

# Hallucinating God?

## The Cognitive Neuropsychiatry of Religious Belief and Experience

### Introduction: Religion as Pathology

*"[Religion] is the opium of the people"* (Karl MARX 1963, pp43–44).

*"Religion would thus be the universal obsessional neurosis of humanity"* (Sigmund FREUD 1927, p713).

At least since MARX and FREUD, there has existed a conceptualization of religious belief as pathological.<sup>1</sup> According to this view, religious beliefs result from, and are indicative of, some kind of intellectual flaw or deficiency (PLANTINGA 2000). We might say that religious beliefs are here construed as reflecting *doxastic dysfunction* (from the Greek word "doxa", meaning "opinion" or "belief")—something has gone awry in the mechanisms by which religious people form and evaluate beliefs.

The advent of cognitive neuropsychiatry (DAVID/HALLIGAN 1996) has heralded a new approach to theorizing about such pathologies of belief, or *delusions*. Cognitive neuropsychiatry aims to develop a model of the pro-

### Abstract

*The claim that religious belief is delusional is evaluated using a current cognitive neuropsychiatric model of delusion formation and maintenance. This model explains delusions in terms of the conjunction of two cognitive deficits—the first a neuropsychological deficit giving rise to an anomalous perceptual experience, the second a deficit in the machinery of belief evaluation.*

*It is argued that to provide an account of religious beliefs as delusional within this model, two requirements must be met: 1. Plausible candidates for the first factor must be put forward; and 2. There must exist individuals with aberrant religious perceptions who do not develop deluded beliefs about those experiences. With regard to requirement 1, a range of "neurotheological" research is reviewed. The second stated requirement is addressed via consideration of "mystic atheists"—individuals who have had mystical experiences yet have not adopted religious beliefs as a result.*

*A variety of problematic issues for the above account are tackled. It is concluded that insight into the motivational basis for religious beliefs, when combined with OCCAM's principle of scientific parsimony, allows a plausible case to be made for religious belief as delusional, provided that a particular construal of belief pathology is adopted..*

### Key words

*Delusion, hallucination, cognitive neuropsychiatry, religious experience.*

cesses underlying normal belief generation and evaluation, and to explain delusions in terms of damage to processes implicated in this model of normal functioning. Cognitive neuropsychiatry is thus a branch of cognitive neuropsychology, a field which investigates disordered cognition as a means of learning more about normal cognition (COLTHEART 2002).

Can religious beliefs, however, properly be conceived of as delusional? The pathological nature of *some* seems quite unequivocal (in psychiatric circles at least). SAVER and RABIN (1997), for example, cite the World Health Organisation's finding that religious delusions occur in 3.2% of unselected schizophrenic patients. SAVER and RABIN also note, however, that making diagnostic distinctions between culturally sanctioned religious be-

liefs and religious delusions is both a clinical challenge and a challenge to established psychiatric nosology. JACKSON (1997) made a psychometric comparison between individuals reporting spiritual

experiences and those reporting psychotic experiences and concluded that there was no clear distinction between them. Due to the apparent equivocation involved in characterisations of religious pathology, therefore, the present paper will not focus upon the more obvious cases of religious pathology, but will evaluate culturally accepted religious beliefs<sup>2</sup>.

So then, can religious beliefs that are sanctioned by, and prevalent in, society be appropriately conceptualized as delusional? If we look to the definition of *delusion* furnished by the American Psychiatric Association (APA), it is not clear that they can. A *delusion* is defined in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, International Version (DSM-IV) as “A false belief based on incorrect inference about external reality that is firmly sustained *despite what almost everyone else believes* and despite what constitutes incontrovertible and obvious proof or evidence to the contrary. *The belief is not one ordinarily accepted by other members of the person’s culture or subculture (e.g., it is not an article of religious faith)* (American Psychiatric Association 1995, p783, italics added).

Just how much credence should be given to the above definition of delusions? Is it appropriate to define delusions in such a way as to exclude anything that a sufficiently large number of people believe? DAVIES et al. (2001) argue that any bizarrely implausible belief (i.e., a belief that violates logical, physical or biological principles that are widely known) that is formed and maintained in ways characteristic of (unambiguous) delusions should, for theoretical purposes, be classified as a delusion<sup>3</sup>. It would seem that many typical religious beliefs (for example, the belief that an obscure Middle-eastern virgin gave birth to a child that was simultaneously God and the incarnate *son* of God) violate at least as many established logical, physical and biological principles as other beliefs that are unequivocally viewed as being delusional (for example, the “Capgras” belief that one’s loved one has been replaced by an impostor). With respect to bizarre implausibility, therefore, at least some conventional religious beliefs certainly qualify as delusions. But are they formed and maintained in ways characteristic of other delusions?

## The Two-Deficit Model

In this paper I will describe a current cognitive neuropsychiatric model of monothematic delusion formation and maintenance<sup>4</sup>, and evaluate the histori-

cal religion-as-delusion claim<sup>5</sup> from the perspective of this new model. The model is known as the “two deficit” or “two factor” model of delusions (DAVIES/COLTHEART 2000; LANGDON/COLTHEART 2000; DAVIES et al. 2001; BREEN/CAINE/COLTHEART 2001; COLTHEART 2002) and takes as its point of departure theoretical work by MAHER and colleagues (MAHER 1974, 1988, 1992, 1999; MAHER/ROSS 1984; MAHER/SPITZER 1993). MAHER had maintained that delusions do not arise via defective reasoning, but rather constitute rational responses to unusual perceptual experiences, which are in turn caused by a spectrum of neuropsychological abnormalities. MAHER’s is thus an *empiricist* account of delusion formation (CAMPBELL 2001).

MAHER’s account has received some theoretical and empirical support. ELLIS and YOUNG (1990), for example, proposed that the aforementioned Capgras delusion arises when the affective component of face recognition is disrupted. The idea is that there are two components to face recognition, an overt “pattern-matching” component and an affective component, which provides the “buzz of familiarity” we experience upon encountering a loved one. If this affective component is disrupted, the ensuing discordance between (say) “she looks like my wife” and “she doesn’t feel like my wife” might be subsequently resolved by invocation of the impostor scenario. This account has received corroboration from work done by ELLIS, YOUNG, QUAYLE and DE PAUW (1997), who recorded skin-conductance responses (SCRs) while showing Capgras patients and normal subjects a series of predominantly unfamiliar faces, with occasional familiar faces interspersed. The findings were that whereas normal subjects showed significantly greater autonomic responsiveness to familiar faces (indexed by mean SCR), Capgras patients failed to show a pattern of autonomic discrimination between familiar and unfamiliar faces—both types of face produced equal degrees of affective response.

This experiment provides support for MAHER’s contention that delusions are responses to aberrant perceptual experiences. COLTHEART, DAVIES, LANGDON and BREEN (DAVIES/COLTHEART 2000; LANGDON/COLTHEART 2000; BREEN et al. 2001; DAVIES et al. 2001) identify perceptual aberrations that may be associated with a series of other monothematic delusions, including delusions of alien control, thought insertion and mirrored-self misidentification. These researchers argue, however, that whereas aberrant perceptual experiences may indeed be *necessary* for delusions to develop, they do

not provide explanatory *sufficiency*. They point to the fact that there exist non-deluded individuals with aberrant perceptual experiences, experiences which indeed parallel those which (it is hypothesised) are experienced by deluded individuals. TRANEL, DAMASIO and DAMASIO (1995), for example, found that non-deluded patients with damage to bilateral ventromedial frontal regions of the brain also fail to discriminate autonomically between familiar and unfamiliar faces. Assuming that the neuropsychological abnormality underlying the performance of Capgras patients and TRANEL's frontal patients gives rise to the same aberrant perceptual experience, a problem surfaces for MAHER's claim that delusions are a rational response to aberrant experiences. COLTHEART and colleagues argue that MAHER's account is incomplete, and that a second factor is needed.

COLTHEART and colleagues admit that the nature of their proposed second deficit is inadequately characterised. At present it can be described simply as the loss of the ability to reject candidates for belief on the grounds of their implausibility and their inconsistency with everything else that the deluded individual knows (DAVIES et al. 2001). They do, however, offer suggestions regarding the nature of the ability that is lost. LANGDON and COLTHEART (2000), for example, suggest that the second deficit entails loss of the ability to override an automatic bias for prioritising sensory evidence when forming beliefs. Natural selection has furnished us with this bias, as it makes good evolutionary sense to trust the evidence of our senses. LANGDON and COLTHEART contend, however, that normal belief evaluation involves an ability to suspend this automatic bias such that other causal explanations (for example, "sub-personal dysfunction" explanations that attribute the experience to dysfunctional neurochemistry) can be weighed up and considered. They hypothesize that the second deficit may essentially be a loss of this ability.

## Religion as Delusion: A Two-Deficit Account

### Two Requirements

The two-factor account seems to provide a plausible explanatory framework for some domains of bizarre belief. But what of religion? Can beliefs of a religious nature be conceptualized as delusional with the two-factor model? The general strategy adopted by

COLTHEART and colleagues for testing the model has been to seek to demonstrate that, when one identifies Deficit-1 in any delusional condition, one can find examples of *non*-deluded people in whom that Deficit-1 is present. Consistent with this approach, I argue in this paper that to provide a two-factor account of religious belief as delusional, two requirements must be met:

1. A plausible candidate or candidates for the first factor (relevant perceptual aberrations underpinned by neuropsychological anomalies) must be put forward; and
2. There must exist individuals with aberrant perceptual experiences that parallel those of the individuals with religious delusions but who do not develop deluded beliefs about those experiences.

### The First Requirement

With regard to requirement 1) above, a range of "neurotheological" research—research into the neural basis of religious and mystical experiences—will now be reviewed. This review will focus on theoretical and empirical work carried out by NEWBERG, D'AQUILI and colleagues, RAMACHANDRAN and colleagues, and PERSINGER and colleagues.

**Newberg, d'Aquili and colleagues.** NEWBERG and D'AQUILI (2000) note that the sensation of union with some higher power or fundamental state is an important aspect of religious and mystical experiences. Such unitary experiences may involve a decreased awareness of the boundaries between the self and the external world, culminating in the "abolition of all boundaries of discrete being" (p. 253). According to NEWBERG and D'AQUILI (2000), it is likely that, neuropsychologically, the self-other dichotomy is a function of the brain's posterior superior parietal lobule (PSPL). They suggest that deafferentiation (blocking of sensory inputs) of the PSPL, which may occur via meditation or the rhythm of ceremonial ritual, underlies unitary states by diminishing the individual's apprehension of the self-other dichotomy. Consistent with this hypothesis, NEWBERG, D'AQUILI and colleagues have in a number of studies found single photon emission computed tomography (SPECT) evidence that meditation is linked to a relative decrease in regional cerebral blood flow (rCBF) in the PSPL (NEWBERG et al. 1997a, 1997b; NEWBERG et al. 2001).

**Ramachandran and colleagues.** A connection between religious experience and epilepsy (especially

temporolimbic epilepsy) has long been appreciated (SAVER/RABIN 1997). According to RAMACHANDRAN, there are three mutually compatible reasons for this connection (RAMACHANDRAN/BLAKESLEE 1998). Firstly, it is possible that the turbulent and inexplicable emotions engendered by the epileptic seizures are misinterpreted in mystical terms. This suggestion accords well with a two-deficit approach to religious belief as delusion—the first deficit comprising aberrant emotional experiences resulting from seizures, which, in the context of the second deficit, are interpreted in mystical (as opposed to subpersonal dysfunction) terms. RAMACHANDRAN and BLAKESLEE (1998) argue, however, that emotional turmoil *per se* cannot suffice as the aberrant experience, because other emotional disorders such as Bipolar Disorder do not have the same association with religiosity.

Secondly, RAMACHANDRAN considers the possibility, first put forward by BEAR and FEDIO (1977), that the repeated electrical bursts characteristic of seizures permanently facilitate certain neural pathways or connections (a process known as “kindling”) involved in the assignment of emotional salience to objects and events. The limbic system forms part of a distributed neural network that performs this function of allocating affective valence and significance to experiences (SAVER/RABIN 1997). If pathways linking sensations to limbic emotional centres (connections between the inferior temporal cortex (IT) and the amygdala) are strengthened, then every object and event (even trivial ones) may become subjectively imbued with deep significance. The patient would “see a world in a grain of sand” (BLAKE 1982, p490).

To test this possibility RAMACHANDRAN et al. (1997) recruited patients with temporal lobe epilepsy (TLE) and religious preoccupations, and used indices of skin-conductance response (SCR) to indirectly measure the strength of connections from IT to the amygdala. The responses of these patients were compared to two normal control groups—“very religious” people and non-religious people. SCRs were recorded while participants were shown a series of stimuli that included words and images from the categories *neutral*, *religious*, *violent* and *sexual*. The results showed that whereas the SCRs of the control participants (both religious and non-religious) were maximal to sexual stimuli, TLE patients showed heightened SCRs to religious words and icons. Their responses to other categories were strangely diminished relative to the control groups.

The results of this experiment eliminate the possibility that ictal “kindling” in TLE patients has resulted in a generalized limbic hyperconnectivity (the religiosity of these patients cannot therefore be explained in terms of *everything* becoming meaningful). The selective augmentation for religious stimuli indicates rather that temporal lobe seizures have selectively enhanced certain neural connections and weakened others. The implications of this research for a two-deficit account of religious belief as delusion are clear: the bottom line is that there may be localizable neural circuitry involved in mediating religious experience, circuitry which becomes hyperactive in cases of temporal lobe epilepsy (RAMACHANDRAN’s third possibility). Religion-specific temporolimbic kindling may thus constitute the first deficit—a neuropsychological abnormality underlying an aberrant perceptual experience.

**Persinger and colleagues.** COOK and PERSINGER (1997) claim that the sense of an external *presence* constitutes the phenomenological basis for most religious experiences. They hypothesise that the experience of this presence is essentially “the transient awareness of a right-hemispheric homologue of the left-hemispheric sense of self” occurring in association with “transient intercalations of neuroelectrical patterns between the two cerebral hemispheres” (p683). In other words, COOK and PERSINGER hypothesise that transcranial magnetic stimulation (TMS) of the region of the brain’s right hemisphere presumed to control notions of the self generates a “sensed presence” when the left hemisphere attempts to comprehend this nonexistent entity (HITT 1999).

PERSINGER and colleagues use a modified motorcycle helmet within which four sets of solenoids are embedded to generate a weak but complex magnetic field over the right temporoparietal lobe (COOK/PERSINGER 1997). The most effective field pattern for generating the sensed presence is known as the “Thomas Pulse”, after Alex W. THOMAS, a colleague of PERSINGER’s who developed it (HITT 1999). According to PERSINGER, at least 80 per cent of participants stimulated in this way experience a presence beside them in the room (VALPY 2001).

### A Symptom Approach to Religious Experience

As mentioned previously, the two-deficit model of COLTHEART and colleagues takes a cognitive neuropsychiatric approach. The focus is on explaining psychiatric *symptoms* (delusions), *irrespective of clinical*

*diagnostic category*, in terms of specific dysfunctions in normal processes. This symptom-based approach may be contrasted with the traditional diagnostic approach in psychiatry, which is concerned primarily with general disease processes. Symptom-based approaches have been increasingly adopted in recent years given doubts about the conception of schizophrenia as a unitary disease entity and the need to develop symptom-focussed therapeutic interventions (BENTALL 1990).

Just as schizophrenia is profitably studied in terms of specific symptoms, a genuine cognitive neuropsychiatry of religious experience might take a “symptom” approach to such experience, breaking it down into specific indicator components and studying these individually. This approach, which conceptualizes religious experience in terms of a collection of potentially dissociable features, is similar to another explicitly cognitive suggestion that religious experience might “be divided eventually into a variety of subprocesses, as has been, for example, the case with memory” (AZARI et al. 2001, p1652).

The research discussed above lays the groundwork for a viable cognitive neuropsychiatry of religious experience. NEWBERG and D’AQUILI have emphasised the feature of *unity*, whereby the subject-object dichotomy is transcended and reality is experienced as an undifferentiated whole (GOODMAN 2002). The work of RAMACHANDRAN and colleagues bears meanwhile on the feelings of deep and profound *significance* associated with religious experiences, while PERSINGER’s work attempts to explain mystic reports of being in the *presence* of God. A symptom-focussed cognitive neuropsychiatric approach to religious experience might synthesize the various “theories of religious experience” implicit in these and other research programs.

A number of authors have proposed lists of the essential features of religious experience (see, for example, BUCKE 1991; PAHNKE 1966; JAMES 1992). In addition to the above features, markers such as *ineffability* (the sense of the incommunicability of the experience) and *timelessness* are routinely mentioned. SAVER and RABIN (1997) claim that their “Limbic Marker Hypothesis” provides an account of the core quality of *ineffability*. Like RAMACHANDRAN, SAVER and RABIN emphasize the central role of the limbic system. They argue that the contents of mystical experience are similar to those of ordinary experience but are tagged by the limbic system as being of deep and fundamental importance. As with strong emotions, therefore, these experiential con-

tents “can be named but cannot be communicated in their full visceral intensity, resulting in a report of ineffability (p507).” GOODMAN (2002), meanwhile, outlines a neurophysiological account of the time distortion that some mystics experience. This account suggests that feelings of timelessness result from serotonergic action upon the substantia nigra neural loop, thought by some to constitute the body’s “internal reference clock” (p269).

### The Second Requirement

With regard to my second stated requirement 2), the aforementioned neuroscientist Michael PERSINGER exemplifies individuals who have had aberrant perceptual (in this case mystical) experiences yet have not developed delusory beliefs about those experiences. RAMACHANDRAN and BLAKESLEE (1998) describe how PERSINGER stimulated his own temporal lobes electromagnetically and “experienced God for the first time in his life” (p175). Elsewhere PERSINGER has been quoted as saying that “religion is a property of the brain, only the brain and has little to do with what’s out there” (VEDANTAM 2001). It seems, therefore, that PERSINGER has had the mystical experience of “encountering a God-like presence”, but has not adopted the religious belief “There is a God” as a result. He is what we might term a “mystic atheist”, someone who is able to override the evidence of his own senses when forming beliefs, and to accept instead a more scientifically plausible (if less personally palatable) subpersonal-level causal explanation for his experiences. In the terminology of the two-factor model, we might say that Persinger has artificially induced the “first deficit” but is not subject to the second.

### Problems for a Two-Deficit Account

#### Interim Summary

I have now sketched out a plausible two-deficit account of experience-derived religious belief as delusional. To recap briefly, I began by noting that there was a tradition, dating back at least to such luminaries as MARX and FREUD, which views religious belief as in some way pathological. I explored the fact that the prevailing diagnostic bible (DSM-IV) makes little provision for this tradition, by conveniently defining delusion in such a way as to exclude conventional religious beliefs, however bizarre and implausible they might be. I sidestepped this issue however and examined the tenets of a currently

popular cognitive neuropsychiatric model of delusions. The two-deficit model of COLTHEART and colleagues attempts to explain all delusions (at least all monothematic delusions) in terms of the conjunction of two cognitive deficits—the first a neuropsychological deficit giving rise to an aberrant perception of some kind, and the second a deficit in belief revision machinery that leaves people with the first deficit unable to discount or override the (aberrant) evidence of their senses.

Subsequently, I noted that recent neurotheological research has identified a variety of anomalous neuropsychological processes that may underpin different facets of mystical experiences, and which thus constitute a spectrum of viable Deficits-1. I noted further a dissociation between individuals with religious experiences who go on to develop religious beliefs and individuals with religious experiences who do not develop such beliefs (our mystic atheists). This dissociation is evidence that our identified Deficits-1 are not in themselves sufficient for the development of religious beliefs. Clearly, some other factor (or factors) must be operating. A viable two-deficit account of experience-derived religious belief thus involves recognizing that religious experience can be conceived as anomalous experience *qua* Deficit-1, whereas the presence or otherwise of Deficit-2 is what distinguishes (non-deluded) “mystic atheists” from (deluded) “mystic believers”.

### Religious Hallucinations?

*“Extraordinary claims require extraordinary evidence”*  
(Carl SAGAN 1997, p60).

Let us now consider some potential criticisms of the account offered above. Firstly, it was suggested that the ability of an individual to override the evidence of their senses (evidence of encountering a God-like presence) and to accept instead a more scientifically credible subpersonal level explanation of their experiences (dysfunctional brain chemistry) is what reveals the presence or absence of Deficit-2. In the face of religious experience, however, is adoption of a religious belief really indicative of intellectual deficit or dysfunction?

It may help here to draw a distinction between *veridical experience* and *hallucinatory experience*. Both types of experience share a compelling sense of reality, yet whereas in cases of veridical experience the sense of reality is accurate (the experience constitutes awareness of a true percept), hallucinatory experiences are distinguished by the absence of exter-

nal stimulation. Given visual experience of an apple, for example, identification of that experience as veridical or hallucinatory is simply a matter of determining whether or not the apple is actually there (I might ask a nearby friend whether she too sees the apple, or I might exercise my other sensory faculties by trying to reach for and take a bite of the apple).

In the case of religious experience, however, veridicality is not so easy to establish. Given an overwhelming sense of God’s divine presence, how might I seek to determine whether my experience is veridical or hallucinatory? What kind of independent verification of God’s presence could I try to obtain? There are no scientific instruments that could confirm His presence empirically, and asking a nearby friend will not solve the matter, because it seems entirely possible that God may be revealing Himself (veridically) to me and me alone. What other faculties could I exercise? Touch? Taste? Smell? These seem futile (not to mention irreverent).

One might argue that the relevant faculty to call upon here is the “faculty of reason”<sup>6</sup>. Viewed objectively and dispassionately, personal experience of God does not constitute appropriate scientific evidence of God’s presence or existence. To dispose of experience-derived religious beliefs therefore we may only need invoke “OCCAM’S RAZOR”, the famous scientific corrective for theories that are explanatorily hirsute. Firstly, however, let us take a few moments to consider what implications religious experience and neurotheological research have for the facts about “what’s out there”.

Some reductionistically inclined commentators have argued that evidence for a brain basis of religious experience is evidence that religious experience is an artifact of biology—“a neurological illusion” (HEFFERN 2001, p23). Others have pointed out, however, that as all human experience is brain-based, evidence that religious experience is brain-based is only to be expected: “The external reality of religious percepts is neither confirmed nor disconfirmed by establishing brain correlates of religious experience” (SAVER/RABIN 1997, p498). According to this view, insights into the way the brain functions to cause religious experience should no more detract from the validity of religious experience than should insights into the way the brain processes visual information detract from the validity and importance of seeing (GOODMAN 2002; RAMACHANDRAN/BLAKESLEE 1998). Indeed, some authors have viewed neurotheological research as evidence *for* religious belief, on the grounds that such research

provides evidence that God has deliberately endowed humans with the neural capacities necessary to perceive Him (SAVER/RABIN 1997).

The bottom line here seems to be that research into the neural bases of religious experience does not bear either way on the truth or otherwise of God's existence. From a scientific standpoint, however (more on this below), God's existence is a complication unjustified by the facts. According to OCCAM's razor, "entities ought not to be multiplied beyond necessity"<sup>7</sup>. If we thus take religious experience as an *explanandum* (that which requires explanation), to posit God in our *explanans*<sup>8</sup> (that which does the explaining) is to posit a superfluous entity, because the most parsimonious *explanans* involves construing religious experience as mere *hallucination*<sup>9</sup>. OCCAM's principle of parsimony thus compels us to suspend belief in God until such time as God provides more objective and incontrovertible evidence of his existence, perhaps by writing "a clear proclamation in the sky, or turn[ing] the moon tartan" (DAVIES 1983, p195).

#### Faith as Motivated Belief?

"Faith is believing what you know ain't so" (Mark TWAIN 1897).

"You can't convince a believer of anything; for their belief is not based on evidence, it's based on a deep seated need to believe" (Carl SAGAN, source unknown).

We have seen that a viable two-deficit account of religious belief as delusion pertains to only a subset of religious beliefs—namely, the portion that derive from religious experience. Presumably, however, substantial numbers of believers in religious doctrines develop and maintain their beliefs in the absence of direct religious experience. How then can we account (atheologically) for the beliefs of these people? To be sure many of them can be attributed to a process of unreflective socialisation—that is, parents instil religious doctrines in their children, many of whom accept these teachings without question. The fact that religious beliefs are not distributed equally around the globe is evidence enough of this process.

But how are we to account for the fact that people are so unreflective and unquestioning in this particular domain—being vastly more credulous here than in other domains?<sup>10</sup> Surely the answer lies in the psychological benefits that religious beliefs confer. This analysis views religious belief as a

species of *akratic* belief—belief that is motivated, that conflicts in some way with the believer's better judgement, and that therefore manifests weakness of will (MELE 1993). We cannot but return to FREUD here, who viewed all instances of religious belief as deriving from and fulfilling deep human wishes: "The secret of their strength lies in the strength of those wishes" (FREUD 1995, p703).

The wish-fulfilling function of religious belief lies in its capacity to allay our *terror*, terror of the world and of the human condition. FREUD writes of nature rising "up against us, majestic, cruel and inexorable..." (1995, p693). Echoing TENNYSON (1850), KEEN (1997) declaims Mother Nature as "a brutal bitch, red in tooth and claw" and notes grimly that "we are ultimately helpless and abandoned in a world where we are fated to die (pxii). BECKER (1973) analyses the terrifying dilemma of human existence, the fact that as sentient, intelligent beings, we can contemplate our fate yet never escape it. We are "dual, up in the stars and yet housed in a heart-pumping, breath-gasping body that... aches and bleeds and will decay and die" (p26).

In the face of such a terrifying and helpless predicament, knowing that we are forever liable to suffering and annihilation, there is a tremendous temptation to take solace in religion, to succumb to beliefs in a divine and benevolent Providence that watches over us and "will not suffer us to become a plaything of the over-mighty and pitiless forces of nature." (FREUD 1995, p696). Crudely put, FREUD's argument is thus that belief in God is simply a result of the desire that there be such a being as God (LOVELL 2003)<sup>11</sup>. The tension between the way the world *is* and the way we would *wish* it to be forces us either to "dully and stoically abandon [our] dreams", or to abandon reality and live in a dream world (KREEFT 1989, pp162–163). FREUD views religious belief as an example of the latter.

It is important to realize that FREUD's is a *genetic* argument, and as such is potentially liable to the *genetic fallacy*. Genetic arguments move from a description of the historical or psychological processes through which certain beliefs come to be held, to the conclusion that those beliefs are false, probably false, unjustified or unwarranted (LOVELL 2003). FREUD's strategy is to debunk religious beliefs by demonstrating that they result from wish-fulfillment. This strategy is clearly genetic. What is less clear, however, is whether the strategy is fallacious. If one construes FREUD as arguing that, owing to their wish-fulfillment origin, religious be-

liefs must be *false*, the genetically fallacious charge would clearly be in order<sup>12</sup>. FREUD's argument, however, is not usually construed so strongly. There is not space here to explore alternative construals. What seems clear is that in failing to distinguish between reasons for belief (*ratio credentis*) and reasons for justification (*ratio veritatis*), FREUD is at least *in danger* of committing an *ad hominem* form of the genetic fallacy. The upshot is that FREUD's claim that religious beliefs derive from wishes has, in itself, only dubious implications for the truth or otherwise of God's existence.

It is only fair to acknowledge here that just as atheists have criticized religious belief as being based on wish-fulfillment, believers in their turn have attempted to expose the motivational underbelly of atheistic beliefs. VITZ (1999), for example, puts forward a "defective father" hypothesis, which argues that atheistic beliefs are the motivated product of anger and disappointment at one's father. The anger and disappointment may stem from death, abandonment or abuse, or simply from the father being cowardly and unworthy of respect (VITZ 1999)<sup>13</sup>. VITZ collected evidence for this hypothesis by comparing prominent atheists and theists in terms of their relationships with their fathers, and found impressive substantiation for his "defective father" hypothesis in the lives of atheists such as HUME, SARTRE, CAMUS, FREUD and NIETZSCHE. A "motivated atheist" account of NIETZSCHE's work is convincingly portrayed by Peter NÁDAS in his extraordinary novel *A Book of Memories*: "I need only think of NIETZSCHE... of how relentlessly and precisely he rails against a God that didn't exist... and thus he fashions Him from His absence, from the desperate anger he felt over His absence; he longs for Him, but should He exist, he'd promptly destroy Him..." (NÁDAS 1997, p208).

VITZ's hypothesis is put forward as a serious theory of the psychological determinants of atheism, and constitutes an ingenious foil for FREUDIAN objections to religious belief. What this argument makes clear is that any attempt to construe religious belief as pathological will need to appeal to more than motivational factors alone. In order to integrate the insight that motives can be a source of religious belief into a conception of religious belief as pathological, we will need to consider some different construals of what it means for a belief to be pathological.

## Construals of "Belief Pathology"

This paper has used the two-deficit model of COLTHEART and colleagues to evaluate the view that religious beliefs are pathological, that they represent breakdown or dysfunction in the way the human belief evaluation system normally operates. Let us take a few moments now to examine more closely this notion of "belief pathology", to consider what it means precisely for the human belief formation system to malfunction. Firstly we need to consider the idea of "proper functioning", a notion that PLANTINGA sees as deeply problematic because of its inherent relativity: "[A system] 'functions properly' only with respect to a sort of grid we impose on [it]—a grid that incorporates our aims and desires". (<http://www.leaderu.com/truth/3truth02.html>). It makes sense to speak of "proper functioning" with respect to systems that we have designed and constructed in explicit accordance with our aims and needs. Thus a television can be said to work properly if it works the way it was designed to. There is no difficulty in speaking of my television malfunctioning, or in saying that my car has broken down, because such devices have been deliberately designed with specific functions in mind.

A natural system, however, be it an ecosystem or the human belief evaluation system, has *not* been designed—at least not according to a standpoint which proclaims religious belief as delusional. As PLANTINGA points out, the "atheological objector" who construes religious belief in terms of *pathology* or *dysfunction* therefore owes an account of these notions<sup>14</sup>. But is it really problematic to speak of dysfunction or pathology where non-designed systems (systems that are the product of blind evolutionary forces) are concerned? What about, say, cardiac pathology? Surely the notion of pathology is a medical notion, a notion inextricably linked with the functioning of the (non-designed) human body? Medical notions of disease and pathology are obviously to be construed relative to health and survival. My heart functions properly, therefore, when it functions in a manner that keeps me alive and well.

One possibility that PLANTINGA suggests as the basis for *proper functioning*, therefore, is in terms of the aptness of that functioning for promoting survival at an individual or species level. Under this construal of *proper functioning*, the onus is clearly on the atheist to demonstrate that religious beliefs are more likely to jeopardize our individual survival, or the survival of our species, than atheistic or agnostic beliefs. There is not space here to explore this in de-



tail. Suffice to say that the abundance of elderly Christians seems to pose an immediate difficulty for any such argument mounted at the individual level. Research indicates, furthermore, that practitioners of any mainstream faith have a longer lifespan, have fewer strokes, less heart disease, better immune system functioning, and lower blood pressure than the general population (NEWBERG/D'AQUILI/RAUSE 2001). Indeed, after a huge review of the literature pertaining to the health benefits of religion, Dr. Karold Koenig of Duke University Medical Centre remarked that "Lack of religious involvement has an effect on mortality that is equivalent to forty years of smoking one pack of cigarettes per day" (EASTERBROOK 1999). Some writers (notably FREUD) have attempted to argue that religious beliefs are a threat to our survival as a species. Others have pointed out, however, that religious traits, like all traits, are evolutionarily determined—selected for their survival value. Religion may have evolved to impose order and stability on society, for example, by reinforcing kinship ties and encouraging tribe loyalty and conformity (RAMACHANDRAN/BLAKESLEE 1998).

The other possibility that PLANTINGA considers is that *proper functioning* may be construed as functioning that *helps us to attain our ends*. Under this construal, the human belief evaluation system functions properly when it functions the way we *want* it to function. Once again, the believer has an easy move here. The believer need only posit happiness and solace as *ends* in order to secure a nonpathological construal of religious belief. If we *want* to feel that our fears are allayed, that a benevolent Providence is looking out for us, then our belief evaluation systems will be functioning properly if they compliantly form beliefs that provide these assurances.

A proponent of the "FREUD-and-MARX Complaint" might argue, however, that there is a *third* possibility—a construal of proper functioning not considered by PLANTINGA in this article. Under this third construal, the belief evaluation system can be considered to function properly when it forms beliefs that most accurately reflect objective reality—when it functions so as to best discern *truth*. Under this construal of proper functioning, belief formation systems that do not function so as to produce beliefs that are, in the first instance, *true*, are pathological. The phrase "in the first instance" is important here, for it may well be that true beliefs produced by the system provide other benefits in addition to yielding truth—they may provide so-

lace, for example, or perhaps increase the likelihood of survival<sup>15</sup>. The fact that a belief formation system may function so as to satisfy motives other than the motive to seek the truth is not therefore a problem, so long as other motives are always subordinate to the truth-seeking motive.

The above analysis views belief-formation systems as functioning properly when belief-formation is predicated upon *alethic* reasons (from the Greek word "aletheia", meaning "truth"), rather than *practical* reasons (a practical reason for believing in God may involve a desire for psychological well-being together with a conviction that belief in God is essential to such well-being; MELE 1993). The scientific method is arguably our greatest alethic instrument, a method which utilizes principles of evidence and OCCAMIAN parsimony to discern truth. On these bases a belief in God's existence is evidentially unjustified and explanatorily superfluous, and therefore pathological.

### Religion as Delusion: A Two-Factor Account

In the writings of COLTHEART and colleagues a trend can be discerned whereby talk of two cognitive *deficits* (DAVIES/COLTHEART 2000; LANGDON/COLTHEART 2000) yields gradually to a broader framework of two general *factors* that are implicated in the formation and maintenance of delusions (DAVIES et al. 2001). In general, the first factor accounts for the *content* of a delusion, including consideration of what perceptual anomalies might lead to a certain delusory hypothesis being generated. The second factor, by contrast, explains why a certain delusory hypothesis, once generated, is then *adopted* and *maintained* in the absence of appropriate evidence for that hypothesis.

Whereas the earlier "second deficit" idea viewed the relevant component of belief evaluation as an all-or-none ability that most people had but that some people could lose through brain damage, the current "second factor" seems rather to consist in being at the extreme end of a belief evaluation continuum, either as the result of ordinary variation (the continuum being normally distributed for people with intact brains), or as a result of brain damage (which would result in a person's position on the continuum being radically shifted).

The precise nature of the dimension implicated here is still open to debate. One alternative is that the dimension is *gullibility* or *credulity*. Individuals high on this dimension would then tend to be ex-

cessively misled by untrustworthy sources of information when forming beliefs. They would thus be vulnerable to accepting (or failing to reject) false beliefs. Another option is that the dimension constitutes the ability to evaluate the likelihood that a potential belief is true, in the light of all relevant doxastic input.

I would like to suggest that the two-factor model be modified by introducing motivational factors as an additional source of first-factor doxastic input. A two-factor account of religious belief as delusion would identify the first factor with whatever *sources* of information suggest a religious belief. Such sources may include the perceptual aberrations that neurotheology has identified, but may also include testimonial sources such as the assertions of our parents and church leaders, *along with a range of defensive suggestions and desires*. Individuals with the “second factor” would tend to be misled by such untrustworthy sources of information. They would thus be prone to giving undue weight to questionable sensory information, apt to uncritically accept the testimony of others, and *liable to having their belief-formation systems derailed and overridden by their motives*.

## Conclusion

The two-factor model of COLTHEART and colleagues explains delusions in terms of the combination of two factors—the first a neuropsychological deficit which gives rise to an aberrant perception of some kind, and the second a dysfunction in the machinery of belief evaluation. This paper has used the two-factor model to assess the claim that religious belief is delusional, by attempting to sketch out a

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plausible two-factor account of such beliefs. This account recognizes that mystical experience can be conceived as first-factor perceptual aberration, whereas the presence or otherwise of the second factor is conceivably what distinguishes atheists from believers.

distinguishes atheists from believers.

In trying to make the case that religious belief is reflective of intellectual dysfunction, the account given here adopts a specific alethic-based construal of belief pathology, and invokes the FREUDIAN argument that religious belief has motivational origins. Sensitivity to the genetic fallacy, however, and recognition of the fact that atheistic belief can also be construed as motivational in origin, requires that a further element be introduced in order to secure an alethic-based account of religious belief as pathological. This element is OCCAM’s principle of scientific parsimony. From an evidential perspective, atheists can be construed as proposing a “negative existential” (God does not exist), whereas believers posit a “positive existential” (God exists)<sup>16</sup>. It is conceivable that both propositions are motivated, but OCCAM’s razor requires only that the latter be scientifically justified<sup>17</sup>. In the absence of compelling objective evidence for God’s existence, therefore, religious belief is, alethically speaking, pathological and, by two-factor standards, delusional<sup>18</sup>.

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## Notes

- 1 These two figures are often credited as originators of the religion-as-pathology perspective. As PLANTINGA (2000) notes, however, the essence of these ideas is to be found much earlier in the writings of the exact contemporaries Jean-Jacques ROUSSEAU (who anticipated MARX) and David HUME (who anticipated FREUD).
- 2 Which are in any case the game pursued by MARX and FREUD.
- 3 Note that other aspects of the DSM-IV definition are also contentious. PETERS (2001), for example, points out that many delusions are not firmly sustained, nor are they necessarily impervious to evidence or experience. Perhaps surprisingly, the stipulation that delusional beliefs be *false* is,

according to PETERS, the *most* problematic aspect of the DSM-IV definition.

- 4 Monothematic delusions are simply delusions that are specific to a particular topic.
- 5 What PLANTINGA (2000) refers to as the FREUD-and-MARX Complaint.
- 6 See SEARLE (2001) for some doubts about the very notion of a separate cognitive faculty of rationality.
- 7 From the latin *entia non multiplicandum sunt praeter necessitatem* (PLANTINGA 2000, p370). \*\*\*Shouldn’t it be: *Entia non sunt multiplicanda praeter necessitatem*\*\*\*
- 8 Alvin PLANTINGA (1996, 2000) denies that theistic belief is ordinarily accepted as an *explanans*. With respect to religious experience, however, I think it fair to construe expe-

- rience-derived belief in God as an explanation of that experience.
- 9 This is because the most parsimonious causal story involves two links in the causal chain: *neural activity* → *experience*. In the absence of a compelling reason to include God in the causal story (intersubjective verification of His presence, for example), to do so is to add a superfluous link to the causal chain.
  - 10 Naturally there are believers who are, in fact, deeply reflective about their religious beliefs. The philosophy of religion is replete with subtle and ingenious arguments for the existence of God; arguments that, on the face of it, constitute rigorous *intellectual* reasons for belief. Nevertheless, I am inclined to agree with Bertrand RUSSELL (and numerous others), who stated that I do not think that the real reason why people accept religion has anything to do with argumentation. They accept religion on emotional grounds (RUSSELL 1957, p24). Furthermore, however ingenious the standard philosophical arguments for Gods existence may be, few if any even attempt to establish the existence of God as a *psychological being*, someone who knows us, loves us, and attends to our prayers. As REY (in preparation) points out, why should a perfect being, or an unmoved mover, uncaused causer, or unexplained explainer have a mind? (p4).
  - 11 For FREUD, recognition of this fact constitutes a reason for giving up religious beliefs, a reason that undercuts ones reasons for so believing. In philosophical terms this fact is (for FREUD) an undercutting defeater for religious belief.
  - 12 For this strategy to avoid committing the genetic fallacy would require the insertion of an extra premise such as All beliefs that result from wish-fulfillment are false, a premise that, as LOVELL (2003) points out, is manifestly unavailable (because wishes sometimes come true).
  - 13 This argument turns back against the psychoanalytically inclined atheist the FREUDIAN view that, psychologically, God is nothing other than an exalted father (FREUD 1995, p504).
  - 14 For the theist there is no difficulty in speaking of the proper functioning of the belief evaluation system. According to theism, human beings and their belief evaluation systems have been designed and created by God (<http://www.leaderu.com/truth/3truth02.html>). The belief evaluation system will thus be functioning *properly* when it forms and maintains beliefs in Gods existence.
  - 15 According to STICH (1990), belief-formation systems that are maximally accurate (yielding beliefs that most closely approximate external reality) are not necessarily those that maximize the likelihood of survival: natural selection does not care about truth; it cares only about reproductive success (p62).
  - 16 Steve LOVELL has alerted me to the positive/negative existential distinction.
  - 17 Because only the latter involves the multiplication of an entity.
  - 18 I want to emphasize that this conclusion is possible only under a specific construal of belief pathology the *alethic* construal. One might object that the manner in which we construe belief pathology is essentially arbitrary, and that applying scientific standards of truth discernment to human belief formation is overly harsh. Thus whereas we might reasonably locate pathology in a *science* that concluded that God exists on the basis of religious experience, to locate such pathology in an *individual* who forms religious beliefs on the basis of their personal experience is excessively stringent. There is no space here to further explore this particular can of worms.

## References

- American Psychiatric Association (1995)** Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, International Version (DSM-IV). American Psychiatric Association: Washington DC.
- Azari, N. P./Nickel, J./Wunderlich, G./Niedeggen, M./Hefter, H./Tellmann, L./Herzog, H./Stoerig, P./Birnbacher, D./Seitz, R. J. (2001)** Neural correlates of religious experience. *European Journal of Neuroscience* 13: 1649–1652.
- Bear, D. M./Fedio, P. (1977)** Quantitative analysis of interictal behavior in temporal lobe epilepsy. *Archives of Neurology* 34: 454–467.
- Becker, E. (1973)** *The denial of death*. The Free Press: New York.
- Bentall, R. P. (1990)** *Reconstructing schizophrenia*. Routledge: London.
- Blake, W. (1982)** *The complete poetry and prose of William Blake* (Newly revised edition). University of California Press: Berkeley.
- Breen, N./Caine, D./Coltheart, M. (2001)** Mirrored-self misidentification: Two cases of focal-onset dementia. *Neurocase* 7: 239–254.
- Bucke, R. M. (1991)** *Cosmic Consciousness: A Study in the Evolution of the Human Mind*. Penguin Books: London. Originally published in 1901.
- Campbell, J. (2001)** Rationality, meaning, and the analysis of delusion. *Philosophy, Psychiatry & Psychology* 8: 89–100.
- Coltheart, M. (2002)** Cognitive neuropsychology. In: Pashler, H. (ed) *Stevens' handbook of experimental psychology: Methodology in experimental psychology* (3rd ed). John Wiley: New York, pp. 139–174.
- Cook, C. M./Persinger, M. A. (1997)** Experimental induction of the “sensed presence” in normal subjects and an exceptional subject. *Perceptual and Motor Skills* 85: 683–693.
- David, A. S./Halligan, P. W. (1996)** Editorial. *Cognitive Neuropsychiatry* 1: 1–3.
- Davies, M./Coltheart, M. (2000)** Introduction: Pathologies of belief. In: Coltheart, M./Davies, M. (eds) *Pathologies of belief*. Blackwell: Malden MA, pp. 1–46.
- Davies, M./Coltheart, M./Langdon, R./Breen, N. (2001)** Monothematic delusions: Towards a two-factor account. *Philosophy, Psychiatry & Psychology* 8: 133–158.
- Davies, P. (1983)** *God and the new physics*. Penguin: London.
- Easterbrook, G. (1999)** *Faith Healers*. New Republic, July 19 & 26.
- Ellis, H. D./Young, A. W. (1990)** Accounting for delusional misidentifications. *British Journal of Psychiatry* 157: 239–248.
- Ellis, H. D./Young, A. W./Quayle, A. H./de Pauw, K. W. (1997)** Reduced autonomic responses to faces in Capgras delusion. *Proceeding of the Royal Society of London: Biological Sciences* B264: 1085–1092.
- Freud, S. (1995)** Totem and taboo. In: Gay, P. (ed) *The Freud reader*. Vintage: London, pp. 481–513. Originally published in 1913.
- Freud, S. (1995)** The future of an illusion. In: Gay, P. (ed) *The*

- Freud reader. Vintage: London, pp. 685–722. Originally published in 1927.
- Goodman, N. (2002)** The serotonergic system and mysticism: Could LSD and the nondrug-induced mystical experience share common neural mechanisms? *Journal of Psychoactive Drugs* 34: 263–272.
- Heffern, R. (2001)** Exploring the biology of religious experience. *National Catholic Reporter* 37: 14–16.
- Hitt, J. (1999)** This is your brain on God. *Wired* 308. Retrieved March 8th 2003, from <http://www.wired.com/wired/archive/7.11/persinger.html>
- Jackson, M. C. (1997)** Benign schizotypy? The case of spiritual experience. In: Claridge, G. S. (ed) *Schizotypy: Relations to illness and health*. Oxford University Press: Oxford.
- James, W. (1902/1992)** *Mysticism*. In: Brody, B. A. (ed) *Readings in the philosophy of religion: An analytic approach* (2nd ed). Prentice-Hall: Englewood Cliffs, pp. 226–242.
- Keen, S. (1997)** Foreword: The denial of death. Simon and Schuster: New York, pp. xi–xvi.
- Kreeft, P. (1989)** *Heaven: The heart's deepest longing*. Ignatius Press: San Francisco.
- Langdon, R./Coltheart, M. (2000)** The cognitive neuropsychology of delusions. *Mind & Language* 15: 183–216.
- Lovell, S. J. J. (2003)** Philosophical themes from C. S. Lewis. University of Sheffield, Sheffield.
- Maher, B. A. (1974)** Delusional thinking and perceptual disorder. *Journal of Individual Psychology* 30: 98–113.
- Maher, B. A. (1988)** Anomalous experience and delusional thinking: The logic of explanations. In: Oltmanns, T. F./Maher, B. A. (eds) *Delusional beliefs*. Wiley: New York, pp. 15–33.
- Maher, B. A. (1992)** Delusions: Contemporary etiological hypotheses. *Psychiatric Annals* 22: 260–268.
- Maher, B. A. (1999)** Anomalous experience in everyday life: Its significance for psychopathology. *The Monist* 82: 547–570.
- Maher, B. A./Ross, J. A. (1984)** Delusions. In: Adams, H. E./Sutker, P. B. (eds) *Comprehensive handbook of psychopathology*. Plenum Press: New York.
- Maher, B. A./Spitzer, M. (1993)** Delusions. In: Costello, C. G. (ed) *Symptoms of schizophrenia*. Wiley: New York.
- Marx, K. (1963)** *Karl Marx: Early writings* (Translated by T. B. Bottomore). Watts: London.
- Mele, A. (1993)** Motivated belief. *Behavior & Philosophy* 21: 19–27.
- Nadas, P. (1997)** *A book of memories* (Translated by I. Sanders/I. Goldstein). Vintage: London.
- Newberg, A./Alavi, A./Baime, M./d'Aquili, E. (1997)** Cerebral blood flow during intense meditation measured by HMPAO-SPECT: A preliminary study. Paper presented at the American College of Nuclear Physicians Annual Meeting, Palm Springs CA.
- Newberg, A./Alavi, A./Baime, M./Mozley, P./d'Aquili, E. (1997)** The measurement of cerebral blood flow during the complex cognitive task of meditation using HMPAO-SPECT imaging. *Journal of Nuclear Medicine* 38: 95P.
- Newberg, A./Alavi, A./Baime, M./Pourdehnad, M./Santanna, J./d'Aquili, E. (2001)** The measurement of regional cerebral blood flow during the complex cognitive task of meditation: A preliminary SPECT study. *Psychiatry Research: Neuroimaging* 106: 113–122.
- Newberg, A. B./d'Aquili, E. G. (2000)** The neuropsychology of religious and spiritual experience. *Journal of Consciousness Studies* 7: 251–266.
- Newberg, A./d'Aquili, E./Rause, V. (2001)** *Why God won't go away: Brain science and the biology of belief*. Ballantine Books: New York.
- Pahnke, W. N. (1966)** Drugs and mysticism. *International Journal of Parapsychology* 8: 295–313.
- Peters, E. (2001)** Are delusions on a continuum? The case of religious and delusional beliefs. In: Clarke, I. (ed) *Psychosis and spirituality: Exploring the new frontier*. Whurr Publishers: London, pp. 191–207.
- Plantinga, A. (1996)** Dennett's dangerous idea: Darwin, mind and meaning. *Books and Culture: A Christian Review*. Retrieved 8th September 2003, from the World Wide Web: <http://www.id.ucsb.edu/fscf/library/plantinga/dennett.html>
- Plantinga, A. (2000)** *Warranted Christian belief*. Oxford University Press: New York.
- Plantinga, A. (2002)** Theism, atheism, and rationality. *Truth Journal*. Retrieved March 18th 2003 from the World Wide Web: <http://www.leaderu.com/truth/3truth02.html>.
- Ramachandran, V. S./Blakeslee, S. (1998)** *Phantoms in the brain: Human nature and the architecture of the mind*. Fourth Estate: London.
- Ramachandran, V. S./Hirstein, W. S./Armell, K. C./Tecoma, E./Iragui, V. (1997)** The neural basis of religious experience. *Society for Neuroscience* 23: 1316.
- Rey, G. (in preparation)** Meta-atheism: Religious belief as self-deception. In: Antony, L. (ed) *Philosophers without God*. Oxford University Press: New York.
- Russell, B. (1957)** *Why I am not a Christian: And other essays on religion and related subjects*. Routledge: London.
- Sagan, C. (1997)** *Billions and billions: Thoughts on life and death at the brink of the millennium*. Ballantine Books: New York.
- Saver, J. L./Rabin, J. (1997)** The neural substrates of religious experience. *Journal of Neuropsychiatry* 9: 498–510.
- Searle, J. R. (2001)** *Rationality in action*. MIT Press: Cambridge MA.
- Stich, S. P. (1990)** *The fragmentation of reason: Preface to a pragmatic theory of cognitive evaluation*. MIT Press: Cambridge MA.
- Tranel, D./Damasio, H./Damasio, A. R. (1995)** Double dissociation between overt and covert face recognition. *Journal of Cognitive Neuroscience* 7: 425–432.
- Tennyson, A. L. (1850\*\*CORRECT YEAR\*\*) In Memoriam: A. H. H. Edward Morton**: London. \*\*Originally published in 1850\*\*
- Twain, M. (1989)** *Following the Equator: A Journey Around the World*. Dover Publications: New York. Originally published in 1897.
- Valpy, M. (2001)** Is God all in our heads? *The Globe and Mail*, 25 August, p. F7. Retrieved 27 February 2003 from <http://www.conspiracyplanet.com/channel.cfm?channelid=63&contentid=249>
- Vedantam, S. (2001)** Tracing the synapses of our spirituality: Researchers examine relationship between brain and religion. *Washington Post* 17 June, p. A1.
- Vitz, P. C. (1999)** *Faith of the fatherless: The psychology of atheism*. Spence Pub: Dallas.