above, the speed with which one judges whether a trait word is self-descriptive is a sensitive measure of whether one is schematic for that trait or not: judgements for schematic words are made faster than for aschematic words (Markus, 1977). In this way judgement speed represents a useful additional data point in addition to the actual rating made:

An endorsement of an item on a self-rating scale *may* reflect an underlying, well-articulated self-schema. It is equally possible, however, that the mark on the self-rating scale is not the product of a well-specified schema, but is instead the result of the favorability of the trait term, the context of the situation, the necessity for a response, or other experimental demands. *Only when a self-description derives from a well-articulated generalization about the self can it be expected to converge and form a consistent pattern with the individual's other judgments, decisions, and actions.* (Markus, 1977, p. 65)

Markus' (1977) finding is well-replicated, and as with memory biases, allows a useful parallel to be drawn with attitude accessibility research (for reviews, see Fazio, 1986, 1989, 2001). Self-referent judgements are made most quickly for words that are high or low in self-descriptiveness; words of moderate descriptiveness are judged more slowly (Kuiper, 1981). In the same way, attitude statements are judged more rapidly for high or low agreement than for moderate agreement (Judd & Kulik, 1980). Of late, multiple judgement speed paradigms for the indirect measurement of attitudes have been developed in addition to Fazio et al.'s (1986) affective priming technique, including the Implicit Association Test (IAT) (Greenwald et al., 1998), the Go/No-go Association Task (Nosek & Banaji, 2001), the Affective Simon Task (de Houwer & Eelen, 1998), and the Extrinsic Affective Simon Task (de Houwer, 2003a), along with further variations of each of these (for reviews, see de Houwer, 2003b; Fazio & Olson, 2003; Spence,

decision task in an effort to explore differences in concrete and abstract thinking. Trait words were encoded under one of four conditions, varying along dimensions of target (*self* or *mother*) and type of memory (episodic/semantic). McCallister's (1995) summary of her findings mentions only that Baptists had better recall for adjectives encoded under the self-referent episodic condition than did Catholics, so the implications of the rest of her data for other work are unknown.

2005). Each of these paradigms may prove useful in the investigation of religious cognition, and indeed, several psychologists of religion have already made use of timing techniques.

Hill et al. (1992) carried out two experiments investigating whether differences between religious and non-religious participants in religious attitude strength could be measured in terms of judgement speed. In the first experiment non-religious participants made slower affective evaluations of religious words (e.g., *Bible*, *damnation*) than did religious participants, while no differences were found between groups in evaluation speed for non-religious control words (e.g., *smile*, *crime*). However, religious participants were not afforded any processing advantage for religious words over non-religious words. The difference in speed for religious words between the two groups may indicate either automatic activation or efficiency of controlled activation of religious attitudes on the part of the religious group (Hill et al., 1992; cf. Fazio et al., 1986), or it may result from inhibition of attitude activation on the part of the non-religious group. Unfortunately, Hill and colleagues' second experiment, following Fazio et al.'s (1986) supraliminal primed attitude activation technique and designed to clarify the cause of this effect, failed to do so, possibly due to a methodological confound.

Wenger and colleagues have used several different timing techniques to investigate religious cognition. Two studies employed the IAT to investigate intrinsic and extrinsic religious orientation: one suggested that explicit measurement of religious motivation is consistent with indirect measurement (Wenger & Yarbrough, 2005); another investigated attitudes toward sinful actions (e.g., *deceive*, *kill*) versus sinful persons (e.g., *liar*, *murderer*) but found ability to separate these attitudes was unrelated to religious orientation (Wenger & Daniels, 2005). A third study simply measured reading time for a short religious passage chosen to appeal to intrinsically oriented believers (Wenger, 2005, Experiment 2). Participants primed to think about their religious failures took considerably longer to read the passage than those primed to think about their religious successes; this difference was particularly marked among believers with high intrinsic religiosity. Finally, Wenger (2004) used a supraliminal priming technique (following Dovidio, Evans, & Tyler, 1986) to analyse the automatic activation of religious action concepts. Participants made a series of timed decisions about the plausibility of performing religious actions (e.g., *sing hymns*), nonreligious actions (e.g., *write reports*), and nonsensical non-actions (e.g., *open sand*) following priming with a category word (either *Christian*, *student*, or *housetop*). Wenger observed a significant crossover interaction between judgement speeds for religious and nonreligious actions depending on priming with a religious or nonreligious word: judgement speed for religious actions was faster following a religious prime than a nonreligious prime; speed

for nonreligious actions followed the reverse pattern. When combined with data on intrinsic and extrinsic religiosity, this interaction was significant for high intrinsic believers but not low intrinsic believers; no variation was found with high or low extrinsic religiosity. This data therefore suggests that intrinsically oriented believers have automatically accessible religious action concepts.

The current investigation measures biases in judgement speed associated with the self-reference effect in judgement speed. Whereas the SRE in memory obtains for self-referent encoding as compared both with other-referent encoding and with more superficial encoding tasks (such as structural, phonemic, or semantic), the SRE in judgement speed obtains only when compared to other-referent judgements. Self-referent trait word decisions are made more slowly than more superficial judgement tasks (Rogers et al., 1977), but more rapidly than other-referent judgements (e.g., Kuiper & MacDonald, 1982; Kuiper & Rogers, 1979; Markus & Smith, 1981). While no meta-analysis equivalent to Symons and Johnson's (1997) has yet been carried out on judgement speed data, available data suggests that as the target in the other-referent condition becomes more familiar, judgement speed tends toward that for self-referent judgements (Bradley & Mathews, 1983; Keenan & Baillet, 1980).¹³ Together with the inverted-U judgement speed effect observed by Kuiper (1981) and noted above, these findings suggest that the SRE in judgement speed occurs because people have a large, well-organized store of readily accessible information about schematic traits for self and intimate others.

Just as with memory, schema accessibility is affected by mood and by the emotional valence of trait word material. In general, likable traits are rated faster than unlikable traits with reference to the self (Mueller, Thompson, & Davenport, 1986), though not for neutral or disliked-others (Ferguson, Rule, & Carlson, 1983). Whether *yes*- or *no*-judgements are made is important here: Lewicki (1984) found that other-referent *yes*-judgements for desirable adjectives were made more rapidly than *no*-judgements for desirable adjectives but only when the other was well-liked; this pattern was reversed for disliked targets. In terms of mood, a similar pattern is found in judgement speed as in recall bias: self-referent positively valent material is judged more quickly in non-depressed individuals than is negatively valent material, whereas for depressives either the

¹³ One exception to this trend occurs when judgement speeds for self-referent ratings are compared with ratings for a group of people that includes the self, such as *most students*. Mueller and colleagues (Mueller, Ross, & Heesacker, 1984; Mueller, Thompson, & Dugan, 1986; Ross, Mueller, & de la Torre, 1986; cf. Aron et al., 1991) found that judgement speeds for *yes*-rated trait words in a *most students* condition were faster than judgements for traits distinctive to the self (i.e., *yes*-rated for *self* but *no*-rated for *most students*).

reverse is found or no difference is found (e.g., Bradley & Mathews, 1983; Derry & Kuiper, 1981; Kuiper & MacDonald, 1982). This bias in judgement speed for depressives does not extend to other-referent judgements, so is not a general bias toward negative material (Bargh & Tota, 1988). Finally, a similar bias in judgement speeds has been found in non-depressed participants following mood induction: judgement speed for positively or negatively valent central traits was unaffected by mood induction; however, positively valent peripheral traits took longer to judge under a sad mood condition than a happy mood condition, while the reverse was found for negatively valent peripheral traits (Sedikides, 1995).

Only two previous studies have made use of a self-reference paradigm to measure biases in judgement speed associated with religious cognition. Spencer and McIntosh (1990), following Markus (1977), measured speed for judgements about the self-descriptiveness of religious and nonreligious control adjectives. Participants who were schematic for religion (i.e., described themselves as religious and for whom this was important) endorsed more religious words as self-descriptive and made these ratings more quickly than did participants describing themselves as not religious and for whom religion was unimportant. Lechner (1989) compared speed for judgements about the descriptiveness of likable and unlikable traits for God, self, and ideal self among groups of low, medium, and high religiousness participants. Though a significant correlation between religiousness and judgement speed for likable traits with God as target was found (with highly religious participants responding more quickly), the expected three-way interaction of group $\times$ target $\times$ trait likability for judgement speed on *yes*-rated decisions was not found. This study mostly likely failed because of inadequate criteria for group formation. Of Lechner's total sample, 82 per cent described themselves as Catholic, and a further 8 per cent as Protestant, and Lechner formed equal-sized groups by dividing the sample according to scores on an unpublished religiosity inventory measuring religious beliefs and attitudes constructed by Lipsmeyer (1984, cited in Lechner, 1989). Unfortunately this strategy is akin to investigating clinical depression by comparing high and low scorers on the Beck Depression Inventory among a sample of college students rather than making use of a clinical group and comparing it to a group of screened non-depressives. Furthermore, no measurements were taken of how often participants attended church, prayed, read Scripture, or engaged in other religious behaviours. A preferable strategy when investigating biases among religious groups, then, would involve selecting contrasting groups from a panel whose members had been screened for frequency of religious behaviours as well as religious beliefs and attitudes.

The current investigation follows this strategy in investigating judgement speed biases for trait-word decisions about God, self, and other targets: efficiency of processing self-referent information can be used as a baseline to compare how individuals of differing religiosity vary in efficiency of processing God-referenced information. Those with well-organized, frequently used God schemas are likely to process God-referent material more quickly than those with poorly developed God schemas; furthermore, the pattern of judgement speeds observed is likely to vary according to the emotional valence of trait words and the judgements made about them, but in a way congruent with feelings toward God. Judgement speed biases are explored in experiments 3, 4, and 5.

2.5 Summary

Many questions are unanswered in our understanding of religious cognition, but fundamental to them all is the question of how religious cognition can be measured. Psychology of religion has primarily used questionnaires to measure religious belief, but many limitations suggest the need for new methods that can tap into implicational religious cognition, such as God schemas, as well as propositional religious cognition, such as God concepts. A consideration of research into the schematic representation of self and other persons suggests multiple hypotheses that can be tested using experimental paradigms adapted from the social cognition and cognition and emotion literatures. The experiments described in the following two chapters employ paradigms designed to measure cognitive biases in attention, memory, and judgement speed that are hypothesized to result from implicational religious cognition. The purpose of the current investigation, therefore, is to launch a systematic exploration of each of these biases to reveal which paradigms most successfully tap into implicational religious cognition, and thereby add a new set of measurement tools to those available to the psychologist of religion.

Chapter 3: The religious Stroop: Searching for attentional biases in religious cognition

3.1 Experiment 1

Experiment 1 compared performance in colour-naming religious and control Stroop stimuli among three groups: evangelical Christians, theologically trained intrinsically motivated Christians, and theologically untrained atheists.¹⁴ Although a variety of other less-committed religious groups could also have been tested, if a religious Stroop effect is observable at all, it is most likely to be found in religious groups for whom emotional expression in religious discourse and ritual behaviour is commonplace. I therefore hypothesized that an interaction between group and task would be found such that either the theologian group (because of an expertise effect) or both of the Christian groups (because of practised belief) would experience more interference on the religious stimuli than would the atheist group.

3.1.1 Method

Participants

Thirty-nine participants were drawn from the panel described in Appendix A to form three groups on the basis of data from the Screening Questionnaire described in Appendix A and found in Appendix B. Group 1 contained 17 atheist participants (6 female and 11 male); group 2 contained 12 Christian participants (6 female and 6 male); group 3 contained 10 Christian participants who had been formally theologically trained (3 female and 7 male). Groups were matched as far as possible for age and educational achievement. All participants were aged 18-40, free of known reading difficulties and colour blindness, spoke English as a first language, and described themselves as currently not depressed. Criteria for inclusion in group 1 included non-belief in God; self-description as a practitioner of no religion; minimal prior experience of Christianity; a Christian orthodoxy score of 10 or less out of a possible 36; and a complete non-

¹⁴ Although an effort was made to recruit a group of atheists with theological training, an insufficient number could be found.

engagement in church attendance, prayer, and Scripture reading for spiritual welfare.¹⁵ Criteria for inclusion in groups 2 and 3 included belief in God; self-description as a Christian; choice of the “born-again” Christian belief statement; practised belief of at least 5 years; a Christian orthodoxy score of 32 or more; an intrinsic religiosity score of 40 or more out of a possible 48; an extrinsic religiosity score of 17 or less out of a possible 24; and an aggregate high level of religious behaviours (church attendance, prayer, Scripture reading, and discussion of religious issues). The additional criterion for inclusion in group 3 was formal theological training for 1 year or longer.

Inspection of Table 3.1 shows that groups 2 and 3 are broadly similar in beliefs, practices, and motivations for religious practices. The mean church attendance for group 3 is skewed by one participant (an ordinand) who had attended 11 religious meetings in the week prior to completing the Screening Questionnaire; mean attendance of the rest of the group is 2.4, the same as for group 2.

Table 3.1. Group characteristics from screening data.

variable	Group 1: atheists (n = 17)		Group 2: evangelicals (n = 12)		Group 3: theologians (n = 10)	
	mean	SD	mean	SD	mean	SD
age /years	26.3	6.7	25.8	5.9	27.2	6.8
length of religious practice /years	-	-	17.5	5.9	18.1	9.7
church attendance ¹	0.1	0.2	2.4	1.6	3.3	3.0
prayer frequency ²	1.0	0.0	5.4	0.6	5.6	0.5
Scripture reading frequency ²	1.0	0.0	4.9	0.4	5.1	0.6
religious issue discussion frequency ²	2.9	0.8	4.6	0.5	5.4	0.8
intrinsic religiosity ³ (max. 48)	-	-	43.8	2.4	45.0	1.6
extrinsic religiosity ³ (max. 24)	-	-	11.3	3.8	12.5	3.0
Christian orthodoxy (max. 36)	3.4	3.2	36.0	0.0	35.5	1.1
theological training /years	0.0	0.0	0.0	0.0	3.3	2.1

Notes: ¹Number of times participant attended church in the week prior to completing the Screening Questionnaire. ²Mean of six-point ordinal data where 1 = *never*; 2 = *rarely*; 3 = *occasionally*; 4 = *weekly*; 5 = *most days*; 6 = *several times a day*. ³Religiosity scores as measured were not meaningful for non-believers.

¹⁵ One member of group 1 had attended a place of worship once in the week prior to filling in the Screening Questionnaire.

Materials

In a review of the literature, Williams et al. (1996) found that both card-presentation and individual computer-presentation of Stroop stimuli produce replicable effects (also see Dalglish, 1995, for a discussion of the two presentation formats). The interference effect is larger for card-presentation than for individual presentation, however, with a grand mean of 84 ms per word across twenty-eight studies versus a grand mean of 48 ms per word across twenty-three studies, respectively. To maximise the possibility of finding a religious Stroop effect, it was therefore decided to present the stimuli on cards. For increased accuracy in timing, the cards were presented digitally on a computer monitor (cf. Mattia et al., 1993).

Each task was presented on a card designed as a single bitmap for full-screen display on a 17-inch monitor at 1024×768 resolution. All words were rendered on a black background in coloured anti-aliased capital letters in 11 pt Verdana typeface. Each card contained 100 words arranged in ten equally spaced columns. Each word was displayed in one of five colours (red, yellow, orange, green, and blue) that were matched for on-screen brightness. Colours were rotated randomly with the constraint that each colour was used twice on each line and that no colour appeared twice in succession. Words were likewise rotated randomly such that no word appeared more than three times in succession.

Table 3.2. Stroop stimuli used in Experiment 1.

Card 3: Religious A	Card 4: Religious B	Card 5: Control A	Card 6: Control B
CHURCH	BIBLE	AGE	BED
GOD	CHRIST	DRAMA	CHAIRS
HOLY	GOD	GROUND	CLOSET
JESUS	LORD	HUMOUR	DESK
SPIRIT	PRAYER	WIND	TABLE

Six colour-naming tasks were used. Following Watts et al. (1986), card 1 consisted of simple colour naming of strings of five letter-Os: “OOOOO”, and card 2 contained classic Stroop conflicting colour-word stimuli. Individual stimuli for the remaining tasks are listed in Table 3.2. Control tasks were equated with the religious tasks for word length, number of syllables, and frequency using frequency tabulations of the British National Corpus of spoken and written

English (Kilgarriff, 1996); frequency data can be found in Appendix C. Although most researchers have used uncategorized neutral material, I decided to make one control task from categorized neutral material to control for potential intercategory priming effects (Williams et al., 1996).

Procedure

Testing took place at the beginning of a 90-minute testing session that included another experiment measuring religious cognition (Experiment 3). Participants were told that the current experiment concerned colour perception, and participants completed a shortened version of Ishihara's *Tests for Colour Blindness* both to reinforce this perception and to check for vision impairments. Before the Stroop cards were presented, participants were familiarized with the colours used and allowed to practise briefly on a few words not used in the cards. They were then instructed to name the colour of all 100 words of each card "as fast as possible" reading row-by-row across the screen, and not to correct any mistakes. Timing began on presentation of the card and stopped when the last colour was named; any errors were recorded. Each card was preceded briefly by a fixation cross to indicate where to start reading. Cards were presented in three pairs with a 15-second pause between the cards in each pair and a 60-second pause after each pair. Cards 1 and 2 were presented in the first pair; cards 3-6 were presented in one of eight counterbalanced orders with the restriction that each pair contained one control task and one religious task to control for any within-session practice effects or priming effects. Finally, to allow for the possibility that verbal IQ might need to be controlled for, participants completed Form 1 of the Mill Hill Vocabulary Scale.

3.1.2 Results

Colour-naming times

Table 3.3 lists the means and standard deviations for colour-naming times for the six versions of the Stroop test for each group. Although participant age correlated significantly with colour-naming time, $r(234) = .39, p < .001$, age did not differ among the three groups, $F(2, 36) = 0.13, p = .883$, and is therefore not considered further. Scores on the Mill Hill Vocabulary Scale¹⁶

¹⁶ Two participants in Group 1 did not complete the Mill Hill Vocabulary Scale.

correlated weakly with colour-naming time, $r(222) = .13$, $p = .046$, but likewise did not differ among groups, $F(2, 34) = 0.49$, $p = .619$, and are likewise therefore not considered further.

Table 3.3. Colour-naming times (seconds per 100 words) for the three groups.

task	Group 1: atheists (n = 17)		Group 2: evangelicals (n = 12)		Group 3: theologians (n = 10)	
	mean	SD	mean	SD	mean	SD
simple colour naming	64.6	11.3	59.8	9.1	67.1	8.3
conflicting colour words	102.7	20.4	89.6	16.0	105.5	21.4
religious A	79.3	14.0	77.3	13.0	83.0	16.8
religious B	79.4	13.6	70.8	10.2	84.3	15.3
control A (non-categorical)	78.3	11.9	71.8	12.1	81.2	14.3
control B (furniture words)	79.1	15.1	70.1	10.9	80.9	12.6

The standard Stroop effect was clearly evident, with all participants taking longer to colour name conflicting colour words than simple letter strings, $F(1, 36) = 234.15$, $p < .001$. Colour-naming time for categorical and non-categorical control words did not differ, $F(1, 36) = 0.07$, $p = .795$, indicating that categorized neutral material did not lead to measurably more interference. A new variable was therefore calculated as the mean of the colour-naming times for the two control tasks, and this was compared in two separate group (atheist, evangelical, theologian) $\times$ task (religious, control) ANOVAs for each religious task in turn. The hypothesized group by task interactions were observed neither for Religious Task A, $F(2, 36) = 2.46$, $p = .100$, nor for Religious Task B, $F(2, 36) = 0.66$, $p = .523$, both illustrated in Figure 3.1.

Although the hypothesized religious Stroop effect was not found, differences in the processing of religious stimuli are likely to be highly individualistic, unlike more generalized cognitive biases for, say, negative trait information. For example, 6 participants, all religious, took between 15 and 36 per cent longer to complete Religious Task A than to colour-name the control stimuli, while none was more than 11 per cent facilitated on the same task. Therefore to aid further investigation two interference indices were used, computed as the Religious Task (A or B) time minus the mean control task time, divided by the mean control task time (thereby controlling somewhat for between-subjects variation). This revealed modest differences among groups in interference for Religious Task A, $F(2, 36) = 3.44$, $p = .043$, with Bonferroni post-hoc

comparisons suggesting that evangelicals were significantly more impaired at colour-naming religious stimuli than are atheists, $p = .044$. The impairment per word, 61 ms, sounds impressive, but interpretation should be tempered by the small effect size: Cohen's $d = 0.14$ (Cohen, 1988). Furthermore, analysis of the interference index for Religious Task B revealed no differences among groups, $F(2, 36) = 0.67, p = .516$.

Figure 3.1. Mean colour-naming times per Stroop task, with standard error bars.

A linear regression was performed to explore whether any variables predicted a high interference index for either religious task. Church attendance and theological training were found to predict interference on Religious Task A, $R^2 = .41, F(2, 36) = 12.30, p < .001$; elimination of the outlier participant who had attended church 11 times and had 2 years of theological training did not alter the model, $R^2 = .42, F(2, 35) = 12.45, p < .001$. No predictor variables could be found for the interference index on Religious Task B, however.

Error rates

In addition to colour-naming times, the number of errors made in colour-naming had been recorded for each task. Errors normally involved using the wrong colour name, but occasionally included intrusions of the actual word; for example, if the stimulus were **wind**, saying “wind” instead of “red”. Because the standard deviation of these data is proportional to the mean, a logarithmic transformation $\log_{10}(X_i + 1)$ was used (Howell, 2002). Table 3.4 shows the converted

mean number of errors (i.e., the antilog of the statistic for transformed data) made in colour-naming times for the six Stroop tasks for each group. The standard Stroop effect was reflected in the relative number of errors made during colour-naming conflicting colour words versus simple colour naming, $F(1, 35) = 15.46, p < .001$.

Table 3.4. Mean number of errors per 100-word colour-naming task.

task	Group 1: atheists (n = 16)¹	Group 2: evangelicals (n = 12)	Group 3: theologians (n = 10)
simple colour naming	0.86	1.14	0.71
conflicting colour words	2.42	2.31	1.56
control A (non-categorical)	0.94	0.43	0.94
control B (furniture words)	1.06	0.29	1.12
religious A	0.71	1.02	0.32
religious B	0.36	0.46	0.32

Note: ¹Error data was not collected for one participant in this group.

As with colour-naming times, error rates for categorical and non-categorical control words did not differ, $F(1, 35) = 0.19, p = .667$. The error values for the control words were therefore combined to form a new variable, and this was compared with errors made for each religious task in turn, in two separate group (atheist, evangelical, theologian) $\times$ task (religious, control) ANOVAs. Group and task were found to interact for Religious Task A, $F(2, 35) = 4.10, p = .025$, but not for Religious Task B, $F(2, 35) = 2.41, p = .104$. Decomposition of the interaction for Religious Task A revealed a simple effect of task for only the theologian group, though the direction was exactly opposite to that hypothesized: members of this group made *fewer* errors on the Religious Task A stimuli than on the control stimuli, $F(1, 35) = 5.69, p = .023$.

3.1.3 Discussion

The current study provided little support for the hypothesized interactions between group and task for Stroop interference as measured either by colour-naming times or by error rates. For colour-naming times, although the evangelical group experienced a slight degree more interference than the atheist group on Religious Task A, the same effect was neither observed in the theologian group on Religious Task A nor replicated for either Christian group on Religious

Task B. Similarly, although church attendance and theological training predicted interference on Religious Task A, no predictors were found for interference on Religious Task B. This finding might be explained by the fact that *church* was one of the words in Religious Task A; however this possibility cannot be verified from the current data. No group and task interaction was observed for error rates, save for an unexpected facilitation for the theologian group on Religious Task A. The overall error rate was sufficiently low however to make this measure of little theoretical interest or practical use.

One possible explanation for the failure to observe a religious Stroop effect is that the religious stimuli chosen may have been too general to activate religious schemas differentially among the groups. A more robust effect might be observed by using religious language with a positive or negative emotional valence, for example, *Heaven, mercy, Saviour, blessing, saved, forgiven*, versus *Hell, Satan, sinful, crucify, evil, demonic*. Experiment 2 explores this possibility.

3.2 Experiment 2

Since no religious Stroop effect was found in Experiment 1, the design of Experiment 2 was more exploratory in nature: I compared performance in colour-naming a wider variety of religious and control Stroop stimuli among three markedly different groups: evangelical Christians, non-evangelical Christians, and atheists. Choice of groups was again driven by the desire to capture relative extremes of religious practice, emotion, and behaviour, but also to provide a sufficient breadth across religious variables to aid interpretation of the results.

In addition to re-running the domain-general religious words used previously, I constructed six further religious word lists to test specific hypotheses: two sets of positive words concerned themselves either with positive religious ideas in general (e.g., *worship, Heaven, blessed*), or with biblically affirmed positive attributes of God or their potential effects on a person (e.g., *Saviour, grace, forgiven*); two sets of negative words concerned themselves with negative religious ideas in general (e.g., *Satan, Hell, demonic*), or with biblically affirmed negative attributes of God or their potential effects on a person (e.g., *judge, condemn, shame*); one set of sacrament-associated words (e.g., *crucified, communion, nails*); and one set of words that might appear theologically heretical if read together (e.g., *God, uncaring, cruel*). Following Watts et al. (1986), to encourage Stroop stimuli with multiple meanings presented in card format to be interpreted in their context, some words are included on more than one list (e.g., *Jesus, God, Christ*). Because some of the religious sets of words had strong emotional valence, I also used a selection of control word lists: two sets of

neutral words, either categorical (e.g., *table, desk, stool*), or non-categorical (e.g., *signal, whatever, wind*); one set of positive emotional words (e.g., *happy, funny, pleased*); and two sets of negative emotional words, either particularly associated with anxiety (e.g., *afraid, fear, fail*) or with threat (e.g., *terror, panic, danger*). Participants also completed a variety of post-test measures designed to validate any observed religious Stroop effects specific to a particular word list. As an extension to the Stroop paradigm, it was also possible to investigate whether the Christian groups would show an implicit memory bias (see also Chapter 4) for the religious Stroop stimuli by giving participants a brief distractor task after each card and following the cards with an unexpected recall test.

I formed two hypotheses to test the effects of religion on attention: first, that an interaction between group and task would be found such that the evangelical Christian group would experience more interference on the emotionally valent religious stimuli than would the atheist group; second, that individuals with schemas for specific approaches to religion would experience more interference for stimuli associated with that approach than would participants who did not value that approach. For example: Christians with a more elaborated sacramental schema might particularly experience interference when colour-naming a card of sacramental words; Christians with a more dogmatic or conservative approach might particularly experience interference when colour-naming a card of schema-inconsistent heretical words; Christians with negatively valent God schemas might particularly experience interference when colour-naming a card of negative attributes of God or their potential effects on a person. An additional, third hypothesis tested the effects of religion on memory: I hypothesized that an interaction between group and type of material would be found such that the evangelical Christian group would experience enhanced recall for religious material as compared to the atheist group. No specific predictions were made regarding the non-evangelical group.

3.2.1 Method

Participants

Forty-eight participants were drawn from the panel described in Appendix A to form three groups, again on the basis of data from the Screening Questionnaire described in Appendix A and found in Appendix B. Group 1 contained 16 atheist control participants (10 male and 6 female); group 2 contained 16 non-evangelical Christian participants (5 male and 11 female); group 3 contained 16 evangelical Christian participants (6 male and 10 female). All participants

were enrolled in, or graduates of, a Bachelor's degree course, aged 18-40, free of known reading difficulties and colour blindness, spoke English as a first language, and described themselves as currently not depressed. Inspection of Table 3.5 shows that all three groups differ markedly on most measures of beliefs, practices, and motivations for religious practices.

Table 3.5. Group characteristics from screening data.

variable	Group 1: atheists (n = 16)		Group 2: non-evangelical Christians (n = 16)		Group 3: evangelical Christians (n = 16)	
	mean	SD	mean	SD	mean	SD
age /years	22.6	4.1	20.3	1.1	21.3	2.5
length of current religious status /years	15.9	8.7	14.3	7.2	9.7	6.6
church attendance ¹	0.0	0.0	0.9	1.1	3.1	2.4
prayer frequency ²	1.0	0.0	4.0	1.3	5.6	0.5
Scripture reading ²	1.0	0.0	2.3	0.9	5.3	0.4
religious issue discussion frequency ²	3.0	0.7	3.3	0.8	4.7	0.8
intrinsic religiosity ³ (max. 48)	-	-	26.8	9.1	45.2	2.2
extrinsic religiosity ³ (max. 24)	-	-	15.4	4.7	13.6	6.4
Christian orthodoxy (max. 36)	4.1	3.0	28.9	7.1	35.9	0.3
theological training /years	0.0	0.0	0.1	0.3	0.2	0.6

Notes: ¹Number of times participant attended church in the week prior to completing the Screening Questionnaire. ²Mean of six-point ordinal data where 1 = *never*; 2 = *rarely*; 3 = *occasionally*; 4 = *weekly*; 5 = *most days*; 6 = *several times a day*. ³Religiosity scores as measured were not meaningful for non-believers.

Criteria for inclusion in group 1 included non-belief in God; self-description as an atheist or a practitioner of no religion; no theological training; and a complete non-engagement in church attendance, prayer, and Scripture reading for spiritual welfare. The criterion from Experiment 1 involving maximum Christian orthodoxy score was dropped due to concerns that non-believers might have misinterpreted the instructions on the Screening Questionnaire and thereby scored artificially high; on a re-test with clarified instructions (see Appendix D) all participants in group 1 scored 10 or less out of a possible 36. A minority had attended a Church of England school or been brought up in a Christian family.

Criteria for inclusion in group 2 included belief in God; self-description as a Christian; and choice of the “moral and ethical” Christian belief statement. No further criteria were defined for

this group so as to provide a variety of potential contrasts with groups 1 and 3, as befitting the exploratory nature of this study. For that reason, and as can be seen in Table 3.5, group 2 had high variability on measures of beliefs, practices, and motivations for religious practices.

Criteria for inclusion in group 3 included belief in God; self-description as a Christian; choice of the “born-again” Christian belief statement; a Christian orthodoxy score of 35 or 36 out of a possible 36; and intrinsic religiosity score of 40 or more out of a possible 48; church attendance at least once per week; and prayer and Scripture reading most days or several times a day. The criteria from Experiment 1 of length of practice and maximum extrinsic religiosity score were dropped to allow extra variables for interpretation of the results.

Materials

Twelve colour-naming tasks and one practice task were used; individual stimuli are listed in Table 3.6. The Religious Heretical list originally included the word *bastard*, but this was replaced with *trickster* in pilot testing after I observed a taboo Stroop effect associated with this word (cf. MacKay et al., 2004). Lists of neutral, positive, and negative valence words were drawn from previous work by Dalgleish (1995) and Sharma and McKenna (2001). The limited pool of suitable religious words available and the variety of planned comparisons made it difficult to match the different tasks exactly for number of syllables, number of letters, and word frequency (again using Kilgarriff, 1996); the differences are however sufficiently small (see Appendix E) that they were judged unlikely to disturb any religious Stroop effect of theoretically interesting size.¹⁷

As with Experiment 1, card-presentation was chosen in preference to individual computer-presentation. Whereas in Experiment 1 words were presented on a monitor, however, in the current experiment each colour-naming task was printed professionally on high grade white paper and mounted on an A2 size (420 mm × 594 mm) card. When held at arm’s length, this presentation format allowed the stimuli to be printed larger and to subtend a larger proportion of participants’ visual field than was possible in Experiment 1. Each word was printed in colour on a white background in upper and lower case letters in 28.4 pt Verdana typeface. Each card contained 96 words arranged in eight equally spaced columns. Each word was printed in one of

¹⁷ Indeed, colour-naming time did not correlate with number of letters per card, $r(576) = .01, p = .739$, with number of syllables per card, $r(576) = .02, p = .624$, or with mean log frequency in the British National Corpus (Kilgarriff, 1996), $r(576) = -.03, p = .445$.

six colours (red, yellow, orange, green, blue, and purple). Colours and words were rotated randomly with the constraint that no colour appeared twice in succession and no word appeared three times in succession.

Participants also completed several other assessments to help with interpretation of results: the Religious Activities Card-Sort Task, the Religious and Spiritual Ideas Survey, and the Supplementary Questionnaire. The materials for each of these can be found in Appendix F.

Table 3.6. Stroop word lists used in Experiment 2.

RELIGIOUS						
Religious General	Religious Positive General	Religious Negative General	Religious Positive God	Religious Negative God	Religious Sacramental	Religious Heretical
Jesus	Jesus	demonic	Jesus	judge	crucified	Jesus
God	God	sinner	God	God	Jesus	God
Christ	Heaven	Satan	Saviour	wrath	Christ	trickster
Lord	worship	burn	mercy	sin	blood	cruel
Bible	blessed	Devil	grace	punish	communion	false
Holy	rejoice	damned	forgiven	shame	cross	liar
Spirit	hope	evil	loving	guilty	nails	uncaring
prayer	joy	Hell	friend	condemn	thorns	weak
CONTROL				PRACTICE		
Control Neutral¹	Control Furniture	Control Positive²	Control Anxiety¹	Control Threat²	Practice²	
signal	table	happy	afraid	terror	thumb	
whatever	settee	pleased	crash	panic	field	
rhythm	desk	cheer	death	danger	autumn	
lock	wardrobe	funny	fail	anxious	clock	
bathe	stool	ease	fear	trembling	gate	
wind	armchair	bright	grief	threat	note	
total	dresser	special	sorrow	stress	exceed	
stove	bed	laugh	misery	tense	senior	

Note: ¹Drawn from Sharma and McKenna (2001). ²Drawn from Dalgleish (1995).

The Religious Activities Card-Sort Task requires participants to eliminate one card at a time from a set of eight cards representing activities associated with Christianity, each time eliminating the

activity least important to them personally, relative to the remaining activities. The eight activities included corporate Bible study and teaching, personal prayer and meditation, sung worship, fellowship with other believers, exercising charismatic gifts, receiving Holy Communion, evangelism, and social action.

The Religious and Spiritual Ideas Survey explores respondents' feelings about various religious topics, including Holy Communion, God, and Heaven and Hell. A free response question about Holy Communion creates a brief schematic activation of related schemas, following which respondents rate the importance and centrality of Communion to them personally, and their frequency of receiving Communion. These questions are followed by the Loving God index from Benson and Spilka's (1973) Loving and Controlling God Scales, with two further semantic differential pairs of adjectives appended: merciful-punishing, and judgemental-sympathetic. Two forced-choice questions elicit views about heaven and hell, drawing on questions formulated by The Barna Group (2003, October 21). Finally, respondents rate fifteen attitude statements about death, afterlife, relationship with God, and awareness and belief in demonic forces; the two questions on death were adapted from Templer (1970).

The Supplementary Questionnaire is a short survey clarifying three areas asked about in the Screening Questionnaire. It includes a checklist of religious and denominational descriptors, a question on length of practice of current beliefs, and a slightly re-worded version of the shortened Christian Orthodoxy scale (Hunsberger, 1989).

Procedure

Testing took place in a single 45-minute session beginning with the colour-naming task and followed by, in order, a surprise free recall task, the Religious Activities Card-Sort Task (administered to groups 2 and 3 only), the Religious and Spiritual Ideas Survey, and the Supplementary Questionnaire.

Before the Stroop stimuli were presented, participants were familiarized with the colours used and given the same instructions as for Experiment 1. Participants were handed each card with their eyes shut, opened their eyes after a brief countdown, and began colour-naming immediately. Participants were timed from the moment that they opened their eyes until they had named the last colour; all errors were recorded. A practice card containing unrelated words preceded the test cards. Test cards were presented in blocks of three with a one minute silent rest after each block; presentation order was counterbalanced within and between blocks to

control for any within-session practice, priming, or fatigue effects.¹⁸ After each card participants were asked to count backwards from a three-digit number in multiples of three for 30 seconds, apart from the last, after which participants counted backwards for 60 seconds. The backwards counting was introduced to clear working memory, and thereby reduce any priming effect one card might have on another. Immediately following the final set of backwards counting participants were given a 10-minute surprise recall test in which they were instructed to write down as many of the words as they could remember having seen on the cards. Following administration of the remaining assessments, participants were paid and debriefed.

3.2.2 Results

Colour-naming times

As with Experiment 1, age was found to correlate significantly with colour-naming time, $r(576) = .28, p < .001$. However, individual groups were not found to differ significantly in age, $F_{\text{WELCH}}(2, 23.9) = 3.20, p = .06$, and the largest difference among groups in mean age, 2.4 years, was non-significant in a Tamhane post-hoc test for unequal variances, $p = .111$. For this reason age is not treated as a covariate in the analyses below.

As inspection of Table 3.7 suggests, there are consistent differences in colour-naming times among the groups, but little variation among cards within the groups. Analysis of variance of card-type (religious, control) $\times$ group (atheist, non-evangelical, evangelical) confirmed the main effect of group, $F(2, 45) = 5.72, p = .006$; evangelicals were on average 14.5 s slower to colour-name each card than non-evangelicals, $p = .005$, while all other group comparisons were non-significant. Religious cards took on average 1.4 s longer to colour-name than control cards, $F(1, 45) = 12.87, p < .001$, but the hypothesized card-type by group interaction was not found, $F(2, 45) = 1.04, p = .362$.

¹⁸ The length of time each participant took on each card was found to be unrelated to the position during the experiment in which the card had been presented, $r(576) = .02, p = .648$, indicating that there were no discernible effects of fatigue or practice.

Table 3.7. Colour-naming times (in seconds per 96 words) for different cards.

task	Group 1: atheists (n = 16)		Group 2: non-evangelical Christians (n = 16)		Group 3: evangelical Christians (n = 16)	
	mean	SD	mean	SD	mean	SD
Religious General	71.6	13.4	61.5	9.5	78.0	15.6
Religious Positive General	70.3	12.6	60.9	8.2	77.8	16.1
Religious Negative General	72.9	17.0	63.4	9.0	78.2	16.0
Religious Positive God	71.6	13.1	64.4	8.3	78.9	17.3
Religious Negative God	72.0	13.2	62.3	8.5	76.1	14.1
Religious Sacramental	72.6	11.9	66.8	10.8	79.9	16.4
Religious Heretical	72.2	14.2	61.4	6.8	78.0	13.8
Control Neutral	68.6	12.9	60.8	7.4	73.9	13.6
Control Furniture	71.4	12.2	62.2	7.8	77.0	15.6
Control Positive	70.4	13.5	62.1	7.8	76.1	15.2
Control Anxiety	72.4	13.4	63.3	9.6	77.9	16.8
Control Threat	69.6	14.6	62.4	8.1	74.9	15.1

Note: Standard deviations in parentheses.

Although multiple comparisons of specific sets of cards had been planned, inspection of Figure 3.2 shows that no pair of cards can be chosen for which an interaction term would be significant. The results of individual tests, all non-significant, are therefore not reported here.¹⁹

Since no group effects were to be found, data were reanalysed on a participant-by-participant basis to determine whether any of the 48 participants showed an overall impairment in colour-naming religious words relative to control words. Consistent with the main effect of card-type observed above, three participants took longer on the religious tasks than the control tasks. These included one atheist (5.9 s slower), $t(10) = 2.86$, $p = .017$, and two evangelicals (4.9 s and 10.0 s slower), $t(6.57) = 2.61$, $p = .037$, $t(10) = 4.86$, $p < .001$, respectively. If the Religious Heretical task were excluded as an atypical set of religious words, differences in colour-naming

¹⁹ The lack of differences did not seem to reflect a failure of the cards to operate in the way in which I had anticipated. A number of participants made comments following the cards indicating that they had connected the words on the card, and one participant even commented that she could not figure out the connection between the (unconnected) words on the Control Neutral task. Even the Religious Heretical task elicited spontaneous comments on completion: for example, one evangelical participant remarked, "I found that bit very distressing, ... the juxtaposition of Jesus with false." Comments such as these suggest that the words on each card were interacting as expected, even though this had no onward effect on colour-naming time, error rates, or recall.

times reached statistical significance for four participants: one atheist (5.9 s slower), $t(9) = 2.63$, $p = .027$; two non-evangelicals (4.3 s and 4.6 s slower), $t(9) = 2.62$, $p = .028$, $t(9) = 2.42$, $p = .039$, respectively; and one evangelical (10.3 s slower), $t(9) = 4.60$, $p = .001$. Although none of these differences can be accounted for by an outlying time on a single religious task, the family-wise error rate in running forty-eight comparisons at the 5% significance level is nevertheless too high to be able to conclude anything from these results: the probability of at least one significant result is .915, and the probability of exactly four significant results is .127.

Figure 3.2. Mean colour-naming times per Stroop task, with standard error bars.

A final analysis was carried out to explore the possibility of any Stroop effects experienced at an individual level. It was hypothesized, for example, that participants with a more sacramental approach to their faith might be selectively impaired in colour-naming sacramental words relative to general religious words. Figure 3.2 suggests a modest but non-significant impairment in the expected direction on the Religious Sacramental task for the evangelical group and, even more so, the non-evangelical group. An interference index was therefore calculated by subtracting the time taken for the Religious General task from the time taken for the Religious Sacramental task,

and dividing the result by the mean time taken for the five control tasks. The centrality and importance of Holy Communion to participants had been measured in several ways in the Religious Activities Card-Sort Task and the Religious and Spiritual Ideas Survey, allowing a series of correlations to be carried out for the two Christian groups. Inspection of Table 3.8 shows that while the centrality, importance, and frequency of Holy Communion are interrelated, none is related to impairment in colour-naming sacrament-related words for either group.

Table 3.8. Correlation matrix for Holy Communion (HC) related measures for evangelicals (bottom-left) and for non-evangelicals (top-right).

		sacramental interference index	HC relative rank	HC importance	HC centrality	HC frequency
sacramental interference index	<i>r</i>		.07	.10	.13	.32
	<i>p</i>		.811	.706	.627	.224
HC relative rank	<i>r</i>	-.32		.84	.66	.61
	<i>p</i>	.223		.001 **	.005 **	.013 *
HC importance	<i>r</i>	.19	.42		.51	.59
	<i>p</i>	.473	.106		.045 *	.017 *
HC centrality	<i>r</i>	.09	.705	.40		.69
	<i>p</i>	.742	.002 **	.126		.003 **
HC frequency	<i>r</i>	-.11	-.22	.11	.05	
	<i>p</i>	.690	.411	.677	.842	

Note: N = 16 for all correlations. ** indicates $p < .01$; * indicates $p < .05$.

Error rates

As number of errors per card was found to be significantly correlated with colour-naming time, $r(576) = .23, p < .001$, error rate results were expected to follow a similar pattern to those for colour-naming times. As for Experiment 1, a logarithmic transformation $\log_{10}(X_i + 1)$ was used (Howell, 2002) in the preparation of the data for analysis; mean data is displayed in Table 3.9.

Table 3.9. Mean number of errors per 96-word colour-naming task.

task	Group 1: atheists (n = 16)	Group 2: non- evangelical Christians (n = 16)	Group 3: evangelical Christians (n = 16)
Religious General	0.57	0.49	1.19
Religious Positive General	1.11	0.77	1.56
Religious Negative General	0.80	0.80	1.29
Religious Positive God	0.89	0.69	0.95
Religious Negative God	0.94	1.21	1.01
Religious Sacramental	1.10	1.25	0.98
Religious Heretical	1.55	0.92	1.07
Control Neutral	0.83	0.91	1.59
Control Furniture	1.23	0.65	0.92
Control Positive	0.86	0.72	0.82
Control Anxiety	1.33	1.03	0.78
Control Threat	0.98	1.11	0.94

Note: Means displayed are the antilog of the statistic for the transformed data.

An ANOVA of card-type (religious, control) $\times$ group (atheist, non-evangelical, evangelical) confirmed the lack of differences in error among card-types $F(1, 45) = 0.06, p = .802$, and among groups, $F(2, 45) = 0.43, p = .654$, and likewise no interaction of card-type and group, $F(2, 45) = 0.57, p = .571$. Together with the colour-naming time data, these data are strongly suggestive that colour-naming religious Stroop stimuli does not produce any systematic group-specific interference.

Recall

Each participant had completed a surprise recall test following the colour-naming tasks. Participants were scored one mark per word correctly recalled; half marks were given for words with the correct root but wrong suffix (e.g., *crucifixion* instead of *crucified*), though this was a relatively rare occurrence. As is seen in Table 3.6, several of the religious words occurred on

more than one card; these words were therefore scored only once and excluded from analyses comparing specific classes of words, such as positive religious words.²⁰

Table 3.10. Percentage of words recalled within each category.

category	Group 1: atheists (n = 16)		Group 2: non-evangelical Christians (n = 16)		Group 3: evangelical Christians (n = 16)	
	mean	SD	mean	SD	mean	SD
total unique words on religious cards [47]	16.4	4.4	20.7	6.5	27.7	7.4
total words on control cards [40]	6.1	3.1	9.5	6.6	9.1	5.8
positive religious words ¹ [12]	10.4	7.3	14.1	9.7	21.9	12.4
negative religious words ¹ [15]	16.3	8.1	17.3	14.5	28.8	14.7
positive control words [8]	5.9	7.0	9.8	13.1	5.5	8.2
negative control words [16]	8.8	7.1	10.5	9.9	9.6	8.9
religious sacramental words ¹ [7]	23.7	18.9	39.7	24.0	34.8	17.9
religious heretical words ¹ [6]	9.9	17.5	6.3	14.8	12.0	14.9

Notes: Total number of words per category in brackets. ¹Words appearing on more than one card are excluded, except *Christ*, which was counted for the religious sacramental words category.

Inspection of Table 3.10 suggests support for my hypothesis of enhanced recall of religious material by the evangelical Christian group. An ANOVA of word-type (religious, control) $\times$ group (atheist, non-evangelical, evangelical) confirmed that recall for religious words was superior for all groups to that for control words, $F(1, 45) = 108.28, p < .001$, and that the word-type $\times$ group interaction illustrated in Figure 3.3 was also statistically significant, $F(2, 45) = 4.19, p = .021$. Decomposition of the interaction revealed that groups differed in recall for religious words, $F(2, 45) = 13.40, p < .001$, but not for control words, $F(2, 45) = 1.95, p = .153$. Sidak pairwise comparisons between groups confirmed enhanced recall for religious words by evangelicals over that of non-evangelicals, $p = .008$, and over that of atheists, $p < .001$; recall for religious words by atheists and non-evangelicals did not differ significantly, $p = .169$. To explore this selective advantage, a new variable was calculated for each participant: the difference between percentage recall for religious material and percentage recall for control material. This recall index was

²⁰ The exception to this is *Christ*, which appeared on two tasks, Religious General and Religious Sacramental, and was scored as a religious sacramental word.

correlated with a selection of potential predictor variables from screening and post-test measures. However, few variables correlated significantly in the first instance, and all that did could be ruled out as spurious by plotting scatter charts of the data.

Figure 3.3. Mean percentage of religious and control words recalled, with standard error bars.

The possibility of the emotional valence of the to-be-remembered material interacting with group and word-type was also explored in a 3-way ANOVA of word-type (religious, control) $\times$ group $\times$ valence (positive, negative). While in this analysis the word-type $\times$ group interaction emerged more strongly, $F(2, 45) = 6.77, p = .003$, and all groups showed enhanced recall for negative material, $F(1, 45) = 7.89, p = .007$, valence did not interact with word-type, $F(1, 45) = 0.78, p = .381$, with group, $F(2, 45) = 0.53, p = .591$, or with word-type $\times$ group, $F(2, 45) < 0.01, p = .998$. Additional analyses on specific sets of words found no differences in recall among groups for words from the Religious Heretical task, $F(2, 45) = 0.54, p = .586$, or from the Religious Sacramental task, $F(2, 45) = 2.59, p = .086$, though the latter shows a trend consistent with that shown for positive and negative religious material. The presence of schema-specific religious recall biases was explored in the two Christian groups separately by correlating recall for specific categories of words with potential predictor variables from the Religious Activities Card-Sort Task and the Religious and Spiritual Ideas Survey, but no consistent effects were observed.

The design of this study, however, with its small group sizes and low number of to-be-remembered words in each category, militates against observing such effects.

In summary then, all groups showed a recall advantage for religious material in general, and for emotionally negative material in general. In addition, and consistent with my third hypothesis, evangelical Christians were found to have enhanced recall for religious material when compared to other groups.

3.2.3 Discussion

The purpose of Experiment 2 was to widen the search for a religious Stroop effect after the failure to observe one in Experiment 1. I had expected evangelical Christians to experience more interference on emotionally valent religious stimuli than atheists, but found no evidence for impairment as measured by either colour-naming times or by error rates. I had also expected individuals with specific religious schemas to experience more interference on stimuli associated with that schema, but again found no evidence for content-specific impairment as measured by either colour-naming times or by error rates. Whereas Experiment 1 still left a religious Stroop effect a possibility due to the performance of the evangelical group on Religious Task A, there is no hint of this effect in the methodologically more rigorous Experiment 2. This makes remote the prospect of finding such an effect without examining different participant groups or major methodological revision.²¹

Experiment 2, however, also included a non-attentional component, a surprise recall test for the religious and control material presented as Stroop stimuli. Here data strongly supported my hypothesis that the evangelical Christian group would experience a recall bias for religious material as compared to the atheist group. Given though the unrelatedness of the religious recall index to all variables on the paper measures administered during testing, quite what leads to enhanced recall for religious material (beyond the differences inherent in the groups) remains an open question. While this is a preliminary result and needs replication, these data do suggest that exploration of memory biases for religious material would provide a rich new vein of

²¹ Although it cannot be verified from the current data, as experimenter my impression was that participants in Experiment 2 were more likely to experience difficulty in colour-naming on the first half of a given task. In contrasting religious cognition with the sort of emotional cognition producing emotional Stroop effects with large effect sizes, it is possible that the “half-life” of attentional resources redirected when presented with religious stimuli is much shorter. If this were the case then one minor refinement for any future studies could be to reduce the number of words presented per card.

Chapter 3: The religious Stroop

investigation for psychologists of religion. The effect of religious cognition on recall is further explored in Experiment 4.

Chapter 4: The God-reference effect: Memory and judgement speed biases in religious cognition

4.1 Experiment 3

A number of researchers have found that self-referent judgements are made more quickly than other-referent judgements (e.g., Kuiper & Rogers, 1979; Kuiper & MacDonald, 1982; Bradley & Mathews, 1983). As the target in the other-referent condition becomes more intimate, however, judgement speeds tend toward those for self-referent judgements (Bradley & Mathews, 1983; Keenan & Baillet, 1980). This experiment tests the hypothesis that judgement speeds for God as target would vary predictably with religiosity, specifically with Christians showing a greater efficiency of processing God-referenced material than non-believers. To test this hypothesis I compared how long different religious groups took to make trait-word decisions about themselves, their mother, and God. A 3 (group) $\times$ 3 (target) $\times$ 2 (word-type) mixed design was used, where target and word-type were repeated measures. The 3 groups selected were evangelical Christians, evangelical theologians, and atheists; the theologians were included to assess whether theological expertise conferred any extra advantage in processing speed in addition to that gained through regular religious practice. Two types of trait words were planned—theological and non-theological—though post-hoc subsets of positive and negative emotionally valent non-theological words were selected during analysis. In addition to the computer-based trait-word decisions, Likert scale ratings were collected to assess participants' personal concept of God and also the concept of God that they would attribute to a strongly committed Christian, using the God Concept Survey. This pencil-and-paper measure was used as a validity check to explore whether participants had more than one propositional concept of God, and whether the concept participants used in the computer-based portion of the experiment more closely resembled their personal God concept or a stereotypically Christian God concept.

Several hypotheses and exploratory questions were formed. First, it was hypothesized that atheists would have two conflicting concepts of God on which they can draw: one that is stereotypically Christian, and one that is personally held. Second, it was hypothesized that Christian participants would have similar judgement speeds for God-referenced material and

self-referenced material, whereas atheist participants would be slower for God-referenced material than for self-referenced material. There were no reasons to assume group differences in judgement speed for self- or mother-referenced material. Third, the question was posed as to whether theologians would be advantaged over evangelicals on God-referenced material in general, or on theological material in particular. Finally, the relationship between the emotional valency of trait words and judgement speed was explored.

4.1.1 Method

Participants

Forty participants were drawn from the panel described in Appendix A to form three groups on the basis of data from the Screening Questionnaire described in Appendix A and found in Appendix B. Group 1 contained 17 atheist participants (6 female and 11 male); group 2 contained 13 Christian participants (6 female and 7 male); group 3 contained 10 Christian participants who had been formally theologically trained (3 female and 7 male). Groups were matched as far as possible for age and educational achievement. All participants were aged 18-40, free of known reading difficulties, spoke English as a first language, and described themselves as currently not depressed. Criteria for inclusion in group 1 included non-belief in God; self-description as a practitioner of no religion; minimal prior experience of Christianity; a Christian orthodoxy score of 10 or less out of a possible 36; and a complete non-engagement in church attendance, prayer, and Scripture reading for spiritual welfare.²² Criteria for inclusion in groups 2 and 3 included belief in God; self-description as a Christian; choice of the “born-again” Christian belief statement; practised belief for at least 5 years; a Christian orthodoxy score of 32 or more out of a possible 36; an intrinsic religiosity score of 40 or more out of a possible 48; an extrinsic religiosity score of 17 or less out of a possible 24; and an aggregate high level of religious behaviours (comprising church attendance, prayer, Scripture reading, and discussion of religious issues). The additional criterion for inclusion in group 3 was formal theological training for 1 year or longer.

Inspection of Table 4.1 shows that groups 2 and 3 are broadly similar in beliefs, practices, and motivations for religious practices. The mean church attendance for group 3 is skewed by one

²² One member of group 1 had attended a place of worship once in the week prior to filling in the Screening Questionnaire.

participant (an ordinand) who had attended 11 religious meetings in the week prior to completing the screening questionnaire; mean attendance of the rest of the group was 2.4, the same as for group 2.

Table 4.1. Group characteristics from screening data.

variable	Group 1: atheists (n = 17)		Group 2: evangelicals (n = 13)		Group 3: theologians (n = 10)	
	mean	SD	mean	SD	mean	SD
age /years	26.3	6.7	25.7	5.6	27.2	6.8
length of religious practice /years	-	-	17.2	5.8	18.1	9.7
church attendance ¹	0.1	0.2	2.4	1.5	3.3	3.0
prayer frequency ²	1.0	0.0	5.4	0.6	5.6	0.5
Scripture reading frequency ²	1.0	0.0	5.0	0.5	5.1	0.6
religious issue discussion frequency ²	2.9	0.8	4.7	0.6	5.4	0.8
intrinsic religiosity ³ (max. 48)	-	-	43.9	2.3	45.0	1.6
extrinsic religiosity ³ (max. 24)	-	-	11.1	3.7	12.5	3.0
Christian orthodoxy (max. 36)	3.4	3.2	36.0	0.0	35.5	1.1
theological training /years	0.0	0.0	0.0	0.0	3.3	2.1

Notes: ¹Number of times participant attended church in the week prior to completing the Screening Questionnaire. ²Mean of six-point ordinal data where 1 = *never*; 2 = *rarely*; 3 = *occasionally*; 4 = *weekly*; 5 = *most days*; 6 = *several times a day*. ³Religiosity scores as measured were not meaningful for non-believers.

Materials

One hundred and eighty-one trait words were initially selected from prior work by Lechner (1989), Gorsuch (1968), and Gibson (1999). After pilot work the list of trait words used was reduced to 120, with words excluded on the basis of low relative frequency in spoken and written British English (Kilgarriff, 1996) or inappropriately long judgement speeds. Pilot work also suggested the merit of treating the subset of theological words typically used to describe God (e.g., *almighty*, *omniscient*) separately from the larger subset of more general non-theological trait words (e.g., *caring*, *indifferent*, *silent*). The 120 words used in the current study can be found listed in Appendix G along with details of their sources. During analysis a post-hoc decision was made to consider the emotional valence of trait words: subsets of positive and negative words were therefore selected by comparing ratings from five judges. Words judged to be interpreted in different senses depending on the target (e.g., *jealous*) were omitted, as were words judged to be

counterintuitive either for a god-like agent (e.g., *fearful*) or for a human (e.g., *glorious*). The words used in further analysis considering emotional valence are listed in Table 4.2.

Table 4.2. Post-hoc selection of negative and positive trait words from those used in Experiment 3.

Negative (17)	Positive (31)
aggressive, controlling, critical, cruel, dangerous, disapproving, distant, impersonal, indifferent, judgemental, petty, punitive, restrictive, severe, unforgiving, unsympathetic, weak	approachable, beautiful, benevolent, benign, caring, charitable, comforting, companionable, considerate, creative, fair, faithful, forgiving, friendly, generous, good, gracious, helpful, humorous, intelligent, loving, merciful, patient, peaceful, reliable, sincere, sympathetic, trustworthy, truthful, understanding, wise

Cueing questions and test words were presented in pale blue lower-case letters in 6 mm high Arial typeface on a black background in the middle of a 17-inch monitor at 1024 × 768 resolution. Word presentation and timing was conducted using the DMDX software (Forster & Forster, 2003) developed at Monash University and at the University of Arizona by K. I. Forster and J. C. Forster, running on a Dell PC with a Pentium III 800 MHz processor and an NVIDIA RIVA TNT2 Pro 16 MB video card. Input was via a standard PS/2 keyboard. Participants sat roughly 60 cm from the computer monitor, which was at eye-level.

The 120 trait words used in the computer-based portion of the experiment were also incorporated in a post-test survey (the God Concept Survey; see Appendix H) assessing two different concepts of God: first, respondents' own concept of God; second, respondents' perception of a strongly committed Christian's concept of God. Both types of ratings were made on 9-point Likert scales.

Procedure

Testing took place in the second half of a testing session that included an adaptation of the Stroop task measuring impairment in the colour-naming of religious words (Experiment 1; one participant in the current experiment had not taken part in the previous experiment). The previous experiment used nine domain-general religious words (*GOD*, *JESUS*, *LORD*, *CHRIST*,

HOLY, SPIRIT, CHURCH, PRAYER, BIBLE) and was followed by the completion of Form 1 of the Mill Hill Vocabulary Scale. The generality of the first test and its separation in time from the current experiment were judged to make any potential priming effects non-significant.

Participants were told that the experiment would involve making decisions about whether they thought different words were descriptive or not of themselves, their mother, or of God. Each item consisted of a question: either “Describes you?”, “Describes mother?”, or “Describes God?” The cue question was presented for 3 seconds after which a trait word appeared below the question on the screen. Participants were asked to decide whether the word described the person in the question or not, using the first meaning of the word that seemed sensible. A *yes*-judgement was indicated by pressing the [/] key and a *no*-judgement by pressing the [\] key; for left-handed participants this arrangement was reversed. Participants were instructed to answer as quickly as possible while being as accurate as possible, and were warned that if they took longer than 5 seconds that they would automatically move on to the next item. In the event that no answer was given after 5 seconds, a time-out was recorded. Participants were automatically advanced on to the next question and trait word upon answering the previous and following a 1-second interval. Items were presented in 12 blocks each of 30 items, such that each word was presented once for each target. No word was presented more than once in a given block, and each block contained an equal number of items pertaining to each of the three targets. Each participant viewed the blocks in a random order, and similarly item order was randomized within each block to control for order effects. A participant-defined rest period was allowed between each block. Before testing, participants completed 6 practice items using words not presented in the experiment and were subsequently given the chance to ask any questions.

Specific instructions were given on how to think about each of the three targets while answering the questions. Regarding self-related questions, participants were asked to be honest about themselves, as opposed to how they would like to be; questions about mother were also to be answered honestly. When answering questions about God, participants were asked to use the way that they personally thought and felt about God rather than necessarily the ‘right’ answer. A small proportion of atheists asked for clarification, typically saying that as they did not believe in God they could not answer questions about God; such participants were reminded that they would not have trouble answering questions about Superman, whom they also did not believe in, and were asked to use their personal idea of God.

Following the instructions and practice items the experimenter left the testing room to reduce any effect he may have had on the social context of making trait judgements. After administration of the God Concept Survey, participants were paid and debriefed.

4.1.2 Results

Data considerations

One male participant from group 1 was excluded from the following analysis because in judging items with *God* as target he answered every item *no* and several hundred milliseconds faster than all other participants. Thirty of the remaining 39 participants took longer than the 5 seconds allowed to make a judgement about at least one trait word. Time-outs were not however distributed unevenly among groups or targets, $\chi^2(4, N = 193) = 5.14, p = .274$.

Judgement speed data for each word was averaged across all participants to explore any relationship with word frequency data. The data set was restructured so that each word contributed nine means (one per target per group), revealing an inverse correlation between log word frequency and mean judgement speed, $r(1050) = -.06, p = .046$. When reactions to specific targets were considered, no relationship was found for *mother*, $r(360) < .01, p = .99$, or for *self*, $r(330) = -.02, p = .775$; but participants were in general faster to make judgements about God for higher frequency words, $r(360) = -.14, p = .008$. Further exploration showed that this correlation was affected by word-type: no relationship between log word frequency and judgement time was found for theological words, $r(63) = -.16, p = .219$; but a relationship was found for non-theological words, $r(297) = -.23, p < .001$. The relationship for non-theological words was present for the atheist group, $r(99) = -.31, p = .002$, the evangelical group, $r(99) = -.28, p = .005$, and the theologian group, $r(99) = -.23, p = .022$. It is worth noting here that this peculiar correlation was not replicated in experiments 4 or 5, so it is not considered further.

Potentially confounding relationships between age and speed of judgement or verbal intelligence and speed of judgement were explored by calculating mean judgement times for each target for each participant. No relationship was found between mean judgement speed and age, $r(117) = .05, p = .62$. Participants with higher percentile scores on the Mill Hill Vocabulary Scale were however found in general to make faster trait-word judgements, $r(108) = -.35, p < .001$. No differences were found in Mill Hill scores among the three groups however, $F(2, 35) = 0.34, p = .712$, so these data are not considered further.

Contrast between personal and stereotypically Christian concepts of God

Before considering the judgement speed data further, several questions need to be answered regarding the explicit concepts of God that participants drew upon when answering questions about God. It was hypothesized that atheists would have at least two contrasting concepts of God on which to draw: one stereotypically Christian concept of God, and at least one personally held concept of God. Using data from the God Concept Survey, this hypothesis was tested by computing a score for the net difference between participants' ratings of their personal concept of God and the predicted God concept of a strongly committed Christian. The maximum theoretical difference on each item would be if a participant had rated a given word -4 in one condition and $+4$ in the other condition, so the overall difference was calculated as a percentage disagreement by adding together the absolute difference between each pair of ratings and dividing it by the total theoretical maximum difference (which varied slightly from participant to participant due to occasional missing items). As can be seen from Table 4.3, atheists' ratings of personal concept of God differed considerably from their predictions of the God concept of a strongly committed Christian, suggesting that atheists do indeed have two contrasting concepts of God.

Table 4.3. Percentage disagreement between atheists' ($N = 16$) ratings of personal God concept and predicted God concept of a strongly committed Christian; one-sample t-tests tested the hypothesis that disagreement was equal to zero.

word-type	mean	SD	t(15)	significance
all words	41.6	21.8	7.53	$p < .001$ **
theological	43.3	35.7	4.86	$p < .001$ **
non-theological	40.6	19.3	8.42	$p < .001$ **
negative	39.4	16.5	6.89	$p < .001$ **
positive	43.6	25.3	9.56	$p < .001$ **

Note: ** indicates $p < .005$; * indicates $p < .025$. Because a negative percentage disagreement score was not possible, these should be interpreted as one-tail tests with $\alpha = .025$.

Whether one of these concepts was indeed stereotypically Christian will be considered momentarily, but first the validity of the comparison between personal God concept and predicted God concept of a strongly committed Christian can be checked by comparing the mean percentage disagreement of atheists with that for the two Christian groups. Inspection of

the disagreement data presented in Table 4.4 suggests that, while non-zero, disagreement between these two concepts was minimal for the two Christian groups. A one-way ANOVA of the disagreement percentages among the three groups on all words confirmed differences in the relative size of disagreement, $F(2, 36) = 28.04, p < .001$. Sidak pairwise comparisons between the groups found no difference in disagreement size between evangelicals and theologians, $p = .906$; differences between atheists and evangelicals (37.8%) and between atheists and theologians (34.0%) were however both significant, $p < .001$, and $p < .001$, respectively. As is suggested by Table 4.4, a similar pattern of results obtained when these tests were repeated for other word-types, so these analyses are not reported here. Summarizing so far, evangelical Christians and theologians show little disagreement between their personal concept of God and their prediction of a strongly committed Christian's concept of God; whereas atheists appear to have two contrasting—if not diametrically opposite—concepts of God on which they can draw.

Table 4.4. Percentage disagreement between ratings of personal God concept and predicted God concept of a strongly committed Christian.

word-type	Group 1: atheists (n = 16)		Group 2: evangelical Christians (n = 13)		Group 3: theologians (n = 10)	
	mean	SD	mean	SD	mean	SD
all words	41.6	21.8	3.2	3.8	7.1	8.6
theological	43.3	35.7	0.2	0.5	2.7	5.8
non-theological	40.6	19.3	3.9	4.5	8.0	9.4
negative	39.4	16.5	6.0	7.2	10.7	9.3
positive	43.6	25.3	1.8	2.5	4.7	8.2

A test on atheists' accuracy in predicting a strongly committed Christian's God concept suffices as a test of whether one of the two God concepts held by atheists was stereotypically Christian in nature. A strongly committed Christian's God concept was estimated by calculating the average of personal God concept ratings across the two Christian groups for each word in turn. Following the same principle as the previous rating comparison, the overall difference was then calculated as a percentage accuracy by adding together the absolute difference between a participant's predicted rating and the estimated Christian God concept for each pair of words, dividing it by the total theoretical maximum difference, and finally subtracting the result from the

total theoretical maximum difference.²³ Inspection of Table 4.5 suggests that accuracy in predicting a strongly committed Christian's God concept was high for atheists, and comparable to that for evangelical Christians and to that for theologians. It is worth noting that Christian participants varied sufficiently in their ratings of personal God concept so that none of the groups was 100 per cent accurate in predicting what a strongly committed Christian would believe about God. In fact when accuracy of the three groups on all words was compared in a one-way ANOVA, groups were found to differ, $F(2, 36) = 9.71$, $p < .001$. Sidak pairwise comparisons between the groups found no difference in accuracy between evangelicals and theologians, $p = .422$, but a 4.7% difference was found between atheists and evangelicals, $p < .001$, and a 3.0% difference was found between atheists and theologians, $p = .046$. While these are statistically significant differences in agreement, the size of the differences is nevertheless small enough to confirm that atheists did have a large degree of accuracy in predicting Christian concepts of God. As is suggested by Table 4.5, a similar pattern of results obtained when these tests were repeated for other word-types, so these analyses are not reported here. These findings therefore lend support to my hypothesis that atheists have at least two concepts of God on which they can draw and that, when instructed, they can draw upon a stereotypically Christian concept with a high degree of accuracy.

Table 4.5. Percentage accuracy of predictions of a strongly committed Christian's God concept.

word-type	Group 1: atheists (n = 16)		Group 2: evangelical Christians (n = 13)		Group 3: theologians (n = 10)	
	mean	SD	mean	SD	mean	SD
all words	84.3	3.2	89.0	2.1	87.2	3.2
theological	95.2	3.0	97.6	1.0	94.8	5.6
non-theological	84.2	3.2	88.1	2.1	87.5	2.5
negative	81.0	3.5	83.1	4.1	82.6	3.5
positive	90.2	4.8	93.5	1.9	93.4	1.9

²³ While the theoretical maximum difference for each item actually depended on the value of the average Christian rating (e.g., the maximum disagreement for a word with an average rating of -2.4 would be 6.4, not 8), maximum disagreement was held constant for each word so as not to weight some words more highly than others when calculating the percentage disagreement.

Consistency of computer-based ratings and God Concept Survey ratings

A final exploratory question before considering judgement speed data was in regard to the consistency of ratings used during the computer-based portion of the experiment, where participants could answer only *yes* or *no*, and the two sets of ratings collected in the God Concept Survey, where participants could use a 9-point Likert scale. Participants had been asked to use the way that they “personally think and feel about God rather than necessarily the ‘right’ answer” when answering questions about God on the computer-based test, so on the basis of the above analysis, the two Christian groups’ computer-based ratings were expected to differ little with either set of ratings from the God Concept Survey. The atheists’ computer-based ratings, by contrast, were expected to be similar to their personal concept of God as measured on a Likert scale, but to disagree with their predictions of a strongly committed Christian’s concept of God as measured on a Likert scale.

To compute scores for the net difference between the computer rating and each of the two Likert scale paper ratings, a *yes*-judgement in the computer-based test was considered to be a +4 rating, while a *no*-judgement was considered to be a -4 rating. As before, the maximum theoretical difference was if a participant made a *yes*-judgement in the computer-based test but selected -4 on a Likert scale rating for the same item. The overall difference was therefore calculated as a percentage of the total theoretical maximum difference by adding together the absolute difference between each pair of scores and dividing it by the theoretical maximum difference (thereby taking into account any missing items for each participant). Inspection of Table 4.6 suggests that evangelical Christians and theologians were relatively consistent in their computer-based ratings and paper ratings, regardless of whether providing an answer for their personal concept of God, or whether predicting how a strongly committed Christian would answer. Atheists, by contrast, showed less consistency (higher disagreement) between computer-based ratings and both types of paper-based ratings; atheists’ personal ratings were however more consistent with their computer-based ratings than were their predictions of how a strongly committed Christian would answer.

Statistical analysis confirmed this pattern of results. When all words were considered together, analysis of group $\times$ comparison-type (computer vs. personal God concept, computer vs. predicted Christian God concept) found an interaction of group $\times$ comparison-type, $F(2, 36) = 9.67, p < .001$. Further analysis found a simple effect of comparison-type for atheists, $F(1, 36) = 34.44, p < .001$, but not for evangelical Christians or theologians, $F(1, 36) = 0.03, p = .868$, and

$F(1, 36) = 0.27, p = .609$, respectively, indicating that atheists' computer-based ratings were more consistent with their personal ratings than with a stereotypically Christian God concept. However, a simple effect of group was found for both the comparison with personal God concept, $F(2, 36) = 29.07, p < .001$, and the comparison with predicted Christian God concept, $F(2, 36) = 29.57, p < .001$; Sidak pairwise comparisons among the groups showed that atheists were overall more inconsistent than both evangelical Christians, $p < .001$, and theologians, $p < .001$, regardless of comparison-type. As is suggested by Table 4.6, a similar pattern of results obtained when these tests were repeated for other word-types; these analyses are therefore not reported here.²⁴ In other words, atheists' personal Likert ratings were more consistent with their computer-based ratings, yet consistency was not as strong for atheists as for the Christian groups.

The question still remained as to why percentage disagreement rates for the comparison with personal God concept were higher for atheists than for the two Christian groups. To answer this question it is helpful first to consider two ways in which a participant's answers on the Likert scale items could increase the percentage disagreement rate. The first involves making a Likert scale rating clearly inconsistent with the computer-based rating; so for example rating a word +4 (*strongly agree* that the word is descriptive of God) on the God Concept Survey when it had previously been rated *no* (not descriptive of God) on the computer-based test. The second involves making a Likert scale rating that is consistent with the computer-based rating but that is more tentative; so for example rating a word -2 rather than -4 on the God Concept Survey when it had previously been rated *no* on the computer-based test. The atheist group may therefore have had a higher percentage disagreement rate for the comparison with personal God concept due to making more inconsistent ratings than the two Christian groups, or due to making less extreme ratings relative to the Christian groups.

²⁴ The higher disagreement percentages for negative trait words for the Christian groups may deserve further comment. No three-way interaction was observed between word-type (positive, negative), comparison-type, and group, $F(2, 36) = 2.08, p = .140$, but a word-type $\times$ group interaction was observed, $F(2, 36) = 19.95, p < .001$, whereby evangelicals and theologians were in general more consistent for positive trait words than for negative trait words, $F(1, 36) = 34.20, p < .001$, and $F(1, 36) = 39.20, p < .001$, respectively; no difference in consistency for negative and positive trait words was observed for atheists, $F(1, 36) = 1.08, p = .305$. The comparison-type $\times$ group interaction followed the same pattern as that for all words.

Table 4.6. Percentage disagreement between computer-based *yes-/no*-judgement of God and paper-based Likert scale rating of personal God concept or predicted God concept of a strongly committed Christian.

paper-based rating against which computer-based rating compared	word-type	Group 1: atheists (n = 16)		Group 2: evangelical Christians (n = 13)		Group 3: theologians (n = 10)	
		mean	SD	mean	SD	mean	SD
personal GC	all words	26.9	9.4	11.4	2.8	10.2	2.6
	theological	17.4	13.0	1.7	1.9	2.5	2.5
	non-theological	29.0	8.9	13.4	3.2	11.9	3.0
	negative	31.6	12.8	21.1	5.7	20.0	8.0
	positive	29.9	10.2	6.3	4.1	5.5	5.6
predicted Christian GC	all words	48.8	22.5	10.7	3.6	12.7	6.3
	theological	48.9	36.5	1.8	2.0	4.6	6.8
	non-theological	48.8	20.0	12.6	4.2	14.4	6.4
	negative	45.8	15.3	19.9	8.0	25.9	7.9
	positive	52.1	29.7	5.9	4.8	5.2	5.5

Inspection of group differences in the percentage of ratings made on the computer-based test that were subsequently reversed in the personal condition of the God Concept Survey, displayed in Table 4.7, suggests that the atheists were indeed more likely to change their minds regarding the applicability of various trait words to God than were Christians. A one-way ANOVA confirmed differences among the groups, $F(2, 36) = 7.73, p = .002$; Sidak pairwise comparisons confirmed that atheists made more reverses than evangelicals, 8.0%, $p = .005$, or theologians, 8.0%, $p = .009$; while the two Christian groups did not differ, $p > .999$. Analysis of word-type (theological, non-theological) $\times$ group confirmed that all participants made significantly fewer reverses for theological words than non-theological words, 6.5%, $F(1, 36) = 52.20, p < .001$; the overall pattern of group differences still obtained, $F(2, 36) = 7.69, p = .002$. Analysis of word-type (negative, positive) $\times$ group revealed a significant interaction between word-type and group, $F(2, 36) = 3.35, p = .046$. Decomposition of this interaction did not reveal any differences among groups in reversed ratings for negative words, $F(2, 36) = 0.51, p = .607$, but did show that groups differed for positive words, $F(2, 36) = 12.31, p < .001$, with atheists making more reverses than the Christian group. Additionally the evangelical group and the theologian group

made more reverses on negative words than on positive words, $p = .002$, and $p = .001$, respectively. Part of atheists' elevated percentage disagreement rates, therefore, can be accounted for simply by inconsistency in their ratings of the trait words used in the experiment. Even so, it is clear that atheists' answers in the personal condition of the God Concept Survey were broadly in agreement with those provided in the computer-based test.

Table 4.7. Percentage of ratings made on computer-based test that were reversed in personal condition of God Concept Survey.

word-type	Group 1: atheists (n = 16)		Group 2: evangelical Christians (n = 13)		Group 3: theologians (n = 10)	
	mean	SD	mean	SD	mean	SD
all words	14.0	8.8	6.0	3.0	6.0	3.9
theological	8.1	10.3	0.4	1.3	1.4	2.3
non-theological	15.3	9.0	7.2	3.7	7.0	4.7
negative	17.6	13.2	13.2	8.7	15.3	12.9
positive	15.1	12.3	1.7	3.4	1.3	4.1

To test the hypothesis that atheists made less extreme ratings than the Christian groups, a mean descriptiveness rating (ignoring the sign) was calculated for each word-type for each participant (cf. Thouless, 1935). Inspection of Table 4.8 suggests that atheists consistently made less extreme ratings in comparison to the two Christian groups. Indeed, when ratings on all words were considered, a one-way ANOVA confirmed differences among groups, $F(2, 36) = 15.22, p < .001$; Sidak pairwise comparisons found atheists made less extreme ratings than either evangelicals, $p < .001$, or theologians, $p < .001$; no differences were found between the two Christian groups, $p = .987$. When theological and non-theological words were compared across groups, the same pattern of group differences was observed, $F(2, 36) = 12.50, p < .001$, and with it a difference in extremity between word-types, $F(1, 36) = 139.16, p < .001$, with ratings for theological words being more extreme across all three groups. When negative and positive words were compared across groups, a significant word-type $\times$ group interaction was observed, $F(2, 36) = 14.36, p < .001$. Decomposition of this interaction revealed a simple effect of group for positive words, $F(2, 36) = 28.44, p < .001$, with the atheist group making less extreme ratings than either of the

Christian groups, but not for negative words, $F(2, 36) = 2.81, p = .074$; additionally, the evangelical and theologian groups made less extreme ratings on negative words than on positive words, $p < .001$, and $p < .001$, respectively. In addition to increased inconsistency in ratings, then, atheists' elevated percentage disagreement rates can be accounted for in terms of less extreme ratings as compared to Christian groups.

Table 4.8. Modulus of Likert scale ratings of personal God concept, by word-type.

word-type	Group 1: atheists (n = 16)		Group 2: evangelical Christians (n = 13)		Group 3: theologians (n = 10)	
	mean	SD	mean	SD	mean	SD
all words	2.44	0.75	3.32	0.22	3.39	0.20
theological	3.10	0.88	3.85	0.14	3.83	0.13
non-theological	2.29	0.75	3.21	0.25	3.30	0.23
negative	2.35	0.93	2.80	0.42	2.93	0.30
positive	2.15	0.84	3.60	0.27	3.58	0.33

Note: Ratings were made on a 9-point scale from -4 to +4.

In summary, these data suggest that all participants were likely to be employing their personal concept of God in making *yes/no* judgements in the computer-based portion of the experiment. The personal concept of God employed by atheists was less extremely defined and less consistent than that employed by the two Christian groups, but was nevertheless distinctly different from the stereotypically Christian concept of God elicited separately.

Judgement speed for all words

The speed in which participants made trait-word decisions about God, mother, and self in the computer-based test had been recorded in addition to the *yes/no* ratings discussed above with regard to God. Because the overall picture in the judgement speed data is a complex one, eventually ending in a significant four-way interaction, this picture will be built up gradually, adding a factor at a time. To begin with, a mean judgement speed for all words²⁵ was calculated

²⁵ An error in the DMDX script for the experiment meant that ten of the words (*loyal, firm, warm, majestic, spiritual, honest, kind, mysterious, safe, powerful*) were presented only for *God* and *mother* as target. Data for these words was therefore excluded from analyses involving mean judgement speeds.

for each target for each participant to explore the hypothesis that religious participants would have similar judgement speeds for God-referenced material and self-referenced material, whereas atheist participants would be slower to make God-referenced judgements than self-referenced judgements.

Table 4.9. Judgement speeds in milliseconds for each target.

target	Group 1: atheists (n = 16)		Group 2: evangelical Christians (n = 13)		Group 3: theologians (n = 10)	
	mean	SD	mean	SD	mean	SD
God	1714	343	1323	273	1377	266
mother	1452	223	1433	242	1473	268
self	1556	260	1496	293	1561	321

Inspection of Table 4.9 suggests that the atheist group were considerably slower to make judgements about *God* as target than about *mother* or *self*, while the evangelical and theologian groups were faster to make judgements about *God* than about *mother* or *self*. Analysis of variance confirmed the group $\times$ target interaction, $F(4, 72) = 19.56, p < .001$, illustrated in Figure 4.1.

Decomposition of this interaction revealed a simple effect of group for *God* as target, $F(2, 36) = 7.03, p = .003$, but not for *mother* or *self*, $F(2, 36) = 0.08, p = .927$, and $F(2, 36) = 0.20, p = .819$, respectively. Sidak pairwise comparisons between groups for *God* as target confirmed differences between the atheist and evangelical groups, 391 ms, $p = .004$, and between the atheist and theologian groups, 336 ms, $p = .027$; differences between the evangelical and theologian group were not statistically significant, -55 ms, $p = .964$. Simple effects of target were found for each group: atheists, $F(2, 35) = 26.09, p < .001$; evangelicals, $F(2, 35) = 10.54, p < .001$; and theologians, $F(2, 35) = 8.89, p = .001$. Sidak pairwise comparisons between targets are tabulated in Table 4.10.

Figure 4.1. Mean speed for trait-word judgements about *God*, *mother*, and *self*, with standard error bars.

Table 4.10. Within-subject Sidak pairwise comparisons between mean judgement speeds for each possible pair of targets.

targets	Group 1: atheists (n = 16)	Group 2: evangelical Christians (n = 13)	Group 3: theologians (n = 10)
God, self	157 $p < .001$ **	-174 $p < .001$ **	-183 $p < .001$ **
God, mother	261 $p < .001$ **	-111 $p = .027$ *	-95 $p = .129$
self, mother	104 $p = .018$ *	63 $p = .313$	88 $p = .163$

Note: ** indicates $p < .01$; * indicates $p < .05$. Mean difference (first minus second) in milliseconds is listed above the significance.

Consistent with my hypothesis, then, self-referenced material was judged at a consistent speed across all three groups, while God-referenced material was judged significantly more slowly than self-referenced material by atheists. Unexpectedly, for the two Christian groups, God-referenced material was judged not *as* quickly as self-referenced material, but *more* quickly.

Judgement speed for theological and non-theological words

The words comprising the subset of theological trait words are used in spoken and written British English on average four times less frequently than the subset of non-theological trait words (Kilgarriff, 1996). Calculating mean judgement speeds for each target and word-type combination allowed exploration of whether either or both of the Christian groups would be additionally advantaged in making decisions for theological words with regard to God. In fact, as can be seen from Table 4.11, all groups made faster judgements on items involving the theological subset than on items involving the non-theological subset, regardless of target.

Table 4.11. Judgement speeds in milliseconds by target and word-type.

target	word-type	Group 1: atheists (n = 16)		Group 2: evangelical Christians (n = 13)		Group 3: theologians (n = 10)	
		mean	SD	mean	SD	mean	SD
God	theological	1519	411	1079	198	1190	255
	non-theological	1757	343	1377	297	1419	279
mother	theological	1221	236	1201	289	1300	240
	non-theological	1503	232	1484	250	1511	303
self	theological	1207	216	1229	292	1372	275
	non-theological	1633	276	1556	312	1603	363

Analysis of variance confirmed the significant main effect of word-type, 281 ms, $F(1, 36) = 87.53$, $p < .001$. The word-type $\times$ group $\times$ target interaction was non-significant, $F(4, 72) = 1.20$, $p = .319$, as was the word-type $\times$ group interaction, $F(2, 36) = 0.83$, $p = .445$, suggesting that groups of differing religious experience were not processing the theological trait words any differently from non-theological trait words, regardless of target. Unsurprisingly, the target $\times$ group interaction was significant as before, $F(4, 72) = 25.53$, $p < .001$, and is illustrated together with the word-type main effect in Figure 4.2.

Figure 4.2. Mean speed of trait word judgements for theological and non-theological words, with standard error bars.

Judgement speed for emotionally valent words

Prompted by work showing that schema accessibility is affected by the emotional valence of material (see Section 2.4.3), the non-theological words were further analysed by considering only those words selected as positively or negatively emotionally valent (see Table 4.2). However, in considering how long participants took to make judgements for emotionally valent trait words, it is also worth considering what judgement participants actually made—either *yes* or *no* (cf. Lewicki, 1984).

Six counts of *yes*-judgements—one for each valence and target combination—were computed for each participant; the relative proportions of *yes*-judgements are displayed in Table 4.12.²⁶ Inspection suggests that the atheist group differed from the two Christian groups in the relative number of *yes*-judgements made when asked whether negative and positive trait words described *God*, but that groups performed similarly to each other when making judgements about other targets. Indeed, analysis of variance confirmed the target $\times$ valence $\times$ group interaction, $F(4, 72) = 13.68, p < .001$. Decomposition of this interaction showed a significant simple interaction effect of valence and group with *God* as target, $F(2, 36) = 38.99, p < .001$, but not with *mother* or *self* as target, $F(2, 36) = 0.20, p = .818$, and $F(2, 36) = 0.94, p = .401$, respectively. A Sidak

²⁶ Proportional calculations were used to compensate for time-outs and for unequal numbers of negative and positive trait words.

pairwise comparison revealed that the proportion of *yes*-judgements by atheists for *God* as target did not differ significantly depending on the valence of the words, $p = .096$. So, while Christians were likely to endorse positive trait words as descriptive of God and to reject negative trait words as descriptive of God, atheists were as likely to judge negative words to be descriptive of God as they were to judge positive words to be descriptive of God.²⁷

Table 4.12. Percentage of judgements that were *yes*-judgements, by target and emotional valence.

target	valence	Group 1: atheists (n = 16)		Group 2: evangelical Christians (n = 13)		Group 3: theologians (n = 10)	
		mean	SD	mean	SD	mean	SD
God	negative	54.0	26.2	18.1	13.0	15.3	13.1
	positive	40.3	30.2	96.0	3.8	94.5	4.6
mother	negative	14.3	19.1	20.4	29.2	18.8	21.3
	positive	81.0	19.5	79.9	23.3	88.4	11.7
self	negative	18.4	14.7	14.5	9.5	21.2	16.0
	positive	78.6	11.8	84.9	8.8	87.4	11.4

A new set of mean judgement speeds was therefore computed—one for each combination of target (*God*, *mother*, *self*), word valence (negative, positive), and rating (*yes*, *no*)—making twelve means in all per participant. However, 18 participants (6 atheist, 6 evangelical, 6 theologian) had not made judgements in all twelve possible combinations (e.g., one participant did not judge any negative words as being descriptive of his mother), and so could not be included in further analysis. While even with these reduced group sizes the target $\times$ valence $\times$ rating $\times$ group interaction was significant, $F(4, 36) = 4.14$, $p = .007$, it was decided to collapse groups 2 and 3 (on the grounds that no substantial differences between these groups had so far been observed) to form a single Christian group ($N = 11$) for the purposes of comparison with the atheist group. The means tabulated in Table 4.13, together with the analysis that follows, may need some

²⁷ When asked to make judgements about whether words are descriptive of God or not, one logical option for an individual who does not believe in God is to answer *no* every time. As was previously indicated, however, only one atheist participant chose to do this. The data presented here and earlier suggest that the majority of atheists will affirm a variety of trait words as descriptive of God—and do so consistently—despite not believing in God.

caution in their interpretation: while all 21 participants involved in this analysis contributed at least three judgements to nine or more of the twelve calculated means, only 3 participants (all atheists) contributed three or more judgements to all twelve of the means.

Table 4.13. Judgement speeds in milliseconds by target, word valence, and judgement.

target	word valence	judgement	Group 1: atheists (n = 10)		Group 2 & 3 combined: Christians (n = 11)	
			mean	SD	mean	SD
God	negative	yes	1817	378	2676	758
		no	1981	647	1539	339
	positive	yes	1933	524	1173	254
		no	1757	333	1926	805
mother	negative	yes	1875	519	1923	533
		no	1429	273	1621	380
	positive	yes	1403	209	1515	393
		no	1906	578	1902	588
self	negative	yes	1762	324	2174	750
		no	1548	345	1474	330
	positive	yes	1453	291	1463	374
		no	1897	604	2081	457

A significant four-way interaction of target, valence, rating, and group was observed, $F(2, 38) = 8.38$, $p = .001$.²⁸ Decomposition of this four-way interaction investigated the simple interaction effect of valence $\times$ rating $\times$ group at each target, revealing that it was significant for *God* as target, $F(1, 19) = 27.47$, $p < .001$, but not for *mother* or for *self*, $F(1, 19) = 0.38$, $p = .546$, and $F(1, 19) = 3.15$, $p = .092$, respectively. As can be seen in Figure 4.3, when making judgements about *mother* or *self*, participants showed a characteristic response of being slow to endorse negative trait words and to reject positive trait words, but quick to endorse positive trait words and to reject negative trait words. When making judgements regarding *God*, Christians retained this pattern,

²⁸ This analysis was re-run using median statistics in case the observed interaction was influenced by outlier judgements, but was still significant, $F(2, 38) = 7.00$, $p = .003$.

Figure 4.3. Mean speed of negative and positive trait word judgements about *God*, *mother*, and *self*, with standard error bars.

$F(1, 19) = 41.41, p < .001$, while judgement times for atheists neither depended on trait word valence nor upon the judgement actually made, $F(1, 19) = 1.22, p = .282$.

So, considering the non-theological words in terms of both emotional valence and rating has revealed a more complex set of effects than was evident from the analysis illustrated in Figure 4.2. However, the above analysis only drew on data from around half of the participants in this experiment. A second analysis considering emotional valence and rating drew on data from all but 5 of the participants by collapsing the valence and rating factors into one new factor: schematicity. Two new variables were computed per target: a mean judgement speed for positive-schematic judgements (i.e., *yes*-judgements for positive words and *no*-judgements for negative words), and a mean judgement speed for negative-schematic judgements (i.e., *no*-judgements for positive words and *yes*-judgements for negative words). No differences were anticipated between groups 2 and 3, so they were combined as for the previous analysis to increase power.

Table 4.14. Judgement speeds in milliseconds by target and schema-type.

target	schema-type	Group 1: atheists (n = 14)		Groups 2 & 3 combined: Christians (n = 20)	
		mean	SD	mean	SD
God	negative	1798	403	2375	573
	positive	1975	603	1277	253
mother	negative	2042	471	1991	632
	positive	1410	213	1456	332
self	negative	1814	435	2020	540
	positive	1491	293	1442	327

Inspection of group means displayed in Table 4.14 suggests that participants were generally slower to make negative-schematic judgements, irrespective of target; a strong main effect of schematicity was accordingly observed, 498 ms, $F(1, 32) = 76.76, p < .001$. The exception to this effect was atheists when making judgements regarding *God*, and a corresponding three-way interaction of schematicity $\times$ target $\times$ group was observed, $F(2, 64) = 15.17, p < .001$ (illustrated in Figure 4.4). Decomposition of this interaction confirmed the simple interaction effect of schematicity $\times$ group for *God* as target, $F(1, 32) = 39.02, p < .001$, but not for *mother* or *self* as

target, $F(1, 32) = 0.21, p = .652$, and $F(1, 32) = 3.36, p = .076$, respectively. With regard to the original hypotheses, atheists were indeed slower to make judgements regarding *God* than *self*, but only for positive-schematic judgements, 484 ms, $p < .001$; no difference in speed was found for negative-schematic judgements, -16 ms, $p > .999$. Christians' advantage on positive-schematic judgements for *God* over *self* did not reach significance, -165 ms, $p = .061$, while negative-schematic judgements for *God* were slower than for *self*, 355 ms, $p = .009$; Christians were in fact slower to make negative-schematic judgements for *God* than were atheists, 577 ms, $p = .003$.

Figure 4.4. Mean speed for negative- and positive-schematic trait word judgements about *God*, *mother*, and *self* with standard error bars.

4.1.3 Discussion

Findings

First, while evangelical Christians and theologians appeared to have a unitary concept of God, atheists did not. Rather, atheists held at least two conflicting concepts of God: one was stereotypically Christian in character, closely reflecting that of an evangelical Christian; the other was a more idiosyncratic, personally held concept. This latter concept, while less extremely defined and fixed in comparison to a believer's personal concept of God, was found to be a consistent concept upon which atheists could draw, despite not believing in God. Analysis of the content of personally held God concepts revealed that Christians tended to endorse positive trait

words and reject negative trait words as descriptive of God, whereas atheists were as likely to judge negative words descriptive of God as they were positive words descriptive of God.

Second, atheists and evangelical Christians differed significantly in speed when accessing their personally held God schemas. Taking the self as a baseline, atheists were slower to access their God schemas than their self schemas, while Christians in general accessed their God schemas as quickly as or more quickly than they accessed their self schemas. However, when emotional valence and rating were considered, Christians were found to be considerably slower in accessing negative-schematic aspects of their God schemas than in accessing negative-schematic aspects of their self schemas, and slower even than atheists.

Third, while no group differences were found in speed for processing theological words, trait word decisions involving these words tended to be made more quickly than decisions involving higher-frequency non-theological words.

4.2 Experiment 4

This experiment tests the hypothesis that a “God-reference effect” in memory would be observed in those for whom God is familiar and intimate—in other words those with frequently used and well-developed God schemas. I tested this hypothesis by comparing recall in different religious groups for words seen in a series of trait-word decisions about themselves, Superman, and God. The paradigm used was a modification of that employed in Experiment 3, with the principal changes being that participants saw each trait word in relation to only one of the targets, instead of all three, and that a surprise recall task was added following the computer-based trait word decisions. I also collected judgement speed data to see whether the schematicity effects observed in Experiment 3 could be replicated. A 3 (group) $\times$ 3 (target) $\times$ 3 (word-type) mixed design was used, where target and word-type were repeated measures; 6 counter-balanced orders were used to present the words but were not included in the experimental design. As a test of whether the God-reference effect in judgement speed observed in Experiment 3 was dependent on belief in God alone, or on other religious factors such as high frequency of religious behaviours in addition to belief in God, the theologian group was replaced by a group of non-evangelical Christians. If belief in God alone caused the God-reference effect, no differences would be expected in judgement speed or recall between the evangelical and the non-evangelical Christian groups. If however the God-reference effect were dependent on, say, practiced belief, the evangelical group (who were selected for frequent practice of religious

behaviours) would be expected to demonstrate the God-reference effect more strongly than the non-evangelical group. Superman was used as a target representing a familiar-but-not-intimate other, with the additional value of being an agent that none of the participants believed in. Three types of trait words were used: positive, negative, and theological. In addition to judgement speeds and recall data, Likert scale descriptiveness ratings were collected to assess participants' personal concept of God and the strength of emotion felt about the descriptiveness ratings made (see Appendix I). The advantage of the extra dimension involving strength of emotion regarding the descriptiveness rating is that respondents have four potential extreme responses for each trait word instead of just two. For example, for *loving*, a respondent could in effect say any of:

- (a) I think God is loving, and I feel quite emotional about God's love.
- (b) I think God is loving, but I don't really care.
- (c) I don't think God is loving, but I feel quite emotional about God's lack of love.
- (d) I don't think God is loving, but I don't really care.

Several hypotheses and exploratory questions were formed in regard to the pencil-and-paper data, the judgement speed data, and the recall data. Hypotheses for the pencil-and-paper data were informed by findings from Experiment 3: first, that atheists and non-evangelical Christians' personal God concept would differ from each other and from that of an average evangelical Christian's God concept; second, that all groups would be consistent in their rating of trait words between the computer-based test and the pencil-and-paper test; third, that the groups would vary in the strength of emotion they felt about the descriptiveness ratings, with atheists feeling least and evangelical Christians feeling most. With regard to judgement speed data, it was hypothesized that a replication of the findings of Experiment 3 would obtain: that evangelical Christians would be facilitated in making positive-schematic judgements about God relative to negative-schematic judgements about God, and relative also to positive- and negative-schematic judgements regarding Superman and self, whereas no difference in judgement speed would be found for positive- and negative-schematic judgements for God, nor any advantage for positive-schematic judgements for God relative to positive-schematic judgements for self. Beyond this hypothesis, exploratory questions concerned the pattern of judgement speed data for non-evangelical Christians in comparison to the atheist and evangelical Christian groups, and whether descriptiveness extremity and strength of emotion in the God Concept Survey [A, B] related to judgement speed. Four hypotheses were formed with regard to recall data: first, that recall for Superman would in general be poor for all groups in comparison to recall for self-referenced material; second, that evangelical Christians would have similar recall for God-referenced

material and self-referenced material, whereas atheist participants would have poorer recall for God-referenced material (tending toward that for Superman-referenced material) than for self-referenced material; third, that on the basis of the recall data from Experiment 2, recall for theological material—regardless of target—would be lowest for atheists and highest for evangelicals; fourth, that all participants would have superior recall for positive material compared to negative material. No specific hypothesis was made regarding recall of God- and self-referenced material by non-evangelical Christians. Exploratory questions of the recall data concerned the effect of schematicity of judgements on subsequent recall of material, and the relation between recall and descriptiveness extremity and strength of emotion ratings.

4.2.1 Method

Participants

Seventy-two participants were drawn from the panel described in Appendix A to form three groups on the basis of data from the Screening Questionnaire described in Appendix A and found in Appendix B. Group 1 contained 24 atheist control participants (14 female and 10 male); group 2 contained 24 non-evangelical Christian participants (19 female and 5 male); group 3 contained 24 evangelical Christian participants (16 female and 8 male). All participants were enrolled in, or graduates of, a Bachelor's degree course, aged 18-40, free of known reading difficulties, spoke English as a first language, and described themselves as currently non-depressed.

Criteria for inclusion in group 1 included non-belief in God; self-description as an atheist or a practitioner of no religion; an absence of theological training; and a complete non-engagement in church attendance, prayer, and Scripture reading for spiritual welfare. The criterion from Experiment 3 involving maximum Christian orthodoxy score was dropped due to concerns that non-believers may have misinterpreted the instructions on the Screening Questionnaire and thereby scored artificially highly; on a re-test with clarified instructions (see Appendix D) all participants in group 1 scored 11 or less out of a possible 36. Six atheist participants had practised Christianity at some point while children or teenagers.

Criteria for inclusion in group 2 included belief in God; self-description as a Christian; and choice of the “moral and ethical” Christian belief statement. No further criteria were defined for this group so as to provide a variety of potential contrasts with groups 1 and 3, as befitting the

exploratory nature of this study. For that reason, and as can be seen in Table 4.15, group 2 had high variability on measures of beliefs, practices, and motivations for religious practices.

Criteria for inclusion in group 3 included belief in God; self-description as a Christian; choice of the “born-again” Christian belief statement; a Christian orthodoxy score of 35 or 36 out of a possible 36; and intrinsic religiosity score of 40 or more out of a possible 48; church attendance at least once per week; and prayer and Scripture reading most days or several times a day. The criteria from Experiment 1 of length of practice and maximum extrinsic religiosity score were dropped to allow extra variables for interpretation of the results.

Inspection of Table 4.15 shows that all three groups differed markedly on most measures of beliefs, practices, and motivations for religious practices.

Table 4.15. Group characteristics from screening data.

variable	Group 1: atheists (n = 24)		Group 2: non-evangelical Christians (n = 24)		Group 3: evangelical Christians (n = 24)	
	mean	SD	mean	SD	mean	SD
age /years	20.9	4.4	21.0	2.5	21.4	3.0
length of current religious status /years	14.2	6.2	16.0	7.1	13.8	7.4
church attendance ¹	0.0	0.0	0.4	0.6	2.7	1.6
prayer frequency ²	1.0	0.0	3.4	1.3	5.6	0.5
Scripture reading frequency ²	1.0	0.0	2.0	1.1	5.3	0.5
religious issue discussion frequency ²	3.2	1.0	3.0	0.8	4.8	0.7
intrinsic religiosity ³ (max. 48)	-	-	22.9	6.9	45.0	2.0
extrinsic religiosity ³ (max. 24)	-	-	15.3	6.1	12.6	5.1
Christian orthodoxy (max. 36)	4.8	5.5	25.8	7.6	35.9	0.3
theological training /years	0.0	0.0	0.0	0.0	0.9	1.5

Notes: ¹Number of times participant attended church in the week prior to completing the Screening Questionnaire. ²Mean of six-point ordinal data where 1 = *never*; 2 = *rarely*; 3 = *occasionally*; 4 = *weekly*; 5 = *most days*; 6 = *several times a day*. ³Religiosity scores as measured were not meaningful for non-believers.

Materials

Three trait-word lists were constructed: negative, positive, and theological; each containing 24 words, as listed in Table 4.16. Frequency data can be found in Appendix J. Stimuli were selected from those used in Experiment 3, with additional words added by using a thesaurus.

Table 4.16. Trait words used in Experiment 4.

Negative	Positive	Theological
aggressive, angry, cold,	approachable, caring,	ageless, all-knowing,
controlling, critical, cruel,	compassionate, creative, fair,	all-powerful, all-wise, almighty,
dangerous, demanding,	faithful, forgiving, generous,	divine, eternal, everlasting,
disapproving, distant, hostile,	gentle, good, gracious, helpful,	glorious, heavenly, holy,
indifferent, judgemental,	honest, humorous, intimate,	immortal, infinite, invisible,
malicious, petty, prejudiced,	kind, loving, merciful, patient,	kingly, majestic, mystical,
selfish, silent, unfair,	protective, strong,	omnipotent, omnipresent,
unforgiving, unfriendly, unkind,	sympathetic, warm, wise	omniscient, perfect, sovereign,
unsympathetic, weak		spiritual, supernatural

Cueing questions and test words were presented in pale blue lower-case 6 mm high letters in Arial typeface on a black background in the middle of a 15.1-inch XGA monitor at 1024×768 resolution. Word presentation and timing was conducted using the DMDX software (Forster & Forster, 2003) developed at Monash University and at the University of Arizona by K. I. Forster and J. C. Forster, running on a Dell Inspiron notebook PC with a Pentium 4 2.2 GHz processor and an Intel 82846G integrated graphics controller with 64 MB video RAM. Input was via the notebook keyboard.

The 72 trait words used in the computer-based portion of the experiment were also incorporated in a post-test survey (the God Concept Survey [A, B]; see Appendix I). Two versions of the survey (the second with the items presented in the reverse order to that of the first) were used to control for order effects. This survey assesses respondents' personal concept of God by eliciting ratings of how well God can be described by the various trait words, followed by rating the strength of emotion associated with the descriptive rating. Both ratings are made on a 7-point Likert scale.

Participants also completed the Supplementary Questionnaire (see Appendix D), a short survey clarifying three areas asked about in the Screening Questionnaire. It includes a checklist of religious and denominational descriptors, a question on length of practice of current beliefs, and a slightly re-worded version of the shortened Christian Orthodoxy scale (Hunsberger, 1989).

Procedure

Testing took place in a single 40-minute session beginning with the timed-judgement task and followed by, in order, a surprise free recall task, the God Concept Survey [A, B], and the Supplementary Questionnaire.

Participants were told that the experiment would involve making a series of decisions about whether God, Superman, or themselves could be described by various words. Each item consisted of a question: either “Describes God?”, “Describes Superman?”, or “Describes you?” The cue question was presented for 3 seconds after which a trait word appeared below the question on the screen. Participants were asked to decide whether the word described the person in the question or not, using the first meaning of the word that seemed sensible. Positive judgement was indicated by pressing the [/] key (marked *YES*) and negative judgement by pressing the [\] key (marked *NO*); for left-handed participants this arrangement was reversed. Participants were instructed to answer as quickly as possible while being as accurate as possible. In the event that no answer was given after 10 seconds, a time-out was recorded. Participants were automatically advanced on to the next question and stimulus upon answering the previous and following a 1-second interval. Each trait word was presented once to each participant. Given that some trait words may be more memorable when associated with a specific target, each participant completed one of six variants of the test counterbalancing targets and trait words. For each variant, the trait words of each word-type (positive, negative, or theological) were distributed equally among the three targets (God, Superman, and self). Items were presented in 2 blocks each of 36 items, with each block containing an equal number of items pertaining to each of the three targets and to each of the three word-types. Block order and item order within blocks was randomized to control for order effects. A participant-defined rest period was allowed between the two blocks. Before testing, participants completed 6 practice items using words not presented in the experiment and were subsequently given the chance to ask any questions. Three buffer items were presented before the first block and 3 buffer items after the second block to control for primacy and recency effects in recall.

Specific instructions were given on how to think about two of the targets when answering the questions. Regarding self-related questions, participants were asked to be honest about themselves, as opposed to how they would like to be. When answering questions about God, participants were asked to use the way that they personally thought and felt about God rather than the way that they might have felt they ought to think or feel about God. If clarification was asked for regarding God, participants were asked to use their personal idea of God. No specific instruction was given regarding how to think about Superman.

On completion of the judgement task, participants were asked to count backwards from a three-digit number in multiples of three for 60 seconds. The backwards counting was introduced so as to clear working memory. Immediately following the backwards counting participants were given a 10-minute unexpected recall test in which they were instructed to write down as many of the trait words as they could remember having seen. Use of distractors, such as backwards counting, and using an unexpected rather than anticipated recall test have both been shown to increase the size of SRE effects (Symons & Johnson, 1997). Following administration of the remaining assessments, participants were paid and debriefed.

4.2.2 Results

Group comparisons on God Concept Survey [A, B]

All groups completed the God Concept Survey [A, B], in which participants provided two ratings, each on a 7-point Likert scale, for all 72 of the trait words encountered previously in the computer-based part of the experiment. The first rating concerned the descriptiveness of the trait word of the respondent's personal concept of God, while the second rating concerned the strength of emotion associated with the descriptiveness rating. Following on from data from Experiment 3, several hypotheses relate to these ratings: first, that atheists' and non-evangelical Christians' personal God concepts would differ from each other and from that of an average evangelical Christian's God concept; second, that all groups would be consistent in their rating of trait words between the computer-based test and the pencil-and-paper test; third, that the groups would vary in the strength of emotion they felt about the descriptiveness ratings, with atheists feeling least and evangelical Christians feeling most.

Contrast between personal and average evangelical Christian concepts of God

An average evangelical Christian's God concept was estimated by calculating an average descriptiveness rating for each trait word on the God Concept Survey [A, B] across all participants in the evangelical group. Divergence from this average concept was calculated as a percentage disagreement by adding together the absolute difference between a participant's descriptiveness rating and the estimated evangelical God concept for each pair of words, and dividing it by the theoretical maximum difference.²⁹ Inspection of Table 4.17 suggests that the three groups differed strongly in their relative divergence from an average evangelical's God concept, with the low means for the evangelical group indicating broad agreement within the evangelical group on descriptiveness ratings for God.

Table 4.17. Percentage disagreement between paper-based Likert scale rating of personal God concept and mean evangelical rating, by word-type.

word-type	Group 1: atheists (n = 24)		Group 2: non-evangelical Christians (n = 24)		Group 3: evangelical Christians (n = 24)	
	mean	SD	mean	SD	mean	SD
negative	35.7	9.3	21.4	7.0	15.5	3.0
positive	45.7	14.7	18.8	10.3	7.1	1.8
theological	39.3	23.6	19.0	9.5	5.8	1.6

A two-way ANOVA of group and word-type confirmed the main effect of group, $F(2, 69) = 92.46, p < .001$.³⁰ Sidak pairwise comparisons confirmed significant differences among all three groups: atheists disagreed with the average evangelical God concept more strongly than did the non-evangelicals, 20.5%, $p < .001$, or the evangelicals, 30.7%, $p < .001$; the non-evangelical

²⁹ While the theoretical maximum difference for each item actually depended on the value of the average Christian rating (e.g., the maximum disagreement for a word with an average rating of -2.4 would be 5.4, not 6), maximum disagreement was held constant for each word so as not to weight some words more highly than others when calculating the percentage disagreement.

³⁰ As with several of the subsequent analyses, a significant group $\times$ word-type effect was also observed, $F(4, 138) = 6.39, p < .001$, due to the two Christian groups showing more disagreement for negative words than for other word-types while the atheist group showed most disagreement for positive words. Because this and subsequent group $\times$ word-type interactions neither relate to the hypotheses being explored nor bear on the conclusions drawn from the significant main effect of group, they are not discussed further here.

group likewise disagreed more strongly with the average evangelical God concept than did the evangelical group, 10.2%, $p < .001$. In addition to divergence from the average evangelical concept of God increasing with decreasing religiosity, increasing standard deviation should also be noted, indicating considerable divergence among the personal God concepts held by members of Group 1 and 2. These data are in line with those reported for Experiment 3 in Table 4.4.

Consistency of computer-based ratings and God Concept Survey [A, B] ratings

The second hypothesis considered the consistency of ratings used during the computer-based portion of the experiment, where participants could answer only *yes* or *no*, and the descriptiveness ratings collected in the God Concept Survey [A, B], where participants could use a 7-point Likert scale. Participants had been asked to “use the way that you personally think and feel about God, rather than the way you perhaps feel you ‘ought’ to think or feel about God” when answering questions about God on the computer-based test, while the pencil-and-paper measure asked participants to “rate each word for how well it describes who God is to you personally”; thus relatively high consistency was expected for all three groups (noting however that in Experiment 3 consistency was not as high for atheists as evangelical Christians due to less extreme Likert scale ratings and more reverses between conditions). Scores for the net difference between the computer rating and the Likert scale paper ratings were computed as for Experiment 3, with the exception that a *yes*-judgement in the computer-based test was considered to be a +3 rating, while a *no*-judgement was considered to be a -3 rating due to the 7-point Likert scales in use in the current experiment. Inspection of Table 4.18 shows that evangelical Christians were most consistent in their ratings. A two-way ANOVA of group and word-type found differences among the three groups, $F(2, 69) = 40.34$, $p < .001$; Sidak pairwise comparisons revealed significant differences between each pair of groups: atheists were 12.7% less consistent than non-evangelical Christians, $p < .001$, and 21.8% less consistent than evangelical Christians, $p < .001$, while evangelicals were 9.1% more consistent than non-evangelicals, $p = .001$. A main effect of word-type was also observed, $F(2, 138) = 13.03$, $p < .001$, wherein consistency was generally higher on ratings of theological words than either positive words, $p = .002$, or negative words, $p < .001$. Consistency for evangelical Christians, then, was high, and slightly higher than that observed in Experiment 3 (cf. Table 4.6). Unexpectedly, however, atheists’ disagreement rates between the two conditions in which they have provided ratings of their personal God concept almost approached the disagreement rates between their personal God concept and an

average evangelical's God concept (cf. Table 4.17), and were higher than those observed in Experiment 3 (cf. Table 4.6).

Table 4.18. Percentage disagreement between computer-based *yes/no*-judgement of God and paper-based Likert scale rating of personal God concept, by word-type.

word-type	Group 1: atheists (n = 24)		Group 2: non-evangelical Christians (n = 24)		Group 3: evangelical Christians (n = 24)	
	mean	SD	mean	SD	mean	SD
negative	32.4	13.6	21.9	12.1	18.1	8.5
positive	38.0	12.5	19.4	9.2	7.4	5.4
theological	26.3	17.2	17.3	11.6	5.9	6.3

The lower levels of consistency among atheists in the current experiment may raise interpretive concerns about the judgement speed and recall data that follow unless some explanation can be found. As was seen in Experiment 3, two factors can contribute to raised disagreement rates: clearly inconsistent ratings between the two conditions, or consistent but less extreme Likert scale ratings. Inspection of group differences in the percentage of ratings made on the computer-based test that were subsequently reversed on the Likert scale ratings, displayed in Table 4.19, suggests that, as in Experiment 3, atheists were more likely to change their minds regarding the applicability of various trait words to God than were evangelical Christians. A two-way ANOVA of group and word-type confirmed the main effect of group, $F(2, 69) = 9.54, p < .001$. Sidak pairwise comparisons found that atheists made 12.0% more reverses than evangelicals, $p < .001$, and 8.1% more than non-evangelicals, $p = .015$; the 3.9% difference between evangelicals and non-evangelicals was non-significant, $p = .429$. However, comparison with Table 4.7 suggests that atheists made similar numbers of reverses in the current experiment as in Experiment 3; indeed a two-way ANOVA of word-type and group (Experiment 3 atheists vs. Experiment 4 atheists) found no significant group differences, $F(1, 38) = 0.24, p = .629$. So, while as in Experiment 3, atheists made more reversed ratings than did the Christian groups, their answers on the two rating conditions were nevertheless broadly in agreement.

Table 4.19. Percentage of ratings made on computer-based test that were reversed on the God Concept Survey [A, B], by word-type.

word-type	Group 1: atheists (n = 24)		Group 2: non-evangelical Christians (n = 24)		Group 3: evangelical Christians (n = 24)	
	mean	SD	mean	SD	mean	SD
negative	14.1	18.9	10.6	10.9	8.9	11.3
positive	18.2	21.2	5.3	7.4	1.0	3.5
theological	14.8	18.7	6.8	11.0	1.0	3.5

To test the hypothesis that the higher disagreement rates for atheists in the current experiment can be accounted for by less extreme Likert scale ratings in comparison to the Christian groups, a mean descriptiveness rating (ignoring the sign) was calculated for each word-type for each participant. Inspection of Table 4.20 suggests that extremity of ratings increased across the groups with increasing religiosity. A two-way ANOVA of group and word-type confirmed the significant main effect of group, $F(2, 69) = 42.38, p < .001$; Sidak pairwise comparisons showed that atheists made less extreme ratings than both non-evangelical Christians, 0.39 Likert units, $p < .001$, and evangelical Christians, 0.90 Likert units, $p < .001$, and that non-evangelical Christians made less extreme ratings than evangelical Christians, 0.52 Likert units, $p < .001$. Comparison with Table 4.8 (noting that ± 3 was the most extreme rating in the current experiment whereas ± 4 was the most extreme in Experiment 3) suggests that the atheist group in the current experiment made less extreme ratings than the atheist group in Experiment 4. Mean Likert scale ratings for atheists in Experiment 3 were multiplied by 0.75 to allow direct comparison with those in the current experiment, and a two-way ANOVA of word-type and group (Experiment 3 atheists vs. Experiment 4 atheists) confirmed that atheists in the current experiment made less extreme ratings than those in Experiment 3, 0.58 Likert units, $F(1, 38) = 13.32, p < .001$. This was surprising in some respects, given that in Experiment 3 participants were making two ratings: one for their personal God concept, and one predicting the God concept of a strongly committed Christian. Under those conditions it would be reasonable to expect some polarization of personal views, so making the atheists give less extreme answers, but in fact the reverse obtained.

Table 4.20. Modulus of Likert scale ratings of personal God concept, by word-type.

word-type	Group 1: atheists (n = 24)		Group 2: non-evangelical Christians (n = 24)		Group 3: evangelical Christians (n = 24)	
	mean	SD	mean	SD	mean	SD
negative	1.44	0.46	1.92	0.53	2.19	0.28
positive	1.31	0.49	1.92	0.46	2.57	0.27
theological	2.02	0.58	2.09	0.37	2.72	0.17

Note: Ratings were made on a 7-point scale from -3 to +3.

In summary, the evangelical Christian group was most consistent in ratings on the computer-based portion of the experiment and the pencil-and-paper measure that followed, making few reverses of rating and using the more extreme ends of the Likert scale, while the atheist group was least consistent, making more reverses of rating and using the more central part of the Likert scale. The non-evangelical Christian group was intermediate between the atheist and evangelical groups in consistency and extremity of ratings. Overall, however, participants in all three groups appear to have been employing the same God concept in both conditions, consistent with the findings of Experiment 3.

Group differences in strength of emotion regarding descriptiveness ratings of God

The third hypothesis concerned variation in the strength of emotion that groups felt regarding the descriptiveness ratings of God, with atheists expected to have felt least and evangelical Christians feeling most. Inspection of Table 4.21 shows the expected pattern of results: increasing strength of emotion with increasing religiosity. A two-way ANOVA of group and word-type confirmed the main effect of group, $F(2, 69) = 56.02$, $p < .001$; Sidak pairwise comparisons found that evangelicals felt 2.5 rating points more emotion than atheists, $p < .001$, and 0.9 rating points more than non-evangelicals, $p = .002$; non-evangelicals felt 1.7 rating points more emotion than atheists, $p < .001$. This finding follows both from expected differences due to differences in group religiosity and from the differences in extremity of descriptiveness ratings noted above: it was unlikely that many participants would have felt strong emotion about a relatively central Likert scale descriptiveness rating.

Table 4.21. Strength of emotion ratings for positive, negative, and theological trait-word decisions on the God Concept Survey [A, B], by group.

word-type	Group 1: atheists (n = 24)		Group 2: non-evangelical Christians (n = 24)		Group 3: evangelical Christians (n = 24)	
	mean	SD	mean	SD	mean	SD
negative	1.8	1.1	3.0	1.1	3.6	0.8
positive	1.4	1.0	3.4	1.0	4.6	0.6
theological	1.4	1.0	3.2	0.9	4.0	1.1

Note: Ratings were made on a 7-point scale from 0 to 6, where 6 is strong emotion.

The descriptiveness ratings and strength of emotion data will be revisited following consideration of the judgement speed and recall data, to which we turn now.

Judgement-speed and word frequency data considerations

The speed in which participants made trait-word decisions about God, Superman, and self in the computer-based test had been recorded in addition to the *yes/no* ratings discussed above with regard to God. Eighteen participants took longer than the 10 seconds allowed to make a judgement about at least one trait word, with a total of 23 time-outs distributed relatively evenly among groups and targets.³¹ One participant had answered one item in less than 50 ms and a second item in less than 300 ms, both implausibly low judgement speeds, so data for these items was treated as missing.

Judgement speed data for each word was averaged across all participants to explore any relationship with word frequency data. The data set was restructured so that each word contributed nine means (one per target per group). Unlike Experiment 3, no relationship was found between log word frequency and mean judgement speed, $r(648) = .04, p = .368$.³²

³¹ A test could not be carried out because the total count of time-outs was too small.

³² A similar correlation was carried out to explore whether recall varied with word frequency: no relationship was found between log word frequency and the log of the number of times each word was recalled, $r(72) = -.05, p = .657$.

Computer-based judgements

As was observed in Experiment 3, judgement speed interacts in a non-trivial way with target, word-type, and judgement. Before examining whether the four-way interaction observed in Experiment 3 was replicated in the current experiment, the distribution of *yes*- and *no*-judgements across word-type and target combinations needs to be considered. Nine counts of *yes*-judgements—one for each word-type and target combination—were computed for each participant; the relative percentages of *yes*-judgements for each combination are displayed in Table 4.22. Comparison with Table 4.12 indicates a replication of the pattern of *yes*-judgements found in Experiment 3, in which Christians were likely to endorse positive trait words as descriptive of God and to reject negative trait words as descriptive of God, while atheists were as likely to judge negative words to be descriptive of God as they were to judge positive words to be descriptive of God.

Table 4.22. Percentage of judgements that were *yes*-judgements, by target and word-type.

target	word-type	Group 1: atheists (n = 24)		Group 2: non-evangelical Christians (n = 24)		Group 3: evangelical Christians (n = 24)	
		mean	SD	mean	SD	mean	SD
God	negative	48.7	26.2	17.0	14.3	12.7	10.0
	positive	57.8	30.1	91.0	13.2	95.3	10.9
	theological	62.2	29.3	85.4	14.1	95.3	7.2
Superman	negative	12.0	12.5	19.3	17.3	15.6	17.8
	positive	68.2	23.3	67.6	22.3	58.5	27.8
	theological	14.1	12.4	12.5	15.6	3.1	7.6
self	negative	19.3	17.7	30.2	20.2	29.7	20.9
	positive	83.3	12.0	75.5	24.6	73.5	19.4
	theological	2.1	4.8	4.7	13.2	13.6	18.8

A three-way analysis of variance confirmed the interaction of target $\times$ word-type $\times$ group, $F(8, 276) = 20.01, p < .001$, illustrated in Figure 4.5. This interaction was decomposed one target at a time. First, a simple interaction effect of word-type and group was observed for *God* as target,

Figure 4.5. Mean endorsement rates of positive, negative, and theological trait words for *God*, *Superman*, and *self*, with standard error bars.

$F(4, 138; \text{Pillai's trace}) = 17.44, p < .001$. A Sidak pairwise comparison revealed that the percentage of *yes*-judgements by atheists for *God* as target did not differ significantly between positive and negative words, $p = .358$, while both the non-evangelical group and the evangelical group made significantly more *yes*-judgements for positive words than for negative words, $p < .001$, and $p < .001$, respectively. No differences were found in the number of *yes*-judgements between evangelicals and non-evangelicals either for positive words, $p = .807$, or for negative words, $p = .841$. Regarding theological words for *God* as target, all three groups were more likely to endorse theological words than negative words: atheists, 13.4%, $p = .018$; non-evangelicals, 68.5%, $p < .001$; evangelicals, 82.6%, $p < .001$. Although the simple effect of group for theological words for *God* as target was significant, $F(2, 69) = 18.80, p < .001$, the 9.9% difference between the evangelical and non-evangelical groups was not significant, $p = .219$.

For *Superman* as target, the simple interaction effect of word-type and group was non-significant, $F(4, 138; \text{Pillai's trace}) = 1.56, p = .188$. The simple main effect of word-type was however significant, $F(2, 68) = 158.94, p < .001$, with Sidak pairwise comparisons showing that, overall, participants endorsed more positive words for *Superman* than either negative words, 49.2%, $p < .001$, or theological words, 54.9%, $p < .001$; no difference was found between endorsement rates for theological or negative words, 5.7%, $p = .051$.

Finally, the simple interaction effect of word-type and group for *self* as target was significant, $F(4, 138; \text{Pillai's trace}) = 3.55, p = .009$, due to group differences in endorsement rates for theological words, $F(2, 69) = 5.53, p = .006$: the evangelical group made more *yes*-judgements for theological words describing self than did the atheist group, 11.5%, $p = .009$; the 8.9% difference between evangelicals and non-evangelicals was non-significant, $p = .074$. No group differences were observed for negative words or for positive words, $F(2, 69) = 1.72, p = .186$, and $F(2, 69) = 2.37, p = .101$, respectively. As for *Superman* as target, the simple main effect of word-type was evident, $F(2, 68) = 430.38, p < .001$, with Sidak pairwise comparisons confirming differences among all three word-types: participants endorsed more positive words for *self* than either negative words, 51.1%, $p < .001$, or theological words, 70.7%, $p < .001$, and more negative words than theological words, 19.6%, $p < .001$.

In summary then, with the exception of atheists when making judgements regarding God, all groups had a similar pattern of responses for each word-type: all three groups endorsed more positive words than negative words irrespective of target, thus replicating the pattern of endorsement rates observed in Experiment 3. Theological words followed the pattern of positive

words when making judgements about God and the pattern of negative words when making judgements about Superman and self.

Effects of word-type, target, and judgement on judgement speed

Only one participant responded *yes* and *no* at least once for every combination of target and word-type, making the computation of a four-way ANOVA of judgement speed in terms of judgement, word-type, target, and group impossible. Because the empty cells were largely predictable (e.g., very few *no*-judgements for theological words for *God* as target; cf. Table 4.22), however, three complementary analyses were carried out to confirm a replication of the schematicity effects observed in Experiment 3. An additional analysis was carried out to investigate the effects of *yes/no*-judgement on theologically correct judgements regarding theological trait words.

First, the number of participants with no empty cells increased when considering only judgements made for positive and negative words for God and self as targets, as displayed in Table 4.23.

Table 4.23. Judgement speeds in milliseconds by target, word-type, and judgement.

target	word-type	judgement	Group 1: atheists (n = 12)		Group 2: non-evangelical Christians (n = 6)		Group 3: evangelical Christians (n = 5)	
			mean	SD	mean	SD	mean	SD
God	negative	yes	2367	1024	2385	1037	3591	1936
		no	2206	860	1888	528	1875	714
	positive	yes	2179	845	1664	431	1884	1025
		no	2515	1415	2160	1122	2847	1170
self	negative	yes	2355	1557	1908	634	3008	1049
		no	1840	518	1970	527	2567	1271
	positive	yes	1849	582	2046	601	2461	979
		no	2767	1983	2510	994	2711	811

Despite resultant small group sizes and low power, the four-way interaction of judgement (*yes*, *no*) $\times$ target (*God*, *self*) $\times$ word-type (negative, positive) $\times$ group (atheist, non-evangelical,

Figure 4.6. Mean speed of negative and positive trait word judgements about *God* and *self*, with standard error bars.

evangelical) was nevertheless significant, $F(2, 20) = 4.13, p = .031$. Decomposition of this interaction revealed a simple interaction effect of judgement $\times$ word-type $\times$ group for *God* as target, $F(2, 20) = 4.68, p = .021$, but not for *self* as target, $F(2, 20) = 0.98, p = .394$. Further analysis explored the simple interaction effect of judgement $\times$ word-type fixed at *God* as target for each level of group: atheists, $F(1, 20) = 1.64, p = .215$; non-evangelicals, $F(1, 20) = 3.28, p = .085$; evangelicals, $F(1, 20) = 19.88, p < .001$. Inspection of the interaction graphs in Figure 4.6 confirms a replication of the pattern observed in Experiment 3 (cf. Figure 4.3)—that evangelicals were quick to make positive-schematic judgements (i.e., *yes*-judgements for positive words and *no*-judgements for negative words) about *God* and slow to make negative-schematic judgements (i.e., *no*-judgements for positive words and *yes*-judgements for negative words) about God, while atheists took a uniform length of time regardless of the judgement and word-type. Non-evangelical Christians demonstrated a weak schematicity effect for judgements about God, but not one that reached significance.

Table 4.24. Judgement speeds in milliseconds by target and schema-type.

target	schema-type	Group 1: atheists (n = 23)		Group 2: non-evangelical Christians (n = 20)		Group 3: evangelical Christians (n = 17)	
		mean	SD	mean	SD	mean	SD
God	negative	2474	1050	2441	893	2928	1649
	positive	2289	956	1691	710	1483	332
Superman	negative	2798	1836	2123	748	2281	648
	positive	1996	609	1817	499	2167	635
self	negative	2425	1120	2200	959	2648	933
	positive	1853	594	1893	714	2082	635

The second analysis tested this conclusion by drawing on data from more of the participants. Two new variables were computed per target: a mean judgement speed for positive-schematic judgements (i.e., *yes*-judgements for positive words and *no*-judgements for negative words), and a mean judgement speed for negative-schematic judgements (i.e., *no*-judgements for positive words and *yes*-judgements for negative words). Inspection of group means displayed in Table 4.24 suggests an overall speed advantage when making positive-schematic judgements as compared to

making negative-schematic judgements regardless of target; indeed, a schema valence (positive, negative) $\times$ target (*God*, *Superman*, *self*) $\times$ group (atheists, non-evangelicals, evangelicals) analysis of variance confirmed the main effect of schema valence, 561 ms, $F(1, 57) = 41.22, p < .001$.

A three-way interaction of schema valence, group, and target was also observed, $F(4, 114) = 7.02, p < .001$. Decomposition of this interaction, as illustrated in Figure 4.7, revealed a simple interaction effect of schema valence and group for *God* as target, $F(2, 57) = 6.76, p = .002$, but not for *Superman* or for *self* as target, $F(2, 57) = 2.57, p = .085$, and $F(2, 57) = 0.77, p = .466$, respectively. While for *God* as target the overall advantage for positive-schematic judgements over negative-schematic judgements was maintained, the size of this advantage varied according to group: the 184 ms difference for atheists was non-significant, $p = .413$; non-evangelicals were 750 ms faster for positive-schematic judgements, $p = .003$; evangelicals were 1445 ms faster for positive-schematic judgements, $p < .001$. Comparison across the graphs in Figure 4.7 also illustrates the advantage for positive-schematic *God*-referenced material as compared with positive-schematic *self*-referenced material for evangelicals, 598 ms, $p = .001$, and its reverse for atheists, -437 ms, $p = .007$; the 202 ms advantage for *God* over *self* was non-significant for non-evangelicals, $p = .432$.

A third analysis explored positive-schematic judgements in more detail, again for all three targets. Virtually all of the participants had made at least one *no*-judgement to a negative word and one *yes*-judgement to a positive word for each target; note also from Table 4.25 that within-groups variability is smaller for positive-schematic judgements than for negative-schematic judgements (cf. Table 4.24). An analysis of variance of judgement-type (*no* to negative, *yes* to positive) $\times$ target (*God*, *Superman*, *self*) $\times$ group (atheist, non-evangelical, evangelical) found no overall three-way interaction, $F(4, 128) = 0.19, p = .942$. Together with a non-significant judgement-type $\times$ group interaction, $F(2, 64) = 0.95, p = .392$, this is strongly suggestive that the two judgement-types drew on the same type of schematic information, and that they were treated similarly by all three groups. As would be predicted by previous analyses, a target $\times$ group interaction was observed, $F(4, 128) = 10.08, p < .001$; decomposition of this interaction revealed a simple effect of group for *God* as target, $F(2, 64) = 7.32, p = .001$, but not for *Superman* or *self*, $F(2, 64) = 0.69, p = .504$, and $F(2, 64) = 0.26, p = .769$, respectively. Sidak pairwise comparisons found that, when making positive-schematic judgements for *God*, atheists were 565 ms slower than non-evangelicals, $p = .019$, and 735 ms slower than evangelicals, $p = .001$; although evangelicals were 170 ms faster than non-evangelicals this difference was not significant, $p = .759$. Simple effects of target were additionally observed for atheists, $F(2, 63; \text{Pillai's trace}) = 10.15, p < .001$, and for

Figure 4.7. Mean speed of positive-schematic and negative-schematic judgements about *God*, *Superman*, and *self*; with standard error bars.

evangelicals, $F(2, 63; \text{Pillai's trace}) = 12.57, p < .001$, but not for non-evangelicals, $F(2, 63; \text{Pillai's trace}) = 1.71, p = .190$. Inspection of the Sidak pairwise comparisons displayed in Table 4.26 shows that atheists were faster to access positive-schematic knowledge about *self* than about *God*, while the reverse was true for evangelicals. *Superman* was indistinguishable from *God* for atheists, whereas evangelicals did not significantly differ between *Superman* and *self*. Non-evangelicals did not differ significantly in speed across any of the three targets.

Table 4.25. Positive-schematic judgement speeds in milliseconds by target and judgement-type.

target	judgement-type	Group 1: atheists (n = 20)		Group 2: non-evangelical Christians (n = 23)		Group 3: evangelical Christians (n = 24)	
		mean	SD	mean	SD	mean	SD
God	no to negative	2374	909	1857	797	1629	482
	yes to positive	2151	730	1538	628	1426	618
Superman	no to negative	1918	580	1738	503	1881	687
	yes to positive	2257	836	2008	721	2177	757
self	no to negative	1808	466	1924	805	1910	737
	yes to positive	1880	732	1817	663	2040	867

Table 4.26. Within-subject Sidak pairwise comparisons between mean judgement speeds for positive-schematic responses at each possible pair of targets.

targets	Group 1: atheists (n = 20)	Group 2: non-evangelical Christians (n = 23)	Group 3: evangelical Christians (n = 24)
God, self	418 $p < .001$ **	-173 $p = .201$	-448 $p < .001$ **
God, Superman	175 $p = .427$	-176 $p = .360$	-502 $p < .001$ **
self, Superman	-244 $p = .034$ *	-3 $p > .999$	-54 $p = .896$

Notes: ** indicates $p < .01$; * indicates $p < .05$. Mean difference (first minus second) in milliseconds is listed above the significance.

A final analysis considered the effect of *yes*- and *no*-judgements for theological trait words. Only 11 participants out of the 72 tested made one or more *no*-judgements for theological words for *God* as target and one or more *yes*-judgements for theological words for *self* as target, so a three-way ANOVA of word-type $\times$ judgement $\times$ group lacked sufficient power to draw any meaningful conclusions. All participants, however, had made one or more *yes*-judgements for theological words for *God* as target and one or more *no*-judgements for theological words for *self* as target, so it was possible to analyse “theologically correct”-schematic judgements for *God* and *self* in the same way as positive-schematic judgements were analysed above. (Judgements regarding theological words for *Superman* were omitted from this analysis on the grounds that it was more ambiguous what would constitute a theologically correct judgement.) As can be seen from Table 4.27, judgements regarding *God* as target were made more quickly with increasing religiosity, while judgements regarding *self* were made somewhat more slowly with increasing religiosity.

Table 4.27. Judgement speeds for theologically-correct-schematic judgements of theological trait words for *God* and *self*.

target	judgement	Group 1: atheists (n = 24)		Group 2: non-evangelical Christians (n = 24)		Group 3: evangelical Christians (n = 24)	
		mean	SD	mean	SD	mean	SD
God	yes	2068	845	1757	732	1353	384
self	no	1388	397	1539	523	1570	551

A two-way ANOVA of judgement-type (*yes* for *God*, *no* for *self*) $\times$ group (atheist, non-evangelical, evangelical) verified a significant interaction, $F(2, 69) = 15.15$, $p < .001$, illustrated in Figure 4.8. Decomposition confirmed the simple effect of group for *yes*-judgements about *God*, $F(2, 69) = 6.62$, $p = .002$; Sidak pairwise comparisons found the 715 ms advantage of evangelicals over atheists to be significant, $p = .002$, but no significant differences were found between the atheist group and the non-evangelical group, 312 ms, $p = .315$, or between the non-evangelical and the evangelical groups, 403 ms, $p = .128$. No group differences were found for *no*-judgements about *self*, $F(2, 69) = 0.93$, $p = .400$. Within-group differences in judgement speed between the two targets were found only for the atheist group, 680 ms, $p < .001$; judgement speed for *God* and *self*

did not differ for non-evangelicals, 217 ms, $p = .063$, or evangelicals, -217 ms, $p = .064$. This pattern of results replicates that observed in Experiment 3 for atheist and evangelical groups rating theological trait words (cf. Figure 4.2); although little distinction was observed in the current experiment for non-evangelical Christians, their results clearly trend midway between the atheist and evangelical Christian groups.

Figure 4.8. Mean judgement speed for theologically-correct-schematic judgements about *God* and *self*, with standard error bars.

In summary then, multiple analyses have demonstrated that evangelical Christians and, to a lesser extent, non-evangelical Christians displayed a speed advantage over atheists in making positive-schematic and theologically-correct-schematic judgements about God. Evangelicals and non-evangelicals (again the former more strongly) were more impaired at making negative-schematic judgements than positive-schematic judgements about God; whereas no corresponding difference in judgement speed according to schema valence was observed for the atheists. Differences in relative judgement speed for positive-schematic and theologically-correct-schematic God-referent and self-referent judgements were also observed: atheists were faster to make judgements about self than about God, the reverse was found for evangelicals, and no difference was observed for non-evangelicals.

Determinants of God-reference effect in judgement speed

Replication of the judgement speed findings of Experiment 3 prompts several exploratory questions regarding what determines the effects described: first, what effects did within-group variation in screening variables have on God-referenced judgements; second, what are the effects on God-referenced judgements of extremity of Likert scale descriptiveness ratings, or of the strength of emotion ratings that accompanied the descriptiveness ratings? A brief attempt will be made to address each of these questions with the available data.

Data on religiosity, orthodoxy, and frequency of religious behaviours were collected principally to screen participants for their suitability for the various experimental groups; for this reason, any variables involved in defining specific groups could not be included in an investigation of the determining variables of the God-reference effect. However, a variety of legitimate exploratory correlations within groups was carried out between selected screening variables and a positive schematicity index (calculated as mean judgement speed of positive-schematic judgements for *God* minus the mean judgement speed of positive-schematic judgements for *self*). As can be seen from Table 4.28, few correlations were significant. However, it may be worth noting that with the exception of private extrinsic religiosity and theological training, the majority of relationships were negative: God-referenced judgements were made faster in relation to self-referenced judgements with increasing religiosity within each group.

Follow-up tests for differences in positive schematicity index were carried out on the significant correlations. Non-evangelical Christians who had attended church one or more times in the week prior to completing the Screening Questionnaire ($N = 8$; $M = -566$ ms, $SD = 605$ ms) were found to have made positive-schematic judgements for *God* more quickly than for *self* relative to non-evangelicals who had not attended church in the same period ($N = 16$; $M = -51$ ms, $SD = 261$ ms), $t(8.33) = -2.30$, $p = .049$. Likewise, evangelical Christians who had attended church three or more times in the week prior to completing the Screening Questionnaire ($N = 10$; $M = -704$ ms, $SD = 594$ ms) were found to have made positive-schematic judgements for *God* more quickly than for *self* relative to evangelicals who had attended church only once or twice in the same period ($N = 14$; $M = -287$ ms, $SD = 354$ ms), $t(22) = -2.15$, $p = .043$. However, the non-evangelical Christians who prayed weekly or more often ($N = 11$; $M = -403$ ms, $SD = 586$ ms) did not differ significantly in positive schematicity index from non-evangelical Christians who prayed less often than weekly ($N = 12$; $M = -75$, $SD = 286$ ms), $t(21) = -1.73$, $p = .098$, and non-evangelical Christians with an intrinsic religiosity score of 22 or more ($N = 12$; $M = -363$

ms; $SD = 584$ ms) did not differ significantly from those with an intrinsic religiosity score of less than 22 ($N = 12$; $M = -83$ ms, $SD = 266$ ms), $t(22) = -1.51$, $p = .145$. Given that church attendance was found to vary with positive schematicity index within both Christian groups, and that these two groups differ in church attendance, it is possible that church attendance may mediate some of the advantage for positive-schematic God-referenced judgements over positive-schematic self-referenced judgements.

Table 4.28. Statistics for correlation of positive schematicity index with selected screening variables, by group.

group	variable	<i>N</i>	<i>r</i>	<i>p</i>
atheist	length of practice	24	.03	.886
	religious issue discussion frequency	24	.09	.659
	Christian orthodoxy	24	-.26	.217
non-evangelicals	length of practice	24	-.29	.176
	church attendance	24	-.57	.003 **
	prayer frequency	23	-.50	.014 *
	Scripture reading frequency	24	-.14	.503
	religious issue discussion frequency	24	-.17	.436
	intrinsic religiosity	24	-.52	.010 **
	extrinsic religiosity (social)	24	-.14	.500
	extrinsic religiosity (private)	24	.19	.380
	extrinsic religiosity (overall)	24	-.01	.981
	Christian orthodoxy	24	-.21	.322
evangelicals	length of practice	24	-.09	.689
	theological training	24	.37	.076
	church attendance	24	-.51	.012 *
	religious issue discussion frequency	24	-.02	.913
	extrinsic religiosity (social)	24	-.20	.355
	extrinsic religiosity (private)	24	.22	.303
	extrinsic religiosity (overall)	24	.02	.912

Note: ** indicates $p < .01$; * indicates $p < .05$.

Turning to the relationship between judgement speed for God-referenced material and both extremity of Likert scale descriptiveness ratings and the accompanying strength of emotion ratings on the God Concept Survey [A, B], the data set was restructured so that each participant

contributed eight judgement times (less any time-outs) per word-type, each associated with a descriptiveness extremity rating (0-3) and a strength of emotion rating (0-6). Correlations were carried out for each word-type and group combination and are presented in Table 4.29. All of the significant correlations were negative: where present for descriptiveness ratings this indicates that when participants judged words more quickly in the computer-based test they were subsequently likely to rate them more extremely on the God Concept Survey [A, B]; where present for strength of emotion ratings this indicates that when respondents judged words more quickly in the computer-based test they were subsequently likely to feel stronger emotion about the descriptiveness rating on the God Concept Survey [A, B].

Table 4.29. Statistics for correlation of judgement speed for God-referenced judgements of negative, positive, and theological trait words with extremity of Likert scale descriptiveness ratings of the same words and with accompanying strength of emotion ratings.

group	rating	word-type	<i>N</i>	<i>r</i>	<i>p</i>
atheist	descriptiveness	negative	190	-.13	.067
		positive	191	-.05	.480
		theological	190	-.26	< .001 **
	emotion	negative	190	-.11	.132
		positive	191	.01	.869
		theological	190	.11	.138
non-evangelical	descriptiveness	negative	189	-.35	< .001 **
		positive	191	-.20	.006 **
		theological	192	-.18	.011 *
	emotion	negative	189	.00	.962
		positive	191	-.09	.205
		theological	192	-.05	.513
evangelical	descriptiveness	negative	189	-.29	< .001 **
		positive	192	-.31	< .001 **
		theological	191	-.65	< .001 **
	emotion	negative	189	.02	.824
		positive	192	-.24	.001 **
		theological	191	-.24	.001 **

Note: ** indicates $p < .01$; * indicates $p < .05$.

Significant correlations with descriptiveness ratings were found for each word-type for each group, with the exception of atheists when rating positive or negative trait words. This exception may be because atheists made fewer extreme ratings on positive and negative trait words by comparison to theological words and by comparison to the two Christian groups (cf. Table 4.20). Where these correlations were present, however, they suggest that trait words rated as either extremely descriptive or extremely unresponsive of who God is to the respondent were more accessible with regard to the respondent's God schema (as measured by judgement speed) than trait words rated as neutral or only slightly descriptive or unresponsive (cf. Kuiper, 1981).

For evangelicals on positive and theological trait words, strength of emotion was found to vary with judgement speed in a way that was not observed for evangelicals on negative trait words or for atheists or non-evangelicals on any word-type. While groups differed in levels of how much emotion they felt about their descriptiveness ratings (cf. Table 4.21), it is important to note that levels of emotion varied widely within each group, yet only varied in relation to judgement speed for the evangelical group, and then only for positive and for theological words. The reasons for these group differences are not obvious, but there are at least two possibilities. It may be that the emotion felt by an evangelical participant when making descriptiveness ratings mediated accessibility of those aspects of her God schema in addition to the extremity of the descriptiveness ratings, while the emotion felt by non-evangelical participants or atheist participants was not associated with their God schemas in the same way. Alternatively, evangelical participants may have used the strength of emotion scale in a different way to the two other groups, for example as an extension of the descriptiveness rating scale rather than as intended. Resolving these possibilities is not possible with the available data.

While the above analyses suggest some initial routes for further understanding within-group differences in judgement speed advantage for God-referenced material, understanding of the between-group differences will require additional data.

Word recall

Each participant had completed an unexpected recall test following the judgement-speed task. Participants were scored one mark per trait word correctly recalled; unlike Experiment 2, no half marks were given for words with the correct root but wrong suffix. Several hypotheses had been made regarding recall:

- (a) that recall for Superman would in general be poor for all groups in comparison to recall for self-referenced material;
- (b) that evangelical Christians would have similar recall for God-referenced material and self-referenced material, whereas atheist participants would have poorer recall for God-referenced material (tending toward that for Superman-referenced material) than for self-referenced material; no specific hypothesis was made regarding recall of God- and self-referenced material by non-evangelical Christians;
- (c) that recall for theological material—regardless of target—would be lowest for atheists and highest for evangelicals;
- (d) that all participants would have superior recall for positive material compared to negative material.

These hypotheses will be explored in turn together with exploratory questions regarding the effects on recall of schematicity of material and strength of emotion. Because the overall picture in the recall data is complex, this picture will be built up gradually, adding a factor at a time.

Effects of target on word recall

Inspection of Table 4.30 suggests that when all words were considered, more words were recalled for *self* and *God* as targets than for *Superman*. A two-way ANOVA of group and target confirmed the main effect of target, $F(2, 138) = 23.93, p < .001$, with Sidak pairwise comparisons revealing differences among all three targets: 1.3 more words were recalled for *God* than for *Superman*, $p = .001$; 2.5 more words were recalled for *self* than for *Superman*, $p < .001$; 1.2 more words were recalled for *self* than for *God*, $p = .006$. This pattern of results supports the hypothesis that recall for self-referenced material would be superior to that for Superman-referenced material.

The second hypothesis, that of a target $\times$ group interaction for recall, was not supported in this overall analysis, $F(4, 138) = 1.47, p = .215$. Further analysis, however, revealed group differences for *God* as target, $F(2, 69) = 7.53, p = .001$, that were not replicated for *Superman*, $F(2, 69) = 1.99, p = .144$, or for *self*, $F(2, 69) = 0.92, p = .404$, as illustrated in Figure 4.1. Sidak pairwise comparisons confirmed that evangelical Christians recalled on average 3.0 more words for *God* as target than did atheists, $p < .001$; the 1.7-word recall advantage of evangelicals over non-evangelicals was non-significant, $p = .101$; likewise the 1.3-word recall advantage of non-

evangelicals over atheists was non-significant, $p = .246$. An interesting pattern of within-groups differences in recall for the three targets was also observed. As expected, all groups recalled more words for *self* than for *Superman*: atheists 2.5 words, $p < .001$; non-evangelicals 2.8 words, $p < .001$; evangelicals 2.2 words, $p = .003$. However, only the atheist group recalled more words for *self* than for *God*: 2.0 words, $p = .007$; for non-evangelicals the difference approached significance, 1.5 words, $p = .070$, but no difference was observed for evangelicals, 0.1 words, $p = .999$. The pattern of differences in recall for *God* and *Superman* was the reverse of the pattern of differences in recall for *self* and *God*: no difference in recall was found for atheists, 0.5 words, $p = .795$; the difference was larger but still non-significant for non-evangelicals, 1.3 words, $p = .104$; while evangelicals had a significant recall advantage for *God* over *Superman*, 2.1 words, $p = .003$.

Table 4.30. Number of words (out of a maximum of 24) for each target.

target	Group 1: atheists (n = 24)		Group 2: non-evangelical Christians (n = 24)		Group 3: evangelical Christians (n = 24)	
	mean	SD	mean	SD	mean	SD
God	7.0	2.4	8.3	2.6	10.0	2.9
Superman	6.5	1.9	7.0	3.0	7.9	2.5
self	9.0	2.9	9.8	3.0	10.0	2.7

Figure 4.9. Group recall for each target, with standard error bars.

So, despite the non-significant group $\times$ target interaction, recall for *God* did tend to that of *Superman* for atheists and to that of *self* for evangelicals, as illustrated in Figure 4.9, and as predicted by the second hypothesis. Non-evangelicals were intermediate in this trend between the atheists and the evangelicals.

Effects of word-type and target on word recall

The relationship of recall to target and group was further investigated by re-analysing the data according to the type of word recalled (negative, positive, or theological), as displayed in Table 4.31. The second hypothesis was explored more thoroughly by considering the overall three-way interaction of word-type $\times$ target $\times$ group, $F(8, 276) = 2.57, p = .010$, illustrated in Figure 4.10. Decomposition of this three-way interaction revealed several effects of interest.

Table 4.31. Number of words recalled (out of a maximum of 8) for each target according to word-type.

target	word-type	Group 1: atheists (n = 24)		Group 2: non-evangelical Christians (n = 24)		Group 3: evangelical Christians (n = 24)	
		mean	SD	mean	SD	mean	SD
God	negative	1.4	1.3	1.9	1.2	2.8	1.5
	positive	2.5	1.3	2.6	1.1	3.5	1.6
	theological	3.0	1.1	3.8	1.7	3.6	1.6
Superman	negative	1.1	1.0	1.8	1.2	1.4	1.1
	positive	2.2	1.2	2.8	1.5	3.4	1.3
	theological	3.1	1.4	2.4	1.3	3.1	1.6
self	negative	2.5	1.4	3.0	1.4	2.2	1.1
	positive	3.5	1.3	3.8	1.4	4.4	1.4
	theological	2.9	1.5	3.0	1.3	3.5	1.1

First, as is evident from Figure 4.10, the effects of target and group varied for different word-types; each word-type will be considered in turn. A simple interaction effect of target $\times$ group obtained for negative trait words, $F(4, 138; \text{Pillai's trace}) = 4.70, p = .001$, largely due to group differences in recall for negative words for *God* as target, $F(2, 69) = 7.06, p = .002$. Sidak pairwise comparisons showed that evangelicals remembered 1.4 more negative words for *God* than did

Figure 4.10. Mean number of words recalled for God-, Superman-, and self-referent judgements of negative, positive, and theological words; with standard error bars.

atheists, $p = .001$; non-evangelicals did not differ from atheists, 0.5 words, $p = .479$, or from evangelicals, -0.9 words, $p = .056$. The simple effects of group for negative words for *Superman* and *self* were both non-significant: $F(2, 69) = 2.14$, $p = .125$, and $F(2, 69) = 2.38$, $p = .100$, respectively. Simple effects of target for negative trait words were observed for each group: atheists, $F(2, 68) = 9.80$, $p < .001$; non-evangelicals, $F(2, 68) = 7.82$, $p < .001$; evangelicals, $F(2, 68) = 9.34$, $p < .001$. Inspection of the pairwise comparisons tabulated in Table 4.32 shows that these simple effects in atheists and non-evangelicals were due to superior recall of negative words for *self* as target over that for *God* or *Superman* as target; whereas for evangelicals the simple effect was primarily due to enhanced recall of negative words for *God* as target. The net effect of all these analyses is that evangelicals had elevated recall of negative trait words for *God* as compared both to between-group recall for *God* as target and to within-group recall for other targets.

Table 4.32. Within-subject Sidak pairwise comparisons between mean recall of negative trait words for each possible pair of targets.

targets	Group 1: atheists (n = 24)	Group 2: non-evangelical Christians (n = 24)	Group 3: evangelical Christians (n = 24)
God, self	-1.4 $p < .001^{**}$	-1.2 $p = .002^{**}$	0.7 $p = .121$
God, Superman	0.3 $p = .754$	0.1 $p = .974$	1.4 $p < .001^{**}$
self, Superman	1.1 $p = .003^{**}$	1.1 $p = .004^{**}$	0.8 $p = .088$

Note: ** indicates $p < .01$; * indicates $p < .05$. Mean difference in number of negative words recalled (first target minus second target) is listed above the significance.

Turning now to positive trait words, we find no simple interaction effect of target $\times$ group for positive words, $F(4, 138; \text{Pillai's trace}) = 0.27$, $p = .899$. The simple main effect of group for positive trait words was significant however, $F(2, 69) = 9.89$, $p < .001$, with evangelicals remembering on average 1.0 more positive words per target than atheists, $p < .001$, and 0.7 more positive words per target than non-evangelicals, $p = .011$; atheists and non-evangelicals did not differ in recall for positive words, -0.3 words per target, $p = .467$. A simple main effect of target was also observed, $F(2, 68) = 19.56$, $p < .001$; simple effects of target for positive words were

observed for atheists, $F(2, 69) = 3.60, p = .033$, and for non-evangelicals, $F(2, 69) = 4.64, p = .013$, but not for evangelicals, $F(2, 69) = 2.72, p = .073$. Inspection of the pairwise comparisons tabulated in Table 4.33 suggests that the observed pattern of recall for positive trait words across the three targets was similar to the recall pattern for negative trait words described above for the atheist and non-evangelical groups but this time extended to all three groups. Taken together with the previous set of analyses, it is clear that the recall advantage experienced by evangelicals for negative words for *God* as target did not extend to positive words for *God*. This means that the second hypothesis was not supported for positive words, but was for negative words. One possible explanation is that evangelicals' enhanced recall for negative trait words for *God* as target was due to their strongly counter-schematic nature. This explanation is tested in the following section by considering judgements made in addition to target and word-type.

Table 4.33. Within-subject Sidak pairwise comparisons between mean recall of positive trait words for each possible pair of targets.

targets	Group 1: atheists (n = 24)	Group 2: non-evangelical Christians (n = 24)	Group 3: evangelical Christians (n = 24)
God, self	-1.0 $p = .050$	-1.2 $p = .017^*$	-0.9 $p = .121$
God, Superman	0.3 $p = .800$	-0.2 $p = .968$	0.1 $p = .986$
self, Superman	1.3 $p < .001^{**}$	1.0 $p = .010^*$	1.0 $p = .007^{**}$

Note: ** indicates $p < .01$; * indicates $p < .05$. Mean difference in number of positive words recalled (first target minus second target) is listed above the significance.

Turning finally to theological words, the simple interaction effect of target and group for this word-type was not significant, $F(4, 138; \text{Pillai's trace}) = 2.26, p = .066$. The simple main effect of group for theological words was also not significant, $F(2, 69) = 1.25, p = .293$, providing no support for the hypothesized group differences in recall for theological material irrespective of target. A simple main effect of target was however observed, $F(2, 68) = 4.31, p = .017$; no simple effects of target for theological words were found either for atheists, $F(2, 68) = 0.22, p = .801$, or for evangelicals, $F(2, 68) = 1.32, p = 0.275$; a simple effect of target for theological words was however observed for non-evangelicals, $F(2, 68) = 6.10, p = .004$. Sidak pairwise comparisons

found that non-evangelicals remembered 1.3 more theological words for *God* as target than for *Superman*, $p < .001$, but that recall for *self* did not differ either from that for *God*, -0.8 words, $p = .144$, or from that for *Superman*, 0.5 words, $p = .399$. The implication of these analyses is that participants from all three groups had broadly similar recall for theological words regardless of target, with the exception that non-evangelicals had enhanced recall for *God* as target relative to other targets within-group (though not as compared to other groups' recall for *God* as target).

The final hypothesis predicted superior recall by all groups for positive material compared to negative material. As anticipated by inspection of Figure 4.10, a main effect of word-type was observed, $F(2, 138) = 73.52$, $p < .001$. Sidak pairwise comparisons revealed that participants overall recalled 1.2 more positive words than negative words, $p < .001$, and 1.1 more theological words than negative words, $p < .001$; no differences were found in recall for positive and theological words, 0.1 words, $p = .954$. This pattern of results therefore supports the fourth hypothesis.

Effects of judgement, word-type, and target on word recall

A further layer of complexity in the recall data explored whether trait-word recall was dependent upon the *yes/no* judgement made. Considering raw recall scores in this situation is problematic however: if one group had a low mean recall score for a particular data point it would not be possible to determine whether that was because of low recall, because of relatively few judgements of that type made for that target, or because of some combination of these two. One solution would be to calculate proportional scores incorporating base rates of *yes*- and *no*-judgements, but this itself is not without difficulty. Ideally, scores would be considered as a proportion of the total number of judgements of that type for that word-type and target combination, e.g., the percentage of *yes*-judgements for negative words for *God* subsequently recalled. As was seen in the earlier presentation of judgement speed data, however, one characteristic of this type of data is that many participants may not make any judgements of a particular type for a given word-type and target combination, leading to the problem of having to divide zero by zero (with indeterminate solution). Calculating a proportion of words recalled out of all those in a given word-type, target, and judgement combination was not therefore viable. Several more limited possibilities were available however:

- (a) recall as a proportion of same-judgement judgements, e.g., recall for *yes*-judgements for positive words for *God* as target calculated as a proportion of the total number of *yes*-judgements for all word-types and targets. This would control for the likely bias toward

yes-judgements, and would also reveal any differences in relative recall for *yes*- or *no*-judgements;

- (b) recall as a proportion of same-judgement and same-target judgements, e.g., recall for *yes*-judgements for positive words for *God* as target calculated as a proportion of the total number of *yes*-judgements made for *God* for all word-types. This would control for any response biases specific to each target;
- (c) recall as a proportion of same-judgement and same word-type judgements, e.g., recall for *yes*-judgements for positive words for *God* as target calculated as a proportion of the total number of *yes*-judgements made for positive words for all targets. This would control for response biases specific to different word-types.

While response biases to different word-types are evident from inspection of Table 4.22, groups differ only for *God* as target. Given this, and that my hypotheses involved target-specific responses from different groups, the second of these three options seemed the most appropriate way to analyze further the recall data. This option would allow, for example, the observation that someone may not have made many *no*-judgements for *God* but remembered most that were made; furthermore the distribution of recall for those judgements across different word-types would also be evident.

Eighteen proportional recall scores—one for each word-type, target, and judgement combination—were therefore computed for each participant as the percentage of same-judgement and same-target judgements. Inspection of Table 4.34 suggests a similar pattern for recall to that for judgement as displayed in Table 4.22, even after adjustment for relative distribution of judgements within each target. The four-way interaction of judgement $\times$ target $\times$ word-type $\times$ group was highly significant, $F(8, 276) = 8.71, p < .001$.³³ Decomposition of this interaction examined the simple interaction effect of judgement $\times$ word-type $\times$ group at each level of target, revealing a significant effect for *God*, $F(4, 138; \text{Pillai's trace}) = 13.14, p < .001$, but not for *Superman* or for *self*, $F(4, 138; \text{Pillai's trace}) = 1.14, p = .339$, and $F(4, 138; \text{Pillai's trace}) = 1.12, p = .350$, respectively. The effect of judgement and recall for *Superman* and *self* will be considered first. The simple interaction effect of judgement $\times$ word-type $\times$ group $\times$ target

³³ The five-way interaction of judgement $\times$ target $\times$ word-type $\times$ group $\times$ counterbalancing order was also non-significant, $F(40, 216) = 1.06, p = .383$, as was the main effect of order, $F(5, 54) = 0.57, p = .722$, confirming that the counterbalancing in use was successful.

Table 4.34. Recall as a percentage of same-judgement and same-target judgements, by target, word-type, and judgement.

target	word-type	judgement	Group 1: atheists (n = 24)		Group 2: non-evangelical Christians (n = 24)		Group 3: evangelical Christians (n = 24)	
			mean	SD	mean	SD	mean	SD
God	negative	yes	7.7	9.8	3.2	4.2	2.8	3.5
		no	5.0	8.3	17.0	15.3	31.9	18.3
	positive	yes	10.0	9.1	16.2	7.3	21.4	10.3
		no	13.2	16.7	2.1	8.0	0.5	2.6
	theological	yes	14.8	9.8	21.2	10.4	20.8	9.0
		no	8.2	9.7	4.8	6.8	2.8	5.8
Superman	negative	yes	2.7	5.8	6.4	12.8	6.4	10.9
		no	5.3	5.6	8.7	8.4	5.4	5.3
	positive	yes	22.7	17.8	26.9	21.5	31.2	21.7
		no	3.4	3.7	5.2	4.9	7.8	6.9
	theological	yes	6.2	6.8	2.4	4.9	1.9	5.3
		no	16.5	8.0	13.9	8.3	17.3	9.4
self	negative	yes	8.9	8.2	13.4	12.1	9.4	9.2
		no	10.9	8.1	12.7	9.9	8.7	6.4
	positive	yes	34.8	17.8	33.6	14.9	30.6	16.3
		no	4.8	4.7	5.5	6.2	10.8	8.8
	theological	yes	1.8	4.2	0.5	2.3	4.9	9.7
		no	17.8	11.3	19.5	8.0	20.6	8.0

(*Superman* and *self* only) was non-significant, $F(4, 138; \text{Pillai's trace}) = 1.54, p = .195$, indicating that the recall pattern did not differ significantly among the three groups on either *Superman* or *self* as target, nor between those targets, as illustrated in Figure 4.11. When all groups were considered together, the simple interaction effect of judgement $\times$ word-type for *Superman* as target was significant, $F(2, 68) = 71.45, p < .001$, as was the simple interaction effect of judgement $\times$ wordtype for *self* as target, $F(2, 68) = 131.08, p < .001$. Decomposing this interaction by word-type, no difference in percentage recall for *yes*-judgements and *no*-judgements was observed for negative words either for *Superman* or for *self*, $-1.3\%, p = .418$, and $-0.2\%, p = .931$, respectively. Positive words that received *yes*-judgements were recalled more

frequently than positive words that received *no*-judgements for both *Superman* and for *self*, 21.5%, $p < .001$, and 26.0%, $p < .001$, respectively. The reverse was true for theological words: they were recalled more frequently when they had received *no*-judgements than when they had received *yes*-judgements for both *Superman* and for *self*, -12.4%, $p < .001$, and -16.9%, $p < .001$, respectively.

Turning now to the effect of judgement on *God* as target, the simple interaction effect of judgement $\times$ word-type $\times$ group for *God* was decomposed by considering the simple interaction effect of judgement $\times$ word-type at each level of group, with target fixed at *God*. As is illustrated by Figure 4.12, this simple interaction effect was non-significant for atheists, $F(2, 68; \text{Pillai's trace}) = 2.03$, $p = .140$, but significant for non-evangelicals and evangelicals, $F(2, 68; \text{Pillai's trace}) = 27.36$, $p < .001$, and $F(2, 68; \text{Pillai's trace}) = 76.22$, $p < .001$. These effects were decomposed according to word-type for Groups 2 and 3. For non-evangelicals, negative words that received a *no*-judgement were recalled more frequently than those that received a *yes*-judgement, 13.8%, $p < .001$. The reverse was true for positive and theological words: those that received a *yes*-judgement were recalled more frequently than those that received a *no*-judgement, 14.1%, $p < .001$, and 16.4%, $p < .001$, respectively. For evangelicals the same pattern obtained, though more strongly: negative words that received a *no*-judgement were recalled more frequently than those that received a *yes*-judgement, 29.1%, $p < .001$; positive and theological words that received a *yes*-judgement were recalled more frequently than those that received a *no*-judgement, 20.9%, $p < .001$, and 17.9%, $p < .001$, respectively. Evangelicals were superior in recall to non-evangelicals for *yes*-judgements for positive words, 11.5%, $p < .001$, and for *no*-judgements for negative words, 14.9%, $p = .002$, but did not differ in recall for *yes*-judgements for negative words or theological words, -0.4%, $p = .994$, and -0.5%, $p = .998$, respectively, or for *no*-judgements for positive words or theological words, -1.6%, $p = .944$, and -2.0%, $p = .751$. The elevated recall by evangelicals for negative trait words for *God* as target noted above (cf. Figure 4.10) can therefore be explained in terms of enhanced recall for negative words that had received *no*-judgements, and thus were positive-schematic. This pattern of responses parallels that found for judgement speed in both experiment 3 and the current experiment. Recall for *God* as target for the atheist group was little influenced either by type of trait word or by the response made to it. By contrast, recall for *God* for the Christian groups, and especially so for the evangelical Christian group, was markedly influenced by the schematicity of the trait-word, with high recall for schema-inconsistent negative material and schema-consistent positive and theological material.

Figure 4.11. Recall as a percentage of same-judgement and same-target judgements of negative, positive, and theological trait words for *self* and *Superman* as target; with standard error bars.

Figure 4.12. Recall as a percentage of same-judgement and same-target judgements of negative, positive, and theological trait words for *God* as target; with standard error bars.

The simple interaction effect of judgement $\times$ word-type $\times$ group for *God* can also be decomposed by considering the relative recall for different word-type and judgement combinations across the three groups. In this way it can be seen from Table 4.35 that recall for *God* by the atheist group was in some cases poorer than that for the Christian groups and in some cases superior, depending on the schematicity of the judgement made: atheists had superior recall for negative-schematic judgements for *God* as compared to evangelicals, while evangelicals had superior recall for positive-schematic judgements for *God* as compared to atheists; non-evangelicals were intermediate in recall between the other two groups.

Table 4.35. Analyses of simple effect of group and Sidak pairwise group comparisons for recall for *God* as target as a percentage of same-judgement and same-target judgements, by word-type and judgement.

word-type	judgement	df	F	p	G1 mean	G2 mean	G3 mean
negative	yes	2, 69	4.10	.021 *	7.7 ^a	3.2 ^{ab}	2.8 ^b
	no	2, 69	20.60	< .001 **	5.0 ^a	17.0 ^b	31.9 ^c
positive	yes	2, 69	9.85	< .001 **	10.0 ^a	16.2 ^{ab}	21.4 ^b
	no	2, 69	9.90	< .001 **	13.2 ^a	2.1 ^b	0.5 ^b
theological	yes	2, 69	3.27	.044 *	14.8 ^a	21.2 ^a	20.8 ^a
	no	2, 69	3.03	.055	8.2 ^a	4.8 ^a	2.8 ^a

Note: ** indicates $p < .01$; * indicates $p < .05$. G1 = atheists; G2 = non-evangelical Christians; G3 = evangelical Christians. Common superscripts within a given row indicate that Sidak pairwise comparisons between groups were not significant at $\alpha = .05$.

A final analysis therefore considered recall for positive-schematic judgements (i.e., *yes*-judgements for positive trait words and *no*-judgements for negative trait words) as a proportion of the total number of positive-schematic judgements for the given target; group means for each target are displayed in Table 4.36. A two-way ANOVA of target $\times$ group revealed a significant interaction, $F(4, 138) = 3.02$, $p = .020$, illustrated in Figure 4.13. Decomposition of this interaction found a simple effect of group for *God* as target, $F(2, 69) = 8.68$, $p < .001$, but not for *Superman* or *self* as target, $F(2, 69) = 1.78$, $p = .176$, and $F(2, 69) = 0.88$, $p = .419$, respectively. Sidak pairwise comparisons confirmed that evangelicals had superior recall for positive-schematic judgements for *God* compared to atheists, 16.9%, $p < .001$, and non-evangelicals, 11.0%, $p = .028$; no difference in recall was found between non-evangelicals and atheists, 5.9%, $p = .397$. A simple

effect of target was observed for each group: atheists, $F(2, 68) = 6.90, p = .002$; non-evangelicals, $F(2, 68) = 6.00, p = .004$; evangelicals, $F(2, 68) = 5.97, p = .004$. Inspection of the Sidak pairwise comparisons shown in Table 4.37 confirms that recall of positive-schematic material for *God* was similar to that for *Superman* for atheists and non-evangelical Christians but to that for *self* for evangelical Christians.

Table 4.36. Percentage of positive-schematic judgements recalled for *God*, *Superman*, and *self*.

target	Group 1: atheists (n = 24)		Group 2: non-evangelical Christians (n = 24)		Group 3: evangelical Christians (n = 24)	
	mean	SD	mean	SD	mean	SD
God	22.6	17.3	28.6	12.1	39.6	12.9
Superman	20.8	12.5	28.1	16.4	26.1	12.1
self	34.5	15.0	40.4	18.4	35.2	16.4

Figure 4.13. Mean percentage of positive-schematic judgements recalled for *God*, *Superman*, and *self*, with standard error bars.

Table 4.37. Within-subject Sidak pairwise comparisons between mean percentage recall of positive-schematic judgements for each possible pair of targets.

targets	Group 1: atheists (n = 24)	Group 2: non-evangelical Christians (n = 24)	Group 3: evangelical Christians (n = 24)
God, self	-11.8% $p = .013$ *	-11.8% $p = .014$ *	4.4% $p = .631$
God, Superman	1.8% $p = .955$	0.5% $p = .999$	13.5% $p = .003$ **
self, Superman	13.7% $p = .003$ **	12.3% $p = .008$ **	9.1% $p = .070$

Note: ** indicates $p < .01$; * indicates $p < .05$. Mean difference in recall (first target minus second target) is listed above the significance.

In summary, the analysis of the recall data complements that of the judgement speed data: just as evangelical Christians showed a speed advantage over atheists and non-evangelical Christians for positive-schematic judgements of God-referenced material, so too evangelicals show a recall advantage over atheists and non-evangelicals for trait words involved in positive-schematic judgements of God-referenced material.

Determinants of God-reference effect in memory

Following the exploration of determinants of the God-reference effect in judgement speed, a similar investigation was carried out into whether any of the screening variables predicted a recall advantage for God-referenced material, and whether words that were recalled for God differed from those that were not in terms of judgement speed, extremity of Likert scale descriptiveness ratings, or the associated strength of emotion ratings.

A series of exploratory correlations were carried out between selected screening variable and a positive schematicity index (calculated as the percentage of positive-schematic judgements recalled for *God* minus the percentage of positive-schematic judgements recalled for *self*). As can be seen from Table 4.38, not one of the correlations was significant, nor did the correlations fall into any discernible pattern (cf. Table 4.28).

Table 4.38. Statistics for correlation of positive schematicity index with selected screening variables, by group.

group	variable	N	r	p
atheist	length of practice	24	-.10	.626
	religious issue discussion frequency	24	.04	.836
	Christian orthodoxy	24	-.06	.791
non-evangelicals	length of practice	24	.35	.095
	church attendance	24	.04	.852
	prayer frequency	23	.27	.206
	Scripture reading frequency	24	.02	.933
	religious issue discussion frequency	24	-.07	.738
	intrinsic religiosity	24	.13	.535
	extrinsic religiosity (social)	24	.03	.893
	extrinsic religiosity (private)	24	.15	.498
	extrinsic religiosity (overall)	24	.09	.672
	Christian orthodoxy	24	.09	.691
evangelicals	length of practice	24	.26	.221
	theological training	24	-.25	.238
	church attendance	24	-.32	.122
	religious issue discussion frequency	24	-.16	.450
	extrinsic religiosity (social)	24	.16	.453
	extrinsic religiosity (private)	24	-.11	.612
	extrinsic religiosity (overall)	24	.03	.877

Note: ** indicates $p < .01$; * indicates $p < .05$.

A series of ANOVAs were carried out on judgement speed for positive-schematic judgements, descriptiveness extremity, and strength of emotion to search for any differences between words that were recalled and words that were not recalled. As can be seen in Table 4.39, no differences were found.

Unlike for judgement speed, then, no relationship was found between recall of God-referenced material and either the screening variables, pencil-and-paper measures of God concept, or indeed the judgement speed data itself. The contrasting lack of finding may be due to the less sensitive nature of recall counts by comparison with averaged judgement speed data, or may be simply because no relationships are there to be found.

Table 4.39. ANOVA statistics for tests of differences between recalled and unrecalled trait words for *God* as target.

variable analysed and model used	effect	df	F	p
positive-schematic judgement speed (recall × group)	R	1, 65	0.91	.344
	R × G	2, 65	0.33	.723
descriptiveness extremity (recall × word-type × group)	R	1, 57	1.83	.182
	R × G	2, 57	1.14	.327
	R × W	1.7, 99.1	1.68	.195
	R × W × G	3.5, 99.1	1.26	.291
strength of emotion (recall × word-type × group)	R	1, 57	1.02	.318
	R × G	2, 57	1.25	.294
	R × W	2, 114	0.68	.510
	R × W × G	4, 114	0.93	.448

Note: ** indicates $p < .01$; * indicates $p < .05$.

4.2.3 Discussion

Findings

The principal goals of this study were to replicate the God-reference effect in judgement speed observed in Experiment 3, to test whether a God-reference effect in memory could be observed in evangelical Christians as would be anticipated from the literature, and to determine whether these effects were due merely to belief in God or to additional undefined religious factors. All three goals were met. First, consistent with the findings of Experiment 3, a strong schematicity effect was observed in evangelical Christians such that they were quick to make positive-schematic judgements about God and slow to make negative-schematic judgements; whereas atheists took a uniform length of time regardless of the judgement and word-type. Second, trait word recall differences among groups for trait-word decisions regarding God were consistent with the pattern of judgement speed differences, in that evangelicals had superior recall for positive-schematic decisions about God compared to negative-schematic decisions about God, while atheists had comparatively poor recall for God and no distinction could be found between positive- and negative-schematic recall. Finally, the presence of these effects in judgement speed and recall appeared to be dependent on more than belief in God alone: the non-evangelical Christian group, despite not differing from the evangelical group in the ratings made during the

computer-based part of the experiment, were frequently intermediate between the atheist and evangelical Christian groups or indistinguishable from the atheist group on measures of judgement speed and recall for God-referenced material. Given that the non-evangelical group differed from the evangelical group both in terms of choice of a moral and ethical belief statement in preference to a born again belief statement and also in terms of orthodoxy, religiosity, and frequencies of religious behaviours, a variety of religious variables present themselves as candidates for future exploration.

4.3 Experiment 5

The previous two experiments have presented data showing that judgement speed for trait-word decisions about God depends on participant religiosity, and in the case of religious believers, also on the schematicity of the judgements made. While no distinction in judgement speed has been found for atheists between negative- and positive-schematic judgements about God, this is not due to atheists making random judgements about God; rather, atheists have been shown to be drawing on a consistent personally held schema for God when making these judgements. However, atheists have also demonstrated that they have a second concept of God on which they can draw: a stereotypically Christian concept that markedly contrasts with their personally held God concept. This experiment explores whether atheists are any faster to access their stereotypically Christian concept of God than they are to access their personally held God concept.

I explored this question by comparing judgement speed for trait-word decisions about themselves, a best friend, and God. The paradigm used was identical to that employed in Experiment 3. A 2 (religiosity) $\times$ 2 (instructional condition) $\times$ 3 (target) $\times$ 2 (valence) mixed design was used, where target and word-type were repeated measures. Half of participants were atheists and half were evangelical Christians; within each of the religiosity conditions half of the participants were instructed to make decisions about God from the perspective of a strongly committed Christian, while the other half were instructed to use their personal concept of God. A named best friend was substituted for *mother* as target to ensure that this target represented an emotionally positive figure for all participants. Positive and negative trait words were used together with a set of buffer trait words that were not part of the experimental design but intended to ensure that participants were processing each trait word for its descriptiveness value rather than making a simple decision of its emotional valence. In addition to the computer-based

ratings, Likert scale descriptiveness ratings were collected to assess all participants' personal concept of God and also the concept of God that they would attribute to a strongly committed Christian, this time using the God Concept Survey [C-F] (see Appendix K). This measure was used as a validity check to ensure that participants were providing computer-based ratings in line with the instructional condition assigned.

Several hypotheses and questions were formed. First, it was hypothesized that the different ratings data would support the finding from Experiment 3 that atheists had two contrasting concepts on which to draw: one stereotypically Christian concept of God, and one personally held concept of God. Second, it was hypothesized that computer-based ratings for God would be consistent with the Likert scale descriptiveness rating set matching the instructional condition, showing that the instructions were functioning correctly. Finally, the question was posed as to whether the religiosity $\times$ target $\times$ schematicity interaction found in previous experiments would be found in the *to a Christian* condition as well as the *to you personally* condition; if the stereotypical God concept was more accessible than the personally held concept, atheists should demonstrate less impairment on God-referenced material relative to self-referenced material.

4.3.1 Method

Participants

Twenty-four atheists and twenty-four evangelical Christians were drawn from the panel described in Appendix A and randomly assigned between two experimental conditions to form four groups, each of 12 participants. Group 1 contained atheist participants (8 female, 4 male); group 2 also contained atheist participants (4 female, 8 male); group 3 contained evangelical Christian participants (9 female, 3 male); group 4 also contained evangelical Christian participants (7 female, 5 male). All participants were enrolled in, or graduates, of a Bachelor's degree course, aged 18-40, free of known reading difficulties, spoke English as a first language, and described themselves as currently not depressed.

Group inclusion criteria were based on data from the Screening Questionnaire, described in Appendix A and found in Appendix B. Criteria for inclusion in groups 1 and 2 were as for group 1 in Experiment 4. Five of group 1 and six of group 2 had practised Christianity at some point while children or teenagers. Criteria for inclusion in groups 3 and 4 were as for group 3 in

Experiment 4. Church attendance data was missing for one participant in group 4. Screening data for the four groups is presented in Table 4.40.

Table 4.40. Group characteristics from screening data.

variable	Group 1: atheists, condition A (n = 12)		Group 2: atheists, condition B (n = 12)		Group 3: evangelical Christians, condition A (n = 12)		Group 4: evangelical Christians, condition B (n = 12)	
	mean	SD	mean	SD	mean	SD	mean	SD
age /years	19.7	2.1	20.1	2.2	21.8	5.4	19.8	2.1
length of current religious status /years	11.4	6.5	14.0	7.4	16.1	9.1	13.0	7.5
church attendance ¹	0.0	0.0	0.0	0.0	3.3	3.0	3.2	2.1
prayer frequency ²	1.0	0.0	1.0	0.0	5.7	0.5	5.9	0.3
Scripture reading frequency ²	1.0	0.0	1.0	0.0	5.1	0.3	5.2	0.4
religious issue discussion frequency ²	3.4	1.0	3.5	1.2	4.6	0.5	5.0	0.7
intrinsic religiosity ³ (max. 48)	-	-	-	-	44.5	2.5	45.2	2.5
extrinsic religiosity ³ (max. 24)	-	-	-	-	11.5	6.6	13.1	5.4
Christian orthodoxy (max. 36)	4.7	4.8	3.7	4.9	35.8	0.4	36.0	0.0
theological training /years	0.0	0.0	0.0	0.0	0.5	1.2	0.1	0.3

Notes: ¹Number of times participant attended church in the week prior to completing the Screening Questionnaire. ²Mean of six-point ordinal data where 1 = *never*; 2 = *rarely*; 3 = *occasionally*; 4 = *weekly*; 5 = *most days*; 6 = *several times a day*. ³Religiosity scores as measured were not meaningful for non-believers.

Materials

Three trait-word lists were constructed: negative, positive, and buffer; each containing 24 words, as listed in Table 4.41. Frequency data can be found in Appendix L. Positive and negative stimuli are similar to those used in Experiment 4, though words common in Christian discourse, such as *forgiving*, *merciful*, and *unforgiving*, were replaced with alternative words chosen using a thesaurus and N. H. Anderson's (1968) list of likeableness ratings for trait words. Buffer items were chosen to be as emotionally neutral as possible. Stimuli presentation was as for Experiment 4.

The 72 trait words used in the computer-based portion of the experiment were also incorporated in a post-test survey (the God Concept Survey [C-F]; see Appendix K). This survey assesses two different concepts of God: first, respondents' own concept of God; second, respondents'

perception of a strongly committed Christian's concept of God. Both types of rating are made on 7-point Likert scales. Participants also completed the Supplementary Questionnaire, as for Experiment 4. Four versions of the survey were used to control for order effects.

Table 4.41. Trait words used in Experiment 5.

Negative	Positive	Buffer
aggressive, angry, cold,	approachable, caring,	busy, calm, careful, cautious,
controlling, critical, cruel,	comforting, compassionate,	changeable, conservative,
demanding, harsh, hostile,	creative, dependable, fair,	curious, feminine, harmless,
indifferent, malicious, narrow-	friendly, generous, gentle,	inoffensive, liberal, masculine,
minded, offensive, petty,	gracious, helpful, honest,	moderate, orderly, organized,
prejudiced, spiteful, unfair,	humorous, intimate, kind,	passive, persistent, polite,
unfriendly, unkind, unpleasant,	loving, patient, reliable,	predictable, proud, quiet,
unreliable, unsympathetic,	supporting, sympathetic,	solemn, spontaneous,
vindictive, weak	trustworthy, warm, wise	talkative

Procedure

Testing took place in a single 40-minute session beginning with the timed-judgement task and followed by, in order, the God Concept Survey [C-F] and the Supplementary Questionnaire.

Procedural details and instructions for the computer-based portion of the experiment were as for Experiment 4 with the following exceptions: (a) *Superman* was replaced by the first name of the participant's best friend; (b) all trait words were seen three times, once for each target; (c) items were presented in 8 blocks each of 30 items; (d) testing was preceded by 9 practice items; (e) no additional buffer items were presented at the beginning and end of testing; (f) participants were instructed to be honest about what their friend was like; (g) instructions regarding God depended on instructional condition: for Condition A participants were asked "to answer according to who or what you think God is *to a strongly committed Christian*"; for Condition B participants were asked "to answer according to who or what God is *to you personally*, regardless of whether or not you believe in God"; participants were asked to paraphrase how they should think about each target to check that they understood the instructions.

Following administration of the remaining assessments, participants were paid and debriefed.

4.3.2 Results

Contrast between personal and stereotypically Christian concepts of God

Findings from Experiment 3 supported the hypothesis that atheists had two contrasting concepts on which to draw: one stereotypically Christian concept of God, and one personally held concept of God. A replication of those results employing data from the God Concept Survey [C-F] had been predicted for the current experiment, dependent first on high contrast for the two atheist groups between their personal concept of God and their predicted God concept of a strongly committed Christian, and second on high accuracy in predicting the God concept of a strongly committed Christian. A score for the net difference between participants' ratings of their personal concept of God and the predicted God concept of a strongly committed Christian was computed as a percentage disagreement by taking the average of the absolute difference between each pair of ratings and dividing it by the maximum theoretical difference between each pair of ratings (i.e., 6). As can be seen from Table 4.42, the atheist groups' ratings of personal concept of God differed considerably from their predictions of the God concept of a strongly committed Christian. A three-way ANOVA of religiosity, condition, and word-type confirmed the main effect of religiosity, $F(1, 44) = 136.75, p < .001$, with atheists showing higher disagreement rates (35.4%) than evangelicals. As would be anticipated, no main effect of condition was observed, $F(1, 44) = 0.02, p = .884$. So, while evangelical Christians showed little disagreement between their personal concept of God and their prediction of a strongly committed Christian's concept of God, atheists appeared to have two contrasting—if not diametrically opposite—concepts of God on which they could draw.

Table 4.42. Percentage disagreement between ratings of personal God concept and predicted God concept of a strongly committed Christian, by word-type.

word-type	Atheists				Evangelical Christians			
	Group 1: Condition A (n = 12)		Group 2: Condition B (n = 12)		Group 3: Condition A (n = 12)		Group 4: Condition B (n = 12)	
	mean	SD	mean	SD	mean	SD	mean	SD
negative	41.0	18.3	42.7	21.5	2.7	3.9	1.9	2.7
positive	41.9	20.7	46.9	21.9	1.9	3.2	1.0	1.4
buffer	28.1	10.6	27.1	9.5	4.5	5.2	3.1	3.5

The accuracy of atheists in predicting a strongly committed Christian's God concept was used as a test of whether one of the two God concepts held by atheists was stereotypically Christian in nature. As for Experiment 3, a strongly committed Christian's God concept was estimated by calculating the average of personal God concept ratings across the two evangelical groups for each word in turn. The overall difference was calculated as a percentage accuracy as previously by averaging the absolute difference between a participant's predicted rating and the estimated Christian God concept for each pair of words, dividing it by the theoretical maximum difference, and subtracting the result from 100. Inspection of Table 4.43 confirms that atheists were highly accurate in predicting a stereotypical concept of God for negative and positive trait words. A three-way ANOVA of religiosity, condition, and word-type, however, revealed a main effect of religiosity, 3.3%, $F(1, 44) = 24.62$, $p < .001$, $\eta^2 = .049$, with atheists less accurate than evangelicals. While this difference is highly significant, its effect size is also sufficiently small that the atheists can nevertheless be considered to have been accurate in predicting a strongly committed Christian's concept of God. The main effect of condition was again absent, $F(1, 44) = 0.32$, $p = .577$. The main effect of word-type is also worth noting, $F(2, 88) = 263.02$, $p < .001$; Sidak pairwise comparisons found higher accuracy for positive trait words than negative trait words, 5.9%, $p < .001$, higher accuracy for positive words than buffer words, 15.3%, $p < .001$, and higher accuracy for negative words than buffer words, 9.4%, $p < .001$. The lower accuracy for negative and buffer words were due to disagreement among the evangelicals on how descriptive these words were of God, and suggest that the buffer items were acting as expected. For this reason, buffer items are not analyzed further.

Table 4.43. Percentage accuracy of predictions of a strongly committed Christian's God concept, by word-type.

word-type	Atheists				Evangelical Christians			
	Group 1: Condition A (n = 12)		Group 2: Condition B (n = 12)		Group 3: Condition A (n = 12)		Group 4: Condition B (n = 12)	
	mean	SD	mean	SD	mean	SD	mean	SD
negative	87.5	1.8	85.0	4.0	87.9	2.6	88.5	3.0
positive	91.3	3.3	89.6	6.2	95.8	1.3	95.8	1.0
buffer	76.8	4.1	76.4	3.8	78.3	3.8	79.9	3.9

In summary so far, data from the current experiment have replicated the findings from Experiment 3 that atheists have at least two contrasting concepts of God on which they can draw, one of which is consistent with a stereotypically Christian God concept.

Consistency of computer-based ratings and God Concept Survey [C-F] ratings

The second hypothesis considered the consistency of ratings used during the computer-based portion of the experiment, where participants could answer only *yes* or *no*, and the descriptiveness ratings collected in the God Concept Survey [C-F], where participants could use a 7-point Likert scale. The type of God concept that participants were asked to draw upon during the computer-based part of the experiment depended upon the instructional condition: participants in Condition A were asked to answer “according to who or what you think God is to a strongly committed Christian”, while in Condition B to answer “according to who or what God is to you personally”. It had therefore been hypothesized that atheists in Condition A would show a high degree of concordance between computer-based ratings and pencil-and-paper ratings of predicted God concept and low concordance for personal God concept, while the reverse would obtain for atheists in Condition B (though with predictably lower consistency than evangelicals in the same condition due to the less extreme descriptiveness ratings and higher rates of reverses observed in experiments 3 and 4); evangelicals were predicted to show high consistency in both conditions for ratings of personal God concept and predicted God concept. As can be seen from Table 4.44 the predicted pattern emerged. In a four-way ANOVA of religiosity, condition, comparison-type, and word-type the religiosity $\times$ condition $\times$ comparison-type interaction was confirmed, $F(1, 44) = 30.82, p < .001$; decomposition of this interaction confirmed that the simple interaction effect of condition $\times$ comparison-type was significant for atheists, $F(1, 44) = 63.52, p < .001$, but not for evangelicals, $F(1, 44) = 0.01, p = .906$. Further analysis decomposed the condition $\times$ comparison-type simple interaction effect for atheists: within groups, the computer-based ratings of atheists in the *to a Christian* condition disagreed more with their personal God concept than with their predicted Christian God concept, 34.1%, $p < .001$, while the computer-based ratings of atheists in the *to you personally* condition disagreed more with their predicted Christian God concept than with their Likert scale personal God concept, 20.2%, $p < .001$; between groups, the disagreement between computer-based ratings and Likert scale personal God concept was higher for atheists in the *to a Christian* condition than atheists in the *to you personally* condition, 16.2%, $p = .004$, while the disagreement between computer-based ratings and Likert scale personal God concept was higher for atheists in the *to you personally* condition

than atheists in the *to a Christian* condition, 38.0%, $p < .001$. These findings are consistent with the hypothesis that all participants could consistently draw upon a specific concept of God both in the computer-based part of the experiment and the subsequent survey.

Table 4.44. Percentage disagreement between computer-based *yes/no* judgement of God and paper-based Likert scale ratings of personal God concept or predicted God concept of a strongly committed Christian.

comparison	word-type	Atheists				Evangelical Christians			
		Group 1: Condition A (n = 12)		Group 2: Condition B (n = 12)		Group 3: Condition A (n = 12)		Group 4: Condition B (n = 12)	
		mean	SD	mean	SD	mean	SD	mean	SD
personal GC	negative	47.2	17.4	28.3	18.8	10.7	6.5	10.6	4.1
	positive	45.7	21.2	32.0	17.6	5.7	5.3	3.0	2.1
predicted Christian GC	negative	13.5	4.9	44.8	23.3	9.9	4.6	9.9	3.3
	positive	11.2	7.0	55.9	24.6	4.4	3.4	3.3	2.5

However, as for experiments 3 and 4, atheists in the *to you personally* condition were still less consistent between computer-based ratings and personal God concept descriptiveness ratings than evangelicals in the *to you personally* condition, 23.4%, $p < .001$, requiring analysis of variation in the percentage of reverses in ratings and the extremity of descriptiveness ratings. Inspection of differences between the groups in the *to you personally* condition in the percentage of ratings made on the computer-based test that were subsequently reversed in the Likert scale personal God concept ratings, displayed in Table 4.45, suggests that atheists were again more likely to change their minds regarding the applicability of various trait words to God than were evangelical Christians, consistent with experiments 3 and 4. A two-way ANOVA of religiosity and word-type confirmed a difference between the groups, 16.1%, $F(1, 22) = 5.60$, $p = .027$. However, comparison with Table 4.7 and Table 4.19 suggests that atheists made similar numbers of reverses in the current experiment as in experiments 3 and 4; indeed a two-way ANOVA of word-type (negative, positive) and group (Experiment 3 atheists, Experiment 4 atheists, Experiment 5 Condition B atheists) found no group differences, $F(2, 49) = 0.21$, $p = .812$. So, while as in the earlier experiments, atheists in the *to you personally* condition did make more reverses in their ratings than did the evangelicals in the *to you personally* condition, the large

majority of answers across the computer-based and Likert personal God concept ratings were consistent.

Table 4.45. Percentage of ratings made under Condition B on computer-based test that were reversed in personal condition of God Concept Survey [C-F].

word-type	Group 2: atheist Christians (n = 12)		Group 4: evangelical Christians (n = 12)	
	mean	SD	mean	SD
negative	19.9	23.3	7.0	5.2
positive	19.9	25.7	0.7	1.6

Relative extremity of ratings was investigated by calculating a mean descriptiveness rating (ignoring the sign) for each word-type for each participant in the *to you personally* condition. As can be seen from Table 4.46, evangelicals made more extreme ratings than atheists by a mean of 0.85 Likert units, $F(1, 22) = 30.55, p < .001$. Comparison with Table 4.8 and Table 4.20 (noting that ± 4 was the most extreme rating in Experiment 3 whereas ± 3 was the most extreme in Experiment 4 and the current experiment) suggests that the atheist group in the current experiment performed more similarly to that in Experiment 3 and less similarly to that in Experiment 4. Mean Likert scale ratings for atheists in Experiment 3 were multiplied by 0.75 to allow direct comparison with those in the subsequent experiments, and a two-way ANOVA of word-type (negative, positive) and group (Experiment 3 atheists, Experiment 4 atheists, Experiment 5 atheists) confirmed the main effect of group, $F(2, 49) = 8.20, p = .001$. Sidak pairwise comparisons found that atheists in Experiment 4 made less extreme ratings than those in Experiment 3, 0.62 Likert units, $p = .001$, and than those in the current experiment, 0.49 Likert units, $p = .027$; no difference was found between the atheists in Experiment 3 and those in the current experiment, 0.13 Likert units, $p = .873$. Atheists in the *to you personally* condition made less extreme descriptiveness ratings than evangelicals in the *to you personally* condition in the current experiment, but more extreme ratings than the atheists in Experiment 4.

Table 4.46. Modulus of Likert scale ratings of personal God concept.

word-type	Group 2: atheist Christians (n = 12)		Group 4: evangelical Christians (n = 12)	
	mean	SD	mean	SD
negative	1.98	0.56	2.58	0.22
positive	1.75	0.52	2.84	0.10

Note: Ratings were made on a 7-point scale from -3 to +3.

Summarizing the consideration of the consistency of ratings between the computer-based part of the experiment and the pencil-and-paper measure that followed, the instructional condition under which atheists made the computer-based ratings determined the rating condition on the God Concept Survey [C-F] with which the computer-based ratings were most consistent. As hypothesized, atheists making computer-based ratings according to who or what they thought God is to a strongly committed Christian had highest consistency with the predicted Christian God concept rating condition, whereas atheists making computer-based ratings according to who or what they thought God was to them personally had highest consistency with the personal concept of God rating condition. While evangelicals under both instructional conditions showed high consistency in ratings of all types, making few reverses and more often using the extreme parts of the Likert scales, atheists under the *to you personally* instructional condition employed a less consistent and less extremely defined personal concept of God, though one that was nevertheless distinctly different from the stereotypically Christian concept of God elicited separately.

Computer-based judgements

As for experiments 3 and 4, the distribution of *yes*- and *no*-judgements needs to be considered before examining the specific hypotheses made regarding judgement speed, condition, religiosity, target, and word-type. Six counts of *yes*-judgements—one for each word-type and target combination—were computed for each participant; the relative percentages of *yes*-judgements for each combination are displayed in Table 4.47.

Table 4.47. Percentage of judgements that were *yes*-judgements, by target and word-type.

target	valence	Atheists				Evangelical Christians			
		Group 1: Condition A (n = 12)		Group 2: Condition B (n = 12)		Group 3: Condition A (n = 12)		Group 4: Condition B (n = 12)	
		mean	SD	mean	SD	mean	SD	mean	SD
God	negative	11.9	4.7	47.3	33.9	8.0	7.6	10.9	9.8
	positive	90.2	9.1	37.0	28.1	97.6	3.3	99.3	1.6
friend	negative	10.1	10.4	22.6	20.7	15.6	21.3	9.7	13.3
	positive	84.4	11.1	77.4	22.1	86.1	12.1	92.7	9.1
self	negative	19.9	12.8	18.4	13.9	15.6	10.7	11.8	7.9
	positive	76.3	18.1	76.3	19.3	81.6	13.6	86.8	13.9

Comparison with Table 4.12 and Table 4.22 indicates that the pattern of *yes*-judgements for atheists and evangelicals in the *to you personally* condition replicates that observed in experiments 3 and 4: evangelicals were likely to endorse positive trait words as descriptive of God and to reject negative trait words as descriptive of God, while atheists were no more or less likely to judge positive words descriptive of God than negative words. The pattern for the *to a Christian* condition did not differ between groups however, and was consistent with that for evangelicals in the *to you personally* condition. A four-way ANOVA confirmed the interaction of target $\times$ valence $\times$ religiosity $\times$ condition, $F(2, 88) = 6.29, p = .003$. Decomposition of this interaction by target confirmed that the three-way interaction of valence $\times$ religiosity $\times$ condition was significant for *God* as target, $F(1, 43) = 27.21, p < .001$, but not for *friend* or *self*, $F(1, 43) = 3.92, p = .054$, and $F(1, 43) = 0.44, p = .509$, respectively. This suggested that the instructional variation introduced for answering questions about *God* as target did not influence the ratings made for *friend* or *self* as targets. This conclusion was confirmed by re-running the four-way ANOVA, this time omitting data from *God* as target. All effects including condition were non-significant: target $\times$ condition, $F(1, 44) = 0.60, p = .444$; target $\times$ religiosity $\times$ condition, $F(1, 44) = 0.88, p = .353$; word-type $\times$ condition, $F(1, 44) = 0.02, p = .883$; word-type $\times$ religiosity $\times$ condition, $F(1, 44) = 2.58, p = .115$; target $\times$ word-type $\times$ condition, $F(1, 44) = 0.82, p = .371$; target $\times$ word-type $\times$ religiosity $\times$ condition, $F(1, 44) = 1.60, p = .212$. The effect of the instruction variation introduced for answering questions about *God* as target was explored by testing the simple

interaction effect of religiosity $\times$ word-type for *God* as target at fixed levels of condition: for the *to a Christian* condition, no effect was observed, $F(1, 44) = 0.92, p = .342$, whereas for the *to you personally* condition, a strong effect was observed, $F(1, 44) = 70.35, p < .001$, consistent with Experiment 4. When making descriptiveness ratings about *God* in the *to you personally* condition, atheists were no more likely to answer *yes* to positive trait words than to negative words, $p = .222$, in stark contrast to other groups' answers for *God* and all groups' answers for *friend* and *self*.

Judgement-speed data considerations

Only positive and negative trait words were considered in analyses of judgement speed. Twelve participants took longer than the 10 seconds allowed to make a judgement about at least one trait word, with a total of 20 time-outs distributed relatively evenly among groups and targets; a test could not be carried out because the total count of time-outs was too small. One participant had answered one item in less than 50 ms and another participant one item in less than 400 ms, both implausibly short judgement speeds, so data for these items was treated as missing. Inspection of the data for outliers with unusually slow judgement speeds revealed that one male participant in Group 2 had a mean judgement speed of 4312 ms, more than three times the mean judgement speed of the rest of his group, 1387 ms, and was therefore excluded from analyses of judgement speed.

Judgement speed data for each word was averaged across participants to explore any relationship with word frequency data. The data set was restructured so that each word contributed twelve means (one per target per group). No relationship was found between judgement speed and log word frequency, $r(576) = .05, p = .221$, consistent with findings from Experiment 4.

Effects of instructional condition, religiosity, target, and schematicity on judgement speed

With a three-way interaction of group $\times$ target $\times$ schematicity observed for experiments 3 and 4, it was hypothesized that a four-way interaction of condition $\times$ religiosity $\times$ target $\times$ schematicity would be found in the current experiment: specifically, that the religiosity $\times$ target $\times$ schematicity interaction found previously would be replicated in the *to you personally* condition, but not be observed in the *Christian* condition due to the atheist group being able to access a stereotypical Christian concept of God more quickly than a personally held God concept, but no difference in access speed for the evangelical groups. No effect of condition or religiosity was expected on judgement speed for *friend* or *self* as target.

As for previous experiments, too many participants had empty cells when means for each judgement (*yes*, *no*), valence, and target combination were considered, thus ruling out the calculation of a condition $\times$ religiosity $\times$ target $\times$ valence $\times$ judgement interaction. Valence and judgement were therefore combined as previously into a schematicity factor by computing two new variables for each target: a mean judgement speed for positive-schematic judgements (i.e., *yes*-judgements for positive words and *no*-judgements for negative words), and a mean judgement speed for negative-schematic judgements (i.e., *no*-judgements for positive words and *yes*-judgements for negative words); group means are displayed in Table 4.48, and analysis of variance statistics in Table 4.49.

Table 4.48. Mean schematic judgement speeds in milliseconds, by target and schema valence.

target	schema valence	Atheists				Evangelical Christians			
		Group 1: Condition A (n = 11)		Group 2: Condition B (n = 11)		Group 3: Condition A (n = 9)		Group 4: Condition B (n = 10)	
		mean	SD	mean	SD	mean	SD	mean	SD
God	negative	1710	548	2201	892	3583	1297	3759	1543
	positive	1436	475	2235	734	1417	361	1533	361
friend	negative	1960	1046	2763	1406	2340	919	2834	1017
	positive	1206	346	1685	691	1472	345	1601	378
self	negative	1959	840	2029	827	2521	837	2655	732
	positive	1319	416	1627	457	1782	609	1647	373

Inspection of Table 4.49 confirms not only that no four-way interaction was found, but that the only significant interaction term involving condition was a weak target $\times$ condition effect not relevant to the experiment's hypotheses. The target $\times$ schematicity $\times$ religiosity interaction was significant, however, and in line with the findings of experiments 3 and 4; interaction graphs for each condition are shown in Figure 4.14. Inspection of these graphs suggest that some further examination of the data is necessary before it can be concluded that there was no effect of instructional condition whatsoever: in particular the apparent facilitation on *God* as target for atheists in the *to a Christian* condition needs investigation. Although no simple interaction effect

Table 4.49. Analysis of variance for negative- and positive-schematic judgement speed.

effect	df	F	p
religion	1, 37	4.80	.035 *
condition	1, 37	2.85	.100
religion × condition	1, 37	0.79	.379
target	2, 74	8.97	< .001 **
target × religion	2, 74	6.04	.004 **
target × condition	2, 74	3.64	.031 *
target × religion × condition	2, 74	0.54	.586
schematicity	1, 37	82.66	< .001 **
schematicity × religion	1, 37	16.85	< .001 **
schematicity × condition	1, 37	0.14	.708
schematicity × religion × condition	1, 37	0.54	.468
target × schematicity	2, 74	4.14	.020 *
target × schematicity × religion	2, 74	21.66	< .001 **
target × schematicity × condition	2, 74	1.11	.335
target × schematicity × religion × condition	2, 74	0.27	.761

Note: ** indicates $p < .01$; * indicates $p < .05$.

of target × schematicity × condition was found for atheists, $F(2, 36) = 1.13$, $p = .335$, a simple interaction effect of target × condition was found for positive-schematic judgements made by atheists, $F(2, 36) = 4.45$, $p = .019$. Decomposition of this interaction revealed a significant simple effect of target for the *to you personally* condition (as would be expected from the results in experiments 3 and 4), $F(2, 36) = 18.18$, $p < .001$, with Sidak pairwise comparisons revealing slower judgement speeds for *God* as target than for *friend* or *self*, 550 ms, $p < .001$, and 608 ms, $p < .001$, respectively; no difference in judgement speeds between *friend* and *self* was observed, 58 ms, $p = .915$. No corresponding simple effect of target for the *to a Christian* condition obtained, $F(2, 36) = 2.97$, $p = .064$. By contrast, for evangelicals the simple interaction effect of target × condition for positive-schematic judgements was non-significant, $F(2, 36) = 1.59$, $p = .219$. What this means is that although the effects observed were not strong enough for an overall interaction to obtain, when within-groups data were considered separately for positive-schematic judgements, atheists in the *to you personally* condition showed a pattern of judgement speeds for the different targets consistent with those observed in experiments 3 and 4; whereas atheists in the *to a Christian* condition showed a similar pattern of judgement speeds to that of evangelicals

in both conditions. This would suggest that atheists were faster to draw upon a stereotypically Christian God concept (while still not differentiating between positive- and negative-schematic judgements) than upon their personal concept of God, consistent with the hypothesis. However, the low power of these tests and the failure to obtain an overall interaction effect means that any such conclusion should be treated with considerable caution. Furthermore, it is clear from Figure 4.14 that judgement speeds for *friend* and *self* were not entirely as expected: for example, when between-groups tests were run for atheists on positive-schematic judgements, a simple effect of condition—with faster judgements made in the *to a Christian* condition—was found both for *God* and for *friend*, 799 ms, $F(1, 37) = 13.14, p = .001$, and 479 ms, $F(1, 37) = 5.68, p = .022$, but not for *self*, 308 ms, $F(1, 37) = 2.40, p = .130$. Given that no differences between instructional conditions were hypothesized for targets other than *God*, any conclusions regarding the effect of instructional condition on judgements for *God* need careful interpretation.³⁴ One feature of the data that is unambiguous from Figure 4.14 is that instructional condition played no role in relative judgement speed for negative- and positive-schematic judgements of *God*, either for atheists or for evangelicals: no difference in judgement speed was observed for atheists either in Condition A or Condition B, $F(1, 37) = 0.83, p = .369$, and $F(1, 37) = 0.01, p = .910$, respectively, while for evangelicals, positive-schematic judgements were made considerably more quickly than negative-schematic judgements on Conditions A and B, $F(1, 37) = 42.25, p < .001$, and $F(1, 37) = 49.57, p < .001$, respectively. Despite drawing on a stereotypically Christian God concept in the *to a Christian* condition, then, and despite being impaired in making negative-schematic judgements for *friend* and *self* in both conditions, atheists' negative- and positive-schematic judgements for *God* could still not be distinguished in terms of judgement speed.

To explore whether the judgement speed effects observed in previous experiments were replicated in the current study, the data set was re-analysed considering only those participants in the *to you personally* instructional condition. In an analysis of variance of target $\times$ judgement schematicity $\times$ religiosity, the three-way interaction was significant as hypothesized, $F(2, 38) = 11.73, p < .001$. Decomposition of this interaction, illustrated in Figure 4.14, revealed a significant simple interaction effect of judgement schematicity and religiosity for *God* as target, $F(1, 19) = 18.25, p < .001$, and for *self* as target, $F(1, 19) = 5.79, p = .026$, but not for *friend* as

³⁴ Other methods of analysis were applied to this data set to try to obtain a less equivocal set of analyses, including using median judgement speeds for each participant instead of mean judgement speeds, and taking using the median of differences in judgement speeds for *God* and *self* as target. In both instances a similar set of results obtained to that reported here.

Figure 4.14. Mean judgement speeds for negative- and positive-schematic judgements for *God*, *friend*, and *self* as target; with standard error bars.

target, $F(1, 19) = 0.10, p = .755$. Despite the overall main effect of judgement schematicity, $F(1, 19) = 31.43, p < .001$, with negative-schematic judgements taking on average 985 ms longer than positive-schematic judgements, the atheists did not differ in judgement speed for *God* as target, 34 ms, $p = .926$; evangelicals on the other hand took far longer to make negative-schematic judgements than positive-schematic judgments regarding *God*, 2226 ms, $p < .001$. Further analysis of the unanticipated simple interaction effect of judgement schematicity and religiosity for *self* confirmed that the simple effect of religiosity for negative-schematic judgements did not reach significance, $p = .083$, despite evangelicals taking on average 626 ms longer to make negative judgements about *self* than did atheists. Finally, whereas previously I had found an advantage for *God*-referenced positive-schematic material over *self*-referenced positive-schematic material in evangelical Christians (e.g., of 598 ms in Experiment 4), the 114 ms advantage in the current study was non-significant, $p = .816$. While the advantage for evangelicals on *God* over *self* was non-significant in the current study, the impairment of atheists on *God* compared to *friend* and *self* was marked, consistent with the effects observed in experiments 3 and 4.³⁵

4.3.3 Discussion

Findings

The goals of this study were to replicate the finding from Experiment 3 that atheists have two contrasting concepts of God on which to draw, and to explore whether atheists were any faster to access their stereotypically Christian concept of God than they were their personally held God concept. The data strongly indicated that atheist participants did indeed have two contrasting God concepts, and also that the instructional condition during the computer-based part of the experiment was successful in determining which concept participants drew upon when making ratings about God. However, though the design was powerful enough to replicate the God-reference effect seen in previous experiments in the *to you personally* condition, it was less clear whether the atheists in the *to a Christian* condition were any faster to make judgements about God than were the atheists in the *to you personally* condition. Certainly no schematicity effect was

³⁵ The small group sizes in the current experiment challenge any meaningful effort to investigate the determinants of within-group variation in the God-reference effect for the two evangelical groups. However, given the significant correlation between positive-schematicity index (*God* minus *self*) and church attendance observed both for the non-evangelical group and for the evangelical group in Experiment 4, this same correlation was carried out for the two evangelical groups in the current experiment, but was non-significant in both instances: Group 3, $r(12) = .42, p = .171$; Group 4, $r(11) = -.18, p = .606$.

observed for atheists in the *to a Christian* condition, suggesting that, despite drawing upon a stereotypically Christian concept of God, for atheists this schema had none of the emotional associations evident for evangelicals. While it is conceivable that an increase in power might reveal that atheists are faster to access a stereotypically Christian concept, it seems unlikely that any increase in power would reveal any schematicity effect for this concept. The God-reference judgement speed paradigm may therefore be able to measure the affectivity of multiple God schemas—in this instance, *the God I believe in* (or *the God I don't believe in*) and *the God a strongly committed Christian believes in*—relative to self-schemas and intimate other-schemas.

Chapter 5: Discussion

5.1 Summary and discussion of measured cognitive biases

5.1.1 Attentional biases

Experiment 1 attempted to observe attentional biases in religious cognition by adapting the emotional Stroop paradigm to measure the colour-naming performance of atheist, evangelical Christian, and evangelical theologian groups on religious and control stimuli. Contrary to hypotheses, little evidence was found for Stroop interference as measured either by colour-naming times or by error rates: interference on religious stimuli was comparable to that for control stimuli for all groups tested. To increase the likelihood of observing a religious Stroop effect, Experiment 2 employed positively and negatively emotionally valent religious and control stimuli and increased the size of the stimuli by presenting them on A2-sized cards instead of a 17-inch computer monitor; these materials were presented to atheist, non-evangelical Christian, and evangelical Christian groups. Again, however, interference on religious stimuli did not differ from that for control stimuli for any of the groups tested; furthermore no evidence was found for content-specific impairment in the colour-naming of stimuli associated with specific religious schemas.

One interpretation of these findings is that a religious Stroop effect may be observable only in individuals whose religious belief carries an unusually strong affective component, perhaps one that goes beyond the bounds of healthy religion (e.g., Oates, 1955). This hypothesis could perhaps be tested by recruiting a sample of clinical patients with a Religious or Spiritual Problem (*DSM-IV-TR*; American Psychiatric Association, 2000). While discovery of a pathological religious Stroop effect would be of theoretical interest—and potentially of practical use—pathological religious cognition is likely to differ from the religious cognition of healthy individuals.

If attentional biases in healthy religious cognition are observable at all, it is possible that religious schemas may need prior activation. Indeed, some emotional schemas need activation to show interference in an emotional Stroop task (e.g., Mogg et al., 1990). Consistent with this hypothesis, a recent study by Wenger (2005, Experiment 1) has observed a religious Stroop effect, but only

under certain priming conditions. Wenger found that religious participants who had been primed through a narrative-writing task to focus on their religious failures were subsequently selectively impaired at colour-naming religious action phrases (e.g., *attend church, say prayers*) compared to religious participants who had been primed to focus on their religious successes. Despite finding that colour-naming impairment was unrelated to participants' levels of intrinsic religiosity, Wenger interpreted these data in terms of the religious failures narrative-writing task having activated schemas for religious goal pursuit through priming a sense of *goal-incompleteness* (cf. Moskowitz, 2002). A measure of state mood and affect would have been a useful adjunct to Wenger's data so as to determine which emotions were associated with this sense of goal-incompleteness; for example, interference may have been mediated by feelings of guilt at having failed to perform the religious actions being colour-named.

A need for schema activation also provides a way to reconcile the findings of the current investigation with those of studies testing the hypothesis that Stroop interference reflects expertise with the material composing the Stroop stimuli (see Section 2.4.1). Previous research had provided mixed support for this hypothesis: Mogg and Marden (1990) found no interference on rowing-related stimuli for a group of college-level rowers, though their participants' expertise has been questioned; Dalgleish (1995), however, found that ornithologists attending an ornithological meeting (and whose bird schemas were therefore presumably activated) were impaired at colour-naming rare bird names. The failure in Experiment 1 and Experiment 2 of the current investigation to observe impairment in colour-naming religious stimuli among either practising Christian theologians or highly committed evangelical Christians suggests that expertise in the absence of schema activation is insufficient to trigger biases in the allocation of attentional resources.

Numerous other techniques are available for schema activation in addition to the narrative technique used by Wenger (2005). Religious schemas might be activated through prior completion of a questionnaire (e.g., Lundh & Czyzykow-Czarnocka, 2001), through priming with emotional religious phrases (e.g., Segal et al., 1995) or phrases designed to generate specific inferences (e.g., Doshier & Corbett, 1982), or through processing entire sentences made up of Stroop stimuli (e.g., Brega & Healy, 1999). Other potentially more ecologically valid options include carrying out testing sessions shortly after a church service or Bible study, in a location rich with religious sensory cues and associations, or following a period during the testing session in which the participant performed a religious behaviour, described a religious experience, or

interacted with religious artifacts or images.³⁶ All of these techniques could be expected to bring religious schemas to the fore and hence reveal a putative religious Stroop effect, if one is to be found.

5.1.2 Memory biases

Experiment 2 and Experiment 4 each included an assessment of biases in memory for religious material. In Experiment 2, I had hypothesized that an evangelical Christian group would show a memory bias as compared to an atheist group on an unexpected recall test for religious and nonreligious control material previously presented as Stroop stimuli. I also tested a group of non-evangelical Christians, though no specific predictions were made regarding their recall performance. Consistent with my hypothesis, while all groups had superior recall for religious material and no group differences were found in recall for control material, the evangelical Christian group demonstrated enhanced recall for religious material over the atheist and non-evangelical Christian groups. The general advantage in memory for religious material was presumably due to an organizational effect of recalling material from a specific category. It is possible that the enhanced recall for religious material in the evangelical group can be explained in terms of a better developed schema for religion by comparison with the atheist and non-evangelical Christian groups (cf. McIntosh, 1995). It is intriguing, however, that the non-evangelical Christian group were no more biased toward recalling religious material than the atheist group, despite differing from the latter in both religious belief and religious behaviour (see Table 3.5) and presumably also—by extension—in elaboration of religious schemas.

In Experiment 4 I tested the hypothesis that those with well-developed God schemas would show memory biases for material related to God by measuring the incidental recall of groups of atheists, non-evangelical Christians, and evangelical Christians for trait words used in descriptiveness ratings of self, Superman, or God. Based on the meta-analysis of Symons and Johnson (1997), recall for material referenced to Superman—a familiar but non-intimate target—was anticipated to be poorer than for self for all groups, and recall for material referenced to God—familiar to all but intimate only to some—was anticipated to be poorer than for self for the atheist group, but similar to that for self for the evangelical Christian group; no specific

³⁶ Indeed, one non-evangelical Christian participant in Experiment 2, having recently seen the graphic depiction of Jesus' scourging and crucifixion in Mel Gibson's 2004 motion picture *The Passion*, remarked after colour-naming the Religious Sacramental Task that he kept thinking of images from the film during the task; he took longer to colour-name this task than any other.

prediction had been made regarding recall of God-referenced material by non-evangelical Christians. Consistent with my hypotheses, recall for Superman-referenced material was poorer than for self for all groups; and recall for God-referenced material was similar to that for Superman-referenced material for atheists and non-evangelicals and similar to that for self-referenced material for evangelical Christians. This pattern, however, was dependent on the affective schematicity of the material related to the target, as was seen in Figure 4.11, Figure 4.12, and Figure 4.13, and held true only for positive-schematic judgements (i.e., *yes*-judgements to positive trait words and *no*-judgements to negative trait words). By contrast, recall for negative-schematic judgements (i.e., *yes*-judgements to negative words and *no*-judgements to positive words) was poor for each group on all targets with the exception of the atheist group when making judgements about God: in this instance atheists' recall was superior to that of the evangelical Christian group.

It is critical to note that the pattern of recall differences observed in Experiment 4 is not what would be anticipated from the computer-based judgement data or the paper-based Likert scale ratings of personal God concept: as was seen in Table 4.17 and Table 4.22, the God concepts held by the non-evangelical Christian group were substantially more similar to those held by the evangelical Christian group than to those held by the atheist group; furthermore, all members of the two Christian groups professed to believe in God, whereas the atheist group did not. In spite of these directly acquired data, indirect measurement of God schemas found virtually no differences between the atheist group and non-evangelical Christian group and instead revealed that the evangelical Christian group had a recall bias for positive-schematic God-referenced material comparable to that for positive-schematic self-referenced material.

The findings of Experiment 2 and Experiment 4 together show that evangelical Christians demonstrate a distinctive memory bias for religious material that is not found in atheists or non-evangelical Christians. According to these data and the data provided by the Screening Questionnaire (see Table 3.5 and Table 4.15), it seems that memory biases for religious material occur only in those (a) with highly orthodox beliefs, as indicated by choice of the born-again belief statement and by near maximal Christian orthodoxy scores; (b) with a highly intrinsic religious orientation; (c) who attend church more often than once per week; and (d) who carry out other religious behaviours (such as praying, reading Scripture, and discussing religious issues) most days or several times per day. One possible explanation for these content-specific biases is that the religious schemas of evangelical Christians may be chronically primed as well as richly elaborated, thus allowing more efficient storage and recall of new religious information (see

Ozorak, 1997). Because of the way the groups were formed, however, the current data does not permit the teasing apart of the above variables. One aspect of future work, therefore, is to discover what the variables are that determine biases in memory for religious material.

5.1.3 Judgement speed biases

Experiments 3, 4, and 5 measured biases in judgement speed for trait word decisions regarding God, self, and other targets, to compare how individuals of differing religiosity varied in efficiency of processing God-referenced information. It had been hypothesized that those with well-organized, frequently used God schemas would be likely to process God-referent material more quickly than those with poorly developed God schemas and that the pattern of judgement speeds observed would be likely to vary according to valence of judgement schematicity and in a way congruent with feelings toward God. Data from all three experiments provided confirmation of these hypotheses. No group differences were found in speed for positive-schematic self-referent judgements, indicating that efficiency of processing self-referent information is an appropriate baseline measure for these and future studies. With regard to God-referent material, however, multiple group differences were found: (a) atheists were considerably slower to access their God schemas than their self-schemas and took the same length of time to make judgements irrespective of judgement schematicity; (b) evangelical Christians and evangelical theologians were as fast or faster to access positive aspects of their God schemas as they were to access positive aspects of their self-schemas, but took even longer than atheists to access negative aspects of their God schemas; (c) non-evangelical Christians demonstrated only a weak schematicity effect and were intermediate between atheists and evangelical Christians in speed to access positive aspects of their God schemas. As in the discussion of memory biases above, it is important to note that the difference in size of judgement speed biases between the evangelical Christian and non-evangelical Christian groups was not what would be predicted from the directly acquired judgement and rating data alone, suggesting that other cognitive, affective, or behavioural factors determine these biases.

Experiments 3 and 5 also allowed an investigation of whether participants had more than one God concept on which they could draw, and, along with Experiment 4, of whether these concepts were consistent over multiple measurements. Experiment 3 elicited participants' personal concepts of God in the computer-based part of the experiment, and measured this concept again, together with participants' concept of the God that a strongly committed

Christian would believe in, on a pencil-and-paper measure later in the testing session. Experiment 4 measured only participants' personal concepts of God, but did so both in the computer-based part of the experiment and in a pencil-and-paper measure later in the testing session, so again allowing a measurement of concept stability. The computer-based part of Experiment 5 measured the personal concept of God of two groups of participants, while for the other two groups it measured their concept of the God that a strongly committed Christian would believe in; a pencil-and-paper measure subsequently measured both of these concepts in all participants. Data from all three experiments indicated that, while evangelical Christians and evangelical theologians were more consistent in their ratings than non-evangelical Christians and atheists, all groups were quite consistent in the descriptiveness judgements made about God under different conditions. This is particularly important to note for the atheist group, because it indicates that—despite not believing in God—atheists did not answer questions about God in a random fashion but instead drew on a relatively well-defined and stable God concept. Data from Experiment 3 and Experiment 5 extended this conclusion by indicating that, whereas evangelical Christians and non-evangelical Christians drew on the same personally held concept of God under both instructional conditions, atheists actually had *two* concepts of God, each of which could be consciously and reliably drawn upon when requested so to do. One of these concepts closely reflected the concept of God held by an evangelical Christian, while the second was a more idiosyncratic, personally held concept that conflicted with the first. In particular, the former tended to include endorsement of positive trait words and rejection of negative trait words as descriptive of God, whereas with the latter atheists were equally likely to endorse negative words as they were positive words as descriptive of God.

It had been hypothesized that atheists would be faster to access their concept of the God that a strongly committed Christian would believe in than to access their personally held God concept. Contrary to hypotheses, however, the atheist groups in Experiment 5 (each of which used one of these concepts when making timed judgements) could not be distinguished statistically. These data need cautious interpretation, however, because the between-subjects design and small group sizes reduced statistical power relative to most of the other analyses reported in this investigation; indeed what differences were observed were in the direction hypothesized (see Figure 4.14). This caution notwithstanding, it was clear that neither group demonstrated any schematicity effect in either condition, suggesting that—for atheists—neither concept was at all affect-laden.

By contrast, the evangelical Christian groups were considerably slower to make negative-schematic judgements than positive-schematic judgements about their personally held concept of God. As inspection of Table 5.1 indicates, the time differences involved here are so large that they deserve further consideration. Several initial points must be made to aid interpretation of these data. First, as indicated by Table 4.12, Table 4.22, and Table 4.47, the vast majority of God-referent judgements made by evangelical Christians were positive-schematic (this was not the case for atheists, as noted above). The consequence of this is that mean speeds for negative-schematic God-referent judgements for evangelicals represent only a small number of judgements per participant.³⁷ Note also, however, that the majority of self- and other-referent judgements made by evangelicals and atheists were also positive-schematic, so the question that is being asked here is *why do the minority of negative-schematic judgements that are made take so much longer to make than positive-schematic judgements?* One possible answer is that participants were dealing with a discrepancy between their actual view of the target (God, self, or other) and the view that they would like to have or feel they ought to have. So, for example, in Experiment 5, the reason that atheists and evangelicals were both significantly slower to make negative-schematic judgements than positive-schematic judgements about their best friends may have been that they felt uncomfortable making a socially undesirable judgement and would prefer to have made a positive-schematic judgement. As inspection of Table 5.1 suggests, this argument can account for judgement speed differences for *mother* in Experiment 3 and for *self* in all three experiments; it can also be extended to account for the pattern of group differences observed for *God* as target by assuming that atheists had no corresponding discrepancy between an actual view and an ideal or ought view of God and thus made no delay and that the reverse was the case for evangelical Christians. The one anomaly in this interpretation, however, is the significant delay by atheists in making negative-schematic judgements for *Superman* as target; evangelicals, at least, performed as would be expected for a non-intimate fictional character, taking no longer to make negative-schematic judgements than to make positive-schematic judgements. While further research is needed to test this interpretation, the previous research reviewed in Section 2.4.3 is supportive of it (Lewicki, 1984; see also Ferguson et al., 1983; Mueller, Thompson, & Davenport, 1986).

³⁷ The mean number of negative-schematic God-referent judgements made by each member of an evangelical Christian experimental group differed according to the total number of judgements made in each experiment, which in turn was dependent on the design for that experiment: in Experiment 3, $M = 4.6$, in Experiment 4, $M = 1.6$, and in Experiment 5, $M = 3.2$.

Table 5.1. Mean difference in milliseconds between negative-schematic judgements and positive-schematic judgements, by target, for experiments 3, 4, and 5.

target	Experiment 3		Experiment 4		Condition B, Experiment 5	
	atheist (n = 14)	evangelical (n = 20)	atheist (n = 23)	evangelical (n = 17)	atheist (n = 9)	evangelical (n = 10)
God	-177	1098 **	184	1445 **	-34	2226**
self	323 **	578 **	572 **	566 **	402 **	1008**
other ¹	632 **	535 **	802 **	114	1079**	1233**

Note: ** indicates $p < .01$; * indicates $p < .05$. ¹ Other target was *mother* for Experiment 3, *Superman* for Experiment 4, and *best friend* for Experiment 5.

Judgement and judgement speed data from experiments 3, 4, and 5 can be summarized as follows: (a) speed of access to self-schemas does not differ with religiosity; (b) atheists are able to draw reliably on two conflicting God concepts—one that is the concept of the God that a strongly committed Christian would believe in, and another that is personally held—neither of which is affect-laden; (c) atheists' speed of access of these two concepts cannot be distinguished; (d) atheists are slower to access their God schemas than they are their schemas for self and intimate others, (e) evangelicals' God schemas are highly affect-laden, and can be accessed as quickly or more quickly than schemas for self and intimate others; (f) non-evangelicals and evangelicals report similar God concepts on direct measures but the God schemas of evangelicals are more affect-laden and more accessible.

5.1.4 Cognitive biases in religious cognition: What's the big picture?

Measurement of cognitive biases can reveal efficiency and centrality of God schemas

Integration of data from experiments 3, 4, and 5 allows several conclusions to be drawn regarding the cognitive representation of information about God. On the propositional level, evangelical and non-evangelical Christians have relatively similar personal beliefs about the character of God, tending to endorse positive trait words and reject negative trait words. Atheists, by contrast, are able to draw consistently on a stereotypically Christian concept of God when asked specifically to do so, but instead consistently draw on a more negative concept of God when asked to use their personal idea of God, despite not believing in God. On the implicational level, the pattern of evangelicals' speed in making God-referent judgements and

subsequent recall of God-referent material strongly suggests that their God schemas are well-elaborated, efficient, and affect-laden: in short, personally intimate. By contrast, the pattern of atheists' speed and recall indicates that their God schemas are poorly elaborated, inefficient, and affect-free; the God schemas of non-evangelical Christians are somewhat better elaborated and more efficient than those of atheists but scarcely more affect-laden.

These conclusions need defending against Bargh and Tota's (1988) criticism of the use of judgement speed to measure schema efficiency:

Self-judgment latencies are not an appropriate measure of the efficiency or automaticity of the underlying relevant constructs because such latencies are also influenced by the amount of attentional processing given the task. The interpretational ambiguity of a decision latency for the issue of automaticity of the decision-relevant constructs is that one cannot tell from the latency alone how much of it was due to the (relatively automatic) construct activation stage and how much of it was due to the (relatively attentional) decision and response stage ... The contribution of the attention-demanding response selection stage varies as a function of situation-specific goals and strategies. (p. 929)

If this criticism were valid for the current investigation, an alternative interpretation of the judgement speed data in experiments 3 – 5 could be advanced: the enhanced judgement speed observed in evangelical Christians relative to atheists for God-referent judgements may simply result from differences in the allocation of attentional resources rather than from differences in schema accessibility and efficiency. This interpretation is likely to be wrong for several reasons. First, if attentional differences were the cause of group differences in judgement speed when making God-referent judgements, we should expect to have observed an attentional bias in the processing of religious Stroop stimuli in experiments 1 and 2, but did not. Second, given the random presentation order of targets in experiments 3 – 5, any difference in attentional resource allocation that could cause the large differences observed between evangelicals and atheists for God-referent judgements would likely have spilled over into group differences for self- and other-referent judgements, yet no such differences were found. Finally, it should be noted that the experimental procedure used in experiments 3 – 5 did not differ in any substantial way from previous studies observing a speed advantage for self-referent judgements over other-referent judgements (e.g., Kuiper & MacDonald, 1982; Kuiper & Rogers, 1979; Markus & Smith, 1981) that is contingent on the intimacy of other targets (Bradley & Mathews, 1983; Keenan & Baillet, 1980) and the affective nature of the judgements being made (e.g., Bradley & Mathews, 1983; Derry & Kuiper, 1981; Ferguson et al., 1983; Kuiper & MacDonald, 1982; Lewicki, 1984;

Mueller, Thompson, & Davenport, 1986; Sedikides, 1995). While Bargh and Tota's (1988) criticism could be applied uniformly to studies observing the SRE in judgement speed, the pattern of judgement speeds observed in this investigation and in prior research seems most parsimoniously interpreted in terms of schema efficiency and affect-ladenness (see also Hill, 1995; Krosnick, 1989). This conclusion could be tested simply enough by repeating Experiment 3 with an added concurrent memory load condition (Bargh & Tota, 1988; see also Logan, 1979): participants with efficient God schemas would be less impaired under memory load when making God-referent judgements than would participants with inefficient God schemas, so a clear difference in degree of impairment would be anticipated between evangelical Christians and atheists.

Pattern of biases in religious cognition resembles that found in depression

Consideration of the overall pattern of cognitive biases observed while investigating religious cognition permits a comparison to be made with the pattern of cognitive biases observed in different emotional disorders. Williams, Watts, MacLeod, and Mathews (1988) proposed an influential model of information processing in emotional disorders in which anxiety and depression are marked by a distinct pattern of attentional and memory biases. Specifically, empirical data suggested that anxiety is marked by biases in attention toward threatening stimuli but less so by anxiety-congruent recall biases; and that depression is marked by biases in memory for depression-congruent self-referent material but less reliably by attentional biases. Though the finer details of this model have developed in the light of subsequent empirical data, further research has broadly supported Williams and colleagues' model (for reviews, see Dalglish & Watts, 1990; Hertel, 2002; Williams et al., 1997). From this perspective, the pattern of cognitive biases observed in this investigation—that is, biases in memory and judgement speed but not in attention—more closely resemble those found in depression than those found in anxiety. Because depressive cognition is so intimately tied up with self-schemas, this resemblance suggests that religious cognition is strongly associated with the self, but only in those in whom these biases are observed.

5.2 Implications for the study of religious cognition

The possibilities for future experimental work in the study of religious cognition are considerable, and in the following sections I outline potential applications of these new methods

to existing research endeavours and discuss what other methods could be fruitfully considered for future use. In all instances it should be noted that choice of participant groups is of critical importance to what may be discovered. While the main focus of the current study was on homogenous groups at the extremes of Christian commitment (i.e., evangelical Christians and atheists), more work is needed on groups of intermediate commitment. Despite the limited criteria for membership of the non-evangelical Christian groups used in the current study (belief in God, self-description as a Christian, and choice of the “moral and ethical” Christian belief statement) and the wide within-group variation in religious beliefs, motivations, and behaviours, few if any of these variables were found to correlate reliably with the indirect measures used (see Section 3.2.2, *Recall*; and also Tables 4.28 and 4.38). A key object for future work, then, should be to discover what the determinants are of the effects observed in evangelical Christians. Several strategies are available, including comparing groups that vary along dimensions other than commitment—for example, contrasting charismatic evangelical Christians with conservative evangelical Christians—or testing groups of highly committed members of other faiths.

5.2.1 Application to specific areas of religious cognition research

The experimental methods developed in this investigation could be usefully applied in each of the existing areas of research into religious cognition reviewed in Sections 1.2 and 1.3, and I provide here some illustrative examples.

Cognitive development. The direct measurement of beliefs and concepts may be even more challenging a task in children than in adults, because, as critics of Piaget have noted, children’s answers to questions posed by adults are easily influenced by pragmatic and situational constraints (e.g., Donaldson, 1978). Children as young as 8, however, have reliably been found to demonstrate greater recall for adjectives encoded during a self-reference task than for adjectives encoded in a semantic condition (Halpin, Puff, Mason, & Marston, 1984; Pullyblank, Bisanz, Scott, & Champion, 1985). It is possible, therefore, that the SRE in memory paradigm may prove useful as an adjunct to the qualitative methods of R. Nye (Hay & Nye, 1998; R. Nye, 1996, 1999) in measuring children’s intimacy with God.

Cognitive science of religion. Experimental work in this area has largely ignored the importance of affect in the representation and acquisition of religious concepts. Although researchers have hypothesized that belief in God or other supernatural agents helps to reduce people’s existential anxieties (e.g., Atran & Norenzayan, 2004), it is unclear whether this benefit is conferred simply

by professed belief in a given supernatural agent, or whether a perceived relationship with such an agent is necessary. One way to address this question would be to use the memory and judgement speed SRE paradigms in conjunction with a technique described by Atran and Norenzayan (2004) designed to prime existential anxiety. In a previous experiment using this technique, Atran and Norenzayan observed significantly stronger Likert scale ratings of strength of belief in God's existence and in the efficacy of supernatural power in participants who had been primed with a story involving the death of a child (but that did not mention religion) as compared to participants who had been primed with a non-emotive religious or neutral non-religious control story.

Cognitive neuroscience of religion. McNamara's (2001) suggestion that the frontal lobes play a role in religious cognition could be explored by adding a neuroimaging component to the SRE in judgement speed paradigm. Recent years have seen multiple studies investigating brain activation during self-referent processing, with activation particularly observed in prefrontal areas (see Gillihan & Farah, 2005, for a review). Given that prefrontal cortex also plays a crucial role in affective processing (Davidson & Irwin, 1999), it would be expected that prefrontal cortex would be more active during God-referent processing for evangelical Christians relative to an appropriate control task and to God-referent processing for atheists. If particular patterns of activation associated with implicational religious cognition could be resolved then neuroimaging would be a powerful tool for the investigation of when people make spontaneous use of religious knowledge.

Survey-based measures of God concepts. As has already been made clear, indirect measures of religious cognition seem to be able to reveal group differences that direct measurement would not predict. If self-report measures are used in conjunction with the measurement of cognitive biases, therefore, all of the hypotheses listed in Section 2.3.4 are laid open for investigation.

Object relations. Rizzuto's (1979) theory that "some people cannot believe [in God] because they are terrified of their God" (p. 47) deserves investigation in the light of recent research using survey-based measures to investigate atheists' feelings about God. Exline (2004; see also Exline, Fisher, Rose, & Kampani, 2005) describes data suggesting that two different types of atheist can be distinguished: one group who reported never having believed in God and whose views about God were relatively affect-free, and a second group who reported having believed in God in the past and whose feelings toward God were predominantly negative relative to believers' feelings toward God. Testing contrasting groups of atheists on indirect measures of attitudes toward

God may be able to reveal negative relational schemas in the latter group and thus provide partial support for Rizzuto's theory.³⁸

Attachment theory. Hill and Hall (2002) hypothesize that the most salient aspects of people's God schemas may be contingent on people's attachment history. For example, they predict that someone whose relationship with God acts as a compensation for an anxious/ambivalent attachment style may primarily focus on God's faithfulness or consistency. Each of their predictions could be tested by probing for schema-specific biases in judgement speed or incidental recall using the methods introduced in this investigation.

Attribution theory. Current research into the causal attributions that people make toward God is limited to self-report measures that give respondents plenty of time to reflect on the answers that they provide. Everyday attributional processes, however, often take place in an automatic unreflective fashion. Use of online measures, therefore, may reveal the implicit relational models that people use when making attributions toward God. One area of particular interest is the two-way relationship between mental health and schemas for God and self—a relationship that is likely to be mediated by attributions. For example, Exline, Yali, and Lobel (1999) found that disappointment with God was related to anxious and depressed mood; but it is also possible that depression can lead to distortions in God schemas. Just as incidental memory paradigms can reveal biases toward self-referent negative material, it is likely that any bias toward God-referent negative material in depression can be revealed using the same techniques.

5.2.2 Other experimental methods

The use of experimental methods in the investigation of religious cognition still represents something of an undiscovered country. While it may be necessary to design new experimental paradigms to address specific theoretical conundrums, the success of the incidental memory and judgement speed paradigms in the current investigation suggest that numerous other extant paradigms could be readily adapted for future work. Paradigms involving the measurement of memory, judgement speed, and inference seem most likely to prove fruitful, especially if used in experiments that manipulate schema activation or the availability of attentional resources through the use of priming or concurrent loads.

³⁸ My impression from testing atheists—particularly in their completion of the God Concept Survey [A/B] in Experiment 4—was that both types of atheist were represented in my samples.

Memory. As indicated by Experiment 2, strongly religious people are likely to demonstrate biases in incidental memory for religious material in general. Other incidental memory paradigms could be used to explore this phenomenon more thoroughly (see Puff, 1982): I would anticipate finding differences among religious people in the kind of religious material that they remember best, with enhanced recall particularly for emotionally significant material.

Judgement speed. It is possible that recently developed measures of attitude may prove even more sensitive to the affective nature of implicational religious cognition than the SRE (for reviews, see de Houwer, 2003b; Fazio & Olson, 2003; Spence, 2005). In particular, the IAT has been used to find differences between direct and indirect measurements of self-schemas (Asendorpf, Banse, & Mucke, 2002; see also Greenwald et al., 2002; Greenwald & Farnham, 2000) so could be easily adapted for the measurement of God schemas.

Inference. Multiple paradigms make use of biases in inferential processes (see Fiske & Taylor, 1991, chap. 9, for a review), in which participants interpret ambiguous or incomplete material using existing schemas. While some studies of religious cognition have already made use of inferential biases in narrative processing (Barrett & Keil, 1996; Barrett & VanOrman, 1996; Barrett, 1998; Gibson, 1999), one problem that they have encountered is that participants have too much opportunity to engage in reflective thinking about whether test words or phrases had occurred in the original narrative. A more effective alternative procedure may be that of McKoon and Ratcliff (1986): participants are presented with short texts followed by recognition memory tests in which they must make rapid decisions about whether or not certain words had been presented in any of the texts.

Activation of schemas through priming. As was noted in Section 5.1.1, religious schemas may need to be primed in order for attentional biases to be observed. However, the effects of priming are likely to differ among participants depending on how well-developed and central their religious schemas are and may therefore interact with potential biases in memory, judgement speed, and inference. Wenger (2003), for example, found that Christians were more likely to employ religious beliefs spontaneously in answering a question about the three greatest events in the history of the world if they had previously been subliminally exposed to Christian priming words. Relational schemas can be primed too, and Baldwin and colleagues have developed a number of ingenious experimental paradigms that show differences in self-evaluative judgements following subliminal priming or cued activation of relational schemas for approving or demanding others (e.g., Baldwin, 1994; Baldwin, Carrell, & Lopez, 1990; Baldwin & Holmes, 1987; Baldwin &

Main, 2001; for review, see Baldwin, 2001). An alternative approach to the activation of religious schemas would be an investigation of the effect on religious cognition of mood induction procedures (for reviews, see Gerrards-Hesse, Spies, & Hesse, 1994; Martin, 1990; Westermann, Spies, Stahl, & Hesse, 1996).

Concurrent load. Use of concurrent memory load during self-referent judgements has already been mentioned above in connection with Bargh and Tota (1988), who asked participants to rehearse a 6-digit number in working memory while making descriptiveness judgements. Other studies have used similar tasks during word completion tasks, for example to demonstrate reduced use of stereotype concepts (D. T. Gilbert & Hixon, 1991). Another alternative is to engage people in a concurrent spatial task, such as tapping out a pattern or carrying out a visual search, which may interfere with viewing particular religious memories “in the mind’s eye”.

5.3 Summary

The purpose of this investigation was to explore biases in attention, memory, and judgement speed in order to reveal which experimental paradigms most successfully tap into implicational religious cognition, and thereby add a new set of measurement tools to those available to the psychologist of religion. Though much research exploring these biases is still to be done, the findings of the current investigation suggest that incidental memory and judgement speed paradigms are successful in tapping into implicational religious cognition and can reveal differences not otherwise observable through more direct measurement. It seems, then, that the use of these indirect measurement techniques provides a way to meet the need expressed by psychologists of religion to go beyond self-report measures of religious attitudes and beliefs (e.g., Batson et al., 1993; Gorsuch, 1990; Hill, in press; Hill & Pargament, 2003; Slater et al., 2001). It is hoped that psychologists of religion will embrace these new tools and will use them to substantiate and develop the body of theoretical work that has emphasized relational spirituality and that has acknowledged the importance of affect in religious cognition (Hall, 2003; Hill, 1995; Hill & Hall, 2002; Rizzuto, 1979; Watts & Williams, 1988).

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Appendix A: Forming the participant panel

Recruitment

Adult participants were recruited from around Cambridge to form a panel from which groups of experimental interest could be drawn. Because a comparison was intended between different degrees of religious commitment, no attempt was made to ensure that the participant panel as a whole was representative of the general population. At the completion of testing for this investigation, the participant panel contained 845 people who had completed the Screening Questionnaire and the contact details of a further 1,824 potential participants.

Recruitment went through multiple stages as it became more clear which strategies were most effective. Initially, I focused on 104 places of worship, religious meeting houses, or theological colleges in the vicinity of Cambridge. Of these, the majority (92) claimed to have some sort of Christian affiliation and included Orthodox and Roman Catholic groups, mainstream Protestant denominations, and more marginal groups, such as Mormons and Jehovah's Witnesses. The remaining 12 groups were associated with Bahá'í, Buddhist, Islamic, Jewish, Spiritist, or interfaith movements. I identified a contact at each group and sent a personalised letter about the research with a request to display enclosed posters and to assist in recruiting potential participants. The study was advertised as an effort to learn "about the way people think and feel about God." However, I found response rates from this approach to be both slow, averaging only one person per month, and low, averaging one person per two groups contacted. Furthermore, the age of the majority of these respondents was outside of the bounds suitable for the experimental paradigms that I had planned, necessitating more targeted recruitment.

The second strategy I used was to advertise on Usenet and local email lists, through newsletter and supermarket adverts, and by placing colour A4 posters in University departments and colleges. Adverts were altered to stipulate specifically that participants should be aged 18-40 and have English as a native language. This strategy proved somewhat more successful in reaching the desired participant population; Usenet and email lists in particular proved cheap and swift, generating multiple requests for more information within 24 hours of posting an initial advert. A further recruitment drive included leaving piles of A5 flyers in college lodges (5 responses out of a potential 500: 1.0%); individually pigeonholing A5 flyers to an entire college (5 responses out of a potential 439: 1.1%); and pigeonholing the Screening Questionnaire (described below) and a

Appendix A: Participant panel

cover letter with a return envelope to an entire college (69 responses out of a potential 500: 13.8%). Of these three methods, piles of flyers in college lodges was most cost-effective while prospective pigeonholing of questionnaires achieved the highest response rate. I also made every effort to capitalize on word of mouth, and panel members who participated in experiments were asked if they were willing to display a poster about the study at their college, department, workplace, or church.

A total of 531 people contacted me in response to either the first or second strategy, with point of initial contact breaking down as follows: 24.3% had seen a poster in their department, college, or workplace; 14.9% had heard via word of mouth; 14.7% had responded to an email list advert; 13.0% had received a Screening Questionnaire in their college pigeonhole; 5.5% had been notified via their church; 5.1% had responded to a Usenet post; 2.8% had seen an advert in a newsletter; 1.9% had responded to a flyer left at their college; 1.5% had seen an advert in a local Supermarket; 16.4% did not report where they had heard about the study. These people were then sent a personalised letter explaining the broad aim of the research programme. A copy of this letter can be found in Appendix M. The letter invited people to complete the Screening Questionnaire and to return it in an enclosed postage-paid return envelope or via the University internal mail system. Enquirers who had not returned the questionnaire within one month of its mailing were sent an email reminder and, if necessary, a replacement questionnaire. Of the 531 who were sent a Screening Questionnaire, 425 completed and returned it, a response rate of 80.0%. If the 69 completed questionnaires resulting from prospective pigeonholing of questionnaires were excluded, the response rate would remain a highly respectable 77.1%.

My third and most successful strategy was to recruit participants at the University's annual Freshers' Fair; over the two years that I recruited in this way I gathered the contact details of 2,160 potential participants. As participants were needed for ongoing experimental testing, people were contacted with an initial "foot-in-the-door" personalized email reminding them that they had signed up for more information about the participant panel, and followed-up within the week by being mailed a Screening Questionnaire with a personalized cover letter and return envelope. The first year I recruited through the Freshers' Fair, 21.1% of those contacted returned their Screening Questionnaires; response rates improved in the second year to 47.0% of those contacted. My use of direct marketing techniques such as personalised letters, inclusion of a return envelope, pre-paid postage (in this case, real stamps), and follow-up reminders—all of which have been found to boost mail survey response rates in a meta-analysis (Yammarino, Skinner, & Childers, 1991)—proved effective.

Screening Questionnaire

The Screening Questionnaire (which was referred to merely as a questionnaire) was designed to be completed by potential participants in less than five minutes. Its purpose was to provide enough information for me to determine a participant's potential usefulness for a given experiment. A copy may be found in Appendix B. Participants were instructed to answer all of the questions as fully as possible.

The questionnaire consisted of three sections. The first assessed anonymised demographic information, including age, sex, occupation, marital status, highest level of education attained, and ethnic origin. Additional variables that had potential to confound various experimental paradigms were also checked, including handedness, first language, colour blindness, reading difficulties, and current incidence of depression.

The second section was adapted from previous work by Gibson (1999), and assessed religious identification, practices, and beliefs. Specifically, participants self-identified any religious affiliation, denominational affiliation, and words commonly used to describe their approach to religion, if any; participants also indicated their length of religious practice and experience of other religions and gave details of any theological training that they had received. Following Fullerton and Hunsberger (1982), participants indicated frequencies of church attendance, prayer, Scripture reading, and, additionally, religious issue discussion. Answers to the latter three were on a six-point ordinal scale. The questionnaire also assessed strength of belief in God on a three-point scale, and finally employed a forced-choice task to determine Christian status. Participants who professed to be Christian indicated their preference for either an ethical statement of faith or a born-again statement of faith (Paloutzian, Jackson, & Crandall, 1978). This task has previously been found strikingly effective in distinguishing two different types of Christian: compared to those who choose the ethical statement, those who choose the born-again statement more frequently attend church, pray, and read Scripture, are more orthodox in their beliefs, and are more intrinsically motivated and less extrinsically motivated (Gibson, 1999). In fact on many measures, those who choose the ethical statement cannot be statistically distinguished from non-believing controls.

The final section included Gorsuch and McPherson's (1989) Intrinsic/Extrinsic-Revised (I/E-R) Scale followed by Hunsberger's (1989) shortened Christian Orthodoxy Scale. The latter scale was slightly modified for inclusive language. Answers to both were made on a 7-point Likert scale.

Because the I/E-R scale was designed for religious samples and religious affiliation was an unknown variable prior to questionnaire completion, the instructions for this section included directions for how to answer statements that did not apply to the respondent's situation.

Panel characteristics

There was a large degree of variation among the 845-member participant panel. Participants were aged between 18 and 80, with a mean age of 23.1 years. The majority were in the 18-40 age range, with only 3.3% older than this. Women made up 57.3% of the panel. The majority of the panel were ethnically White Caucasian (87.1%); other ethnic groups constituting more than 1.0% of the sample included Chinese (4.5%) and Indian (2.2%). The majority of the panel were full-time undergraduate or graduate students (84.1%); the remainder worked in a variety of professional occupations. Reflecting this, 33.7% of the panel had at least one degree, and the majority of the remainder were working toward a degree. Most of the panel described themselves as single (85.4%); of the remainder, 13.4% were married, engaged, or "living with partner", and 1.2% were divorced, separated, or widowed.

The panel was also religiously diverse. Just over half believed in God (54.2%), while 25.1% did not, and 20.7% were unsure. While 51.7% spontaneously described themselves as practising Christianity or one of its denominations, 41.1% said that they did not practice any religion or described themselves as being atheist or agnostic, 4.7% reported practising specific other religions, and the remainder described themselves as either "esoteric" practitioners with a "strong sense of spirituality" or "non-practising" Christians (including one "elapsd Catholic" [sic]). Of those who said that they were Christian, 41.7% chose the moral and ethical statement of Christian belief, while 53.5% chose the "born-again" statement; the remaining 4.8% refused to make a choice or chose both despite instructions to choose one only. Just over half of those describing themselves as Christian also described themselves as Anglican (50.9%); of the remainder who were willing to classify themselves (2.5% refused to), self-descriptions included Roman Catholic (11.4%), Orthodox (1.7%), free/independent/non-denominational evangelical (12.9%), Baptist (4.5%), Methodist (3.0%), Presbyterian (2.0%), mixed (6.2%), or as a member of some other less-represented denomination (5.0%). Participants supplied a wide variety of words to describe their approach to religion, most common of which were liberal (29.4%), evangelical (17.5%), charismatic (17.5%), conservative (10.4%), or some combination of these, including the intriguing "liberal conservative" and "liberal evangelical". Of those who did not describe

Appendix A: Participant panel

themselves as Christian, 43.0% reported having had experience of a religion, either through family, education, or previous practice themselves. Finally, 10.0% of the panel had some kind of formal theological training, the majority at the undergraduate level.

Although the panel could not be said to represent the general population, it provided ample variety for the selection of contrasting homogeneous groups for experimental work. A minority of the panel had characteristics that excluded them from participation in certain experimental paradigms, however, including lack of English as a first language (2.0%), self-described depression (4.6%), reading difficulties (2.2%), or colour blindness (2.5%).

Psychology of Religion Questionnaire

Your personal details

Please complete as much of this section as you feel comfortable doing. The information that you provide will help me to make sure that my research includes the broadest possible selection of participants.

Age: _____

Sex M/F: _____

Occupation: _____

Handedness (preferred hand for writing): *(please circle)*

left

right

Marital status: *(please circle)*

never been married

living with partner

widowed

divorced

married

Highest level of education completed: *(circle one)*

GCSE/O-Level

A-Level

HND/GNVQ

Honours degree (Bachelor's)

Master's degree

Doctoral degree

other (please specify): _____

Ethnic origin (origin of recent forebears): *(circle one)*

white

black Caribbean

black African

black (other)

Indian

Pakistani

Bangladeshi

Chinese

other (please specify): _____

Is English your first language? *(circle one)*

yes

no

Would you say you are depressed at the current time? *(circle one)*

yes

no

Do you have any reading difficulties? *(circle one)*

yes

no

Are you aware of being colour blind? *(circle one)*

yes

no

Your religious practices and beliefs

Please answer all of the questions as fully as possible.

1. What religion do you practise, if any? _____
2. If your religion has different denominations, which are you a part of? _____
3. Are there any other words commonly in use to describe your particular approach to your religion (e.g., conservative, liberal, charismatic)?

4. For how many years have you practised your religion (including no religion)? _____
5. If you have practised any other religions, please give details: _____

6. Have you ever had any formal theological training (6 months or more, including a theology degree)? Please give details of what and for how long:

7. How many times have you attended a place of worship or religious meeting in the last week (**not including weddings, funerals, or the like**)? _____
8. During the past year, how frequently have you prayed (**for your own or others' spiritual welfare**, not just while attending weddings, funerals, or the like)? *(please circle closest answer)*
several times a day most days weekly occasionally rarely never
9. During the past year, how frequently have you read Scriptural or devotional writings (**for your own spiritual welfare**, not just while attending weddings, funerals, or the like)?
several times a day most days weekly occasionally rarely never
10. During the past year, how frequently have you discussed religious issues with others?
several times a day most days weekly occasionally rarely never
11. Do you believe in God?
yes no unsure
12. Would you say you are a Christian?
yes no unsure
13. If yes, which statement *most closely* describes your life as a Christian? *(please circle one only)*
 - A. "I respect and attempt to follow the moral and ethical teachings of Christ."
 - B. "I have received Jesus Christ into my life as my personal Saviour and Lord."

Your religious attitudes and beliefs

Below you will find a list of statements relating to specific religious attitudes and beliefs. You will probably find that you **agree** with some of the statements, and **disagree** with others, to varying extents. Please rate each statement according to how much you agree or disagree. If the wording of questions (a) through (n) does not apply to your situation, please write "n/a".

	<i>strongly disagree</i>	<i>moderately disagree</i>	<i>slightly disagree</i>	<i>neutral</i>	<i>slightly agree</i>	<i>moderately agree</i>	<i>strongly agree</i>
(a) I enjoy reading about my religion.	-3	-2	-1	0	+1	+2	+3
(b) I go to church because it helps me to make friends.	-3	-2	-1	0	+1	+2	+3
(c) It doesn't much matter what I believe so long as I am good.	-3	-2	-1	0	+1	+2	+3
(d) It is important to me to spend time in private thought and prayer.	-3	-2	-1	0	+1	+2	+3
(e) I have often had a strong sense of God's presence.	-3	-2	-1	0	+1	+2	+3
(f) I pray mainly to gain relief and protection.	-3	-2	-1	0	+1	+2	+3
(g) I try hard to live all my life according to my religious beliefs.	-3	-2	-1	0	+1	+2	+3
(h) What religion offers me most is comfort in times of trouble and sorrow.	-3	-2	-1	0	+1	+2	+3
(i) Prayer is for peace and happiness.	-3	-2	-1	0	+1	+2	+3
(j) Although I am religious, I don't let it affect my daily life.	-3	-2	-1	0	+1	+2	+3
(k) I go to church mostly to spend time with my friends.	-3	-2	-1	0	+1	+2	+3
(l) My whole approach to life is based on my religion.	-3	-2	-1	0	+1	+2	+3
(m) I go to church mainly because I enjoy seeing people I know there.	-3	-2	-1	0	+1	+2	+3
(n) Although I believe in my religion, many other things are more important in life.	-3	-2	-1	0	+1	+2	+3
(o) Jesus Christ was the divine Son of God.	-3	-2	-1	0	+1	+2	+3
(p) The Bible may be an important book of moral teachings, but it was no more inspired by God than were many other such books in human history.	-3	-2	-1	0	+1	+2	+3
(q) The concept of God is an old superstition that is no longer needed to explain things in the modern era.	-3	-2	-1	0	+1	+2	+3
(r) Through the life, death and resurrection of Jesus, God provided a way for the forgiveness of people's sins.	-3	-2	-1	0	+1	+2	+3
(s) Despite what many people believe, there is no such thing as a God who is aware of our actions.	-3	-2	-1	0	+1	+2	+3
(t) Jesus was crucified, died and was buried but on the third day He arose from the dead.	-3	-2	-1	0	+1	+2	+3

Appendix B: Screening Questionnaire

This page will be separated from the questionnaire so that your anonymity will be protected.

Title: _____ Name: _____

Address: _____

_____ Postcode: _____

Telephone: _____ (day) _____ (eve)

Mobile: _____

Email: _____

Where did you hear about the study? _____

Thank you for taking the time to complete this questionnaire. Please return it to me in the envelope provided to:

Nicholas Gibson
Psychology and Religion Research Programme
Faculty of Divinity, West Road, Cambridge, CB3 9BS

or

Nicholas Gibson
Queens' College, Cambridge, CB3 9ET

Appendix C: Experiment 1 Stroop stimuli

Word frequencies are the number of occurrences in Kilgarriff's (1996) analysis of the British National Corpus of spoken and written English, regardless of the word-class of the original source.

Table C. Word frequency data for Stroop stimuli used in Experiment 1.

task	letters	syllables	frequency	log frequency
Religious A				
holy	4	2	3,026	3.481
Jesus	5	2	5,535	3.743
spirit	6	2	6,490	3.812
church	6	1	20,543	4.313
God	3	1	23,746	4.376
Religious B				
Bible	5	2	1,976	3.296
prayer	6	2	2,098	3.322
Christ	6	2	4,716	3.674
Lord	4	1	16,469	4.217
God	3	1	23,746	4.376
Control A				
humour	6	2	2,241	3.350
drama	5	2	3,558	3.551
wind	4	2	7,660	3.884
ground	6	1	16,200	4.210
job	3	1	22,891	4.360
Control B				
closet	6	2	226	2.354
chairs	6	2	2,026	3.307
desk	4	2	4,515	3.655
bed	3	1	15,896	4.201
table	5	1	20,200	4.305

Appendix D: Supplementary questionnaire

1. Which of the following words do you feel describe you? Tick as many as you like.

☐ agnostic	☐ investigating Christianity	☐ Lutheran
☐ Anglo-Catholic	☐ lapsed	☐ Methodist
☐ anti-religion	☐ liberal (theologically)	☐ non-denominational
☐ atheist	☐ low church	☐ Pentecostal
☐ charismatic (theologically)	☐ Anglican (Church of England)	☐ Presbyterian
☐ conservative (theologically)	☐ Baptist	☐ Quaker
☐ evangelical	☐ free church	☐ Roman Catholic
☐ high church	☐ Greek/Russian Orthodox	☐ other:

2. This question is about how long you have practised your current religious beliefs, whatever they are (including non-belief). Some people have grown up in a Christian family and at some point stopped practising; others have become Christian after previously not believing; still others have practised what they currently believe (including non-belief) for as long as they can remember. Please indicate for how many years you have practised your current religious beliefs: _____

3. Below you will find a list of statements relating to specific religious beliefs. You will probably find that you *agree* with some of the statements, and *disagree* with others, to varying extents. Please rate each statement according to how much you agree or disagree.

	<i>strongly disagree</i>	<i>moderately disagree</i>	<i>slightly disagree</i>	<i>neutral</i>	<i>slightly agree</i>	<i>moderately agree</i>	<i>strongly agree</i>
(a) Jesus Christ is the divine Son of God.	-3	-2	-1	0	+1	+2	+3
(b) The Bible may be an important book of moral teachings, but it was no more inspired by God than were many other such books in human history.	-3	-2	-1	0	+1	+2	+3
(c) The concept of God is an old superstition that is no longer needed to explain things in the modern era.	-3	-2	-1	0	+1	+2	+3
(d) Through the life, death, and resurrection of Jesus, God provided a way for the forgiveness of people's sins.	-3	-2	-1	0	+1	+2	+3
(e) Despite what many people believe, there is no such thing as a God who is aware of our actions.	-3	-2	-1	0	+1	+2	+3
(f) Jesus was crucified, died, and was buried but on the third day He arose from the dead.	-3	-2	-1	0	+1	+2	+3

Appendix E: Experiment 2 Stroop stimuli

Word frequencies are the number of occurrences in Kilgarriff's (1996) analysis of the British National Corpus of spoken and written English, regardless of the word-class of the original source.

Table E. Word frequency data for Stroop stimuli used in Experiment 2.

task	letters	syllables	frequency	log frequency
Religious General				
Jesus	5	2	5,535	3.743
God	3	1	23,746	4.376
Christ	6	1	4,716	3.674
Lord	4	1	16,469	4.217
Bible	5	2	8,991	3.954
Holy	4	2	3,026	3.481
Spirit	6	2	6,490	3.812
prayer	6	2	2,098	3.322
Religious Positive General				
Jesus	5	2	5,535	3.743
God	3	1	23,746	4.376
Saviour	7	2	375	2.574
mercy	5	2	1,113	3.046
grace	5	1	2,471	3.393
forgiven	8	3	552	2.742
loving	6	2	1,478	3.170
friend	6	1	16,863	4.227
Religious Negative General				
demonic	7	3	105	2.021
sinner	6	2	147	2.167
Satan	5	2	407	2.610
burn	4	1	1,728	3.238
Devil	5	2	1,729	3.238
damned	6	1	978	2.990
evil	4	2	2,881	3.460
Hell	4	1	5,315	3.726

Appendix E: Experiment 2 Stroop stimuli

task	letters	syllables	frequency	log frequency
Religious Positive God				
Jesus	5	2	5,535	3.743
God	3	1	23,746	4.376
Saviour	7	2	375	2.574
mercy	5	2	1,113	3.046
grace	5	1	2,471	3.393
forgiven	8	3	552	2.742
loving	6	2	1,478	3.170
friend	6	1	16,863	4.227
Religious Negative God				
judge	5	1	6,789	3.832
God	3	1	23,746	4.376
wrath	5	1	366	2.563
sin	3	1	1,361	3.134
punish	6	2	445	2.648
shame	5	1	2,076	3.317
guilty	6	2	4,233	3.627
condemn	7	2	481	2.682
Religious Sacramental				
crucified	9	3	149	2.173
Jesus	5	2	5,535	3.743
Christ	6	1	4,716	3.674
blood	5	1	10,170	4.007
communion	9	3	599	2.777
cross	5	1	7,556	3.878
nails	5	1	1,345	3.129
thorns	6	1	218	2.338
Religious Heretical				
Jesus	5	2	5,535	3.743
God	3	1	23,746	4.376
trickster	9	2	47	1.672
cruel	5	2	1,388	3.142
false	5	1	3,684	3.566
liar	4	2	413	2.616
uncaring	8	3	75	1.875
weak	4	1	3,572	3.553

Appendix E: Experiment 2 Stroop stimuli

task	letters	syllables	frequency	log frequency
Control Neutral				
signal	6	2	3,176	3.502
whatever	8	3	13,236	4.122
rhythm	6	2	1,523	3.183
lock	4	1	2,576	3.411
bathe	5	1	150	2.176
wind	4	1	7,660	3.884
total	5	2	18,568	4.269
stove	5	1	615	2.789
Control Furniture				
table	5	2	20,200	4.305
settee	6	2	332	2.521
desk	4	1	4,515	3.655
wardrobe	8	2	966	2.985
stool	5	1	864	2.937
armchair	8	2	742	2.870
dresser	7	2	296	2.471
bed	3	1	15,896	4.201
Control Positive				
happy	5	2	11,731	4.069
pleased	7	1	5,111	3.709
cheer	5	1	781	2.893
funny	5	2	4,490	3.652
ease	4	1	3,098	3.491
bright	6	1	5,540	3.744
special	7	2	22,119	4.345
laugh	5	1	3,805	3.580
Control Anxiety				
afraid	6	2	5,976	3.776
crash	5	1	2,508	3.399
death	5	1	20,526	4.312
fail	4	1	3,374	3.528
fear	4	1	8,991	3.954
grief	5	1	1,428	3.155
sorrow	6	2	570	2.756
misery	6	3	1,273	3.105

Appendix E: Experiment 2 Stroop stimuli

task	letters	syllables	frequency	log frequency
Control Threat				
terror	6	2	1,512	3.180
panic	5	2	2,065	3.315
danger	6	2	6,016	3.779
anxious	7	2	3,088	3.490
trembling	9	2	1,085	3.035
threat	6	1	5,656	3.753
stress	6	1	4,870	3.688
tense	5	1	1,305	3.116

- **listening to Bible-based sermons and teaching**
- **Bible studies in groups**

- **exercising spiritual gifts**
- **using charismatic gifts**

- **having quiet times**
- **personal prayer or meditation**
- **reading the Bible alone**

- **receiving Holy Communion**
- **attending Eucharist**
- **sharing bread and wine**

- **singing praise and worship songs and hymns**

- **sharing the Christian faith with non-believers**
- **evangelism**

- **spending time with other Christians**
- **fellowship**

- **serving through social action**

Your feelings about religious and spiritual ideas

Your feelings about Holy Communion

1. Please briefly describe how you feel about Holy Communion.

2. Please rate the following statements according to how well it agrees with your feelings about Holy Communion, being as honest as you can:

	<i>disagree strongly</i>	<i>disagree</i>	<i>disagree slightly</i>	<i>neutral</i>	<i>agree slightly</i>	<i>agree</i>	<i>agree strongly</i>
(a) Holy Communion is important to me.	-3	-2	-1	0	+1	+2	+3
(b) Holy Communion is <i>the</i> heart of my Christian faith.	-3	-2	-1	0	+1	+2	+3

3. How often do you receive Holy Communion?

daily several times a week weekly fortnightly monthly rarely never

Your feelings about God

4. The following items are to find out how you feel about God. Please rate God on each of the following dimensions, using the way you feel about God personally:

		<i>extremely</i>	<i>quite</i>	<i>slightly</i>	<i>neutral</i>	<i>slightly</i>	<i>quite</i>	<i>extremely</i>	
(a)	Damning	☐	☐	☐	☐	☐	☐	☐	Saving
(b)	Rejecting	☐	☐	☐	☐	☐	☐	☐	Accepting
(c)	Loving	☐	☐	☐	☐	☐	☐	☐	Hating
(d)	Unforgiving	☐	☐	☐	☐	☐	☐	☐	Forgiving
(e)	Approving	☐	☐	☐	☐	☐	☐	☐	Disapproving
(f)	Merciful	☐	☐	☐	☐	☐	☐	☐	Punishing
(g)	Judgemental	☐	☐	☐	☐	☐	☐	☐	Sympathetic

Your ideas about Heaven and Hell

5. Which statement below *most closely* agrees with your ideas about Hell?

- ☐ Hell is a state of eternal separation from God's presence.
- ☐ Hell is an actual place of torment and suffering where people's souls go after death.
- ☐ Hell is just a symbol of an unknown bad outcome after death.
- ☐ There is no such thing as life after death.
- ☐ Unsure.

6. Which statement below *most closely* agrees with your ideas about Heaven?

- ☐ Heaven is a state of eternal existence in God's presence.
- ☐ Heaven is an actual place of rest and reward where people's souls go after death.
- ☐ Heaven is just a symbol of an unknown good outcome after death.
- ☐ There is no such thing as life after death.
- ☐ Unsure.

Your feelings about different religious ideas

7. Below you will find a list of statements. Sometimes our feelings can differ from what we think we should believe. Please rate each statement for how closely it agrees with your *feelings*, being as honest as you can:

	<i>disagree strongly</i>	<i>disagree</i>	<i>disagree slightly</i>	<i>neutral</i>	<i>agree slightly</i>	<i>agree</i>	<i>agree strongly</i>
(a) I am afraid to die.	-3	-2	-1	0	+1	+2	+3
(b) I often feel guilty about wrong things I did a long time ago.	-3	-2	-1	0	+1	+2	+3
(c) I am looking forward to Heaven.	-3	-2	-1	0	+1	+2	+3
(d) I believe in Hell.	-3	-2	-1	0	+1	+2	+3
(e) Sometimes I feel like God is condemning me.	-3	-2	-1	0	+1	+2	+3
(f) When I die, I am going to Heaven.	-3	-2	-1	0	+1	+2	+3
(g) There is no such thing as an afterlife.	-3	-2	-1	0	+1	+2	+3
(h) The thought of death never bothers me.	-3	-2	-1	0	+1	+2	+3
(i) I believe in Heaven.	-3	-2	-1	0	+1	+2	+3
(j) The devil is active in the world today.	-3	-2	-1	0	+1	+2	+3
(k) Sometimes I feel ashamed of who I am.	-3	-2	-1	0	+1	+2	+3
(l) I believe in Satan.	-3	-2	-1	0	+1	+2	+3
(m) I feel forgiven by God for everything I've done wrong.	-3	-2	-1	0	+1	+2	+3
(n) When I die, I am going to Hell.	-3	-2	-1	0	+1	+2	+3
(o) I sometimes feel aware of demonic forces.	-3	-2	-1	0	+1	+2	+3

Appendix G: Experiment 3 trait word stimuli

Trait words were drawn from previous work by Gibson (1999), Gorsuch (1968), and Lechner (1989). Word frequencies are the number of times these words appeared as an adjective in Kilgarriff's (1996) analysis of the British National Corpus of spoken and written English.

Table G. Source and word frequency data for trait word stimuli used in Experiment 3.

word	source	frequency	log frequency
Theological			
absolute	Gorsuch	3,480	3.542
all-knowing	Gibson	2	0.301
all-powerful	Gibson	108	2.033
all-wise	Gorsuch	8	0.903
almighty	Gibson	349	2.543
divine	Gorsuch	1,224	3.088
eternal	Gorsuch, Gibson	822	2.915
everlasting	Gorsuch	175	2.243
glorious	Gorsuch	1,067	3.028
holy	Gorsuch, Gibson	3,025	3.481
immortal	Gibson	262	2.418
ineffable	Gibson	60	1.778
infinite	Gorsuch	945	2.975
kingly	Gorsuch	1	0.000
majestic	Gorsuch, Gibson	229	2.360
mythical	Gorsuch	237	2.375
omnipotent	Gorsuch	36	1.556
omnipresent	Gorsuch, Gibson	38	1.580
omniscient	Gorsuch, Gibson	53	1.724
sovereign	Gorsuch	418	2.621
universal	Gibson	2,602	3.415
Non-theological			
active	Gorsuch	7,290	3.863
aggressive	Lechner	1,925	3.284
approachable	Gibson	93	1.968
avenging	Gorsuch	19	1.279
beautiful	Gibson	8,670	3.938

Appendix G: Experiment 3 trait word stimuli

word	source	frequency	log frequency
benevolent	Gibson	319	2.504
benign	Gibson	488	2.688
blessed	Gorsuch	209	2.320
caring	Gibson	196	2.292
challenging	Gibson	140	2.146
changeable	Lechner	68	1.833
charitable	Gorsuch, Gibson	684	2.835
close	Gibson	7,911	3.898
comforting	Gorsuch	277	2.442
companionable	Lechner	61	1.785
concerned	Gibson	11,238	4.051
considerate	Gorsuch	216	2.334
constant	Gibson	4,449	3.648
controlling	Gorsuch	150	2.176
creative	Gorsuch, Lechner, Gibson	2,444	3.388
critical	Gorsuch, Lechner	5,763	3.761
cruel	Gorsuch	1,388	3.142
damning	Gorsuch	51	1.708
dangerous	Gorsuch	5,730	3.758
demanding	Gorsuch, Lechner	1,497	3.175
disapproving	Gibson	30	1.477
distant	Gorsuch, Gibson	2,913	3.464
dominating	Lechner	53	1.724
fair	Gorsuch, Gibson	5,127	3.710
faithful	Gorsuch, Gibson	950	2.978
fatherly	Gorsuch, Gibson	58	1.763
fearful	Gorsuch	717	2.856
feeble	Gorsuch	442	2.645
firm	Gorsuch	2,078	3.318
forgiving	Gorsuch, Lechner, Gibson	156	2.193
friendly	Lechner	4,058	3.608
generous	Lechner	2,307	3.363
gentle	Gorsuch, Lechner, Gibson	2,889	3.461
good	Lechner	74,839	4.874
gracious	Gorsuch, Gibson	422	2.625
guiding	Gorsuch	115	2.061
helpful	Gorsuch, Lechner, Gibson	3,150	3.498

Appendix G: Experiment 3 trait word stimuli

word	source	frequency	log frequency
honest	Lechner	2,960	3.471
humorous	Gibson	438	2.641
impersonal	Gorsuch, Gibson	464	2.667
important	Gorsuch	39,265	4.594
inaccessible	Gorsuch	341	2.533
indifferent	Lechner	619	2.792
intelligent	Lechner	1,895	3.278
intimate	Gibson	1,091	3.038
jealous	Gorsuch	917	2.962
judgemental	Gibson	95	1.978
just	Gorsuch, Gibson	777	2.890
kind	Gorsuch, Gibson	76	1.881
lenient	Gorsuch	182	2.260
loving	Gorsuch, Gibson	518	2.714
loyal	Lechner	1,320	3.121
meek	Gorsuch	152	2.182
merciful	Gorsuch, Gibson	138	2.140
mysterious	Gibson	1,336	3.126
passive	Gorsuch, Lechner	1,263	3.101
patient	Gorsuch, Lechner, Gibson	1,014	3.006
peaceful	Gibson	1,640	3.215
permissive	Gorsuch	219	2.340
petty	Gibson	815	2.911
possessive	Lechner	179	2.253
powerful	Gorsuch, Gibson	7,213	3.858
prescriptive	Gibson	168	2.225
protective	Gorsuch	1,285	3.109
punitive	Gibson	287	2.458
redeeming	Gorsuch	15	1.176
reliable	Lechner	2,231	3.348
restrictive	Gorsuch	864	2.937
righteous	Gorsuch	179	2.253
safe	Gorsuch	6,090	3.785
severe	Gorsuch	4,607	3.663
silent	Lechner	3,798	3.580
sincere	Lechner	481	2.682
spiritual	Gibson	2,308	3.363

Appendix G: Experiment 3 trait word stimuli

word	source	frequency	log frequency
stern	Gorsuch, Lechner, Gibson	259	2.413
strong	Gorsuch	15,898	4.201
supporting	Gorsuch	621	2.793
sympathetic	Lechner	1,426	3.154
tender	Lechner	1,116	3.048
tolerant	Lechner	402	2.604
tough	Gorsuch	2,958	3.471
trustworthy	Lechner	153	2.185
truthful	Lechner	211	2.324
unchanging	Gorsuch, Gibson	178	2.250
understanding	Lechner	3	0.477
unforgiving	Lechner	13	1.114
unpredictable	Lechner	680	2.833
unsympathetic	Lechner	155	2.190
unyielding	Gorsuch	117	2.068
valuable	Gorsuch	3,883	3.589
warm	Gorsuch	6,358	3.803
weak	Gorsuch	3,571	3.553
wise	Lechner	1,916	3.282
wrathful	Gorsuch	12	1.079

Appendix H: God concept survey

Instructions

The following is a survey to determine how well different descriptive words apply to God. Please rate each word twice: first according to how well it describes what the term “God” means to you, and secondly on how well you think the word describes what the term “God” would mean to a strongly committed Christian. **+4** indicates that the you **strongly agree** that the word is descriptive of God. **-4** indicates that you **strongly disagree** that the word is descriptive of God. Circle **0** if you feel exactly and precisely **neutral** about whether the word is descriptive of God. Please complete all of the questions.

	you										strongly committed Christian									
	strongly disagree										strongly agree									
tough	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		
sincere	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		
prescriptive	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		
trustworthy	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		
patient	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		
aggressive	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		
strong	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		
helpful	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		
fair	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		
charitable	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		
avenging	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		
petty	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		
reliable	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		
everlasting	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		
concerned	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		
wise	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		
eternal	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		
dominating	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		
feeble	-4	-3	-2	-1	0	+1	+2	+3	+4	-4	-3	-2	-1	0	+1	+2	+3	+4		

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	you										strongly committed Christian									
	strongly disagree					strongly agree					strongly disagree					strongly agree				
intelligent	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
loyal	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
firm	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
warm	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
majestic	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
spiritual	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
honest	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
kind	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
mysterious	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
safe	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
powerful	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
creative	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
all-knowing	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
impersonal	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
sympathetic	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
omnipresent	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
tender	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
punitive	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
all-powerful	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
companionable	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
benevolent	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
caring	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
just	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
good	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
challenging	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
fearful	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
blessed	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	
protective	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4	

Appendix H: God Concept Survey

	you											strongly committed Christian										
	strongly disagree											strongly agree										
damning	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
intimate	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
mythical	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
passive	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
merciful	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
ineffable	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
jealous	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
cruel	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
weak	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
gracious	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
demanding	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
dangerous	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
restrictive	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
divine	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
unpredictable	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
gentle	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
important	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
universal	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
valuable	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
silent	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
truthful	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
faithful	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
omnipotent	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
sovereign	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
righteous	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
all-wise	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
approachable	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			
unchanging	-4	-3	-2	-1	0	+1	+2	+3	+4		-4	-3	-2	-1	0	+1	+2	+3	+4			

Appendix H: God Concept Survey

	strongly disagree	you									strongly agree	strongly disagree	strongly committed Christian									strongly agree
judgemental	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
unforgiving	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
absolute	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
omniscient	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
close	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
lenient	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
loving	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
peaceful	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
humorous	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
beautiful	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
possessive	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
controlling	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
considerate	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
stern	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
kingly	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
inaccessible	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
glorious	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
changeable	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
generous	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
forgiving	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
benign	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
friendly	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
holy	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
permissive	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
meek	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
supporting	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
unsympathetic	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		
immortal	-4	-3	-2	-1	0	+1	+2	+3	+4			-4	-3	-2	-1	0	+1	+2	+3	+4		

Appendix H: God Concept Survey

	strongly disagree	you									strongly agree		strongly disagree	strongly committed Christian									strongly agree
disapproving	-4	-3	-2	-1	0	+1	+2	+3	+4				-4	-3	-2	-1	0	+1	+2	+3	+4		
distant	-4	-3	-2	-1	0	+1	+2	+3	+4				-4	-3	-2	-1	0	+1	+2	+3	+4		
wrathful	-4	-3	-2	-1	0	+1	+2	+3	+4				-4	-3	-2	-1	0	+1	+2	+3	+4		
critical	-4	-3	-2	-1	0	+1	+2	+3	+4				-4	-3	-2	-1	0	+1	+2	+3	+4		
redeeming	-4	-3	-2	-1	0	+1	+2	+3	+4				-4	-3	-2	-1	0	+1	+2	+3	+4		
tolerant	-4	-3	-2	-1	0	+1	+2	+3	+4				-4	-3	-2	-1	0	+1	+2	+3	+4		
understanding	-4	-3	-2	-1	0	+1	+2	+3	+4				-4	-3	-2	-1	0	+1	+2	+3	+4		
comforting	-4	-3	-2	-1	0	+1	+2	+3	+4				-4	-3	-2	-1	0	+1	+2	+3	+4		
indifferent	-4	-3	-2	-1	0	+1	+2	+3	+4				-4	-3	-2	-1	0	+1	+2	+3	+4		
active	-4	-3	-2	-1	0	+1	+2	+3	+4				-4	-3	-2	-1	0	+1	+2	+3	+4		
severe	-4	-3	-2	-1	0	+1	+2	+3	+4				-4	-3	-2	-1	0	+1	+2	+3	+4		
unyielding	-4	-3	-2	-1	0	+1	+2	+3	+4				-4	-3	-2	-1	0	+1	+2	+3	+4		
constant	-4	-3	-2	-1	0	+1	+2	+3	+4				-4	-3	-2	-1	0	+1	+2	+3	+4		
infinite	-4	-3	-2	-1	0	+1	+2	+3	+4				-4	-3	-2	-1	0	+1	+2	+3	+4		
guiding	-4	-3	-2	-1	0	+1	+2	+3	+4				-4	-3	-2	-1	0	+1	+2	+3	+4		
fatherly	-4	-3	-2	-1	0	+1	+2	+3	+4				-4	-3	-2	-1	0	+1	+2	+3	+4		
almighty	-4	-3	-2	-1	0	+1	+2	+3	+4				-4	-3	-2	-1	0	+1	+2	+3	+4		

Appendix I: God concept survey A

Different people have different ideas about what God is like, whether they believe that God is real or fictional. This survey is to find out how well different words are descriptive of your concept of God.

Instructions

In Column A please rate each word for how well it describes who God is to you personally. **+3** indicates that the word is **extremely descriptive** of who God is to you personally. **-3** indicates that the word is **not at all descriptive** of who God is to you personally. Circle **0** if you feel exactly and precisely **neutral** about whether the word is descriptive of who God is to you personally

In column B please rate each word for your strength of emotion about the rating you made in column A. Circling **6** indicates that you feel **strong emotion** (of whatever sort) about your rating in column A. Circling **0** indicates that you feel **completely indifferent** about your rating in column A.

Example 1: if you feel that the word *severe* is very descriptive of who God is to you personally, and if God's severity causes a strong emotional reaction, you might circle +3 in column A and 6 in column B.

Example 2: if you feel that the word *close* is quite descriptive of who God is to you personally, but you do not feel very moved emotionally by God's closeness, you might circle +2 in column A and 2 in column B.

Please complete all of the questions.

	Column A							Column B						
	extremely undescriptive -3	quite undescriptive -2	slightly undescriptive -1	neutral 0	slightly descriptive +1	quite descriptive +2	extremely descriptive +3	no emotion / strong emotion						
fair	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
invisible	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
controlling	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
divine	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
wise	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
demanding	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
spiritual	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
unfair	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
merciful	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
supernatural	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
critical	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
everlasting	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
weak	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
patient	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
distant	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
strong	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
cruel	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
good	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
infinite	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
honest	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
mystical	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
judgemental	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
heavenly	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
unkind	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6

	Column A							Column B						
	extremely undescriptive	quite undescriptive	slightly undescriptive	neutral	slightly descriptive	quite descriptive	extremely descriptive	no emotion						strong emotion
sovereign	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
gracious	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
majestic	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
malicious	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
all-wise	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
warm	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
perfect	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
compassionate	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
omnipotent	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
indifferent	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
eternal	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
gentle	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
all-powerful	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
selfish	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
sympathetic	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
glorious	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
faithful	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
all-knowing	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
caring	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
prejudiced	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
generous	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
ageless	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
unfriendly	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
creative	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
unforgiving	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
loving	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
holy	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
protective	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
aggressive	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
kind	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
disapproving	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
immortal	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
hostile	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
helpful	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
cold	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
forgiving	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
petty	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
omnipresent	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
dangerous	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
intimate	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
omniscient	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
unsympathetic	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
almighty	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
silent	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
humorous	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
kingly	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
angry	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6
approachable	-3	-2	-1	0	+1	+2	+3	0	1	2	3	4	5	6

Appendix J: Experiment 4 trait word stimuli

Word frequencies are the number of times these words appeared as an adjective in Kilgarriff's (1996) analysis of the British National Corpus of spoken and written English.

Table J. Word frequency data for trait word stimuli used in Experiment 4.

word	frequency	log frequency	word	frequency	log frequency
Negative			Positive		
aggressive	1,925	3.284	approachable	93	1.968
angry	4,226	3.626	caring	498	2.697
cold	7,308	3.864	compassionate	247	2.393
controlling	343	2.535	creative	2,447	3.389
critical	5,763	3.761	fair	7,816	3.893
cruel	1,388	3.142	faithful	1,005	3.002
dangerous	5,730	3.758	forgiving	159	2.201
demanding	1,786	3.252	generous	2,307	3.363
disapproving	66	1.820	gentle	2,889	3.461
distant	2,913	3.464	good	78,376	4.894
hostile	1,644	3.216	gracious	422	2.625
indifferent	619	2.792	helpful	3,160	3.500
judgemental	95	1.978	honest	2,960	3.471
malicious	343	2.535	humorous	438	2.641
petty	815	2.911	intimate	1,091	3.038
prejudiced	65	1.813	kind	82	1.914
selfish	693	2.841	loving	838	2.923
silent	3,798	3.580	merciful	138	2.140
unfair	1,933	3.286	patient	1,556	3.192
unforgiving	28	1.447	protective	1,285	3.109
unfriendly	194	2.288	strong	15,898	4.201
unkind	270	2.431	sympathetic	1,520	3.182
unsympathetic	162	2.210	warm	6,358	3.803
weak	3,571	3.553	wise	1,936	3.287

Appendix J: Experiment 4 trait word stimuli

word	frequency	log frequency	word	frequency	log frequency
Theological			Theological		
ageless	42	1.623	infinite	945	2.975
all-knowing	6	0.778	invisible	1,245	3.095
all-powerful	108	2.033	kingly	1	0.000
all-wise	8	0.903	majestic	264	2.422
almighty	349	2.543	mystical	506	2.704
divine	1,363	3.134	omnipotent	67	1.826
eternal	827	2.918	omnipresent	58	1.763
everlasting	175	2.243	omniscient	53	1.724
glorious	1,067	3.028	perfect	5,574	3.746
heavenly	393	2.594	sovereign	677	2.831
holy	3,025	3.481	spiritual	2,324	3.366
immortal	262	2.418	supernatural	310	2.491

Appendix K: God concept survey C

Instructions

In the left column, please rate each word for how well it describes who or what God is *to you personally*, regardless of whether or not you believe in God. **+3** indicates that the word is **extremely descriptive** of who God is to you personally. **-3** indicates that the word is **not at all descriptive** of who God is to you personally. Circle **0** if the word is **neither descriptive nor undescriptive** of who God is to you personally.

In the right column, please rate each word for how well it describes who or what you think God is *to a strongly committed Christian*. **+3** indicates that you think the word is **extremely descriptive** of who God is to a strongly committed Christian. **-3** indicates that you think the word is **not at all descriptive** of who God is to a strongly committed Christian. Circle **0** if you think the word is **neither descriptive nor undescriptive** of who God is to a strongly committed Christian.

Don't spend too long on a single word. Please complete all of the questions.

	You							Strongly committed Christian						
	extremely undescriptive	quite undescriptive	slightly undescriptive	neutral	slightly descriptive	quite descriptive	extremely descriptive	extremely undescriptive	quite undescriptive	slightly undescriptive	neutral	slightly descriptive	quite descriptive	extremely descriptive
changeable	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
narrow-minded	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
persistent	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
gracious	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
friendly	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
aggressive	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
dependable	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
careful	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
unreliable	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
loving	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
inoffensive	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
calm	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
cruel	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
fair	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
feminine	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
hostile	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
approachable	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
unfriendly	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
unpleasant	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
warm	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
liberal	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
critical	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
unkind	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
predictable	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
petty	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
cautious	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
masculine	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
unfair	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3

	You							Strongly committed Christian						
	extremely undescriptive	quite undescriptive	slightly undescriptive	neutral	slightly descriptive	quite descriptive	extremely descriptive	extremely undescriptive	quite undescriptive	slightly undescriptive	neutral	slightly descriptive	quite descriptive	extremely descriptive
compassionate	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
prejudiced	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
spontaneous	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
cold	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
patient	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
organized	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
spiteful	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
polite	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
malicious	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
reliable	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
indifferent	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
conservative	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
vindictive	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
sympathetic	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
angry	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
trustworthy	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
controlling	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
orderly	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
comforting	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
supporting	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
demanding	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
passive	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
harsh	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
talkative	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
gentle	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
humorous	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
busy	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
harmless	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
generous	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
creative	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
unsympathetic	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
solemn	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
intimate	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
proud	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
offensive	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
wise	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
curious	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
honest	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
moderate	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
weak	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
helpful	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
caring	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
quiet	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3
kind	-3	-2	-1	0	+1	+2	+3	-3	-2	-1	0	+1	+2	+3

Appendix L: Experiment 5 trait word stimuli

Word frequencies are the number of times these words appeared as an adjective in Kilgarriff's (1996) analysis of the British National Corpus of spoken and written English.

Table L. Word frequency data for trait word stimuli used in Experiment 5.

word	frequency	log frequency	word	frequency	log frequency
Negative			Positive		
aggressive	1,925	3.284	approachable	93	1.968
angry	4,226	3.626	caring	498	2.697
cold	7,308	3.864	comforting	383	2.583
controlling	343	2.535	compassionate	247	2.393
critical	5,763	3.761	creative	2,447	3.389
cruel	1,388	3.142	dependable	136	2.134
demanding	1,786	3.252	fair	7,816	3.893
harsh	1,542	3.188	friendly	4,079	3.611
hostile	1,644	3.216	generous	2,307	3.363
indifferent	619	2.792	gentle	2,889	3.461
malicious	343	2.535	gracious	422	2.625
narrow-minded	65	1.813	helpful	3,160	3.500
offensive	1,280	3.107	honest	2,960	3.471
petty	815	2.911	humorous	438	2.641
prejudiced	65	1.813	intimate	1,091	3.038
spiteful	133	2.124	kind	82	1.914
unfair	1,933	3.286	loving	838	2.923
unfriendly	194	2.288	patient	1,556	3.192
unkind	270	2.431	reliable	2,231	3.348
unpleasant	1,306	3.116	supporting	890	2.949
unreliable	487	2.688	sympathetic	1,520	3.182
unsympathetic	162	2.210	trustworthy	153	2.185
vindictive	128	2.107	warm	6,358	3.803
weak	3,571	3.553	wise	1,936	3.287

Appendix L: Experiment 5 trait word stimuli

word	frequency	log frequency	word	frequency	log frequency
Buffer			Buffer		
busy	4,890	3.689	moderate	1,196	3.078
calm	1,382	3.141	orderly	553	2.743
careful	5,218	3.718	organized	522	2.718
cautious	1,137	3.056	passive	1,444	3.160
changeable	68	1.833	persistent	1,249	3.097
conservative	6,594	3.819	polite	1,174	3.070
curious	2,180	3.338	predictable	936	2.971
feminine	861	2.935	proud	3,096	3.491
harmless	661	2.820	quiet	6,191	3.792
inoffensive	52	1.716	solemn	474	2.676
liberal	5,492	3.740	spontaneous	1,029	3.012
masculine	706	2.849	talkative	105	2.021

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Psychology of religion experiments

Thank you for your interest in joining the psychology of religion participant panel. The following details should provide you with enough information to make a decision about participation.

Aims of the research

The Psychology and Religion Research Programme is a group of researchers at the Faculty of Divinity interested in investigating how religion works from the perspective of psychology. We are not trying to “explain religion away” psychologically, but are instead using the scientific tools of experimental psychology to try to understand how different people engage with religious ideas and concepts. To do this we need the help of religious and non-religious people as participants in our experiments.

Participation

You may be able to participate in this research if you are a native speaker of English and are aged between 18 and 40. You are free to withdraw from the research at any point. Before you can take part in one of the experiments, we would like you to complete a short questionnaire. It should only take a few minutes to fill out. When you have returned the questionnaire, I may then ask if you are willing to take part in one or more experiments.

Experiments

Once we are running a suitable experiment, I will phone or email you to arrange a convenient time for you to come to the Faculty of Divinity to be tested. Most experiments involve making simple responses to various words or pictures that are presented on a computer screen, but may also include another questionnaire. Either way, it won't involve electric shocks or anything unpleasant! Depending on the experiment, a typical session of testing lasts about 45 minutes, and you will be paid £6 for the session. After the experiment is finished I will be able to explain more fully what the research is about.

Want to help?

We would very much appreciate your participation in this research. If you would like any further information before deciding whether to participate, please contact me at the address above. However, if you would like to participate in this study, please complete the attached questionnaire and return it to me in the enclosed envelope. I will then get in touch with you to discuss meeting together.

Yours sincerely,

A handwritten signature in blue ink, which appears to read 'Nicholas Gibson'.