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Guest Editors: David L. Smith/Robert E. Haskell

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Introduction

THE PAPERS IN THIS SPECIAL ISSUE OF EVOLUTION AND COGNITION were presented at the 2nd Annual Conference of the *New England Institute for Cognitive Science and Evolutionary Psychology* (NEI) on Religion, Cognitive Science and Evolutionary Psychology in Portland, Maine (USA) on August 12–13, 2003. Just as last with year's proceedings, the fit with *Evolution and Cognition* is a good one. Not only are *Evolution and Cognition* and NEI both founded on an integrative biological evolutionary and cognitive science framework, but on a strongly interdisciplinary perspective as well.

At least since the great psychologist and philosopher William JAMES, the issue of religious experience has been the subject of scientific investigation. NEI was conceived on a commitment to bring together divergent viewpoints as, indeed, are reflected in the papers from the conference. The papers selected for inclusion in this volume reflect a broad array of conceptions of religion deriving from neuroscience, experimental psychology, philosophy, artificial intelligence, and evolutionary biology. They also reflect the whole rage of investigative norms appropriate to these disciplines.

Because of the strongly interdisciplinary flavor of these papers, it was difficult to divide them neatly into categories. However, we have arranged them in an order broadly reflecting their main emphases. We hope that these papers will not only provide a basis for further thought, but will also convey something of the flavor and excitement of the conference itself.

Finally, we would once again like to thank the editors of *Evolution and Cognition* for their interest in publishing these proceedings.

Robert A. Hinde

Religious Systems

Evolution, Cultural Change, and the Development of Religiosity

Introduction

The aim of this paper is to show that full understanding of any religious system requires an integration of evolutionary, cultural and individual processes. The implication is that a similar conclusion applies to virtually any aspect of specifically human behaviour. The intention here is to indicate a route to an understanding and synthesis of the bases of religiosity rather than to enter into detail on any particular aspect[1]. The paper focuses successively on evolutionary/functional issues, changes in religious systems, and the development of religiosity in the individual.

Abstract

Six components can be recognised in most religious systems, though there are great differences in the extent to which each is emphasized. These are structural beliefs, which are outside time, like the trinity; narratives, like the parables; ritual; a moral code; religious experience; and a social aspect. Each of these depends on pan-cultural psychological characteristics that are adaptive in other contexts. For instance belief in all-powerful deities enables individuals to explain strange events by attributing them to a deity; to feel some measure of control over their lives by prayer, to receive comfort in the face of adversity; to be comforted when lonely, and so on.

The acquisition of a religious system again depends on pan-cultural characteristics in interaction with the social environment. For instance, morality depends on the propensities of children to assert their own needs and to behave prosocially. Cultural differentiation depends on diachronic dialectical relations between people's values and behaviour and those they are supposed to hold and do.

Key words

Religion; belief; morality; evolution; culture; development.

Evolution of Religious Systems

On the basis of relationship studies, it has been argued that around half of the variance between individuals in religious attitudes and values is due to genetic factors (WALLER et al. 1990). However there has been no satisfactory explanation of the evolution of a religious system in terms of its biological advantage. REYNOLDS/TANNER (1983) claimed that cultures in which the relevant code of conduct favoured a high reproductive rate tended to be those in which the environment was unpredictable, and vice versa (i.e., that r and K selection operated on religious systems as wholes). However the data available to them were inadequate for their thesis. More recently a favoured hypothesis has been that religious systems have been selected to promote the social integration of communities (e.g., WILSON 2002). While there can be no doubt that social integration is a beneficial consequence of religious systems, that is quite a different matter from showing that it is a function in the strict sense of a consequence through which selection (natural or social) has acted (HINDE 1976). Furthermore, such an approach cannot account for all the manifestations of a religious system.

The view adopted here is that every religious system involves a number of interdependent components, whose relative importance differs between religious systems. The several components are mutually supportive, producing a more-or-less integrated system. These components depend on pan-cultural psychological characteristics that can reasonably be supposed to be adaptive in other contexts (HINDE 1999). This would still be compatible with a role of genetic factors in transmission. Their role would be the result, not of selection through the beneficial consequences of the system as a whole, but through those of the basic psychological processes upon

which it depends. This approach thus depends on analysis of religious systems into components; identification of the basic psychological processes upon which each component depends; understanding how the components support each other, and analysis of the cultural differences arising over historical time.

Six components can be recognised in most religious systems, though there are great differences in the extents to which each is emphasized. We may consider each in turn, referring briefly to the pancultural psychological characteristics on which each depends.

Structural Beliefs

Most religious systems involve acceptance of certain beliefs that are outside time, such as the Christian Trinity. Belief in one or more deities can satisfy a number of human needs:

Attribution. People seek to understand the world around them, and it is presumably adaptive to do so. Understanding here implies attributing events to causes. The sorts of attributions that are made depend on the individual and on the culture in which he is living (MORRIS/NISBET/PENG 1995). In our everyday life we use principles that we already possess: thus if a tree falls over we may attribute it to the force of the wind. If the event is otherwise incomprehensible, as for instance with the eruption of a volcano or the creation of the earth, some satisfaction is available if the event can be attributed to a deity: at least the world no longer appears to be unpredictable.

Control. People need to feel that they are in control of their fates (BANDURA 1997). If the gods can affect the world, perhaps prayer, sacrifice, or good behaviour will influence them to do so in ones favour.

Adversity. Similarly, comfort in adversity can be obtained from appeal to a deity for help, or by belief that it is Gods will. It has also been argued that religions effectiveness comes from the fact that it is not merely a form of tension-reduction or denial, but that it affects the significance of what is sought (PERGAMENT 1997).

Mortality. Gods provide ways of coming to terms with our mortality.

Relationship needs. People need relationships with others, for instance to share their experiences. For the believer, gods may be always available, and a period of prayer or contemplation can provide much of the satisfaction of sharing ones experiences with a sympathetic listener.

Social integration. Shared beliefs attract us to others, especially if those beliefs are otherwise unverifiable (BYRNE/NELSON/REEVES 1966). In this and other ways, religion aids social integration.

Meaning in life. There is evidence that something that can be called peace of mind, stemming from a consistent system of beliefs, aids well-being and health. One study showed that certainty of belief, whether it involved religiousness or a confident non-religious attitude, was associated with better mental and physical health (SHAVER/LENAUER/SADD 1980).

Structural beliefs usually involve an anthropomorphic, or at least animate, being. This is in harmony with the early developing ability to distinguish animate from inanimate objects by the former's ability to act as agents (GELMAN/DURGIN/KAUFMAN 1995). Deities also combine everyday with improbable characteristics. The former make them comprehensible, the latter (for instance omnipresence, omniscience) make them interesting (BOYER 1994, 2002). They are in a way comparable to ghosts, which are transparent, can pass through walls, and so on, but also have anthropomorphic properties in that they can be unhappy, wail and express other emotions. The Christian Trinity goes some way to parcelling out the anthropomorphic and improbable characteristics to different beings: Jesus is human-like, the Holy Ghost is intangible and improbable, and the Father combines both.

It is reasonable to suppose that the needs met by belief in a deity are independent of that belief, and have been shaped by selection (also) in other contexts.

The ability to form beliefs depends in turn on yet other more general mechanisms, which also function in other contexts. For instance, beliefs tend to be stable. This can be accommodated in the concept of the self-system, a concept valuable for explaining many psychological phenomena. Thus an individual may see herself as female, good-looking, sociable, Christian, honest, and so on. In other words, our beliefs, attitudes and values are included in how we see ourselves. But we see ourselves as more or less the same person in all contexts. Much of human behaviour can be understood on the view that it is directed towards maintaining congruency between how one sees oneself, ones perception of ones own behaviour, and how one perceives others to perceive oneself. Thus if a person who sees himself as honest, and believes himself to be behaving honestly, hears some one say that he is not honest, he may employ a variety of devices to maintain a constant view of

himself. For instance he may treat it as a joke, regard the speaker as biased or unreliable, and so on (BACK-MAN 1988). Our religious beliefs are part of our self-systems, and so are protected in this way.

Narratives

Most religions involve narratives, such as the Gospels. This is hardly surprising, since most of our thinking about our lives is in narrative form, mostly loosely linked vignettes of incidents (BRUNER 1986). Parents use narratives in the socialisation of children, and our explanations of events take a narrative form. In a religious system the narratives help to define the deities and relate them to the everyday world. Their content is influenced by the current social system (life in Palestine in the case of Christianity) and they concern matters of general concern, such as the mysteries of birth, life and death.

Ritual

Probably all religions employ rituals. These too depend on psychological propensities that appear in many other contexts. The repetitive nature of many actions used in religious rituals finds parallels in children's games and in obsessive/compulsive disorders. Religious rituals (and narratives) employ symbolism, such as up/down and light/dark, that are employed in many other contexts. They utilise superstitions that play a part in most peoples everyday lives: for instance we tend to think that things that look alike share a common essence (and so may stick pins into pictures of our enemies, or venerate the image of a saint), and tend to feel that touching another object may transfer something from that object to oneself (as pilgrims feel blessed by touching a sacred object). These superstitions are functional in other contexts: it is sensible to treat something that looks like a tiger as if it were a tiger, and it is as well not to touch faeces (ROZIN/NEMEROFF 1990). Furthermore representations of ritual actions respect general logical distinctions that inform everyday action sequences (LAWSON/MCCAULEY 1990). WHITEHOUSE (2000) and MCCAULEY and LAWSON (2002) have elaborated theories of ritual action, drawing attention to the contrast between religions that involve much repetitive prayer and so on, like Christianity, and those that depend on traumatic rituals, such as the initiation rituals found in many of the indigenous religions in non-literate groups.
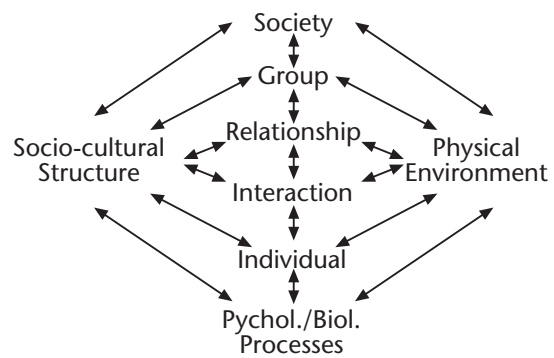
Figure 1: A simplified view of levels of social complexity. Each level continually influences, and is influenced by, others, by the physical environment, and by the socio-cultural structure, with its beliefs, values, conventions and institutions. The influences involve behavioural, cognitive and affective processes in the individuals concerned, mediated by the meaning attributed to events and situations. Each level, including that of the individual, is thus to be seen not as an entity but as involving diachronic and synchronic processes of creation, maintenance and degradation through the dialectical relations between and within levels.

Moral Codes

Our moral codes and values are often seen as having been provided by a deity to govern our behaviour. In fact, while they have indeed been purveyed by religious systems, they can be understood as resulting from continuous dialectical diachronic transactions between what people do and what they are supposed to do over historical and perhaps prehistorical time. It is convenient to see this in terms of a scheme that finds application in many other contexts, as follows.

To understand fully any aspect of specifically human behaviour it is necessary to distinguish a number of levels of social complexity (Figure 1): societies, groups, relationships, short-term interactions, individual behaviour, and psychological/physiological processes. Each of these affects, and is affected by, the others. For instance, the course of an interaction is affected by the natures of the individuals involved, and by the relationship (if any) in which it is embedded (and perhaps by expectations of future interactions with the same individual). In addition, each of these levels is affected by, and affects, the physical environment and the socio-cultural structure of beliefs, values, norms, precepts and so on of the society. For example, as more people became divorced, divorce became more respectable, and as divorce became more respectable, more people were divorced.

The moral precepts and norms of the societies are incorporated into the self-systems of individuals. The conscience (good or bad) thus involves a discrepancy between the precepts incorporated in the self-system of the individual and the way in which he/she sees his/her own behaviour.

As discussed further below, moral codes can be seen as a necessitated by the ubiquitous but mostly incompatible pancultural human propensities to look after ones own interests and to behave prosocially to other kin group members. They concern not only being nice to other people but also a number of other issues, and fall into a number of categories:

Prosociality to kin. Individuals are predisposed to behave more prosocially and cooperatively to those whom they perceive to be related to them than to others. Related here refers in the first place to genetic relatedness, but cultural norms may extend the category to include non-related individuals. Prosociality to related individuals can be readily understood in terms of kin selection: natural selection operates to ensure that individuals act to maximise their lifetime reproductive success and that of their close relatives. Prosociality to unrelated individuals *perceived* as kin is presumably due to cultural selection (see below).

The practices of contraception, infanticide, and child adoption, all of which are apparently incompatible with the principle of kin selection in that they involve an apparent reduction in reproductive potential, can all in practice be understood in terms of that principle in interaction with individual and cultural demands. Thus contraception may prevent conception when the mother is in no condition to raise a child; while in the modern world it is used when the demands of a modern life-style seem more important than reproduction. Infanticide is practiced mostly when the mother is unlikely to be able to rear the child successfullly, or by step-fathers who are not genetically related. Adults who adopt children are usually related genetically to it, or unable to conceive themselves and thus satisfying their (naturally selected) desire for parenthood.

Prosociality and reciprocity to non-kin. The most powerful group of theories concerned with interactions between individuals involve the principle of fair exchange. Fair here, of course, means perceived to be fair. Human relationships are seen as involving exchange, individuals incurring costs (in an everyday, not a biological, sense) in the expectation of future returns. A variant of the moral principle Do-as-you-would-be-done-by is espoused by virtually all world religions (Kung/Kuschel 1993). Reciprocity implies initial prosociality, for a potential exchange sequence started assertively is likely to be aborted.

The ubiquity of prosociality and reciprocity to non-kin group members has provided an evolutionary puzzle, since it appears to involve sacrificing one's own reproductive potential for the sake of an individual who is more or less unrelated. However it can be understood in terms of cultural group selection (Wilson 2002; Boyd/Richerson 1991). Emotions such a guilt and shame, and virtues such as honesty and trustworthiness, can be seen as necessary concomitants of prosociality and reciprocity.

Status and rights. The moral precepts that follow from the selection for prosociality are necessitated by the pancultural propensity for self-assertiveness (see below). For human groups to be viable, prosociality to in-group members must predominate over selfish assertiveness. However selfish assertiveness can also contribute indirectly to coherence in the society. For instance, in most societies it is considered proper to show respect to those older or senior to oneself, and humility is seen as a virtue (see, for instance the Anglican catechism). Such moral principles were presumably imposed by those with power in the society. Again, the precise way in which human rights are defined differs between societies, but insistence on them presumably depends on the developing need for autonomy and individual assertiveness.

Respect for deities and religious leaders. Moral precepts here again presumably depend on the assertiveness of religious specialists whose positions in society depend on compliance, or on secular rulers whose position is in some way linked to the religious system. Like other moral precepts, they may be reinforced by threats of punishment for non-compliance in this life or hereafter.

Sex- and gender related issues. Sexual arrangements differ greatly between cultures, but survey evidence from fairly diverse cultures indicates that women are expected to be more prosocial in a variety of ways than are men (Williams/Best 1982). Evidence of several kinds indicates that women do in fact tend to be more caring, and to place more emphasis on personal relationships, than men (e.g., Gilligan 1982), while men tend to be more aggressive and assertive. In this and a variety of aspects of gender relations, it is possible to argue convincingly that the gender differences are in keeping with biological expectations, though more difficult to obtain hard proof that they are the result of natural or cultural selection. However, an explanation in terms of bio-

logical function is strongly suggested. In brief, the comparative anatomy of the genitalia of the great apes and humans indicates that humans, earlier in evolution, were mildly polygynous (SHORT 1979). It would have been in the male's interests to be assertive in obtaining and protecting female partners. For females, pregnancy and lactation mean that replacing a lost infant is more costly for females than for males. Therefore, females need to be caring for their offspring and, if male care and protection is important for the rearing of the offspring, prosocial to partners or potential partners.

Every culture has norms, often elevated to moral precepts, specifying when and where sexual relations between individuals is permitted (WESTERMARCK 1891). These differ markedly between societies, but in virtually all there are barriers to intercourse with close kin. In biological terms, these serve to prevent inbreeding, However kinship is often culturally defined: This may serve to regulate the exchange of wives across social groups, or be in the interests of powerful groups in the society: GOODY (2000) suggests that the Christian marriage laws were imposed by the Church to maintain its power and its ability to attract benefactions.

In virtually all societies, men are allowed more sexual freedom than women. Biologically, a woman incurs fewer costs if her partner has an extra-partner liaison than a man does in the reverse situation, for he might then be raising a child that he did not father. Thus virginity at marriage and female fidelity has been valued more than male in virtually all societies. No doubt the rigidity of the prohibition has been due to the ability of males, holding greater power than females over social matters, to shape cultural norms.

Although males have had the greater power in social and political arenas, in many cultures the reverse is true in the homes. This is in harmony with biological predictions: men have needed the power the ensure the proper organization of the group for protection from the men of other groups, and proper internal structure so that their women were protected from other in-group males, while women needed to preserve resources for themselves and their children.

Group integration is likely to further the survival and reproductive potential of group members in comparison with members of less well integrated groups. It depends on a variety of pancultural psychological characteristics. For instance, individuals see themselves as members of particular groups, and strive to maintain the congruency of their self-sys-

tems (see above). Individuals also like to associate with others who share the same beliefs and attitudes as themselves, especially if the beliefs are unverifiable, and to see their own group as superior to other groups. These appear to be pancultural attributes. A variety of moral precepts and values contribute to this end. For instance, loyalty to the in-group, and the willingness to sacrifice interests or life itself for the sake of the group are highly esteemed characteristics. Cultural devices such as flags and parades may be used to augment these values, and the symbols may acquire an almost sacred quality.

In addition, some moral precepts, such as the Jewish dietary laws, result in the maintenance of distinctiveness from other groups.

Integration of Social Groups

This has already been mentioned in the context of moral codes.

Religious Experience

This is the most difficult aspect of religiosity to understand in terms of pancultural propensities. There have been two approaches, both drawing on parallels between religious and secular experience. A cognitive approach suggests that religious experience involves some sort of cognitive resolution (HOOD et al. 1996) or solving an intellectual problem (BATSON/VENTIS 1982). The other points to the resemblance between the language used in many accounts of religious experience and that used to describe aesthetic experiences, the difference lying mainly in the interpretation. It is, of course, impossible to dissect the description of the experience from the interpretation. There is some evidence that some forms of aesthetic experience, especially that stemming from the perception of natural scenes, may have been adaptive earlier in human history (ORIANS/HEERWAGEN 1992).

The Integration of Religious Systems

Not only does each component of a religious system satisfy or exploit certain pan-cultural propensities, but also each supports others to form a system. For instance, the narratives illustrate the structural beliefs and the moral code; the rituals are usually based in the beliefs and narratives (though this is not the case in the indigenous religions of many pre-literate societies, WHITEHOUSE 2000), and may support the moral code. The narratives, the ritual

and the moral code support social integration. Social integration and ritual promote the structural beliefs. And within each component the sub-components may support each other: for instance in small groups the kin group and the social group become virtually the same.

It is thus dangerous to consider the genesis of one component of a religious system in isolation from the others.

Cultural Differentiation of Religious Systems

The relative emphasis and patterning of the components of a religious system differ between cultures. This is presumably a consequence of cultural selection, whose consequences are determined in part by the history, and environment of the group and its relations to other groups.

The usual explanation of cultural differences is that cultural group selection operates because the group becomes more effective in competition with other groups (WILSON 2002). Competition with other groups would also give an advantage to a group that was able to change with change in the non-human environment or the nature of surrounding groups. While group effectiveness is certainly often a beneficial consequence, and is indeed likely to be an important matter, there are also proximal causes of changes in group structure and religion. For instance, charismatic leaders or oppressed groups may initiate change.

Many aspects of religious systems seem to be such as to maintain not only effectiveness but also distinctiveness from other groups. The Jewish dietary laws have already been mentioned in this context. One may ask why this should be a good thing? Many explanations are possible, such as that marriage to another group prevents inbreeding. But there is also another proximate issue it is in the interests of the group leaders, and thus depends on propensity for status-seeking.

But cultural change also occurs as a result of the internal dynamics of the group. Changes in the moral code may depend on diachronic dialectical transactions between what people do and what they are supposed to do. For instance, as divorce became more usual in western societies, it became more acceptable, and as it became more acceptable it became more frequent (see Figure 1). In addition, individuals in positions of power may seek to amend the code in their own interests. Religious and secular leaders may use religious vindication for their ac-

tions. And those low in an hierarchical system may seek to remedy perceived injustices by changing the system.

Comparable changes may be seen in the elaboration of codes of law. Initially, the evidence suggests, prosociality and fair reciprocity was maintained by the threat of revenge (BOEHM 2000). But revenge can escalate, leading to bitter feuds. Control was taken over by chiefs or kings, and the punishment for infringements came to include an element for breaking the peace as well as retribution to the victim or his/her family. From there, codes were elaborated, with punishments according to the nature of the offence (ADAMS 1876). However, the nature of the changes that occur depend on the history and ecology of the group. For instance, the early kibbutzim did not find it easy to establish themselves. When it became necessary to introduce punishment for offences, the contribution of the offender to the public good was taken into account as well as the nature of the offence (SALTMAN 1985).

Individual Acquisition of Religious Systems

(i) *Acquisition in Christian communities*. Religiosity is not to be seen as something that is merely taught, added on in the course of development. Rather, while teaching may play its part, religiosity is acquired as an integral part of socialization. Consider first acquisition in Christian communities. In our society many children are taken to church before they have any comprehension of what it is all supposed to mean. They accept it as part of what people do on a particular day of the week. No doubt they are impressed by the contrast with ordinary life by the special atmosphere, by the religious leader who speaks with a strange tone of voice, and by the unusual behaviour of their parents.

Acquisition of morality is based on the pancultural predispositions to assert one's own interests and to please others. Infants do many things that are a nuisance to their parents, but mostly these are not to be seen as bad, but as part of natural development. They also have propensities to please others, especially their parents. This is, of course, in their own interests in fostering their parent's caregiving.

The acquisition of religiosity depends also on a number of other psychological capacities and propensities functional also in other contexts. Among these may be mentioned the early emerging recognition that animate objects differ from inanimate objects in that the former are capable of self-pro-

pelled motion; the capacity to name and classify living beings; the theory of mind, including the imputing of states of mind to others; and the capacity to store knowledge in terms of schemata. Children are able to accept and find attractive ideas about beings with improbable properties, and become able to commit themselves to a religious system in a manner comparable to commitment to personal relationships.

The content of the religious system that is acquired, and the extent of their commitment to it, depends on their relationship with their parents. On the whole, children's religiosity is likely to be similar to that of their parents. However a Swedish study has shown that this depends on their relationship with their parents. Children with a close, secure relationship are likely to share the religiosity of their parents and, if they undergo a conversion, it is likely to be a gradual one. By contrast, children with insecure relationships may or may not share the religiosity of their parents, and any conversion is likely to be sudden, intense, and self-transforming (Granqvist, in press). Of course, it is not only the parents who influence the growing child's religiosity: later on peers and authority or charismatic individuals may be important.

Since religiosity is likely to exercise a restraining influence on the child's behaviour, religious practice is likely to conflict with his or her increasing desire for autonomy. This will influence its course of development.

(ii) *Acquisition in other cultures*. The course of acquisition may be different in other cultures. For example, the preceding outline contrasts dramatically with the way in which religious traditions are acquired and transmitted in many groups in Papua New Guinea. In such cases individuals are initiated, usually around the age of puberty, in ceremonies that may continue for days, weeks or even years and which contain intensely traumatic episodes. The relation of such sorts of religiosity to those more common in the west is a matter of current discussion amongst anthropologists (McCauley/Lawson 2002; Whitehouse 2000).

Conclusion

The understanding of religious systems can be facilitated if they are seen as involving a number of interdependent components, whose relative importance varies between religious systems. Each of those components depends in part on pancultural psychological characteristics that are presumably adaptive in other contexts. Although differences in the basic beliefs of different religious systems have provided a basis for intolerance, cruelty, war, and enormous suffering, the practice of religion can satisfy individual needs and bring great comfort to many.

Although religious sytems appear to be fixed and rigid, especially in literate societies, they are susceptible to change through external influences, charismatic rebellious leaders, or through the diachronic changes induced over time by the dialectical relations between what individuals do and what they are supposed to do.

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Note

1 The paper summarises the principle conclusions in Hinde (1999 and 2002), where more extended discussion and detailed references are given.

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Religion, Death and Horror Movies

Some Striking Evolutionary Parallels

WHY ARE SOME ASPECTS of culture more pervasive and memorable than others? BOYER (2001) has addressed this question from an evolutionary point of view, focussing on religion—a form of human culture that has proven as resistant to analysis as it is widespread.

Any explanation of religion must reach beyond the safety of considering so-called "primitive" belief systems to include the "sophisticated" beliefs of the author's own culture, including his family, professional colleagues and, ultimately, himself. A general explanation of religion, per se, must address commonalities between the most exotic tribal beliefs and widely accepted dogma of the major religions.

BOYER (2001) has done this. Drawing on a wealth of anthropological data, BOYER has surveyed the common aspects of world religions and looked for the underlying elements that unify them. Such an analysis inevitably leads to cognitive science, for it is the way our minds have evolved to process information that will determine the kind of belief systems we create and embrace. Although the full details of BOYER's explanation are beyond the scope of this paper, several features of

Abstract

BOYER (2001) offers an evolutionary account of the cross-cultural success of religion. His approach provides a number of testable hypotheses, including those centered on religion's treatment of death. BOYER's analysis focuses on the way death and dead bodies trigger powerful inference systems and violate ontological categories, thus inducing strong emotional responses. If BOYER is correct about this aspect of religion, his logic should also apply to other successful forms of culture which share an emphasis on death. Horror films, which focus on death and dead bodies, have been a hugely successful genre of the motion picture industry since its inception over a hundred years ago. To what extent do the specific predictions BOYER makes about death and religion apply to the content of horror films as well? Forty horror films released between 1931 and 1999 were rated with regard to the extent that each film successfully triggered inference systems involving Predation and Contagion or violated the Person ontological category. A significant correlation was found between the aggregate score on this questionnaire and the average rating (range 1–10) given each film on the internet movie data base (IMDB). In addition, questionnaire items dealing directly with Predation and Depersonalization also were significant predictors of IMDB ratings. Our results confirm that BOYER's "blueprint for success" corresponds to the content of horror films as well as religion, thus supporting an evolutionary analysis for two persistent death-related aspects of culture.

Key words

Religion; death; horror; zombies; vampires; culture.

his work are worth noting. First, BOYER relies on a modular theory of mind in which specific *inference systems* may be triggered alone or in combination to produce cognitions, emotions and behavior. Second, the *violation* of ontological categories (such as Person) by one or more features makes entities both salient and memorable. As SPERBER (1994, p55) has argued, "…beliefs that violate head-on module-based expectations… gain a salience and relevance that contributes to their cultural robustness." Indeed, such cases serve as the basis for supernatural belief systems that are embraced by most cultures.

BOYER notes that rituals surrounding death are a common theme in world religions. Death poses both physical and mental challenges to the living. The treatment and disposal of dead bodies is a concern for human health. Religions provide a framework for treating the dead in a manner that minimizes contagion to the living. Religions also offer a palatable framework for understanding death and dealing with its aftermath. Although religions differ in how they conceptualize the supernatural world, most contain detailed accounts of spirits, ghosts, angels or disem-

bodied souls which surround the living and affect their daily affairs. Not surprisingly, religions also provide mechanisms and rituals by which the living can bargain with or otherwise influence the spiritual agencies which hover about their lives and control their destinies.

Perhaps the most striking part of BOYER's analysis is his statement that "religion may well be much less about death than about dead bodies" (BOYER 2001, p228). BOYER reasons that our minds evolved to understand death in very specific ways. The presence of a corpse triggers a number of highly specific inference systems or mental modules. These result in cognitions and emotions primarily related to three themes: (1) Predation, (2) Contagion and (3) Violations of the Person Ontological Category.

Predation. As BOYER (2001, p216) notes, "Humans and their hominid ancestors have been both predators and prey for a very long time." It is reasonable to assume that humans have mental predispositions for understanding and reacting to what happens in predatory situations. Such fear-based cognitions may be triggered by the sight of a dead body, even when such death did not result from predation. Indeed, predation may be easier to understand than death itself (BARRETT 1999).

Contagion. Dead bodies are biological objects in the state of decomposition. Decomposing organic matter produces by-products that are toxic, even fatal to living organisms. The sensory properties of decomposing matter produce strong unconditioned disgust reactions. Decomposing bodies must be dealt with quickly and effectively in order to remove potential sources of contagion from living humans in their presence. Many religions offer florid notions such as "killing air" to facilitate or justify the disposal of corpses, often by specialists.

Violations of Person Category. Animate objects, depending on their properties, trigger a number of unconscious inference systems. For example, there may be a general module which provides inferences about all biological entities (BACKSCHEIDER/SHATZ/GELMAN 1993), as well as several inference systems that are triggered by humans beings. Even more specifically, cognitive modules known as "Person-files" may be triggered by exposure to individual humans. Humans share with all biological entities the fact that they move, have goals, reproduce and die, but they have additional properties as well. We assume that humans talk, think and can draw inferences about the mental lives of other humans. Inference systems about the human mind are often referred to as an *intuitive psychology* or "theory of mind" (e.g., LESLIE 1987; GOPNIK/WELLMAN 1994).

Death violates most of the specific and general inferences we make in the presence of a person. We continue to produce inferences about a dead person's mind, but not about their body. For example, someone at Mary's funeral might observe "She would have loved these flowers" or "I know she's happy where she is now." On the other hand, it is unlikely that anyone would make comments about a dead person being physically animate. Thus, no one will suggest that Mary might sit up and start crying. As BOYER notes, this distinction explains the prevalence of ghosts, spirits or other disembodied but cognitive creatures. Although such reactions normally change over time, the sight of a recently deceased person, especially one we knew, is a source of powerful emotional responses as inference systems continue to be triggered in a pattern that violates our ontological Person Category or more specific "Person-file."

In short, dead bodies trigger a complex set of emotions and cognitions such as fear (from inferences about predation); disgust (from contagion inferences); and confusion or disorientation (from violations or inconsistencies in how our "Person file" and intuitive psychology system have been triggered.) As BOYER (2001, p226) concludes, "Once a particular theme or object triggers rich inferences in a variety of different mental systems, it is more likely to be the object of great cultural attention and elaboration. This certainly seems to be the case for dead bodies."

Religions work because their content maps specifically on to the results of relevant inference systems, offering a narrative for the way these systems have been triggered. As BOYER notes, the same evolved system of cognitions and emotions would be triggered by death whether or not religion was present to provide a framework of stories or rituals. Religions are successful to the extent that they offer an intuitive way to deal with the powerful mental events that are inevitably triggered.

BOYER's description of the mental systems triggered by exposure to dead bodies provides a template for the success of any cultural entity that deals with death, be it religion, art, ritual or myth. The triggering of multiple inference systems provides fertile ground for the success of cultural constructs. It remains only to match the content of those constructs with the evolved inference systems that have

been triggered. Thus, BOYER's analysis should apply equally well to aspects of culture other than religion; indeed, it should provide a general blueprint for the success of art, literature, drama or cinema.

We have chosen to test this hypothesis by examining the content and success of horror films. Death and dead bodies have been a staple of horror films since the dawn of the commercial film industry over 100 years ago (CLARENS 1967). Classic horror films deal with vampires ("the undead"), zombies ("the walking dead"), ghosts (persons—often dead—without bodies), resurrected and re-animated creatures (e.g. Frankenstein, the Mummy), ghouls (eaters of the dead), and predators (human, animal, and alien varieties) who turn the living into terrified prey. Always a successful genre of film making, horror movies presently generate over a billion dollars a year in film sales, rentals and admissions. There has never been a decade in which horror films did not constitute a sizable portion of both major studio and independent film output in North America, Europe and Asia.

Despite their prevalence and the similarity of their themes, not all horror films are created equal. There are measurable differences among films in both their critical and financial success. Put simply, some horror films are better than others in "doing their job." What does it take to create a successful horror film? We will attempt to answer that question by applying the criteria outlined by BOYER in his analysis of religion. We will select two death-related inference systems and one ontological category identified by BOYER and examine the extent to which a sample of 40 horror films contains elements that are relevant to these systems. Our hypothesis is simply that the extent to which these inference systems are triggered and ontological categories are violated will predict the film's degree of success. Because accurate box-office returns are not available for all films in our sample, we will measure success in terms of the overall rating achieved by each film on the Internet Movie Data Base (*www.imdb.com*). In addition to detailed information about cast and crew, the IMDB provides extensive critical information for each of the titles in its data base. Each film in our sample was assigned an IMDB rating on a 10-point scale by an average of 8655 raters. That rating will be compared to the score from a questionnaire given to participants in our study, in which they were asked to rate the film's effectiveness on four separate categories corresponding to Predation, Contagion, and violations of the Person ontological category.

Method

Participants. The participants were 182 persons ranging in age from 19 to 61 years. Most, but not all were students at the University of Guelph. Each participant rated between one and six films (mean = 2.5). Subjects volunteered to participate and were recruited on the basis of their familiarity with horror movies. No remuneration was given.

Materials. The questionnaire is shown in Appendix A. Participants were required to provide a brief plot summary in order to deter participants from rating films with which they were unfamiliar. Question 1 was used to assess triggering of the Predator inference system. Question 2 dealt with triggers to the Contagion inference system. The third and fourth questions dealt with separate violations of the "Person" ontological category.

Procedure. We compiled a list of 40 horror films (see Table 1). Each film was rated by a minimum of eight participants (*mean* = 11.5). All but two titles were taken from the 2000 and 2001 Halloween programming of American Movie Classics and Turner Classic Movies, both highly successful US-based cable and satellite-TV systems. The remaining two films were selected from titles commercially available on VHS tape or DVD in a local video store. The films in our sample were produced over an approximately 70 year period, ranging from 1931 (*Frankenstein*—see Figure 1) to 1999 (*The Mummy*).

There are moments in a number of films that epitomize each of the four items on the questionnaire. The film *Predator* is aptly named. A poorly glimpsed alien presence is out to get a group of soldiers in a hazardous jungle location. The attacks are random and the menace is continuous. Similarly, the 1968 film *Night of the Living Dead* features a group of characters who have taken night-time refuge in a farmhouse which is surrounded by creatures whose sole agenda is breaking into the house and killing (and eating) the inhabitants. The fear of relentless predation, especially in confined quarters, is a common theme in horror movies, featured also in the film *Alien*, as well as the title *Signs* (2002), which was released too recently for inclusion in our study.

The Contagion inference system is highly triggered by the sub-genre of "gore" films (such as *Dead Alive* or *The Evil Dead* in the present study), or by the inclusion of elements of gore into mainstream horror films. The first mass market film to profit from
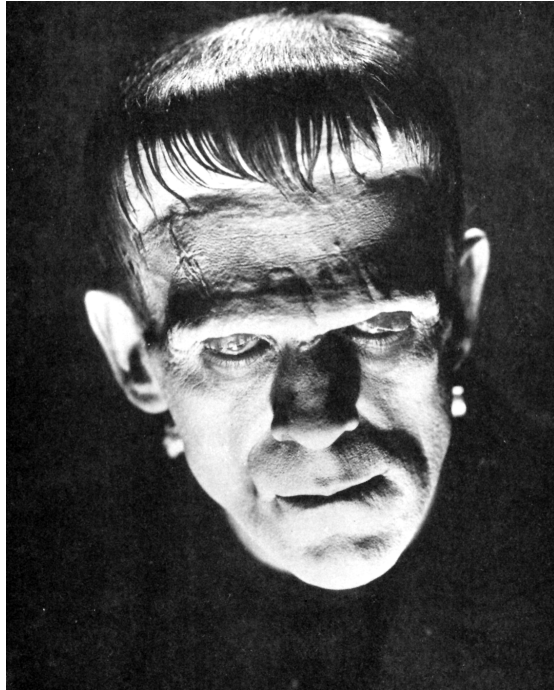
Figure 1: Boris KARLOFF as Frankenstein (1931).

Film (year of release)	Questionnaire	IMDB Rating
Alien (1979)	17.94	8.20
American Werewolf In London, An (1981)	20.44	7.10
Arachnophobia (1990)	14.30	6.10
Beginning of the End (1957)	8.00	3.60
Birds, The (1963)	15.93	7.80
Blair Witch Project, The (1999)	20.50	6.20
Brain that Wouldn't Die, The (1963)	10.21	3.10
Candyman (1992)	19.27	6.10
Carrie (1976)	16.18	7.10
Curse of the Demon (1958)	16.58	7.50
Dead Alive (1992)	18.43	7.50
Dracula (1931)	18.00	7.50
Earth vs. the Spider (1958)	14.78	3.70
Evil Dead, The (1983)	21.75	7.30
Exorcist, The (1973)	22.75	7.90
Fly, The (1986)	16.18	6.80
Frankenstein (1931)	15.31	7.90
Friday the 13th (1980)	20.44	5.70
Garden of the Dead (1972)	10.60	2.50
Giant Gila Monster, The (1959)	7.75	2.60
Godzilla (1998)	12.17	4.30
Halloween (1978)	18.70	7.60
Haunting, The (1961)	17.91	7.60
Hellraiser (1987)	19.88	6.40
I Was a Teenage Werewolf (1958)	11.67	4.40
Invasion of the Body Snatchers (1956)	17.38	7.80
It Conquered the World (1956)	12.33	4.30
Jaws (1975)	16.33	8.20
Mummy, The (1999)	19.20	6.60
Night of the Living Dead (1968)	21.09	7.50
Nightmare On Elm Street, A (1984)	20.27	7.00
Omen, The (1976)	17.33	7.20
Poltergeist (1982)	20.92	7.20
Predator (1987)	19.91	7.20
Psycho (1960)	18.50	8.60
Rosemary's Baby (1968)	16.40	7.80
Shining, The (1980)	17.38	8.20
Texas Chainsaw Massacre, The (1974)	20.70	6.80
Thing, The (1951)	20.90	7.60
Wolf Man, The (1941)	17.14	7.40

Table 1: Aggregate questionnaire score (from 4–28) and rating on IMDB (from 1–10) for each of 40 films used in study.

triggering this inference system was *The Exorcist*, famous to generations for its projectile vomiting scene, as well as its portrayal of the progressive deterioration of the possessed girl's body. The film *Alien* is likewise famous for a shocking scene in which an alien baby punches its way out of a human chest cavity in order to exit the body of its host. The zombies of *Night of the Living Dead* are shown munching on a loop of intestine as they walk towards the farmhouse, and even mainstream Hollywood films like *Jaws* were not above including a severed arm and leg, a head missing an eye, and depicting a graphic on-screen shark attack in which a character is eaten alive, feet first.

The first violation of the "Person" category involves a character—either a person or animal—without a "soul." (The second cinematic version of *Frankenstein*, released in 1915, was actually titled *Life Without Soul)*. Menace from "soul-less" characters is particularly frightening because the intended victim cannot reason with his tormentor. Prediction and control of an adversary's actions are difficult when an *intuitive psychology* or "theory of mind" can not be applied. Such menace from animal or alien attackers is an easy way to achieve this effect; hence the success of *Jaws* and *The Birds* and the use of similarly non-human predators in films like *The Fly,*

Arachnophobia, The Giant Gila Monster, Godzilla, Earth vs. the Spider, Beginning of the End, *Alien* and *It Conquered the World*. The effect is even more chilling when the menace comes from a depersonalized human—i.e., one who should be amenable to reason but has lost his or her "soul." There is a moment in *Night of the Living Dead* which portrays the actual

transition between normal person and soul-less remnant. A mother hugs her wounded little girl, trying to keep her alive against the onslaught of zombies. Unknown to the mother, the girl dies in her arms and promptly busies herself with finding a sharp weapon to use against her unsuspecting and defenseless mother. The effect is chilling because the mother is still motivated by her person file for "daughter." Will she be able to update the information in time to respond to what her daughter has now become?

Perhaps the most memorable example of this peril is the 1956 film *Invasion of the Body Snatchers,* in which everyday people in a small town are being replaced with soul-less clones. Only those closest to them can tell the difference, but will anybody believe them? In his discussion of this violation of the Person Category, BOYER likens the disorienting effect to a clinical condition known as CAPGRAS syndrome, in which "subjects have a strong intuition that the person they are dealing with cannot be the *real* one… They recognize from indicators such as facial appearance or voice that the person should be identified as X, but the person-file system does not provide a clear answer to the question of who the person is" (BOYER 2001, p221).

Inferences about the "Person" ontological category can be violated in another way. In such cases a normal personality remains present; i.e., a "theory of mind" is still useful. However, the character lacks a body. Such entities are commonly referred to as ghosts or spirits. They appear to have agendas and goals and may also produce effects on the physical environment. These entities, too, are a staple of horror films. The understated 1961 film *The Haunting* features such a presence, as do later, more cinematically explicit tales such as *Poltergeist* and *The Exorcist.*

Results

The aggregate score on our questionnaire, i.e., the total for items 1–4, was highly correlated with the IMDB rating of each film ($r = .74$, $p < .0001$). The correlation for the Predation item alone was nearly identical to that obtained for the aggregate score ($r = .72$, $p < .0001$). Indeed, the bivariate correlations between all four predictors and IMDB ratings were significant.

Because the four items on our questionnaire were highly intercorrelated, we performed a regression analysis to determine the unique amount of variance in IMDB ratings accounted for by each predic-

tor individually. Table 2 contains the results of this regression analyses. Only two predictors—Predation and Depersonalization—accounted for a significant amount of unique variance in IMDB ratings (10% for Predation [$p < .01$] and 7% for Depersonalization [$p < .05$]).

Questionnaire Item	ß	t	p
Predation	.44	2.97	.01
Contagion	.04	0.35	.73
Violation: Depersonalization	.33	2.50	.02
Violation: Ghost	.18	1.58	.12

Table 2: Regression statistics for IMDB ratings as a function of each of four questionnaire items.

Discussion

As predicted, there was a strong relationship between each film's rating on the IMDB and the degree to which the film triggered death-related inference systems or violated the Person ontological category. The aggregate score on the questionnaire (i.e., the total of all four items) was highly correlated with IMDB rating, thus suggesting that the overall impact of a film, at least insofar as it is expressed in a rating, may result from the collective impact of having several different inference systems triggered or ontological categories violated. Although each single item on our questionnaire correlated with the IMDB rating, a regression analysis revealed that two items—Predation and Depersonalization—made a significant unique contribution to predicting the success of the film.

We propose the following overview of the factors we have identified: A general sense of peril is a staple, even a defining feature of the horror genre. Arguably, to succeed, horror films *require* the viewer (or central character) to feel menaced by something (see Figure 2). Not surprisingly, then, Predation was the one theme common to all 40 films in our sample, and the extent to which it was triggered correlated highly with and accounted for a significant amount of unique variance in IMDB ratings.

Triggering of the "Contagion" inference system (i.e., disgust) operates as a modulator variable, amplifying the threat of predation by offering visible evidence of its effects (see Figure 3). As our data suggest, "Gore effects" are not a necessary component of successful horror films. Predation can be effectively implied, as it often was in earlier (i.e., pre-1970) films. Even a film like *Jaws*, which helped normalize depictions of gore in major studio productions, confirms that the results of predation need

Figure 2: The resurrected dead attack the living in *The Mummy's Ghost* (1944).

Figure 3: Concrete evidence of predation by *The Monster of Piedras Blancas* (1959).

not be seen to establish a sense of menace. One of the most effective moments in *Jaws* comes not from watching an open-mouthed mechanical shark or glimpsing severed limbs on a beach, but rather from watching actor Richard Dreyfuss react to the off-screen remains of a shark attack victim. In short, a well-triggered inference system does not require a studio special effects department.

The use of "gore effects" to enhance the sense of menace in films has an interesting history. According to SKAL (1991), one of the earliest effective uses of stage makeup to convey mutilation was in the 1937 film *J'Accuse*. This classic anti-war film featured a stunning scene in which the dead of war were seen rising from their graves and marching on the living. Their graphically depicted facial and bodily mutilations were based on actual photographs of combat casualties. Ironically, these makeup effects are mirrored by many subsequent horror images that appear in non-war related films. Thus, the actual predatory effects of war on its victims were later used to trigger fears of imaginary predators such as vampires, werewolves and space aliens. Later films such as *American Werewolf in London* and *Alien* would actually win Academy Awards for their special effects.

Films obviously differ in the success with which the Predator inference system is triggered, as well as in the *source* of such predation. Typically, menace
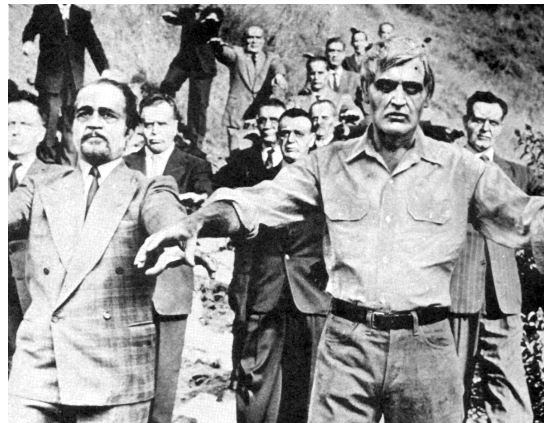
Figure 4: Zombies on the move in *The Invisible Invaders* (1959)

comes from one of two violations of the "Person" ontological category. Danger may come from Depersonalization; i.e., a "soul-less" unreasoning creature that we can see, such as a zombie or robot or shark or vampire (see Figure 4). Alternatively, danger may come from a malevolent source operating without a body, such as a vengeful ghost or spirit. It is rare for a character to be menaced by both forms of Person violations. Thus, it was unusual for a film to score highly on all four questionnaire items; i.e. to depict gory menace from both soul-less and non-corporeal sources.
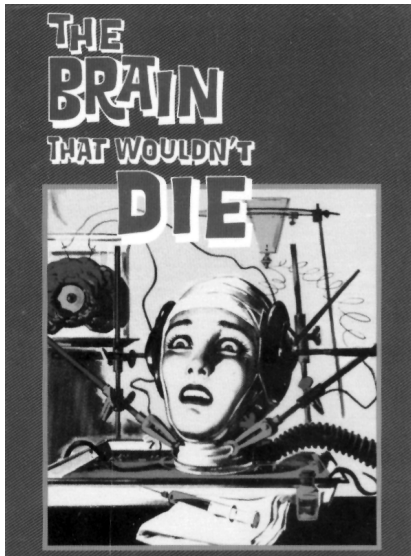
Figure 5: Low budget peril from the disembodied (*The Brain That Wouldn't Die*, 1963).

We acknowledge that the critical or commercial success of a horror film does not depend solely on the extent to which it *includes* material that triggers or violates inference systems. Our questionnaire specifically asked participants to rate the quality of the presentation as well as its content. Thus, for example, participants in our study as well as raters on the IMDB could presumably discriminate between the depiction of zombies in films like *Garden of the Dead* and *Night of the Living Dead.* Despite comparable subject matter, the effect was demonstrably more frightening in the latter film. Similarly, gore effects are a product of technology and vary in their impact. The severed head in the cheaply produced *The Brain That Wouldn't Die* (see Figure 5) is less shocking than the sight of a rotating head in *The Exorcist*. In short, horror films, like most endeavors, require skill as an important component of success.[1]

All the films in our sample had been screened in cinemas and/or televised, and were available for sale or rent as video/DVD product. In that regard, our test is arguably a conservative one. To the extent that we were able to demonstrate a significant correlation between our variables, we can only assume that the effect might have been stronger had we drawn from a broader range of horror films which included titles that did not find commercial distribution.

Although we have proposed an analysis of the elements underlying successful horror films, we do not believe that the writers or directors of such films are consciously aware of these factors or attempt to construct their product with "triggered inference systems" in mind. It is far simpler to assume that the creators of horror films, like other humans, simply "know" what is scary and insert as much of it—with varying degrees of success—into their work. In this sense they are no different from comedians or producers of comedic films: a scholarly analysis of the elements of comedy is not a prerequisite for creating it.

The application of BOYER's view of religion to the success of horror films, while intellectually gratifying, is not altogether surprising. As BOYER, himself, noted prior to his 2001 book *Religion Explained*, "Religious ideas seem the 'most cultural' part of culture, and consequently the least likely to be explained in cognitive terms… If cognitive hypotheses are relevant in the explanation of religion, then other aspects of cultural representations will be (all the more) amenable to such a description" (BOYER 1994, p392).

The fact that BOYER's (2001) analysis of death-related themes in religion also pertains to the content and success of horror films suggests that the success of cultural entities, regardless of their nature, may ultimately be rooted in how well they "fit" with the way our minds process information. Certainly, this is the view of BOYER (2001), SPERBER (1994, 1996) and others, who stress the fact that our minds are not passive recipients or transmitters of information. Certain themes, presented in certain ways, have a measurable advantage in the likelihood of spreading within a culture (hence, SPERBER's epidemiological model of culture). In this sense, culture is as biological a force as the human minds that create it.

Those entities that match the evolved predispositions of our minds hold a selective advantage over competing entities (or "memes" in DAWKINS' 1976 term). The content of horror films, like religions, must pass muster with their human patrons. Religions that fail to provide memorable, relevant and useful myths and rituals will suffer from lack of followers. Our data suggest that horror films, also, are most successful when their content adheres to the evolved cognitive structures of the human mind.

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Appendix A:
Horror Movie Questionnaire

■ Which movie are you rating?

■ Provide a brief (no more than 1 or 2 sentences) plot summary.

■ Using the scale below, please tell us to what extent this movie successfully portrayed each of the following themes. You may find it helpful to compare the treatment of these issues in the present movie with how the same issues were portrayed more or less successfully in other horror films you've seen.

1: Not at all; 2: Very little; 3: Little; 4: Moderately; 5: Much; 6: Very Much; 7: Extremely

1. A sense that someone or something is out to get a character in the movie. Danger is out there.	1 2 3 4 5 6 7
2. Disgust based on contact with or the suggestion of a rotting or decomposing body, body parts, or body fluids.	1 2 3 4 5 6 7
3. A depersonalized creature: a person or animal who has somehow lost their normal personality or doesn't have a "soul". You can't reason with them.	1 2 3 4 5 6 7
4. A disembodied spirit or ghost: a character who can affect the environment and act in human ways (e.g. think, speak), but who does not have a body.	1 2 3 4 5 6 7

Note

1 Ineptitude in the case of horror films appears to enjoy a unique status. Although sub-standard writing, acting, direction and special effects may diminish a horror film's effectiveness, it appears to result in an alternate form of entertainment. A genre of television shows including *Mystery Science Theatre 3000*, and hosts such as John ZACHERLY and Elvira, Mistress of the Night, all specialize in heaping humorous disdain on inept horror and science fiction movies. The effect is, at times, quite hilarious, with *Mystery Science Theatre 3000* in particular providing a scathingly critical running commentary along with the original film. It is notable that inept westerns, war movies, romances or musicals, have not resulted in a comparable form of entertainment.

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Joseph Bulbulia

Religious Costs as Adaptations that Signal Altruistic Intention

Opening

Below I use research in theoretical biology to shed light on the nature and function of supernatural cognition, and suggest some promising new paths of psychological inquiry these new understandings open. By supernatural cognition I mean beliefs[1], emotions, and practices relative to supernatural beings and powers like Yahweh, The Amida Buddha, Shiva, Jesus Christ, Zeus, grace, mana, soul, num, and other supernatural beings and forces to which individuals are committed. To make exposition easier, I have adopted the convention of using "religion" to denote supernatural cognition and the term "gods" to denote supernatural beings and powers.[2]

I argue that a central function of supernatural cognition is to facilitate efficient solutions to otherwise difficult or intractable co-ordination problems. These emerge when individuals acting collectively further their individual interests through sacrificing on each others behalf. Religion is an adaptation that generates a special kind of reciprocal altruism, which may be called religious altruism. An altruistic act is one that benefits the inclusive fitness (RS) of the recipient at some cost to the inclusive fit-

Abstract

Most cognitive psychologists explain supernatural understandings as cognitive by-products acquired in specific but fairly common cultural circumstances. This paper uses evolutionary game theory and the biology of animal signalling to promote a contrary view. It explains religious cognition as an exquisite adaptation that enhances individual reproductive success by facilitating reciprocal altruism. The key to understanding the design innovation of religious altruism lies in the specific costs that religious thought and practice impose on the believing organism. These costs play a strategic role in displaying authentic commitment to policies of social exchange, applying critical safeguards to defection from co-operative ventures. The following account explains a suite of otherwise anomalous cognitive features associated with religious thought, such as strong emotional responses to unseen persons and forces; belief in supernatural punishments and reward; illusions about the moral goodness of co-religionists and the vices of heretics; and dispositions to invest in expensive and wasteful ritual displays. The paper offers some testable predictions about the psychological architecture that generates religious thought and suggests some new horizons for psychological exploration.

Key words

Altruism; cognitive psychology; evolutionary psychology; game theory; NASH equilibrium; prisoners dilemma; reciprocal altruism; religion; religious cognition; ritual; social exchange; the handicap principle.

ness (RS) of the benefactor.[3] Religious altruists are motivated to altruism from a belief in supernatural powers capable of rewarding altruism and punishing defection (failure to reciprocate). The paper explains religious beliefs, emotions, and behaviours as products of an adaptive signalling system designed to propagate religious altruism.

The Costs of Religion

The main problem facing any adaptationist theory is how to account for religions reproductive cost (–RS) (ATRAN 2002).[4] The most immediate expense of religious belief is a distortion of reality. Religious persons live under a sky crowded with supernatural beings and must adjust their activities to these beliefs. Selection generally acts against tendencies to misperceive.[5] At a physiological level, the devotions and pieties of religion, bowing and scrapping before gods deplete metabolic reserves. Religious persons will often assume strenuous bodily postures and enact ritual movements that burn calories and require long training regimes. Religion also incurs material costs. To stage a ritual means gathering precious objects and animals and manipulating them in ways that may lead to their

destruction, another form of waste. Inevitably there are opportunity costs that flow from any religious practice. In venerating gods, the religious delay or forgo hunting, gathering, breeding and rearing, leaving potential fitness enhancement unrealised. Religion is frequently hazardous. The devout risk infection by ritual piercing; malnourishment through starvation; malling when hunting sacrificial carnivores; burning in trials by fire, and other harms.

Given the price of religion, it is interesting to inquire why selection did not recoil from sticker shock at the religious option. Biologists and cognitive psychologists have proposed two general answers, which though promising, leave some critical questions unanswered.

Standard adaptationism and cost

Traditional adaptationist accounts hold that religious cognition is evolutionarily enforceable because whatever its costs, the reproductive payoffs are higher (WILSON 1998). Selection will favour traits that incur metabolic, material, or opportunity costs, sometimes substantial, if the average inclusive fitness of an individual disposed to this kind of biological spending thereby increases. Most adaptationist accounts look for the advantages of religion in enhancements to social exchange (WILSON 2002).

Standard Adaptivism: $RS cost of religion < +$RS value of enhanced social exchange

The approach is helpful because it places religious cognition within the natural history of our species, a perspective that in other domains has shed much light on the nature and function of cognition (PLOTKIN 1998; BARKOW/COSMIDES/TOOBY 1992). The analysis however leaves obscure why selection did not endorse cheaper versions of co-operation. The reproductive costs of religious practice must be subtracted from reproductive benefits of social exchange. It is unclear how sacrificing to imaginary sky beings instead of promoting ourselves and others who will promote us increases average RS. Given the added expense of god commitment, an optimal system would eliminate costly religious inclination.

Problem: +$RS value of religious social exchange < + RS value of non-religious social exchange. Given that non-religious altruism is reproductively cheaper than religious altruism, it is unclear what evolutionary force holds god-belief in place.[6]

Spandrel theory and cost

It may be that there is no overall +RS advantage to religious cognition. Perhaps religion is not itself a design artefact but rather a cognitive by-product of other adaptive systems, a spandrel (GOULD/LEWONTIN 1979). If so, the costs of religion do not need to be explained. Religion is merely noise made by functional cognitive machinery (BARRETT/KEIL 1996; BARRETT/NYHOF 2001; BOYER 1992, 1994; BOYER/WALKER 2000).

Spandrel Theory: $RS cost of religion < +$RS value of cognitive systems that accidentally generate it

Spandrel theories are desirable because they minimise assumptions about the complexity of the cognitive system. It is better to avoid postulating an intricate functional design when a simpler explanation, appealing to a rag heap of cognitive mechanisms, adequately explains religious thought (BOYER 2001).

Moreover, the connection between religious understandings and social exchange remains explicable. The social exchange system, itself exquisitely adaptive, may simply incorporate religious information as cultural input, weaving it into the relevant exchange outputs. Suppose, plausibly, that altruists act in virtue of group identities (HARDIN 1995). It may be that social exchange system takes religious understanding and affiliation as the relevant marker. In other cases, sex, race, age, family, trade, sporting affiliation or something else may serve as the relevant marker. That exchange partners sometimes use religion as a shibboleth does not imply a dedicated faculty that systematically distorts the world as god ridden (BOYER 2001).

Finally, spandrel theory accords well with the observation that religion is not universal in the way that vision or language is (SPERBER 1990, 1996). Some normal people claim not to believe in gods while presenting no cognitive deficiency. They are not like language speakers without verbs.

Most cognitive psychologists argue that religious understandings are acquired and transmitted in virtue their intrinsic recall properties and/or features of ritual settings in which they are learned.[7] Even committed evolutionary psychologists agree there are no *dedicated* faculties designed to produce religious thought (ATRAN 2002; PINKER 1997, pp554–558).[8] Rather, religion emerges through an interaction of specific cultural material and the

evolved mind. Remove those specific materials and watch religion disappear.

In spite of its explanatory virtues, it may be that spandrel theory undervalues the costs of religious commitment. If religion is cognitive noise, its sounds seem to be reproductively deafening. It is critical not to lose sight of the broad spectrum of human investment that lies behind a god-centred reality, one extreme of which is occupied by convulsing shamans, celibate priests, and suicide bombers. It seems selection should have placed mufflers over the relevant cognitive systems that produce such understandings and practices as by-products. On the contrary, selection seems only to have amplified religious distortions with powerful emotional responses and motivations.

> Spandrel Theorys Problem: $RS of religion is sufficiently high for selection to have acted against it.

Spandrel theory only works if religion is reproductively inexpensive, yet religious believers seem to pay a high reproductive premium to inhabit castles in the air.

In what follows I will not attempt to prove that religious cognition is costly. Rather the paper explains religious cognition as a signalling system that generates cost as an adaptive feature. If there are such costs, as there seems to be, the present model can explain them.

Solution: religious cost as adaptive

In order to understand how religion works it is important to look beyond the religious believer to her audience. Religion facilitates altruism. For altruism to evolve, altruistic individuals need to find each other. To do this they must reliably signal their willingness to reciprocate to others. Religion differentiates genuine altruists from impostors by imposing specific costs on altruists that only they are willing to pay. Cost is an adaptive feature of this signaling system: *if supernatural cognition were not expensive it would not have evolved.*

The following account explores how religion reliably encodes altruistic commitment. First I explain how the intentional structure of religious belief motivates altruistic exchange. I show how:

> Religious belief + (other beliefs and desires) → reliably motivates → commitment to altruistic exchange

Next I briefly examine how certain emotional expressions of religious commitment reliably mark the presence of specific motivations for altruistic sacrifice. I show how:

> Religious emotion → reliably signals → [Religious belief +... → commitment to altruistic exchange]

Thirdly I explain how the specific costs of ostentatious religious practice, especially rituals, certify religious commitment, and hence altruistic exchange. I show how:

> Participation in religious ritual → reliably signals → [Religious Belief +...→ commitment to altruistic exchange]

If religion is a cost inducing signalling mechanism, it may be possible to reverse engineer important but concealed features of its cognitive design. I close with a discussion of key distortion mechanisms that generate commitment to supernatural beings and other illusions; signalling and detection mechanisms that enabling individuals to distinguish co-religionists from defectors; and altruistic mechanisms to reward and punish persons believed to hold similar supernatural commitments.

Religious Belief and Reciprocal Altruism

Convention

In an important paper on the evolution of reciprocal altruism, AXELROD and HAMILTON point out that the benefits sought by living things are disproportionally available to co-operating groups (AXELROD/ HAMILTON 1981, p1391) a statement that seems a truism, but whose truth, when analysed, seems far from guaranteed (AXELROD 1997).

Where interests exactly converge it is easy to see how co-operation can evolve (LEWIS 1969; SKYRMS 1996). HUME considers the example of two rowers positioned in the same boat (HUME 1739). Left to a random stroke pattern, the boat will jerk forward inefficiently. Assuming speed and fluidity of motion as desiderata (the rowers are not playing some game of disruption or assaulting each other) each rower shares the identical interest: to synchronising their strokes. Assuming zero establishment costs and an arbitrary benefit for convergence of one utile, the rowers are bound by the following payoff matrix:

	Rower 1	Rower 1
Rower 2	Unsynchronised 0 0	0 0
Rower 2	0	Synchronised +1 +1

Table 1: Rowing Problem

Each rower therefore has an interest in adopting the same standard.

Similarly, consider two individuals who want to meet for a beer. There are three options: *Tupelo, Motel, and the Q-bar*. Neither cares where to meet. Their payoff matrix is:

	Trundle 1	Trundle 2	Trundle 3
Ed 1	Tupelo 1 1	0 0	0 0
Ed 2	0	Motel 1 1	0 0
Ed 3	0	0	The Q-bar 1 1

Table 2: Meeting Problem

Trundle and Ed gain by going to the same place. To improve the odds, they need to signal their intentions. They have no interest in lying, so clear and accurate signals work best: When Ed tips his hand to his mouth, then meet at Tupelo.

Assume the benefits of convergence in these cases enhance reproductive success, that the scenarios are repeated often in life, and that they arise consistently generation after generation. Selection will tend to advance any psychological disposition that improves synchronisation. Over evolutionary time, selection will favour cognitive systems that foster conventional signalling in pure co-operative ventures.[9]

It is easy to see how the benefits sought by living things are disproportionally available to social creatures able to co-ordinate on matters of common benefit with zero loss. But in nature such interactions are rare because benefits are distributed unevenly (MAYNARD SMITH 1982). Often, an individuals best move depends critically on how others with conflicting interests will act. Where interests overlap imperfectly action is strategic. Frequently it is in an organisms best interest to effectively misrepresent how it will act. For example, in species where parental investment falls heavily on females, males have an incentive to present themselves as willing investment partners to as many females as will cop-

ulate with them, even if a strategy of promiscuity prevents such global parental investment (TRIVERS 1972).

Economists have developed methods for describing optimal strategies in uncertain conditions. Because selection endorses strategies optimised to maximise RS, it is possible to use economic theory to generate hypotheses about an organisms cognitive design (MAYNARD SMITH 1982). Understanding how organisms bypass strategies of deception in uncertain conditions sheds much explanatory light on how religion works.

Strategy and social exchange: Classical game theory and the concept of a Nash equilibrium

Call a *game* an interaction between two or more persons called *players* whose outcome depends on the interactive strategies of each player. Allow that each players motives may coincide, conflict, or fall somewhere between these extremes. A *NASH equilibrium* is a strategy or set of strategies in a game in which no player can benefit by changing his or her strategy while the other players keep their strategies unchanged. In a two-player game, a NASH equilibrium occurs where each players strategy is optimal, given the other players best strategy (NASH 1951; SCHELLING 1960).

Consider the prisoners dilemma: Ed and Trundle are captured by the authorities for a crime they jointly committed. If neither complies with the authorities (that is if both players cooperate with each other), both will go to jail for three years. If one defects by turning in the accomplice, who co-operates by remaining quite, the snitch will be set free, while the accomplice will be sentenced to twenty years in jail. However if both comply with the authorities each will spend ten years in jail. What should the prisoners do?

	Trunde defect	Trundle co-operate
Ed defect	−10 −10	−20 0
Ed co-operate	0 −20	−3 −3

Table 3: The Prisoners Dilemma

Defection is the single NASH equilibrium for this game. Both Ed and Trundle could do no better by remaining silent, given the best strategy of the other is to remain silent. In fact, defection is an example of a dominant NASH equilibrium: it is the best strat-

egy no matter what the other may do, that is, even if the other co-operates.

Notice that co-operation, the irrational option, is *strictly efficient*: it is the strategy whose interaction with itself brings the greatest payoff. Yet neither prisoner has an incentive to follow the strictly efficient strategy. Defection dominates strictly efficient moves, hence the dilemma. A large class of social interactions involve conflicts of interest of this kind (FRANK 1988; SCHELLING 1960).[10]

Evolutionary game theory and strictly efficient strategies

Natural selection is a theory of reproduction and differential survival of individuals living in breeding populations. Selection favours alleles (gene sequences) that generate reproductively successful phenotypes, organisms with high average (+RS). The relevant traits may be physiological or psychological, with no sharp distinction between the two. Assuming strategic innovations can be inherited, the expectation is for individuals in species with high neural capacity to demonstrate elaborate sophistication in strategic thinking, particularly in multiparty interaction.[11] Even organisms as simple as *Rhizobium* bacteria seem to exhibit strategic responses to their environment (AXELROD/HAMILTON 1981, p1392). Where players are not closely related, selection would seem to promote strategies of defection in interactions resembling the Prisoners Dilemma. Defection is an evolutionarily stable strategy, because it cannot be invaded by mutants adopting a different strategy.[12]

Where players can match themselves to other players, the case is different. Given high correlation between co-operators, strictly efficient strategies, once they appear in a finite population, will move to fixation. Brian SKYRMS has used computer modelling to show that in cases of perfect correlation, evolution will carry co-operation to fixation. What evolves is a DARWINIAN version of KANT's categorical imperative: *Act so that if others act likewise, fitness is maximised* (SKYRMS 1996, p62). If co-operators can secure encounters with like-minded co-operators, then the costs imposed by co-operative behaviour are more than repaid by its benefits. This is true even if co-operative strategies are strictly dominated by other strategies.

The trick in this instance is for co-operators to reliably signal their strategy to others and to avoid exchanging with defectors who have an interest in mimicking the signal. Because defectors stand to reap even higher rewards by imitating co-operative signalling, defectors should be willing to pay the price for any arbitrary (conventional) signal a co-operator would pay. Where co-relation is unreliable, defection can invade. Hence, for cooperation, signalling needs to be secure.

Reliable signalling is essential to the model of religion promoted here and I explore the evolution and functional nature of this capacity more formally below. Before turning to signalling behaviour, however, it is important to examine how brute force can ensure obedience to co-operative strategies, an aspect of social exchange that will prove critical to understanding religious cognition.

Enforced co-operation

Clearly external systems of reward and punishment, if widely advertised, may enhance cooperation. Call such systems external enforcement systems. If the relevant costs of such systems do not exceed the average benefits to each individual supporting it, selection will ratify psychological dispositions that favour establishing a police force. Enforcement works by altering the punishment structure for games that invite defection, converting strictly efficient strategies into NASH equilibriums, thus eliminating defection as a rational option.

Imagine that the jailed Ed and Trundle are members of a Mafia family, the Agaronis. Though turning states evidence on an accomplice brings freedom, the advantage is short lived. The Agaroni family promptly hunts down all defectors and outfits them with swimsuits and matching cement shoes. Perfectly credible threats of punishment alter the actual structure of the original game where defection was the NASH equilibrium.

	Trunde defect	Trundle co-operate
Ed defect	−10 −10	−20 − infinity
Ed co-operate	− infinity −20	−3 −3

Table 4: External Enforcement Game: Agaroni Family

Co-operation in the Agaroni punishment game is the single NASH equilibrium. The new payoff schedule, when advertised, enforces cooperation.

Similarly, credible promises of reward for co-operative play adjust the pay-off schedules of individual players. If each prisoner possessed the assurance that co-operation will bring specific new

value, say a million dollars upon release, then strictly efficient co-operation becomes the single Nash equilibrium in this game. Co-operation in the Reward Game is rational because the game itself has been altered to favour co-operation.[13] Variations of the Reward Game are variations of external enforcement. Whether punishments or rewards, extra inducements alter rational play by altering the game itself.

The costs of external enforcement

Any system providing the relevant incentives, however, will necessarily impose further costs on the organisms that produce, manage, and enforce such a system. First, we must pay our police. The levies from which enforcers are paid must be enforced, as each individual has an incentive to avoid taxation. Second, it is easy for corruption to enter into a system of exchange that relies on enforcement at precisely those points where players should want to forestall itnamely where the gains from defection are potentially massive. In such cases defectors need only bribe the police more than their salaries. Dynamic interaction with enforcement agents sets up additional co-ordination problems. Once deputised, the police have an incentive to turn power to their advantage. Once corrupted, there will be no one to guard us from our guardians.

Mechanisms that effectively police co-operative exchanges are costly in proportion to their efficacy. That crime pays brings fresh incentive to extend the arm of the law. As that arm grows longer to meet defection incentives, enforcement cost (and thus negative utility) thereby rises.

Strong deterrence may bring the desired effect because strategic planning balances probable outcomes against expected utility (Frank 1988; Schelling 1960). The prospects of torture, mutilation, and a prison boyfriend when factored into the expected utility equation can enforce co-operation, even where the likelihood of getting caught is low. Excessive rewards may act as similar inducements. However, deterrence imposes fresh costs. Enforcement must avoid erroneous discipline lest beneficial co-operators get locked away or coalitions arise to combat the harsh regime. Accuracy is expensive and even then not assured. A system of terror is moreover open to fresh internal corruption of various kinds. There are, for example, strong incentives to bribe those charged with distributing justice. As before, self-interest may dictate abusing power for gain.

Generalising, the establishment of a reliable policing system may prove to be too expensive to be worth while. Each cost counts against any gain from co-operation.

Enforcement through supernatural causation

Shifting the *actual* payoff matrix of the game through external inducement may prove inefficient because the relevant costs involved in the adjustment are too high. Suppose that we cannot afford to pay our police. Does this place co-operation out of reach? Curiously not if there are irrational players who opt for strictly efficiency play, the irrational option. in iterated exchange, if irrational players were to interact only with other irrational players, then each irrational player would fair better than the rational economist would. Moreover the extra expense of paying for enforcement is avoided.

Return to Ed and Trundle in the prison. Imagine the authorities are coming down hard on them to turn states evidence. The authorities have laid out the options, but imagine that both Ed and Trundle have poor hearing. The authorities say:

"Twenty years if the other talks and you don't."

Instead they hear:

"You go free if you don't talk you bloke."

An improbable sentence, but not impossible (especially if the prison officials speak with heavy accents.)

Here *misunderstanding* the payoff matrix brings strictly efficient rewards to both players. The assumption is that both Ed and Trundle are rationally self-interested agents. But they both get the problem wrong, and for this fortunate mistake each is better off. Of course, the reward is conditional on interaction with another player who also gets it wrong, but no less real.

The example highlights how incorrect assignments of reward value may generate substantial payoffs when confused players interact with others who similarly misunderstand. In iterated play, discrete groups of befuddled players will fair better than economic rationalists do.[14] Consider how belief and commitment to supernatural agents with specific properties constitutes a fitness enhancing illusion. If individuals believe in gods who can alter fortune in accordance with strictly efficient play such god-fearers will benefit from co-operative exchange with each other. The religious belief induces altruism. Supernatural rewards may be in kind: do good and good will be done to you; or of some equivalent value, blessed are the poor for they shall

inherit the earth, the concept of reward in the latter instance relying on other supernatural elements. A property of the relevant gods is that they trouble with mortals by imposing a payoff matrix that clearly favours co-operation. Those who believe in such gods are like the befuddled prisoners who misunderstand the payoffs of co-operation. For them, *strict efficiency* is NASH. When those who believe in gods of fortune co-operate exclusively with each other (or with other reliable altruists) the players flourish.

Imagine that Ed and Trundle both believe in the great god Zugroo. The eye of Zugroo observes all and the hand of Zugroo dispenses riches to those who act by His law. The sword of Zugroo vanquishes those who transgress His way.

	Trunde defect	Trundle co-operate
Ed defect	– infinity – infinity	+ infinity – infinity
Ed co-operate	– infinity + infinity	+ infinity + infinity

Table 5: God of Fortune Game: Submission to Zugroo game

If Zugroo exists, then co-operation is the single NASH equilibrium for the game. From the perspective of strict efficiency, however, the gods *actual* existence is an inessential detail. Zugroo himself is an imaginary being, a tissue of confusion. Yet motivations to co-operate follow directly from Ed and Trundles belief in the god. Commitment to Zugroo adds +RS value when both exchange partners share it.

Generalising, once agents believe in gods who render fortune commensurate with co-operation, religiously motivated altruism is possible.

> *Religious Altruism*: belief in supernatural causation + belief that causal agents enforce strict efficiency + [natural beliefs and desires] → motivates → commitment to altruism.

A cognitive design that distorts information flow within individuals, altering expected utilities in accordance with strictly efficient exchange could evolve alongside perceptual and motivational systems that bring such players together and keep defectors out. Religious causation and the motivational systems that underlie religious life seem to fit this description. Beliefs in the existence of supernatural agents serve to enhance strictly efficient exchange in communities of shared commit-

ment. Belief in gods capable of altering individual fortune promotes efficient play by prompting the motivational structure to produce *strategically* co-operative behaviour. The sacrifice of the defection payoff is understood as a kind of investment, the god acting to insure desirable outcomes through supernatural causation. *The strategy works because it is based on an illusion, not in spite of any illusion.* Selection will reinforce tendencies to this illusion along side other co-relational mechanisms. If belief in supernatural causation is to evolve, there clearly need to be further constraints on the cognitive design of individuals disposed to this belief. These includes a system of projection and denial that generates supernatural commitment with zero empirical evidence; the desire to seek out con-specifics who are of a similar mind about the gods; careful attention to displays that authenticate commitment; a willingness to publicly manifest and present evidence of god commitment; mistrust of heretics; and moralistic aggression against unbelievers where the costs of defection are high.

Before exploring these and additional aspects of religious altruism, it is critical to examine how religious believers reliably signal the presence of religious commitment to others.

Signalling Religious Commitment

Religion appears to be an efficient means for policing the social exchange. But how can players harbouring the relevant illusions find each other?

Defection pays better than co-operation, so it is always in a defectors interest to attempt to imitate a signalling behaviour. But a signal that can be imitated is worthless as a signal. More formally:

> –$RS cost of a strictly efficient play signal < +$RS value of reciprocity < +$RS value of (unpunished) defection

Hence,

> Σ [+RS value of reciprocity – $RS cost of a strictly efficient play signal] < Σ [+$RS value of (unpunished) defection – $RS cost of the strictly efficient play signal]

How then does reliable signalling evolve? With ordinary (non-religious) reciprocal altruism, the signalling of altruistic tendencies among those who are not closely related comes from an ability to (1) observe and remember past play (2) gather informa-

tion relative to past play not directly observed, and (3) follow the rule "past is precedent." AXELROD and HAMILTON have shown that simple "tit-for-tat" strategies are robust and stable over iterated play (AXELROD/HAMILTON 1981). The strategy is simple: co-operate first and imitate an exchange partner's the last move. By helping those who have helped in the past, and not helping those who with a record of defection, altruists can be reliably identified and co-operation becomes evolutionarily stable. Notice the altruistic signal here is intrinsically connected to its meaning. It is difficult for defectors to invade without acting altruistically, that is without *becoming* altruists.

Much of human social thought can be explained by placing altruistic signalling in contexts where individuals must frequently interact with many different players. Under such conditions, the theory of reciprocal altruism accounts for many aspects of social cognition, including an interest in past reciprocity, tendencies to gossip, the desire to seek and defend reputation; dispositions to advertise past altruistic efforts; the desire to enhance the status of altruistic players as well as to disguise one's own indiscretions; dispositions to falsely present oneself in an altruistic light; the tendency to self-deception about one's moral goodness in order to better deceive others, and much more, to a high order of intricacy (TRIVERS 1971, 2001). The elaborate productions of the psychological system that generates human altruism can be traced to the simple fact that altruists signal authentic altruism merely by acting altruistically. Reciprocity is what reciprocity has done.

With respect to religious altruism, the signalling of altruistic intention is harder to explain. Religious altruists cannot simply look to past examples of religious behaviour as a signal without already knowing how to detect religious behaviour. Audiences need to know what makes some behaviour a reliable signal of religious (and therefore altruistic) commitment. Crucially, linguistic utterances—declarations of faith, pious professions, etc.—are poor vehicles for signalling commitment. Atheistic defectors could merely lie their way into exchange with the god-fearing, repeating the rewards of social existence without paying any price.[15]

I have suggested that the *costs* imposed by religious cognition are themselves adaptive because they certify authentic commitment to the gods, and hence to altered expected utilities. Words are cheap, but more costly expressions may do the trick. *Crucially, not any wasteful display can ensure the reliability of a signal of religious commitment.* Suppose that growing to a height of six meters and producing colorful feathers from one's forehead (an arbitrary costly signal) emerges as a cue enabling audiences to separate the religious wheat from atheistic chaff. Because defection pays better than co-operation, defectors have an incentive to match these, or any other, arbitrary cues. As with ordinary altruism, there must be an *intrinsic* relationship between a signal of religious altruism and its meaning. It is critical to understand how this intrinsic signaling relation may be forged.

The handicap principle

Consider religious signaling in its wider biological context. The Israeli biologists Amotz and Avishag ZAHAVI have shown from an analysis of a broad range of organic communication devices that where deception pays signals are always self-certifying. Authentication comes by way of handicaps built into the signal that strategically target specific information about the signaler. Handicapping costs disadvantages signalers as only authentic signalers can endure. In doing so, a signal's cost is always linked to the nature of the information transmitted. The ZAHAVIs call this rule "The Handicap Principle"(ZAHAVI 1975, 1977, 1987, 1993; ZAHAVI/ZAHAVI 1997) see also (Grafen 1990a, 1990b; LOTEM 1993; MAYNARD-SMITH 1993).[16]

There are innumerable examples in nature of signals that strategically handicap organisms. When approached by a predatory wolf, fit gazelles will often leap in to the air (stot), a highly puzzling action given the predatory-prey relationship. Stotting makes the gazelle both more visible and requires aerobic expenditure, flushing its muscles with lactic acid. Why would a gazelle signal its presence and then exhaust itself before a life-threatening chase? The answer is that it can afford the expense. Less fit gazelles are incapable of such feats, and so must conserve resources for effective flight. The less fit cannot afford catch-me-if-you-can signaling. Observers of gazelle/wolf interactions note that the predators rarely chase stotting prey (FITZGIBBON/FANSHAWE 1988). Stotting has evolved as an effective signaling system that enables both predators and prey to avoid pointless pursuits that impose significant costs on both organisms. Bright coloration, complex and difficult mating rituals, exposure to risk through stretching or stotting, warning cries, threats and mock fights, markings that accentuate features, song and howling—these and other costly

aspects of animal appearance and behavior all encode specific meanings. The signals handicap organisms in ways *directly related* to the signal's meaning.

By placing religious signaling in this wider biological framework, it is possible to inquire how the costs of religion are intrinsically connected to the meaning of the message conveyed. Because, presumably, the meaning of a religious signal is, "I am committed to a god of reciprocal justice," the costs that signal religious commitment must simultaneously test the bonds of precisely that commitment. The assessment should be such that those lacking commitment to a god of reciprocal justice will find it very difficult to pass.

Religious Emotions as a Signal of Religious Commitment

The economist Robert FRANK argues that all emotional states share a common functional design. According to FRANK, emotions act as commitment devices that strategically enhance individual prospects in co-operative exchange. Paradoxically, they do this by pre-committing individuals to certain policies that may run against their strategic interests. Emotions lock people into moves that depart from NASH, in ways that tend ultimately to benefit those driven by emotion (FRANK 1988).

Emotions seem to be private affairs of the heart, but if emotions were *merely* internal guides to act in irrational ways, they would have no functional value. In order for emotions to work they must be displayed. In our own species emotions have physical manifestations, in the subtle expressions of my face, in my stride and posture, in the timbre of my voice, through blushing and tremors, each manifestation when combined with others provides information about my motivation states.

Emotions function as signalling devices by linking motivational states to physiological responses whose characteristic manifestation identifies the presence of these states. A solitary organism would have no need to wear her heart on her sleeve. But the automatic display of emotion certifies the presence of specific commitments to an audience, to better manipulate them. Manipulation is possible only if emotional displays accurately predict future responses emotions work because they are oracles.

The theory of emotions as commitment devices is deepened when viewed in light of the ZAHAVI's Handicap Principle. A cost based signalling theory predicts that emotional displays will be intrinsically related to their message. For this intrinsic relation to hold, signals must be expensive such that only a truthful signaller could produce them.

With respect to emotional display, commitment is authenticated because emotional signals 1) remain largely out of a signallers conscious control and 2) provide information about an organisms motivational state.[17] Typically, emotions generate extremely subtle and complex physiological manifestations, which are largely invariant across cultures: the dilation of pupils, perspiration, atypical facial coloration, rapid bodily vibrations or shudders, intricate facial manoeuvring, and other characteristic exhibitions denoting particular emotional states. Critically, emotions are processed in areas of the brain outside the neo-cortex, the region that governs conscious motor control. Rather emotions involve regions of the limbic system, which controls motivation and autonomic responses. The link of emotional display to motivation is so obvious that it is easy to overlook. Yet this relation is critical to the oracular function of emotional display. Knowing an organisms true motivations an audience can better predict what it will do.

Comparing forced smiles prompted by command with natural smiles, the neuroscientist V. S. RAMACHANDRAN writes: "Despite its apparent simplicity, smiling involves the careful orchestration of dozens of tiny muscles in the appropriate sequence. As far as the motor cortex (which is not specialised for generating natural smiles) is concerned, this is as complex a feat as playing Rachmaninoff though it never had lessons, and therefore fails utterly" (RAMACHANDRAN/BLAKESLEE 1998, p14). Were emotional displays easy to consciously manipulate, would lose their value as signals. Were the displays not intrinsically linked to motivation, their informational content would be uninteresting to observers.[18]

Selection could enhance the ability of organisms to consciously align emotional display with self-interest, each advance in mimicking ability in turn followed by refinements in detection. FRANK has shown that where the costs of false signalling are high, the detection ability will outpace lying ability, though when costs are lower successful mimicking can evolve (FRANK 1988, ch3; ZAHAVI/ZAHAVI 1997). The expectation is for audiences to scan signallers for subtle signs of deception (and self-deception) integrating the analysis of an emotional display with other strands of information, as for example come from the observance of past play, gossip, reputation, and so on.[19]

Turning to the religious emotions, the theory predicts emotional displays signalling authentic commitment to the gods (and so, to the altruistic group morality god belief motivates). The simplest system would link conventional emotional display to god belief. It is not surprising therefore that religious emotions are manifested as ordinary emotional displays directed to supernatural beings: hard to fake expressions of gratitude, shrinking before great authority, maternal and filial piety, fear of reprisal, hopeful expectation, sibling love for co-religionists, and so on. These emotional signals, an others, are intrinsically linked to behavioural trajectories via the motivations they assess: gratitude denoting an accumulation of debt, filial piety indicating fidelity to god's way, fear signalling an avoidance of danger (that of unavoidable supernatural punishment), and joy marking the expectation of heavenly rewards. The model predicts that:

Religions emotions → reliably signal → [Religious belief +… → commitment to altruistic exchange]

Religious emotions, like all emotions, admit of gradations in intensity. I may love a little or fall into loves bottomless abyss, hate a little or loathe my place on the spectrum between extremes showing in my responses. In my view, the intensity of religious feeling suggests that religious altruism played a vital role in the evolution of our species.

Generalising, religious emotions reliably convey strategic information about how an agent will act in the future by exposing her religious motivations. These emotions tell and audience that the agents actions are informed by a specific conception of reality; the belief that supernaturally enforced justice holds ultimate sway.

Ritual Action as a Signal of Religious Commitment

For religious commitment to facilitate altruistic exchange there must be public occasions in which supernatural commitments are put to test, especially for potential exchange partners who are not closely related, and so against whom there is often a special temptation to cheat. Displays of religious emotion would be worse than useless were they to occur only in private, their costs bringing no strategic advantage through the manipulation of others. The theory therefore predicts not only the display of religious commitment but also ostentatious display.

When will religious commitment be signalled? One of the paradoxes of god belief is that, on the one hand, it produces epistemic certainty and strong emotional responses, this confidence and passion certifying religious commitment as genuine. On the other hand, religious commitment must be safely contained from the business of ordinary life. Those who rely on imaginary beings to provide for their daily bread will have no daily bread (see discussion below). So audiences cannot look for evidence of religious commitment from practical dealings. Private life (in the ancestral environment as now) centres on family existence and close friendships, areas where independent measures of trust are normally available. We need no gods to love family and friends. Religion may be displayed in private, but were individuals *only* to display religious emotions outside of public view they could not manipulate others with them.

The theory of religion as a signalling system accords well with evidence of panhuman dispositions to produce and participate in rituals (Brown 1991). Selection leaves nothing important to chance. It is no accident that displays of religious commitment are prompted in special collective encounters, where emotional responses may undergo public scrutiny, where tears are matched to crocodiles. Occasions set apart from ordinary life where religious belief is publicly tested reduce uncertainty about who believes and how strongly. Such occasions provide immediate information about the relevant mental and motivational states of individuals in a community.

Given that rituals function as commitment assessments, the model predicts structural regularities beyond public display. In spite of the emphasis on creeds in some religions, transacting in verbiage is insufficient to tests the bonds of commitment, and should not be relegated to a central role in any ritual test. Defectors could merely lie, mouthing the relevant words and adding strategic "nots" to their actual selfish commitments and intentions.

The model predicts that where commitment is critical, ritual participation generally will be understood as obligatory, with failure to participate judged a species of defection, the unwillingness to be tested a sign one would likely fail.[20] If non-participation were unpunished, rituals could not serve as reliable gages of religious commitment. The temple becomes an imprecise instrument when empty.

It goes without saying that religious rituals will be geared to prompt explicit emotional reactions to the gods, mining the wells of feelings and calling up specific physiological responses. This include displays of

love and adoration, otherworldly stares and transports, the distinctive look of ecstasy, the quivering of fear, tears of joy, submission postures and others—the ritual body serving as a billboard to the believer's soul. It would be of little benefit to those interested in theological commitment to know how their fellows brush their teeth or cook meat (though this practical information may prove valuable in other contexts). Moreover, religious rituals will rarely assess emotional information unrelated to god commitment.

Critically, rituals may provide information about religious commitment through methods other than emotional prodding. The presence and strength of religious commitment can be tested by subjecting ritual goers to various traumas and ordeals. Such costs test subjects by rendering expected utilities explicit in ways directly related to supernatural belief. The trials need to be arranged so that only those actually committed to the relevant gods would be willing to subject themselves to the trials.

Consider Ed the believer deciding whether to partake in the strenuous rituals of his tradition. The costs of participating in the ritual times their frequency are discounted by the conditional probability that supernatural causation will bring about some better outcomes outweighing the costs. If Ed genuinely accords a high probability to future supernatural beneficence then for Ed:

Cost of ritual participation x frequency < Conditional probability of value from pleasing the gods.

Consider Trundle the selfish atheist. Trundle would like to receive the spoils of defection from social exchange, but he must discount those benefits from the costs of ritual participation multiplied by their frequency. Trundle expects zero future returns to make up for these costs. Rather he anticipates only more ritual drudgery everlastingly, etc. Beyond this expense, there is the real possibility that Trundle will be caught out as defector—given this is her plan—and hence the requirement to factor in additional risk. It is easy to see that the expected utility from costly ritual action can exceed the likelihood of any advantage from cheating the devout.

So for Trundle:

Conditional probability of value from cheating the devout < Costs of ritual participation x frequency

Notice that the ritual costs are not arbitrary. For ritual to be an effective test, it must accurately mea-

sure religious commitment. It must reliably reflect the belief in a system of supernatural causation capable of altering outcomes favourable to those who believe in it (and so act altruistically towards others similarly committed.) The logic is simple: if Trundle does not believe the gods will repay his ritual sacrifice then why should he believe they will repay his altruistic sacrifice? Whatever Trundle may say about his conviction, rituals assess whether he is willing to put his money where his mouth is.

The nature of a ritual ordeal may very widely. At one end of the spectrum it may involve exposing persons to settings that please the committed but which vex and bore the un-devout. What might be called "trials of unendurable tedium" tests authentic commitment by inflicting ennui on ritual participants who do not believe.[21]

The opposite end of the cost spectrum is distinguished by ordeals of extreme risk and denial: severe ascetic privations, the battle with carnivorous animals, immolation of expensive objects, leaping from extreme heights, trials by fire, and so on. The more arduous the test, the more effective it is at screening out those uncommitted to supernatural powers, or those whose commitments are weak.

The model predicts that where the costs of defection from religiously motivated altruism are high—as in war or famine—the more common and frequent will be rituals of extreme ordeal.[22] Partners in co-operative ventures will want strong evidence of enduring religious conviction before undertaking the risks of reciprocal exchange.

Summarizing, religious belief and emotion are insufficient by themselves to produce religious altruism. For religious altruism to evolve, individuals will have to hold their commitment open to public scrutiny. A more precise assessment of religious commitment comes when it is put directly to test. Rituals serve this function. They are public forums that prompt and assess religious understandings. Strong commitment to a system of supernatural causation implies a willingness to invest in activities that would otherwise appear pointless or dangerous. For believers, however, the ordeal is evidence of a secure investment bringing future advantage through sacred channels. For those who do not believe, or who believe only weakly, these trials are best avoided. Without any gods, the expected returns from such rituals are cannot justify their costs.

Participation in Religious Ritual → reliably signals → [Religious Belief +… → commitment to altruistic exchange.]

It may be, of course, that rituals serve other functions as well.[23] Moreover, there may be other cognitive features that further constrain possible ritual structures.[24]

Task Analysis: Reverse Engineering Religious Cognition

I suggested at the outset that by providing an evolutionary rational for a psychological design that actively distorts information about the world in costly ways, it is possible to open new lines of inquiry into the nature and function of religious cognition. I have argued that supernatural cognition distorts information flow within individuals in ways that enhance reciprocal exchange with their audience. It does this by making defection seem more expensive than co-operation, an illusion that fosters individual RS in communities whose members share this illusion. Altered expected utilities follow directly from the belief in supernatural agencies that dispense rewards and punishments commensurate with altruistic sacrifice. Around these beliefs various signalling and detection mechanisms producing costs that clearly identify and display religious commitment have arisen. It is therefore possible to explain the expensive illusions, feelings, and behaviours intrinsic to the religious life as signals of altruistic commitment.

It may be possible to take explanation even further. Reflecting on the optimal design of such a system may reveal more intricacy and specialisation at the level of systems dedicated to processing information relevant to religious altruism. With respect to the systems controlling the content and acquisition of religious information, the following seems likely, and worth pursuing in greater empirical detail. However, should many of these avenues lead to empirical dead ends, it may be necessary to substantially revise or abandon the theory that religion is a signalling system that propagates altruism.

Gods

Gods of fortune: I have noted that the gods take an interest in human affairs, and possess powers to alter the future as it relates to the prospects of individual players, manipulating expected outcomes to motivate strictly efficient exchange. What is demanded, of course, are dispositions to believe in a particular kind of supernatural causation, one even *more specific* than category violation of the relevant intuitive kinds, as many contemporary cognitive

psychologists suggest (BARRETT/NYHOF 2001; BOYER 1994; BOYER/RAMBLE 2001). The theory predicts that the relevant supernatural causation will 1) bear on individual fortune in such a way that 2) rewards co-operation and punishes defection. Zugroo has the power to bring infinite reward and punishment, but such incentives exceed requirements of the system. Small benefits and punishments may be all that is needed to induce altruism. Moreover, the gods may be fallible yet deter defection by altering probable outcomes and hence expected utilities.

Unjust gods: taking the notion of fallibility further, gods need not always be imagined as perfectly just. Consider the Biblical story of Job who is a paradigm of righteousness and devotion, a man blameless and upright, one who feared God, and turned away from evil (Job 1: 1). Notably, God visits plagues transfiguring disease, and financial ruin upon Job. God also kills Jobs children. These are hardly optimal reproductive outcomes for righteous Job. Generalising, if the Gods are perfectly just, then why do bad things happen to good people? One way of avoiding theodicy is to drop the assumption that supernatural justice is perfect. Inevitably the vicissitudes of life bring tragedy to religious altruists, occasionally massive tragedy of the kind Job endures. Life also brings riches to defectors who by their deeds worship NASH. But the gods need not be perfectly just to alter expected utilities in the relevant ways. The representations should entail only that the Gods bring better lives *on balance* to those who act righteously, those who in committing to gods commit to relevant others. Those better lives could be worse than lives with no gods at all. Perhaps capricious Zugroo merely injures altruists less than defectors:

	Trunde defect	Trundle co-operate
Ed defect	– infinity – infinity	–1000 – infinity
Ed co-operate	– infinity –1000	–1000 –1000

Table 6: Evil Zugroo reward Game

Another solution is to project rewards into the future, perhaps after death. It is noteworthy that Job, in fact, is rewarded at the end of his life, where:

"The Lord restored the fortunes of Job, when he had prayed for his friends; and the Lord gave Job twice as much as he had beforeand the Lord blessed the latter days of Job more than his beginning; and he had fourteen thousand sheep, six thousand cam-

els, a thousand yoke of oxen, and a thousand she-asses. He also had seven sons and three daughtersJob lived a hundred and forty years, and saw his sons, and his sons sons, four generations. And Job died, and old man, and full of days" (Job 42: 10–14).

This is exactly as the model predicts, a Hollywood ending for Job.

Impersonal gods: It may be that the supernatural persons like Zugroo are the typical vehicles by which persons imagine their actions are held accountable. But religion understood as altruistic self-deception does not require cosmic individuals, and there are many instances of supernatural belief where the guiding forces are imagined as impersonal. The wheels of Karma, magical substances like sin and grace, astrological forces, the powers of witchcraft, and so on, when commonly assumed by partners in social exchange facilitate reciprocity. It is interesting that a shared belief for example in Karma, the idea that what goes around comes around—actually brings such a system of reward into existence. What goes around *really does* come around for those who exchange according to their belief in Karma, though for entirely natural reasons. Karma ensures strictly efficient action which delivers rewards to partners in exchange that are only possible when individuals make sacrifices on each others behalf.

Indifferent gods: There are many representations of gods who are not interested in human affairs or who though interested are impotent to alter individual fortune. The creator gods of many tribal religions certainly fit this description intellectually and morally imperfect beings, easily duped by human agents who on other occasions are charged with the task of educating them (KATZ 1984). The model proposed here does not exclude the possibility of such concepts emerging as objects of supernatural belief. It does however predict that uninterested and ineffectual gods are less likely to be candidates for extreme piety and devotion. Here the data are important: if such gods are imagined *never* to influence fortune, come what may, then costly sacrifice to them does not signal the relevant commitment to altruistic exchange. Sacrifice to an inert god is merely undirected conspicuous consumption. The model predicts that such gods, though perhaps discussed, will not provide the co-ordinating link that binds individuals together in common efforts. Emotional and ritual displays of commitment to them will be rare. Other gods will arise to fill the relevant functional roles.[25]

Supernatural dessert and the Soul: Given that natural justice imperfectly matches altruism and defection that defectors sometimes flourish and co-oper-ators sometimes suffer the projection of supernatural agencies will involve the simultaneous projection of supernatural rewards and punishments that impinge on the believer beyond this world. It goes without saying that supernatural desserts will match altruistic decisions. From a long record of imperfect natural justice, it is easy to see how beliefs in a non-bodily essence, a spirit or soul, as well as in an afterlife, could emerge. Whereas an altruist may suffer material harm, there is another invisible side to an individuals existence, the life of the soul or spirit, which transcends this poor distribution. Rewards come mysterious through supernatural channels, affecting the soul in this world or in a supernatural world to come. Often, it will be possible to discern in an imaginary portrait of the gods, an image of a believers supernatural self and cosmic future.

Gods with group effects: Gods are frequently understood to effect group rather than individual destinies. The explanation for commitment to supernatural powers that primarily act by influencing individuals not genetically related to the believer is more complicated than belief in gods who directly influence individual fortune. Call such a deity a group god. The belief in a group god who will bring benefits *primarily to others* may seem to fall outside an explanatory framework that views supernatural belief in terms of distributary justice and individuals. In cases where the relevant supernatural causation benefits the group, as when a Yahweh restores his people to the Promised Land, rewards and punishments are not exactly visited upon individuals according to their exchange. It seems probable that expressions of conviction in gods who benefit a group are at least as common (perhaps more common) that convictions in gods who benefit individual worshipers, so they cannot be discounted as rare anomalies.

One obvious line of explanation would construe players as acting on the straightforward rational: what is good for my group is good for me, analysing group gods in terms of optimal individual strategies. Such an analysis quickly encounters trouble: a belief in a god that benefits me by benefiting my group raises the spectre of defection all over again. Why pay religious taxes to a god (and exchange fairly with others) as long as most of the others of my group will sacrifice? More problematic, it is difficult to see how selection would act on such beliefs. Whereas belief in individualistic gods evolves because audiences use the conviction of supernatural justice to certify commitment to reciprocal ex-

change, group gods seem to have the opposite effect. With a group god, there is scope for sacrificial laziness: Even if I defect, so long as others do not, the god of group fortune will help us. If one believes in a group god, then one believes in a system of justice that generates a payoff matrix that supports defection as the apparent NASH equilibrium. In a two-person group, where the group god is perceived to pay 1000 utiles for co-operation, and signalling costs 10 utiles, we have:

	Trunde defect	Trundle co-operate
Ed defect	+1000 +1000	+1000–10 +1000
Ed co-operate	+1000 +1000–10	+1000–10 +1000–10

Table 7: Group God Game

Why then, would religious commitment ever be expressed as a commitment to group-gods? A better understanding comes when we place convictions expressing commitment to such gods in the broader framework of human altruism. Many of the distortions produced by the altruism system are arrayed to make individuals appear more "beneffective" (GREENWALD 1980; TRIVERS 2001). In playing down past defections and viewing myself as genuinely good (distortions of denial and projection) I am able to more convincingly deceive others that my defects are small when compared with my virtue. Given my virtue they should want to exchange with me. Similarly, expressions of commitment to a collective god one empowered to help all of us (not merely me) will be favoured by a system established to make people appear beneffective. If my sacrifice to god is understood as a sacrifice to others (and not just self-interested way of sucking up to ultimate authority) then such sacrifices enhance my record of altruism.

Moreover, the theory advanced here predicts significant and testable constraints on the imagined nature of supernatural agency. Though capricious, group gods should not return individual piety with aggregate misfortune. The theory predicts that the good of the group generally will not come at zero-sum expense to the individually pious, and an individual's sacrifice, while benefiting the group, should not be expected to leave the sacrificer correspondingly worse off. And while the good of the individual may arrive through the good of the group, group gods should not let defection go unpunished. The model predicts that they will tend to distribute jus-

tice effectively to deter cheating. That is, group gods will also display an interest in individuals similar to that of purely individual gods.

The evolution of god belief: It is easy to see how selection acting gradually on genetic substrates could produce phenotypes that interpret their world as alive with cosmic agents, if small reproductive benefits accrued to these misapprehensions (GUTHRIE 1993). Given the presence of certain other psychological systems regulating altruism: an interest in social drama, fear of punishments, hope for reward, etc., it would be a small step to for selection to integrate anthropomorphic processing strategies with altruistic intuitions, enabling like minded proto-religionists to better achieve the benefits disproportionately available to social creatures. The precise steps evolution took to achieve the present design is a matter for speculation, and there are numerous possibilities. It cannot be ruled out that anthropomorphic tendencies initially performed functions unrelated to the policing of social exchange, perhaps facilitating healing through placebo like effects or promoting fitness-enhancing optimism and hope (MCCLENON 1997, 2002). There is some evidence that religious commitment still performs these functions (ELLISON 1991), and nothing in this account should be taken to rule out multiple functionality. However, once linked to altruistic sensibilities selection would have endorsed any disposition to detect the presence of god-belief in possible exchange partners, enhancing these signaling dispositions in successive generations of religionists. The expression of a signal, as I have noted, is intrinsically linked to its meaning. Any tendency in religionists to act as if the eye of a just god (or gods) sees all could serve as a candidate signal. Over time, and with the right neurological mutations, the effect would be to accentuate the vividness in passionate display to cosmic beings, reflecting heightened emotional depth and richness in the religious life. From here, selection would have endorsed any disposition to produce and maintain public ordeals rituals whose strategic organization targets the presence and level of religious commitment through the imposition of specific costs.

Acquisition, Information Processing, and Bias

The acquisition of religious understandings: Recently there has been much intriguing research on the nature of religious concepts and their acquisition (BARRETT 2001; BARRETT/NYHOF 2001; BOYER/WALKER

2000; LAWSON 2000; MCCAULEY/LAWSON 2002; WHITEHOUSE 2000). Inferences concerning supernatural agents, substances, and powers seem to reflect the tacit understandings of ordinary agents, substances, and powers, with some minimal violation of intuitive expectations for the relevant kinds (BARRETT/KEIL 1998; BOYER 1999). That is, we think about gods in the same way we think about natural objects only the gods surprise us with a few extraordinary powers or properties. These results are interesting, among other reasons, because they suggest that the gods elaborated at length in theological tombs are very different from the gods of ordinary belief, and therefore serve as poor guides for psychological inquiry (BARRETT/KEIL 1998).

Is it possible to explain the acquisition and transmission of religious concepts by the vividness of such counterintuitive agents? Such an explanation leaves much unexplained. Jane may find Zugroo striking, but feel incapable of contemplating His existence, while Ed and Trundle can, and do. Jane may find Zugroo absurd, but dedicate her life to the Jesus Christ, an equally unnatural figure. With respect to Jane, a mature theory of religion needs to explain how Jane may simultaneously assent to the following propositions:

A. Zugroo violates an intuitive expectation, therefore does not exist.

B. Jesus violates and intuitive expectation and I dedicate my life to him.

Viewing religion as a signalling system that enhances altruism suggests dispositions to develop the religious understandings and practices of a social group may well be artefacts of natural design. Supernatural understandings do not spread simply because, as HUME writes, "the passion for surprise and wonder, being an agreeable emotion, gives a sensible tendency towards the belief in those events, from which it is derived" (HUME 1993, p90). In fact, roughly the opposite: our species possesses a passion for surprise and wonder and a tendency to believe in religious entities because we are designed to produce religion. While the nature of the systems that generates religious thought remains obscure, an optimal system would produce highly structured outcomes from impoverished informational inputs. The theory predicts that individuals (perhaps beginning in childhood) will take an active interest in the theological ideas of con-specifics, develop motivational commitments to these ideas, eventually producing emotional displays of these commitments and manifesting a willingness to engage in costly ritual activity to signal these commitments to oth-

ers. Little is known about the initial state and development of these systems. Speculating, it may be, as with language, that the relevant information triggering their development arrives by way of an extreme poverty of stimulus, suggesting much of the structural and semantic architecture of the system is part of our genetic endowment (CHOMSKY 1988). Given the rest of what we know about the mind, it would be unsurprising if experience plays a minimal role in development, merely prompting and giving labels to pan-human religious understandings and strategies. Whether development proceeds along a fixed schedule is unknown. Given strong nativism in other areas of cognition, again looking to language as a model (CHOMSKY 2000), it is worth exploring the possibility children produce all possible religions, with experience fixing belief to some, causing children to forget certain of theseroughly the opposite of BOYER's memory theory. This much seems very likely, that in spite of massive apparent cultural diversity, all supernatural understandings are approximately the same, with variation on the margins. The view of mind expressed by DESCARTES as composed of innate understanding given in advance of any experience has been thoroughly vindicated after sixty years of research in cognitive psychology. It may be that DESCARTES will be shown correct on another and related score, namely that knowledge of Divinity is imprinted in on every human mind, though here the seas of speculation run high.

Informational encapsulation: The model predicts that belief in supernatural causation will be isolated to social exchange and display, and will be separated to a high degree from practical empirical understandings. Though religious commitment incurs cost, its costs should not be lethal. We should not look to the gods to build our houses, till our fields, or raise our children. Somewhat paradoxically, individuals will expect supernatural forces to be related to practical interest, that supernatural forces are mysterious connected to our lives. They will sacrifice on the basis of these beliefs, to signal commitment and on behalf of co-religionists in altruistic exchange. But they will not leave the exigencies of life up to the gods. They will believe the gods will provide, but their actions will speak differently. Outside of the altruistic system, the model predicts they will fight tooth and nail for their reproductive interests.

Signaling costs: As mentioned above, religious signals impose costs that assess religious commitment. In practice, the costs incurred by religious commit-

ment should be reduced to the threshold at which defectors are kept out. Again, the system that generates supernatural commitment must remain checked by and fully integrated with the systems that facilitate interaction with the natural world. Again the theory predicts its various costs should not be lethal, and modulate to the perceived payoffs of exchange.

Receptiveness to religious signaling: The model predicts that individuals will exhibit acute interest in whether partners in exchange are acting in ways consistent with belief in supernatural agency. That is, they will track costly behavior that signals commitment. The theory predicts, paradoxically, that they should not explicitly view their own behavior as a signal, something to be consciously manipulated to better manipulate others. Quite the opposite, discerning audiences will attend to signals that are buried from conscious control. Fully undertaking a distorted conception of reality that projects supernatural agents into the cosmos, together with capacities to identify similarly committed exchange partners, furnishes the most reliable and efficient solution to the problem of invasion by cheaters.

Implicit denial of disconfirming evidence: The confinement of supernatural commitment to altruism suggests there is no relationship between religious belief and the (non-social) empirical world. In developing and expressing religious conviction, religious cognition does not seek to align thought to the outlay of the natural world. Rather it actively distorts reality while prompting costly signalling behaviour. One such cost is the mistaken supernatural belief itself. Because social exchange hinges on the degree of certainty the devout accord to such beliefs (as mentioned, one fundamental aim of ritual is to assess that degree precisely) selection will act against any tendency to falliblism about ones religious conviction. Quite the contrary, it is expected that disconfirming evidence generally will be internally suppressed and openly denied. It is clear how active suppression and denial may benefit an organism exchanging with co-religions: self-deception produces more convincing displays of conviction in a religious truth. Religious belief is a distortion represented as a certainty. But its epistemic status is better understood as an output of the systems that regulates social exchange rather than of the perceptual systems that mediate the relation between organisms and non-social reality.

Explicit moralistic denial: The core elements of this system that produces religion are hidden from consciousness, indeed when presented as mechanisms of projection, moralistically condemned, perhaps aggressively. Explicit denial of the distortion is likely.

The altruism system: Given that religion facilitates altruism, an optimal psychological architecture will produce a high degree of functional mesh between the systems that generate religious signalling and the broader psychological architecture underlying non-religiously motivated social exchange. It is therefore predictable, for example, that individuals will gossip about the religion of conspecifics, describe commitment in the language of infamy and prestige, and punish and reward acts of religious defection and charity. Given this integration, discriminating between the functional domains of religious altruism and ordinary reciprocal altruism may prove difficult. For example, dispositions to make religious converts may belong to the altruism system, which takes religious commitment as the relevant exchange signal. Some of the aspects I describe as belonging to the domain of religious altruism may be more usefully understood as aspects of an altruism system working with religious material. Divergence between the outputs of religiously motivated altruism and those of the reciprocal altruism system may provide convincing evidence in support of the theory that group selection dynamics played a vital role in the evolution of our species. If religion modulates the outputs of reciprocal altruism in a way that enhances the success of groups (an in turn average RS of the genes of individuals living in strong groups) this may add empirical support to group selectionist theories (WILSON 2002). Quite apart from the group selectionist controversy, the analysis of distinctive elements of religious altruism remains critical to advancing a broader understanding of the human sociality. Again, these aspects remain almost entirely unexplored.

Strict efficiency and god concepts: It is important not to underestimate the difficulties in securing convergence in judgements over fair exchange. Intuitions must intersect to approximately common understandings across players whose individual interests diverge. When making a decision, a self-interested individual will ask what is in it for me? and will act on the expected utility of probable outcomes, a difficult problem, but one that pales in comparison to the determination of fairness. Gods cannot merely endorse individual self-interest, backing what individuals want to do anyway because such gods cannot secure altruism. The computational feats involved in arriving at such determinations are presumably massive, as greater degrees accuracy are

demanding in forecasting the consequences of action over longer stretches of time.[26] What view will be projected into the commanding mouth of a god?

In hunter-gather societies it is common to find explicit pronouncements about the nature of the gods, voiced by religious elites (often shamans or adepts) to whom special knowledge of the supernatural is accorded (McCLENON 1997, 2002; PEARSON 2002). Explicit pronouncement by religious elites, while perhaps facilitating religious conventions, cannot explain strictly efficient outcomes. In fact, the power to authorise religious conventions only makes such an explanation more urgent. Otherwise religious elites could *always* promote their individual self-interest, dressing it up to look like the will of the gods.

The solution to the problem comes by reflecting on religions broader functional role. I have suggested that religious cognition enhances reciprocal altruism it does not replace the broader system that regulates altruism. There seem to be multifarious cognitive processes through which we undertake co-operative ventures and determine fair exchange. Much of the operations of the altruism system are implicit in our sense of justice as fairness, aspects of guilt and shame, feelings of friendship and dislike, moralistic aggression, sympathy, trust and suspicion, some forms of self-deception and strategic dishonesty. Leaving possible effects of group selection to the side, the simplest assumption is that the gods are projected through the lens of ordinary reciprocal altruism, with the intuitive deliverances of that system of justice left largely in tact. As with ordinary altruism, individual conceptions of justice may vary (typically veering towards self-interested conclusions) and may be subject to explicit bartering. The model therefore predicts variation in the content of divine justice as tolerable. As with ordinary altruism, variation is bounded by the practical exigencies of exchange. Individuals will tend to infer outcomes commensurate with strict-efficiency: they will tend to infer policies of sacrifice for those who will return favour, and of punishment for cheaters.

Convention: The theory predicts the emergence of conventions through which gods are named and differentiated from fictions, norms of religious practice are explicated, and the standards of worship and piety are explained. As noted above, effective co-ordination frequently requires convention. Some division of religious labour will likely emerge in any small society to facilitate theological standardisation about the nature and expectation of the gods. In a species with the capacity for both for religious

illusion and social differentiation, such as our own, a class of religious elites charged with instituting religious conventions may be expected arise. Again, even if the remarks of religious elites establish conventions necessary for efficient exchange, nevertheless the epistemological and motivational basis of religious intuitions that which makes these remarks plausible guides to action, must come from the implicit understandings of individuals. Utterances and marks on course merely direct a system whose internal design generates predicable outcomes.

Religious experience: Given the substantial sacrifice religious commitment imposes, on the one hand, and zero evidence for the gods, on the other, an effective cognitive design will generate confirming supernatural experience to support god-belief. In an optimal design, religious experience should be powerful but relatively rare and confined to areas of life not directly impinging on survival. Selection will not favour religious experiences that greatly impede the ability to hunt and gather food, or to seek out high quality sexual partners, and other practicalia. Special technologies for inducing religious experiences through music, drugs, the manipulation of bodily postures, and other means are also expected to be preserved and cultivated, if these foster religious commitment at a cost that justify altruistic returns.

Real rewards and punishments: Religious individuals will believe that the gods efficiently reward and punish, but will not leave it up to the gods to reward and punish. Here lies another paradox. The practical inference from a belief that the gods absolve the righteous and bring justice to enemies (viz. defectors) would ordinarily be, let the gods punish and reward. However, adopted as a general policy this inference would have disastrous effects on reproductive health of creatures prone to it, and selection will act powerfully against dispositions that favour it. If religion is to enhance survival, it must have material effects. Because the gods do not exist, they are not able to deliver the relevant punishments and rewards. For religious altruism to evolve then, real benefits must come through natural channels. The model therefore predicts that religion will not suppress the motivation to seek this-worldly justice. If defection is left entirely to non-extant gods, defection will spread.

Doubting of Religion: If religion is distortion in the service of altruism, it is not surprising that doubting the truth the distortion should be experienced subjectively as a kind of sedition against a group who one is enjoined to love. And it is. The expectation is

for cognitive protocols that quickly stamp out doubting, especially in cases where it is strategically unwise to defect form one's group.

Expressions of doubt: Verbal expressions of religious belief are insufficient to certify religious commitment. However verbal expressions of doubt warrant special concern, because presumably there is no advantage in lying about an intention to defect. The expectation is for members of religious communities to treat expressions of disbelief seriously, punishing them if the cost of defection is significant, as plots to commit any crime when discovered are punished. What is true for verbal expressions applies to lacklustre emotional and ritual performance, though here the prediction is for correspondingly less severe punishments if some display has been ventured.

Punishments to perceived heretics: Symbolic expressions of disbelief (in the relevant gods) may be interpreted as threats to social order, and punished. Punishments may range from simple avoidance and non-co-operation to more aggressive measures: mutilation, torture, and execution. Dispositions to punish the symbolic expressions of religion reflect the deeply social nature of religious commitment. We do not inflict such harm on those who doubt it will rain tomorrow or believe in the actuality of numbers. We do not torture the weatherman or mathematician as we do the heretic. The expectation is that expressions of religious disbelief, as for example advanced by this author, will be returned with genuine concern about his moral goodness.

Apparent moral difference: The theory predicts bias concerning the virtues of co-religionists and the vices of heretics. These moral properties may be given supernatural overtones, as when the faithful think of themselves as chosen or of their fate as predestined, or conceive of themselves as endowed with magical qualities—grace mana etc.—lacking in wicked heretics. Given that religious cognition is geared to produce altruism, these predictions of the faithful will generally forecast social interaction, a self-fulfilling prophecy: co-religionists will tend to sacrifice on each others behalf, and less reliably in the interests of out-group members, perhaps actively seeking their harm. This outcome actually produces real empirical evidence for the apparent moral differences separating groups, thereby fuelling inter-group bias.

Apparent theological difference and synchronism: If religious understandings serve to discriminate between exchange partners then an optimal system will systematically overestimate the differences be-

tween religious points of view. On the flip side, the theory predicts that individuals sitting next to each other at supernatural rituals will believe themselves to think along similar lines, even if there is wide variation in the details of theological belief. Beyond shows of religious altruism, it may be that much theological variation is permissible. All things equal, the model predicts a default bias favouring the uniqueness and particularity of religious traditions, and in turn, a default bias against universalistic theories of religion, such as the one advanced here. An optimal system would reverse these settings when new groups of formally theologically distinct communities merge into co-operative units. Agents should be expected to promote and commit to a new theological and ritual synthesis, perhaps constructed out of fragments of the older religious traditions.

Theologians: If the principal design function of belief in unseen realities is to ensure social co-ordination through reciprocal exchange, then it is plausible to describe theology, the practice of explicating religious commitment through analysis and ratiocination (counting angels on pins), as a kind of ostentatious religious expression. Mastery of a religious tradition shared by members of a group provides a reliable watermark of religious commitment—who wants to count angels on pins?—but it serves as a poor guide to the psychology of belief. BARRETT and KEIL (1998) have shown that laypersons make for poor theologians, drawing massively conflicting inferences. Again, were religion designed for empirical matters, say as a navigational system, such exposure to contradiction would prove lethal. A migratory animal cannot believe that North and South are both that-a-way (pointing to the same direction) and live long. From an engineering perspective, religion is optimised to bring dependable co-operators together at the exclusion of defectors. Belief in the gods as brokers of fortune, religious emotions, and rituals (such as theological practice) are expensive signals whose costs reliably certify commitment to altruistic exchange. The details of an individuals theological convictions do not matter very much to this aim, except when explicit as signals of commitment to a supernatural world that favours in-group reciprocity. Discrepancies at the level of religious doctrine only matter when explicated and when those explications threaten co-operative activity. Religious belief is what it does, not what it says.

Theological correctness: toleration for theological variation is possible within religiously circumscribed communities. Toleration ends only where

the expression of theological divergence signals defection from social exchange. In the simplest cases, toleration will end when the relevant theological convictions radically alter the payoff schedule in co-ordination games of partial conflict. Any reduction in accountability to supernatural law is an obvious example of such departures, and will not likely go unpunished.

Interest in the religious conviction of others: Given the significant role of religious commitment in social exchange, the theory predicts an interest in the religion of others, as well as dispositions to put those convictions to the test where exchange is at issue. We are interested in the natural beliefs of others, whether for example they think what I am eating is poisonous. However, the practical inferences that follow from an assessment of religious conviction should reflect moral understandings. I will not moralistically condemn someone who in good faith (but falsely) warns me that I have ingested poison, unless I think he is playing at my expense. But I may avoid and dislike a worshiper of Zugroo. Again, the expectation is for interest in religion to track strategic information relevant to exchange.

Preference for co-religionists: On the flip side, the model predicts that individuals will generally feel more secure and comfortable in company with those committed to the same gods, and should display a preference for arrangements that place them in association with them.

Conversion: The system that generates religion is expected to remain indifferent to empirical disconfirmation, but this does not mean that it incapable of change. Given the strategic nature of social exchange, an optimal system would adjust to local social circumstances, strategically modulating itself to changes in social arrangement in ways that tend to increase RS. Not only will the costs of religious display adjust to actual (non-supernatural) returns, but also the nature of the conviction displayed will be expected to change if these strategic advantages are obvious. An optimal system will motivate individuals to convert when presented with credible prospect of long-standing exchange with a social group bound to common motivating religious ideals. Reflection on the long-standing regularities (if any) in the ancestral environment, considered with reference to internal constraints imposed by architectural features of the religion system, should enable a more careful task-analysis of conversion strategies. The rhetorical techniques of missionaries and cultural anthropologists may shed further light on nature of these strategies.

Missionary behaviour. It may seem that a signalling based theory of religious cost cannot account for the expense of missionary activity, where (presumably) individuals display commitment to gods in front of audiences who do not believe in them. If anything, the model would seem to predict hostility and aggression in response to such displays, further escalating the costs of religious investment. What then accounts for the desire to convert others? If group selection were a strong force in the evolution of our species, then an argument could be developed that missionary investment builds stronger coalitions: missionaries sacrifice to enhance the power of their groups. But missionary cost can be explained from within the limits of ordinary selection, if genuine enhancements to the average inclusive fitness of signallers follow from their seeking of converts. Placing to the side any expected return generated through successful missionary activity (which may be far from trivial) it may be that missionaries and their kin are rewarded by *current religious affiliates*. Such benefits may come in the form of actual goods (payments and the like) or as prestige, a reputation for moral excellence. It is not hard to see how dispositions to evangelise could evolve as *signals of altruistic worth directed to ones group*. Like emotional commitment and ritual display, the costs of missionary sacrifice are intrinsically linked to their message. Only a committed believer would undertake the associated discomfort and risk of trying to convert cannibals, etc. Here there is a strong analogy to exhibitions of military courage where the risks of harm in battle are presumably balanced against the benefits generated by courageous signalling and against potential injury via one's local affiliates, who may not leave cowardice unpunished. A fully developed account of missionary psychology would need to factor all the expected benefits of sacrifice, carefully assessing the various strategic advantages of missionary behaviour and signalling. With respect to potential converts, the model predicts very little initial religious display directed to converts (where such display is likely to induce blank looks of incomprehension or hostility) and much material benevolence. Very likely, missionaries will work first to improve the concrete worldly circumstances of those they seek to initiate, signalling their altruistic value tangibly by their deeds. The pomp of religion will likely emerge later, only after the exact meanings of religious display have been explicated and conveyed.

Agape: Religiously motivated co-operation has its limitations. Individuals should not be prepared to make *any* sacrifice for their co-religionists. They

should rather tend to act in ways that maximise re-productive fitness, if all act as they do. This is a version of reciprocal altruism, not altruism at all costs come what may. As a strategy, selection will act against generalised love that is not reciprocated. It is theoretically possible that agape (universal love) could emerge as an optimal strategy if its costs were taken as signalling costs, and repaid indirectly by other Agapists. Agape may further advance conversion by prompting strategies of altruistic exchange in heretics. Roughly, the idea is that if the Agapist has given me something I must be indebted. Where heretics are genuine threats—especially when the benefits of agape come at risk of peril to Agapists, as in crime and warfare—selection will act against indiscriminate assistance to the out group as a form of signalling. We do not feed sharks with our hands.

There is much evidence to support this prediction. It is clear that most Christians in Northern Ireland or the Balkans do not turn the other cheek as their Gospel enjoins them to. One interpretation is that they are bad Christians. From a tactical point of view however their strategies conform to the expectations of a social mind engineered to enhance RS in ancestral conditions. A corpse cannot turn its cheek. When stakes are sufficiently high, then, the expectation is violence returned for violence and sanctioned by divine command.

As noted above, David Sloan WILSON has recently provided an intriguing group selectionist account of religious altruism consistent with altruistic sacrifice beyond reciprocity (WILSON 2002). The presence of supererogatory tendencies may be evidence that selection at the level of groups was a strong force in human evolution. Alternatively, explicit avowal of extreme sacrifice may be best explained as a strategy of self-deception. We sincerely and openly promote high- minded ideals while living by less stringent morals when this pays (ALEXANDER 1987; TRIVERS 2001). The precise extent to which individuals will sacrifice for their gods, turning their backs on established exchange partners and family, compels a more careful empirical study.

Implicit Religion: Religion is an artefact of natural selection, part of a panhuman psychological design and a species property. The simplest assumption is that individuals without gods should be as rare as babies lacking feet. Yet, clearly, a developmental outcome of our psychological architecture cannot exclude atheism and

disenchantment with religious ritual. This seem paradoxical, a prediction that all will believe in gods that allows some may not. Paradox is resolved by noticing residual elements and vestiges of supernatural understandings are frequently expressed through secular thought and practice. "He believes in no God and worships him," William JAMES once wrote, a sentiment applicable to many contemporary materialist professions of faith. It seems clear that persons uncommitted to gods conduct their lives under the motivational influences of abstract entities that have some quasi-magical bearing on the self and its future. Such abstractions as: The Constitution, Justice, Law, Evolutionary Psychology, Philosophy, Progress, Freedom, Tradition, Community are exemplary. Even if such concepts can be reduced to the language of physics (doubtful) those who transact in them rarely bother with the details of reduction. Yet exchange with others is frequently based, at least partially, on evidence of commitment to such abstractions. And such commitments are costly in the ways religious commitments are. A prediction of the theory outlined here is that altruistic exchange in the modern world is based at least partially on costly strategic commitments to ideals conceived of as relevant to individual fortune.

Conclusion: Religion and Distortion

Religious cognition is based on a strategic distortion of reality as god infested. Given that much social bias follows from this distortion, it may seem useful to seek rectification, perhaps using psychological theory as a lens to correct blurred misapprehensions. But if the theory advanced here is correct, it predicts the systematic denial of disconfirming evidence, with moralistic overtones, if co-religionists perceive the stakes of religious defection to be high. It also predicts advocacy of the theory as a sign of defection, and therefore suspicion of any heretic advancing it. Like a Chinese finger trap, the harder one uses theory to pull religious understandings apart, the more firmly they will likely become entrenched. Even if it were possible to delete religious understandings from human thought, it is not clear this would be desirable. It would be surprising if an overall improvement to life would be secured by the labotimization of instincts that have been selected for altruism.

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Notes

1 Read "religious belief" as ontological commitment to the existence of *x* where *x* is a supernatural entity or force. A belief that a supernatural reality does not exist will not be considered a religious belief. I assume that there is a clear intuitive difference between "supernatural" and "natural" entities (BOYER/RAMBLE 2001).

2 This convention departs from somewhat from ordinary language where "religion" generally signifies something institutional, not psychological, and "grace" "soul" and "num" and other such essences and powers, though supernatural, are not "gods" in the ordinary language sense.

3 "Altruism" and "defection" here are descriptive terms, and should not be interpreted as denoting normatively good or bad actions. Normative inquiry involves a separate though related philosophical analysis (HARMAN 1998–1999). The terms describe the average effects of actions not intentions, which may conflict. Burning heretics at the stake may be intended for their benefit but nevertheless damage reproductive interests. "Inclusive fitness" henceforth "RS" denotes the number of surviving offspring plus the surviving offspring of relatives weighted by degree of relatedness (HAMILTON 1964).

4 Throughout this paper, "cost" denotes "reproductive cost" in terms of an organism's inclusive fitness or –RS.

5 FODOR argues we are "…devices built to find out what is true" (FODOR 1986, p18) and that "…a condition for the reliability of perception, at least for a fallible organism, is that it generally sees what is there, not what it wants or expects to be there. Organisms that don't do so become deceased" (FODOR 1983, p68). The idea is that selection tends to enhance *accuracy* in perception and forecasting ability.

6 It may be that there are *other* non-altruistic benefits produced by the systems responsible for religious thought that we can add to the benefit side of the equation. For example, religion may instil hope, facilitates healing through placebo effects, morally instruct, silence the explanatory drive, give purpose to life, or bring some other reproductive advantage. All things considered, its benefits may exceed its costs. However, the problem remains. There are cases of optimism, healing, altruism, and global explanatory indifference outside of religious circles. Presumably, human beings could have evolved greater capacities in these domains without worshipping imaginary beings. It remains obscure why cognition does not bypass the substantial expense of religious practice, causing individuals to live out their days breeding and rearing before happily facing the grave.

Problem: +$RS value of religious [hope, healing, moral instruction, explanation, meaning…] < + RS value of non-religious [hope, healing, moral instruction, explanation, meaning…]

Standard adaptationist s require some further account for why selection did not produce systems that yield these reproductive benefits without the massive additional costs that religious belief and practice impose.

7 For recent overviews of the literature, see (BARRETT 2000; ANDRESEN 2001).

8 ATRAN (2002) notes that with respect to social groupings "To keep the morally corrosive temptations to deceive or defect under control, all concerned—whether beggar or king— must truly believe that the gods are always watching" (pp144–145). Furthermore "the successful communication of commitment through display implies that the displays themselves are critical to commitment…" (p145). The ZA-

HAVIAN approach to signalling I advance below explicates the evolutionary logic of such displays, revealing how their costs are intrinsically related to the message they encode. ATRAN himself situates sacrificial cost within a larger "evolutionary landscape" of the mind, and argues that: "Religion has no evolutionary function per se. It is rather that moral sentiments and existential anxieties constitute—by virtue of evolution—ineluctable elements of the human condition, and that the cognitive invention, cultural selection, and historical survival of religious beliefs owes, in part to success in accommodating these elements" (ATRAN 2002, pp279–280) This may be so. As with language, it is probable that religion is "so large and elaborated a system that any precise characterization of the total selection pressures acting on it over evolutionary time is beyond our present ability to analyse in detail" (TOOBY/COSMIDES 1990, p761). But adaptationist reasoning may nevertheless be brought to bear on specialised sub-systems that accomplish specific functional ends. I suggest that cost elements of the cognitive systems underlying religion are best viewed as a signalling system adapted for social co-ordination, and that many religious expressions—"existential, cultural, an historical"— are structured products of this exquisitely designed cognitive device, knowledge of which may be advance by reverse engineering the types of coordination problems it solves.

9 Evolutionary game theorist Brian SKYRMS has modelled the evolution of signalling and detection systems that foster co-ordination in interactions of pure mutual gain. His conclusion is that the emergence of such systems is a "moral certainty" (SKYRMS 1996, p93); see also LEWIS (1969).

10 Consider bargaining problems. Trundle and Ed can make $1,000 through some joint financial venture. The project's success depends on the collaboration: neither can make it work without the other. Suppose Ed is already rich whereas Trundle is broke. Because every penny counts for Trundle, Ed is in a stronger bargaining position. Ed can credibly demand (say) $900 or walk away. Trundle is rational to accept the offer because $100 beats nothing. Similarly consider problems of deterrence. Suppose Trundle is in a position to steal a sheep from Ed's pasture (Ed is elsewhere enjoying other of his flock). Ed may hunt down and attempt to punish Trundle but doing so generates expense both in material resources and opportunities lost. Catching Trundle also invites the risk that other of his sheep will be stolen or flee his loving pasture. Assume the cost of punishment exceeds the value of the sheep. The logic of self-interest yields the counterintuitive conclusion that Ed should let Trundle go as the lesser of two evils.

11 Applied to interactions common in the evolutionary environment, in our species, the Pleistocene.

12 Evolutionary game theoretic analysis must consider the effects of strategies played out over successive generations, where payoffs relate to RS. It is interesting that with respect to the prisoner's dilemma, the analysis fails to distinguish a single strategy as optimal. Assuming random pairing, if the initial number of defectors in a population is proportionately high, and co-operation imposes substantial costs, then co-operators will typically encounter defectors and will fair less well over time, eventually vanishing. Selection in this case does ratify defection as the single pure strategy. Co-operators gain by helping kin, but when the benefits of co-operation are high, and populations initially consist of related co-operators living in close proximity—in "viscous" communities—then co-operation emerges as one of two effective strategies. But defectors living on the periphery of co-operating communities also gain, enabling them to

maintain a presence in any population. Both defection and co-operation may be optimal, depending on where an organism is placed. More generally, when pairing is randomised ideal strategies often remain indeterminate. It is not possible to predict the proportion of defectors and co-operators within a population, or even whether there that proportion remains stable over time. Ratios depend critically on 1. the precise cost/payoff matrix for the relevant games; 2. the relationship of this payoffs to RS; 3. the frequency of interaction 4. the initial proportion of defectors and co-operators 5. their genetic relatedness and 6. factors unrelated to the game, a huge category. See extended discussion in (SKYRMS 1996, ch3). This result though inconclusive, is interesting because reveals that defection is not overdetermined in cases resembling the prisoner's dilemma and random pairing. Self-interest need not always come out on top, even where interaction is purely random.

13 Policing could come indirectly in a species with the ability to make and enforce contracts. The capacity to institute binding agreements capable of altering the pay-off matrix could also favour strictly efficient solutions. Returning to the Joint-Investment game above (note 12), if Trundle could enter into a contract with a hit man (or a spouse) enjoined to kill Trundle if he allows himself to bargain for less than $500, then Trundle could induce a rational Ed into dividing the profits evenly. His hands, after all, are tied. Some theorists view morality as a collection of such binding contracts (HARMAN 2000).

14 There are many instances in nature where distortion is beneficial. A defector who deceives herself into believing she is a co-operator may better deceive others, thus bringing strategic advantage (ALEXANDER 1987; TRIVERS 1991, 2001).

15 Presumably other aspects of the psychological system that regulates altruism could punish the religiously mendacious. Those prone to false professions could, for example, acquire a reputation for lying.

16 "The Handicap Principle states that the receiver of a signal has a stake in the signal's reliability, or accuracy, and will not pay attention to it unless it is reliable. Thus signals are not arbitrary; rather, each signal is the one best suited to reliably convey the specific message it carries" (ZAHAVI/ZAHAVI 1997, p229).

17 Consider Trundle who has stolen Ed's sheep in the deterrence problem. Assuming this is a one-off crime, catching Trundle proves to be more expensive than the price Ed could fetch for the sheep, so a rational Ed should let Trundle go. But an irrational Ed, who can effectively signal his irrationality, would fair better. If Ed mistakenly believes that no price is too high to redress Trundle's injustice and effectively signals this to Trundle, then he can avoid the expense of the theft. It is interesting to think about the many ways in which Ed could demonstrate the relevant motivations. He could show his commitment by having frequently expressed explosive moral indignation in the past, developing a reputation for violence at being wronged. He could speak of his loaded gun and let gossip do the rest. He could tattoo his arms with regalia that Trundle will interpret as "scary." Notice that Ed's irrational displays manipulate Trundle's expected utilities and that an irrational Ed fairs better than a rational Ed does. From this it is easy to see how expression of many human emotions are based on strategic misunderstandings of the world.

18 The intricate nature of emotional signalling is easy to miss until one tries acting feelings out:
- Imagine hearing sharp, grating sounds but displaying an expression of overwhelming rapture.
- Your aircraft has fire coming off its wings and as it descends nose first toward the ground. Imagine convening an expression of sexual coyness at this.
- Imagine thinking "Absolutely, yes!" while conveying scornful denial your face.

Even trained actors have a hard time reproducing emotional states, their techniques relying subtly on their ability to brainwash themselves into character (FRANK 1988).

19 TRIVERS (2001) argues that the machinery of self-deception, the active distortion of reality, has arisen as an anti-detection technology. We deceive ourselves so as better to deceive others. It is worth pointing out, however, that if deception is thoroughgoing, the signalling organism for all intents and purposes *really will* possess the relevant motivations. Religion is, at any rate, a form of self-deception in TRIVERS's sense: an active distortion of information flow within an organism to advance its reproductive interests through the manipulation of an audience. Whether these beliefs attach to reality is a separate question from how an individual will act in the future, in light of those beliefs.

20 This may be one reason that television and the internet—while connecting the entire world through an electronic medium—has proved an unpopular medium for religious ritual. In spite of the incredible convenience of the new media, judgements about the relevant emotional states of one's own particular exchange partners cannot be made.

21 It is noteworthy that, excepting anthropologists, people do not generally adopt the religious practices of persons whose religious views strike them as incredible. And even anthropologists who report "going native" may unconsciously do so to maximise exchange.

22 See OVERHOLT (1986, pp122–142) for a discussion of Wovoka and Paiute Ghost Dance, for an example of a fervent a millennial ritual at a moment acute cultural crisis.

23 For example they may serve as systems of moral instructions that illustrate mores. They may also serve to test one's commitment to a regime of natural authority, that of the religious elites, whose power hinges on distinguishing genuine allies from potential challengers. Moreover, rituals may serve to illustrate the hegemonic power of a religious community. In our era of nation states, shows of force through military parades or the deployment of troops and weapons to borders, or terrifying "military exercises" can be viewed as evidence of strength and warnings to potential enemies. In like fashion, it may be that religious rituals put on display the natural power of a religious community, an awesome show to potential defectors of what they are up against.

24 WHITEHOUSE has analysed the relationship between the frequency of a ritual and its staging, noting that frequently of a ritual is a good predictor of the "pageantry" in its staging (WHITEHOUSE 2000). Rites of passage such as inaugurations and weddings are far more vivid to the senses than rites that occur daily. MCCAULEY/LAWSON (2002) have recently offered a slightly different account in which the form of a ritual bears on the frequency of its repetition. A mature theory of ritual would need to incorporate both the cognitive constraints on ritual action of the kind these cognitive anthropologists explore with biologically motivated theory of religious signalling offered here.

25 Among the Kalahari people, where the creator gods are usually imagined as indifferent, ancestor spirits and the magical healing substance num provide the basis of emotional display and ritual interaction (KATZ 1984, 1997).

26 It used to be assumed that subjective probability departs significantly from Bayesian probability though this assumption has recently come under fire (COSMIDES/TOOBY 1996).

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Allen D. MacNeill

The Capacity for Religious Experience is an Evolutionary Adaptation to Warfare

Introduction

"If we were forced to say in one word who God is and in another what the Bible is about, the answer would have to be: God is a war-rior, and the Bible is about victory" (Jack MILES 1995)

Recent events have rein-forced a pattern observ-able for at least the past six millennia: that reli-gion and warfare are tightly, perhaps inextrica-bly, intertwined. Even a cursory review of the his-tory of wars and warlike conflicts indicates that re-ligion has played a central role in these events. The common use of words and phrases such as "cru-sade," "holy war," and the now-infamous "jihad" point to the intimate con-nection between religion and warfare. From the most exalted "god-kings" to the lowliest "grunts" in the foxholes (where, as tradition tells us, there are no atheists), religion has both accompanied and facilitated warfare.

    That religion and warfare are at some level related is virtually undeniable. What is less obvious at first glance is the quality of this relationship; is it causal, and if so, in which direction? There are at least three possibilities:

Abstract

The pan-specific qualities of religious experience and warfare indicate that both are evolutionary adapta-tions. Selective advantages for participation in war-fare accrue to both winners and losers as long as the benefits of participation exceed the average costs. These advantages, primarily in the form of differen-tial reproductive success, accrue to males on the win-ning side and to females on either side. Recent work on the evolution of religion have converged on a "stan-dard model" in which religions are treated as epiphe-nomena of human cognitive processes for the detection of and reaction to agents under conditions of stress, anxiety, and perceived threat. Religious experi-ence and participation in warfare are both character-ized by depersonalization and submission to a super-individual force. The capacities for religious experi-ence and participation in warfare evolve by means of natural selection operating primarily at the level of in-dividuals who are members of groups in which both kin selection and reciprocal altruism also occur. It is likely that the overall patterns of supernatural organi-zation exist as the result of co-evolution between the memetic content of religious beliefs and the neurolog-ical matrix within which such beliefs are maintained and transmitted in the context of specific ecological subsistence patterns.

Key words

Religion; war; warfare; evolution; co-evolution; meme.

■ that religions cause wars,
■ that warfare promotes religion, or
■ that both religion and warfare are causally linked to other, more general causative factors.

    However, a more so-phisticated analysis may indicate that religion and warfare are both cause and effect of each other. That is the thesis of this presentation: that the ca-pacity for religious expe-rience exists among hu-mans primarily because it has facilitated warfare, which in turn reinforces the underlying causes of religion. In other words, the human capacities for religious experience and warfare have adapted to each other in a co-evolu-tionary spiral that has made individual and group mass murder and suicide virtually inevita-ble, given prevailing eco-logical subsistence pat-terns.

The Capacity for Religion Is an Evolutionary Adaptation

In *The Descent of Man*, DARWIN argued that humans do not have an innate instinct to believe in God: "The belief in God has often been advanced as not

only the greatest, but the most complete of all the distinctions between man and the lower animals. It is however impossible…to maintain that this belief is innate or instinctive in man" (DARWIN 1882, p612). He based this conclusion on the widespread observation that many human cultures do not include a belief in a deity that can be interpreted as being in any way conceptually similar to the monotheistic Judeo-Christian God. However, DARWIN went on to point out that "…a belief in all-pervading spiritual entities seems to be universal; and apparently follows from a considerable advance in man's reason, and from a still greater advance in his faculties of imagination, curiosity and wonder" (DARWIN 1882, p612).

Implicit in DARWIN's argument is the idea that only species-wide behavior patterns can legitimately be thought of as evolutionary adaptations. This is a common assumption among both ethologists and evolutionary psychologists, and in my opinion is at best misguided. I prefer G. C. WILLIAMS' definition of an adaptation: "An adaptation is any trait that enhances fitness and [has been] modified by selection to perform that role" (WILLIAMS 1966). However, even this definition is somewhat muddied by the inclusion of the term "fitness." The working definition for "evolutionary adaptation" that will be used throughout the rest of this presentation is this:

Definition 1. An *evolutionary adaptation* is any heritable phenotypic character whose frequency of appearance in a population is the result of increased reproductive success relative to alternative versions of that heritable phenotypic character.

Let us set aside for the moment the question of how such phenotypic characters are inherited. As we will see, this is not a trivial question, but one that in the long run does not fundamentally alter the argument I am about to make. Given this definition of evolutionary adaptation, it should be immediately clear why pan-specificity alone is a poor criterion for determining whether some character is an adaptation.

Implicit in this definition of evolutionary adaptation is the idea that there is some real (i.e., non-trivial) *variation* in the phenotypic characteristics present among the members of a population. Indeed, it was the recognition of the existence of such variation, and the insistence that this variation is the basis for natural selection, that was perhaps DARWIN's most revolutionary discovery. Any trait that is an evolutionary adaptation will show some

non-trivial variation in the expression of that trait, from individuals who express it to a very high degree, to individuals in whom its expression is virtually unnoticeable. What appears at first glance to be pan-specificity is actually the numerical preponderance of individuals whose expression of the trait is close to the population mean for that trait.

Is there other evidence that can be used to determine if a particular characteristic is an evolutionary adaptation? In addition to showing that the numerical preponderance of a particular phenotypic trait is the result of differential survival and reproduction, it may also be possible to link the phenotypic trait with an underlying anatomical and/or physiological substrate that is the efficient cause of the trait in question. For example, it is commonly accepted at present that the ability to speak and understand speech is an evolutionary adaptation in humans. This conclusion was originally based primarily on linguistic grounds (cf. LENNEBERG 1964, 1967; CHOMSKY 1965) but has more recently been correlated with underlying neurological processes (PINKER 1994; PINKER/BLOOM 1999).

Another way of determining if a characteristic is an evolutionary adaptation is to correlate the population dynamics of the adaptation with its evolutionary environment of adaptation (BOWLBY 1969):

Definition 2. The *evolutionary environment of adaptation* (or *EEA*) is the ecological milieu under which a particular adaptation has arisen as the result of selection.

The concept of an EEA can be fruitfully employed when trying to determine whether a particular characteristic is an adaptation by attempting to show how the ecological circumstances prevalent in the EEA would have resulted in differential survival and reproduction. However, application of this technique is complicated by the fact that determination of the EEA of a given adaptation can be a somewhat circular process. Ideally, the circumstances of the EEA should be determined by means other than reference to a particular adaptation, followed by an analysis of the effects of the inferred EEA on the survival and reproduction of the organisms inhabiting it.

Final verification that a particular trait is indeed an evolutionary adaptation would require all of the foregoing, plus linking the appearance of the trait to an underlying gene or gene complex and showing that the frequency of the controlling gene(s) in the population in question has indeed been altered as the result of differential survival and reproduc-

tion. This is difficult to do even with very simple genetic traits, such as sickle-cell anemia. Furthermore, it may be that the causal connection between the underlying genes and the trait for which they code may be indirect at best. However, rather than abandon the concept of evolutionary adaptation altogether (as some have suggested; cf. MARGULIS 1997), it may still be useful to apply Definition 1 (above) with four further qualifications:

Qualification 1. An evolutionary adaptation will be expressed by most of the members of a given population, in a pattern that approximates a *normal distribution*;

Qualification 2. An evolutionary adaptation can be correlated with *underlying anatomical and physiological structures*, which constitute the efficient (or proximate) cause of the evolution of the adaptation;

Qualification 3. An evolutionary adaptation can be correlated with a pre-existing *evolutionary environment of adaptation* (EEA), the circumstances of which can then be correlated with differential survival and reproduction; and

Qualification 4. An evolutionary adaptation can be correlated with the presence and expression of an *underlying gene or gene complex*, which directly or indirectly causes and influences the expression of the phenotypic trait that constitutes the adaptation.

Given the foregoing, we can reframe DARWIN's question thusly: is *religion* an evolutionary adaptation? This question is similar to the question, "Is speaking English an adaptation?" Clearly, speaking English is not adaptive, any more than is speaking French or Tagalog. Given Definition 1 and the qualifications enumerated above, to assert that speaking English is an evolutionary adaptation would require that one verify that individuals who speak English survive and reproduce more often than individuals who speak some alternative language. Furthermore, their differential survival and reproduction must be shown to be causally related to their speaking English, and not to some other, related characteristic, such as the ability to speak, regardless of what language is spoken.

Here is the essential distinction: the *capacity* to speak English (or any other language, for that matter) is quite clearly an evolutionary adaptation. That it is so is reinforced by the fact that there are specific circuits and regions in the human brain that are dedicated to the production and understanding of speech. Damage to these structures can severely limit or even completely destroy a person's ability to speak or understand spoken language. (PENFIELD/ROBERTS 1959) Furthermore, although every neurologically normal person can learn to speak and understand speech, there is the same kind of natural variation in this capacity that DARWIN first pointed out as the basis for natural selection. That is, some individuals learn to speak and understand speech with great difficulty, others do so with great facility, while the vast majority of humanity muddles through with one "mother tongue." The point here is that the *capacity* for religious experience appears to have the same characteristics as the capacity for language. While it is pan-specific, there is considerable individual variation in the capacity for religious experience, with some individuals having very high capacity, others very low, and the average person somewhere in the middle (see Qualification 1, above).

Furthermore, there is accumulating evidence that there are underlying neurological structures that facilitate religious experience. The work of D'AQUILI/NEWBERG (1999; NEWBERG/D'AQUILI 2001), PERSINGER (1987), RAMACHANDRAN/BLAKESLEE (1998), and SAVER/RABIN (1997) all purport to find correlates between religious experiences and specific brain structures and neurological processes. The point here is not to argue for the specific neurobiology underlying the particular states described by these researchers, nor to argue that the neurological states they have studied comprise the whole of what we mean by the term "religion." Rather, the fact that some psychological states identified with religious experience have been correlated with specific neurological activity in specific structures in the human brain satisfies, at least in part, the criterion enumerated in Qualification 2 (above).

Finally, is there a "religion gene" that can be shown to correlate with the capacity for religious experience, and whose frequency can be shown to vary in such a way as to approximate the patterns characteristic of an evolutionary adaptation? No, nor should we expect there to be one. Only in so-called "vulgar sociobiology" are there presumed to be single genes (or even gene complexes) that code for complex human behaviors such as the capacity for speech or religion. Rather, there are genes that code for the assembly, operation, and modification of "mental modules" that bring about these complex behavior patterns.

One way to avoid the whole morass of gene–behavior linkages is to employ what Stephen EMLEN (1976) has called the "correlation approach" to behavioral ecology. According to this method, one may be able to "…interpret and partially predict the social structure of a species on the basis of a limited set of environmental or ecological variables…[that] impose limits on the range of types of social organization that will be adaptive" (EMLEN 1976, p736). According to this viewpoint, "[Species] faced with similar ecological 'problems' exhibit a predictable convergence in their 'solutions,' as shown in their social organizations" (EMLEN 1976, p737). Following EMLEN's lead, we can compare the types of religious experiences and patterns of religious behaviors exhibited by humans in different ecological subsistence patterns and at different times and places. In so doing, we may find some general patterns that will point to the underlying evolutionary dynamics influencing the development of the biological and cultural mechanisms producing those experiences and behaviors.

Adaptive characteristics do not increase in frequency monotonically in populations, nor are selective pressures usually limited to one or even a few parameters. Following the lead of SEWELL WRIGHT (1968–1978), it has been very common for evolutionary biologists to model the *adaptive landscape* for a given population or species (cf. RIDLEY 1996, pp215–219). However, what is sometimes lost in diagrams such as these is the fact that there are individual organisms represented by nearly every point on the surface illustrated. That is, not all individuals in the population have risen to the adaptive peaks in the population, nor are all of them slipping down into the troughs of maladaptation. Perhaps it would be better to imagine each individual and its descendents as a boat-like cluster of adjacent points on this surface, tossed up and down by the vicissitudes of ecological change.

In this viewpoint, it may be easier to see that some changes in the environment are much less important than others, and that some shifts in adaptive character may be much more significant than others. In particular, it is quite possible for a major change in one parameter in the environment to cause a corresponding change in the adaptive characteristics of the population, swamping any effects of smaller changes. In essence, what I am describing here is an evolutionary over-ride of sorts, in which selection for one characteristic swamps selection for most or all other characteristics among the members of a population.

At this point, it appears likely that the capacity for religious experience has many of the characteristics of an evolutionary adaptation:

■ the capacity for religious experience is pan-specific in humans, although there is considerable variation in this capacity, both within and between human groups,

■ the capacity for religious experience has been correlated with underlying neurological structures and processes,

■ the capacity for religious experience can be correlated with a known evolutionary environment of adaptation (i.e., intergroup warfare in agricultural societies, as will be discussed in more detail below), and

■ although no underlying genetic mechanisms for the development of the capacity for religious experience are now known, the existence of consistent cross-cultural patterns of religious expression indicates that religious behavior is subject to evolutionary convergence in a manner analogous to other evolutionary adaptations.

The Capacity for Warfare is Also an Evolutionary Adaptation

Now it is time to address the other half of the co-evolutionary spiral, to whit: is warfare (or, more precisely, the capacity for warfare) an evolutionary adaptation? Once again, DARWIN was unequivocal on this subject. In *The Descent of Man*, he wrote:

"When two tribes of primeval man, living in the same country, came into competition, if (other circumstances being equal) the one tribe included a great number of courageous, sympathetic and faithful members, who were always ready to warn each other of danger, to aid and defend each other, this tribe would succeed better and conquer the other…. Thus the social and moral qualities would tend slowly to advance and be diffused throughout the world" (DARWIN 1882, p130).

Two things are immediately noticeable about this description: that DARWIN assumes that the ability to be successful in warfare arises from courage, sympathy, and faithfulness within human groups, and that the level at which selection is operating in the evolution of such qualities is the group, rather than the individual. As we shall soon see, neither of these assumptions are necessarily in accord with the evidence.

Before we can decide if warfare is adaptive, it is first necessary to define precisely what we mean by warfare. There appear to be at least three intergroup

aggressive activities that are often referred to by the same name. It is important to my later argument that these be distinguished, and so here they are:

Definition 3. *Raiding* (or *rustling*, as in cattle rustling) is an activity in which small groups of humans, virtually always men and almost always close kin groups, spontaneously and with relatively little planning or hierarchical organization, temporarily enter the recognized territory of a nearby group with the intention of forcibly obtaining resources, usually domesticated animals or women, or both. Not all members of a given kin group will necessarily participate in raiding, and all "warlike" activity and organization occurs immediately before, during, and after a raid. At all other times, the participants in such a raid are engaged in other domestic activities, generally unrelated to raiding.

Definition 4. *Militia warfare* is an activity in which somewhat larger groups of humans, again almost exclusively male but not necessarily close kin groups, band together periodically with some planning and hierarchical organization, with the intention of either forcibly entering the recognized territory of a nearby group or defending against the forcible entry by similarly constituted raiding parties or militias from other groups. In militia warfare, most of the able-bodied males in a given social group will participate in some way, either in direct combat or combat support. However, once the immediate "warlike" activity has ended, the militia disbands and most, if not all, of its members turn to other tasks. An important characteristic that distinguishes raiding from militia warfare is the presence in the latter of generally recognized hierarchical ranks and specialized duties and training, a situation generally lacking in raiding/rustling.

Definition 5. *Professional warfare* is an activity in which relatively large groups of humans (i.e., armies), again almost exclusively male but usually not close kin groups (and often including noncombatant female auxiliaries), band together regularly or permanently with considerable planning and hierarchical organization, with the intention of either forcibly commandeering the recognized territory of a nearby group or defending against the forcible entry by similarly constituted armies from other groups. In professional warfare, many of the able-bodied males in a given social group will participate in some way, either in direct combat or combat support. Furthermore, regardless of when or if the immediate "warlike" activity has ended, the army continues to exist and its members pursue specialized tasks within the military organization. An important characteristic that distinguishes raiding and militia warfare from professional warfare is the proliferation in the latter of strictly defined hierarchical ranks and specialized duties and the existence of a permanent professional class of warriors which includes almost all officers, but not necessarily all combatants (i.e., the "grunts" get to go home and take up other occupations after the war…assuming they survive).

Although there are many variations on these three themes (and an almost infinite gradation of one into the other), there are broad patterns of correlation between these three patterns across most societies. Furthermore, the three types of warlike organization are generally correlated with ecological subsistence patterns. Raiding is most common among hunter–gatherers and pastoralists (i.e., people who raise domesticated animals as an important part of their subsistence). Militia warfare is more common among simple agriculturalists, especially those who live in widely dispersed villages and who depend primarily on domesticated crop plants for their subsistence. Professional warfare is most common among societies that are characterized by a combination of village agriculture and urban living. In particular, the maintenance of a professional army requires both large populations and a large surplus of food and other resources, as the members of the army themselves are no longer available for food production or distribution and must therefore be supported by the rest of the population.

According to WALLACE, "[t]here are few, if any, societies that have not engaged in at least one war in their known history" (WALLACE 1968, p173). Indeed, there is reason to believe that warfare (or at least raiding) predates the evolution of the genus *Homo* and may not even be restricted to the order Primates. Jane GOODALL (1986) describes behaviors among the chimpanzees (*Pan troglodytes*) of the Gombe preserve that are remarkably similar to the raiding behavior of humans in pastoral societies. Moving beyond the Primates, KRUUK (1972) describes behaviors among the spotted hyaenas (*Crocuta crocuta*) of east Africa which bear some resemblance to the behaviors described by GOODALL.

Given that raiding and other forms of social aggression appear to be pan-specific, can they be considered to be adaptations? Or, to be more precise, is the *capacity* for social aggression, either offensive or

defensive (or both), an evolutionary adaptation? I believe the answer to this question is yes. Clearly, there are neurological modules for aggressive behavior in humans and related primates. Primatologist Richard WRANGHAM (1999) has proposed that both chimpanzee and human males have a genetically influenced tendency to raid and kill members of neighboring groups whenever there is a state of intergroup hostility and one group can muster sufficient force to raid the other with relatively little fear of losses. WRANGHAM and PETERSON (1996) have pointed out that there are striking similarities between the raiding behavior of wild chimpanzees and the raiding behavior of the Yanomami. CHAGNON (1990) has taken this argument further; in a discussion of the behavior of Yanomami warriors designated as *unokais* (a designation given to males that have undergone a ritual purification following a killing), CHAGNON points out that *unokais* have a significantly higher reproductive success than non-*unokais*, as shown by statistical analysis of reproductive success at different ages. Males with the highest relative reproductive success are middle-aged men with children, a pattern that is repeated in many other societies (CHAGNON 1988).

TOOBY and COSMIDES (1988) have argued that the capacity for raiding and warlike behavior shown by humans and other primates is based on an evolutionary "algorithm" in which the costs of warfare are balanced by the corresponding benefits to reproductive success (TOOBY/COSMIDES 1988). I think we need to be clear that, in this context, "reproductive success" is used in the same sense as it is used by evolutionary biologists: that is, the net number of offspring produced by individuals performing different behaviors. We are not necessarily speaking of a kind of sexual selection for the capacity for warfare. Rather, we are referring simply to the number of offspring that survive in each behavioral cohort, for whatever reason. Ecological factors, such as the availability of food resources (especially proteins), the spatial and temporal distribution of such resources (e.g., dispersed and non-defensible versus clumped and defensible), the availability of specific tools and weapons (such as metal tools), and the number, size, and physical development of potential fighters, all play a part in the calculation of potential costs and benefits of warlike social behavior. In other words, the "algorithm" postulated by TOOBY and COSMIDES is a mental means of factoring in all of the various costs and benefits of alternative behaviors to determine which alternative will result in the most positive outcome.

At what level—individual or group—must such outcomes be positive for the capacity for warfare to be adaptive? SOBER and WILSON (1998) have argued that cooperative behavior (i.e., "altruism") can evolve as the result of natural selection at the level of groups. Although at first glance it may not seem that warfare is "altruisitic," it clearly is, as individual members of a society engaged in warfare risk (and sometimes lose) their lives in defense of the group. SOBER and WILSON do not specifically discuss warfare, but it would qualify as a form of cooperative behavior. So, does the capacity for warfare evolve as the result of selection at the level of groups?

In the early 1960s, V. C. WYNNE-EDWARDS used the concept of group selection as the basis for the explanation of nearly all of animal social behavior (WYNNE-EDWARDS 1962). It was in response to WYNNE-EDWARDS that G. C. WILLIAMS wrote *Adaptation and natural selection* (WILLIAMS 1966) in which he argued forcefully for the primary importance of selection at the level of individuals, rather than groups. WILLIAMS pointed out that any group of organisms in which reproductive success has been lowered by group processes (specifically by decreasing the number of offspring per individual by means of various mechanisms) is vulnerable to invasion and ultimate replacement by individuals who are not so constrained. WILLIAMS' model for individual selection has been extended to the evolution of social behavior and cooperation by HAMILTON (1964), TRIVERS (1971), AXELROD (1984), and DAWKINS (1982).

Warfare is often thought of as an aberration, rather than a central characteristic of human sociality. However, even a brief review of human history should impress upon one that warfare has been a constant, if episodic, aspect of human social behavior. The point here is that, even if it does not happen regularly, warfare can have an effect on natural selection equivalent to—and in some cases greater than—a constant selective pressure. During periods in which warfare is not occurring, selection will result primarily from those sources of mortality and reduced reproductive success characteristic of peacetime society: disease, famine, competition for scarce resources, etc. However, during periods of warfare, these "everyday" forms of selection can be overwhelmed by the effects of warfare-specific changes in mortality and reproductive success. In other words, periods of warfare act like evolutionary "bottlenecks" selecting with greatly increased relative intensity for any physiological or behavioral characteristic that allows for differential survival and reproductive success.
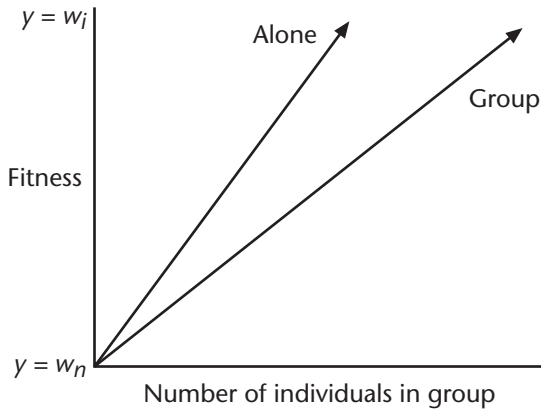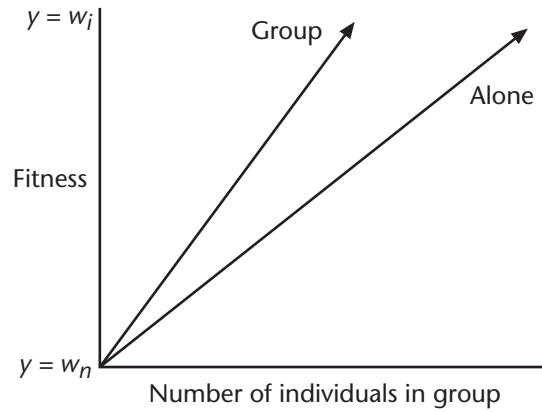
Figure 1: Negative group selection.

Figure 2: Positive group selection.

Furthermore, it seems likely that these selective pressures will be exerted primarily at the level of individuals, rather than groups. To understand why, consider SOBER and WILSON's definition of a group: "a set of individuals that influence each other's fitness with respect to a certain trait, but not the fitness of those outside the group" (SOBER/WILSON 1998, p92). To be consistent with standard practice in evolutionary theory, let fitness (symbolized by w) be defined as the average per capita lifetime contribution of an individual of a particular genotype to the population after one or more generations, measured in number of offspring bearing that individual's genotype. If we apply this definition of fitness to SOBER and WILSON's definition of a group, then each individual member of a group will have some fitness (w_i), with the group fitness reducing to the sum of the fitnesses of the individuals that make up the group ($w_G = w_i + w_j + \ldots w_n$). Furthermore, let us assume that fitness is a function of some limited resource. In real terms, this resource might be food, or shelter, or access to mates, or some other factor that contributes directly or indirectly to survival or reproduction. Each individual can exploit some small fraction of the limited resource with the aggregate consumption of resources eventually reaching a maximum value (i.e., when each individual has maximized its fitness via the exploitation of that resource and the resource has been completely subdivided among the individuals in the group). Until that limit has been reached, competition between individuals in the group is relatively unimportant, and so individual fitness of each member of the group will not be limited by group membership.

Under such circumstances, there are at least three different ways in which intra-group cooperation could affect individual fitness:

■ The fitness effect of group membership on individual fitness could be *negative*, compared with the fitness of each individual acting alone; that is, being a member of the group *detracts* from each individual's fitness, compared with acting alone (Figure 1).

This is the situation described by WYNNE-ED-WARDS (1962) and criticized by WILLIAMS (1966). Under these conditions, the addition each new member to a group *decreases* the average fitness of each member of the group, with the effect that such a group is constantly vulnerable to invasion and replacement by individuals who act entirely in their own interests. Given the relationship between group size and individual fitness, it is unlikely that this type of group selection would prevail under most natural conditions.

■ The fitness effect of group membership on individual fitness could be *positive*, compared with the fitness of each individual acting alone; that is, being a member of the group *adds* to each individual's fitness, compared with acting alone (Figure 2).

This is the essentially the situation proposed by SOBER and WILSON (1998). Under these conditions, the addition of each new member to a group *increases* the average fitness of each member of the group, with the overall effect that such a group becomes less vulnerable to invasion and replacement by "selfish" individuals as it grows larger. Unlike the situation with negative group fitness above, this type of group selection could easily evolve, as membership in the group clearly benefits individuals and vice versa.
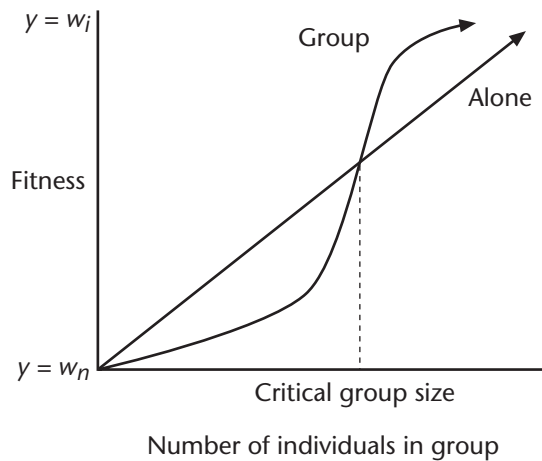
Figure 3: Variable group selection.

■ The fitness effect of group membership on individual fitness could be *negative* when the group size is below some critical value, but could become *positive* as that critical group size is exceeded (Figure 3).

Under such conditions, a group would have to reach a "critical group size" before the fitness benefits of intra-group cooperation would begin to be felt. This would seem to present a barrier to the evolution of such cooperation via group selection. However, the group might reach critical size for reasons unrelated to the activities resulting in reduced aggregate fitness. Once above the critical size, adding new members to the group would add to the fitness of each individual.

There are many circumstances in nature in which the kind of variable group fitness described above has been shown to exist. For example, in a study of the hunting behavior of wolves (*Canis lupus*) on Isle Royale, MECH (1970) found that the larger a wolf pack was, the better able it was to exploit larger prey. Intra-group cooperation is often essential to the success of hunting forays among social carnivores in general. TELEKI (1973) found the same to be true for hunting behavior among wild chimpanzees. Indeed, chimpanzees exhibit unusually cooperative behavior when hunting, especially when their prey is other primates.

It is very likely that human warfare follows the pattern described in Figure 3. That is, there is a critical group size above which the effectiveness of warfare increases, as reflected in its effects on fitness. There are two primary reasons for this:

■ As virtually any military commander would point out, the larger the military force, the more likely it is to prevail over its opponents. Calculation

of the relative sizes and strengths of the opposing sides in any warlike interaction would be of crucial importance to the participants, regardless of rank. Therefore, it is likely that natural selection would have resulted in the evolution of mental algorithms that would facilitate such calculations under conditions of repeated or sustained warfare.

■ As the size of a military force increases, the probability of injury or death to each individual member of the group generally decreases. One-on-one violent interactions between individual combatants are most likely to result in the injury or death of one or both combatants. As the number of combatants increases, the number of injuries and deaths per capita generally decreases (except in the case of modern technological warfare, where overwhelmingly powerful weapons can injure or kill huge numbers of combatants and non-combatants). This decrease in probability of injury and death with the size of a military force is another factor in the mental calculations performed by any potential participant in warfare.

Given the foregoing, it should now be clear that participation in warfare can have positive effects on both individual fitness and group fitness, when group fitness is measured as the aggregate fitness of the individuals making up the group. Participants in warfare—combatants and their supporters—can gain access to territory and to resources if they are on the winning side in a conflict. In particular, it is a well-known (but not often discussed) fact that the winners in virtually all warlike conflicts have greatly increased reproductive success compared with both the losers and non-participants in their own group. Wars and warlike interactions (including simple raids) are often followed by increases in birth rates among the winners. In particular, soldiers (i.e., combatants) are notorious for the commission of rape during war (THORNHILL/PALMER 2000). That this is the case has been recognized as far back as the founding myths of western civilization: the legend of the rape of the Sabine women is based on an actual event in the early history of the city of Rome. Many authors have pointed out that access (including, of course, forcible access) to reproductive females is a constant theme in the genesis and prosecution of warfare. The Old Testament contains numerous examples of such forcible reproductive access, including several cases in which God specified which females (young, but not yet pregnant) were to be forcibly taken for reproductive purposes and which females (pregnant, old, or infertile) were to be killed, along with all males (including children).

Rape as a constant in warfare has continued to the present day (cf. BEEVOR 2002). That rape would result in increased reproductive success on the part of soldiers is fairly obvious. What is not obvious is that this would also result in increased reproductive success on the part of the females being raped. So long as being raped does not result in injury or death, and so long as the person being raped is not subsequently harmed or placed under conditions of increased risk of harm, having been raped by a soldier would result in essentially the same increase in reproductive success as any other form of copulation. That the male Yanomami studied by CHAGNON who participated in raids on neighboring groups in which females were forcibly abducted would have an increased reproductive success as a result has not been seriously questioned (except see FERGUSON 2001). What has not been systematically investigated is the effects of such abduction on the reproductive success of the females so abducted. In the absence of such data, the idea that such victims could indeed benefit (in a purely DARWINIAN sense) from the effects of warfare remains at present an interesting but untested hypothesis.

Being on the losing side in a warlike conflict need not be entirely negative for males either. From a DARWINIAN standpoint, what matters is reproductive success, not happiness nor freedom from oppression. In ancient Rome, it was quite common for members of the conquered peoples to be pressed into slavery by the Romans. Although being a slave under such conditions might not be what one would have preferred, it was quite common for slaves to be allowed to marry and have children. Indeed, if the children of a slave became the property of the slave's owner, then there would have been a positive incentive for the slave owner to encourage the fecundity of his slaves. The point here is not to endorse slavery, but rather to point out that there are conditions under which the losers in a warlike conflict might benefit from participation in such conflict almost as much as the winners.

In sum, then, we may also conclude that the capacity for warfare, like the capacity for religious experience, has many of the characteristics of an evolutionary adaptation:
■ the capacity for warfare is pan-specific in humans, although there is considerable variation in this capacity, both within and between human groups,
■ although it has not yet been possible to correlate the capacity for warfare with underlying neurological structures and processes, there is ample evidence for a correlation between aggressive and violent behavior and the emotional control centers of the brain,
■ the capacity for warfare can be correlated with known evolutionary environments of adaptation (raiding with hunting/gathering and pastoral agriculture, militia warfare with settled agriculture, and professional warfare with large-scale agriculture and urban culture), and
■ although no underlying genetic mechanisms for the development of the capacity for warfare are now known, the existence of consistent cross-cultural patterns of group violence and coercion indicates that warlike behavior is subject to evolutionary convergence in a manner analogous to other evolutionary adaptations.

The Evolution of Religion: The Standard Model

Before turning to the crux of the argument, it is necessary to consider in more detail what the capacity for religious experience consists of. Recent work on the evolutionary dynamics of religion has converged on a "standard model" in which religions are treated as epiphenomena of human cognitive processes dealing with the detection of and reaction to agents, especially human agents, under conditions of stress, anxiety, and perceived threat. BOYER has proposed a comprehensive theory of the evolution of religion based on an underlying cognitive process whereby "Our minds are prepared [to give] us particular mental predispositions" (BOYER 2001, p3). In particular, "…evolution by natural selection gave us a particular kind of mind so that only particular kinds of religious notions can be acquired" (p4).

BOYER begins by asserting that "[r]eligion is about the existence and causal powers of nonobservable entities and agencies" (p7). He then proceeds to show that the common explanations for the origin of religion—explanations of puzzling physical and mental phenomena, explanations of evil and suffering, provision of comfort in times of adversity, and provision of the moral basis for social order—cannot be reduced to nor included in an explanation of the evolutionary origin of the capacity for religious experience. BOYER then points out that "…there is only a limited catalogue of possible supernatural beliefs" (p29). This is because "…[t]he religious concepts we observe are relatively successful ones selected among many other variants" (p32). Therefore, "…religion emerges… in the selection of concepts and the selection of memories" (p33).

What are the criteria by which certain concepts are reinforced and others are lost? Following SPER-BER (1985), BOYER distinguishes between simple concepts and templates. The latter are large-scale concepts that subsume many smaller, simpler concepts, essentially by analogy. For example, the word "animal" designates a template, which is usually applied to any entity that is obviously alive (especially because it moves under its own power and with intentionality), eats things, reproduces, and has a general body plan that conforms to what most people would agree is an "animal" body plan. According to this model of mental classification, religious concepts are easily transmitted from person to person because they both conform to such templates in most respects, but violate them in obvious and memorable ways: they "...surprise people by describing things and events they could not possibly encounter in actual experience" (BOYER 2001, p55).

In this way, religious concepts are much more easily remembered and transmitted than non-religious concepts:

"Some concepts...connect with inference systems in the brain in a way that makes recall and communication very easy. Some concepts...trigger our emotional programs in particular ways. Some concepts...connect to our social mind. Some...are represented in such a way that they soon become plausible and direct behavior. The ones that do *all* this are the religious ones we actually observe in human societies. They are most successful because they combine features relevant to a variety of mental systems" (BOYER 2001, p50).

Central to BOYER's theory on the evolution of the capacity for religious experience is the concept of *agency*:

Definition 6. *Agency* is that set of characteristics by which we infer the existence and action of an *agent*; that is, a living (or life-like) entity whose behavior indicates that it has intentions and can act upon them. Agents are purposeful, and purposeful action is the hallmark of agency.

Along with other cognitive and evolutionary psychologists, most notably BARRETT (1999), BOYER asserts that the ability to detect agency has high selective value. BARRETT points out that humans, like other potential prey animals, should have "hyperactive agency detectors," because any human who did not would be more likely to be injured or killed by a predator. Selection for ultra-sensitive agency detectors would result in a tendency for such detectors to

produce "false positives"; that is, the tendency to infer the existence of agency in an entity in which it is absent.

Although BOYER seems to be on the right track, there is a strong implication throughout his work that the capacity for religious experience is an epiphenomenon that arises secondarily as the result of the action of agency detection and the increased mnemonic transmissability of concepts that violate cognitive templates. DONOVAN (1994, 2002) disagrees: for him, "...religion has direct evolutionary advantages that have been directly selected. That benefit relates to the mitigation of existential anxiety with its roots in death awareness." DONOVAN asserts that religion arises primarily as the result of the selectively positive effect of the reduction of anxiety caused by the awareness of death. DONOVAN looked at the ability of "spiritual healers" to enter into possession trances, and he concluded that this is arguably a genetically-based ability that has been selected as a belief-enhancing mechanism by which the palliative effect of religious participation can be rendered (DONOVAN 1994, 2003).

ATRAN incorporates BOYER's argument from cognitive processes into a more comprehensive selectionist explanation for the evolution of the capacity for religious belief and behavior. ATRAN agrees with BOYER that there are underlying cognitive (and therefore presumably neurological) processes by which certain types of beliefs can be spread with greatly increased ease and fidelity of transmission. However, he adds a social and political dimension to BOYER's argument, tying religion to the establishment and maintenance of social organization and political power. He quotes IRONS (1996) to the effect that "[r]eligions in large-scale societies all show evidence of social dominance." ATRAN goes on to point out that religious rituals usually involve submissive displays, such as kneeling, bowing, prostration, hand spreading, and throat baring, which he likens to the submissive displays of subordinate non-human primates (ATRAN 2002, p127). Taking this line of reasoning further, ATRAN points out that "...[h]uman worhip requires even dominant individuals to willingly submit to a higher moral authority in displays of costly, hard-to-fake commitment or risk losing the allegiance of their subordinates (ATRAN 2002, p127).

This is the heart of ATRAN's argument: that religion forms a kind of "social glue" that uses ritualized demonstrations of commitment to supernatural authority to encourage and even coerce individual adherence to group norms and goals. AT-

RAN's argument is essentially that all members of a society (i.e., a "group," in the parlance of group selection), from the most subordinate to the most dominant, benefit from the social cohesion and singularity of purpose that religion fosters. He states that "…[t]he more a ruler sacrifices and suffers, the more the ruler earns respect and devotion" (ATRAN 2002, p127). But clearly the same principle would apply to his subordinates, at any level: individual demonstrations of sacrifice and suffering (or at least the willingness to do so) on behalf of the group tend to encourage group solidarity.

There are two problems with this outlook: it assumes that costs and benefits are shared approximately equally throughout such groups, and it implicitly focuses on the group as the primary unit of selection. ATRAN is clearly aware of the first of these shortcomings. He refers to the classical MARXIST "coercion argument" for the origin of religion, by which he means that "…religion was [according to MARX] created by and for rulers to materially exploit the ruled, with…secondary benefits to the oppressed masses of a low but constant level of material security" (ATRAN 2002, p128, citing MARX 1972). He then goes on to cite DIAMOND's theory that in large-scale societies (by which he presumably means settled agricultural societies with a mixed village and urban settlement pattern), the members of the ruling hierarchy (or "kleptocracy") gain the support of their subordinates by "…constructing an ideology or religion justifying kleptocracy" (DIAMOND 1997, p277). DIAMOND asserts that this reification of the supercision of the ruling hierarchy by religion represents a fundamental shift from the situation in bands and tribes (of hunter-gatherers and pastoralists), in which "…supernatural beliefs…did not serve to justify central authority" (p277).

DIAMOND concludes his discussion of the origin of religion by asserting that institutionalized religion confers two important benefits to centralized societies:

■ shared ideology or religion helps solve the problem of how (genetically) unrelated individuals can cooperate by providing a bond not based on (genetic) kinship, and

■ religion gives people a motive, rather than genetic self-interest, for sacrificing their lives on the behalf of others (DIAMOND 1997, p278).

I believe that both ATRAN and DIAMOND are on the right track, but that their arguments are derailed by a common misapplication of selectionist thinking. ATRAN proposes what appears to be a relatively weak counter-argument to the "coercion argument," pointing out that religions can be liberating as well as oppressive (ATRAN 2002, p129). While this is true in some cases, I believe it misses the point: if religion (or, more properly, the *capacity* for religious experience) is to evolve by natural selection, it must do so at the level of individuals in the context of specific ecological circumstances.

Secondly, if WILLIAMS is correct about the non-existence of group selection, then for the capacity for religion to evolve, it must somehow increase *individual* reproductive success. In the context of small, relatively non-hierarchic bands or tribes of hunter–gatherers or nomadic pastoralists, it seems most likely that selection at the level of individuals would result in behaviors that would approximate those observed in hunting groups of primates and social carnivores. Although there are clearly recognized dominant individuals in such groups, all of the members of such groups clearly benefit from their membership in them. This is because there are circumstances in which groups of cooperative individuals can obtain resources that would be out of the reach of individuals acting on their own.

This same argument applies at all levels of social organization. For particular social processes to evolve by classical DARWINIAN selection, there must be some benefit that accrues to individuals from participating in such processes, a benefit that equals—if not clearly supercedes—the benefit to be gained from acting alone. That such benefits to individuals do result from highly organized social interactions in human and other animal societies is not in question. What is still to be decided here is whether such increases in individual fitness can be observed as the result of the capacity for religious experience, specifically in the context of warfare.

The Capacity for Religious Experience Has Evolved via Individual Selection Among Humans in the Context of Warfare

Here we come to the crux of my argument: that the capacity for religious experience is an adaptation that facilitates warfare. Let me begin by carefully defining the following terms:

Definition 7. *The capacity for religious experience* is the capacity to formulate, communicate, and act on beliefs (that is, concepts, memories, and intentions or plans) that include reference to supernatural entities and processes. Like the capacity for language, such a capacity must be based on a corresponding

neurological "hard-wiring," although the dimensions (and limitations) of such neurological structures and processes await further investigation.

Definition 8. *Religion* is not the specific content of the beliefs that arise from such a capacity. Rather, religion is the overall pattern of such beliefs, including concepts like omniscience, omnipotence, and omnipresence (on the part of supernatural deities), the existence of a soul that is separable from (and can live on after the death of) a physical body, and the existence of supernatural realms inaccessible to normal senses, but accessible to deities and incorporeal entities such as souls.

Note that this definition of religion is not as inclusive as that used by Boyer, who includes not only the concepts and entities noted above, but also virtually all forms of "folk belief" (i.e., superstition). It seems likely to me that the origin of the capacities for both folk beliefs and religion has its roots in the same neurological substrate: a neurological mechanism that reduces anxiety in the face of stress induced by unknown, unpredictable, and presumably dangerous circumstances. However, part of my thesis here is that true *religious* experience is a later development in the evolution of the human mind (and presumably the human nervous system), one that has evolved as the result of individual selection primarily in the context of warfare.

How, precisely, does the capacity for religious experience evolve in the context of warfare? Consider the decision that each potential combatant must make prior to participating in a raid, a battle, or an extended military campaign. This decision will include (but is certainly not limited to) the following:
■ The probability that one will be seriously injured or killed in the raid, battle, or campaign,
■ The possible consequences of *not* participating (e.g., everything from social disapprobation to summary execution),
■ The probability that one will gain something (e.g. resources, social position, access to mates, etc.) as the result of one's participation, and
■ The quality of such gains, especially when compared with the costs of non-participation.

It is important to note that the calculation of such costs and benefits need not be overtly conscious. Whether conscious or unconscious, the outcome of such a calculation would be either an increased or decreased motivation to participate in the impending conflict.

What happens during war? According to von Clauswitz, "[w]ar is nothing but a duel on an extensive scale. If we would conceive as a unit the countless number of duels which make up a war, we shall do so best by supposing to ourselves two wrestlers. Each strives by physical force to compel the other to submit to his will: his first object is to throw his adversary, and thus to render him incapable of further resistance" (von Clauswitz 1873). War involves violent force, up to and including killing people. To participate in a war means to participate in an activity in which there is a significant probability that one either will kill other people or be killed by them.

This means that any participant in warfare is faced with the possibility of painful and violent death as the result of such participation. Given this probability, if natural selection acts at the level of individuals, how can natural selection result in a propensity to participate in warfare? Clearly, either the probability that one will be killed must be perceived as low or the potential payoff from such participation must be perceived as high. If natural selection is to operate at the level of individuals, these two circumstances should ideally be obtained simultaneously,

Here is where the capacity for religious experience is crucial. By making possible the belief that a supernatural entity knows the outcome of all actions and can influence such outcomes, that one's "self" (i.e., "soul") is not tied to one's physical body, and that if one is killed in battle, one's essential self (i.e., soul) will go to a better "place" (e.g., heaven, valhalla, etc.) the capacity for religious experience can tip the balance toward participation in warfare. By doing so, the capacity for religious belief not only makes it possible for individuals to do what they might not otherwise be motivated to do, it also tends to tip the balance toward victory on the part of the religiously devout participant. This is because success in battle, and success in war, hinges on commitment: the more committed a military force is in battle, the more likely it is to win, all other things being equal. When two groups of approximately equal strength meet in battle, it is the group in which the individuals are more committed to victory (and less inhibited by the fear of injury or death) that is more likely to prevail. To give just one example, the battle cry and motto of the clan Neil has always been "*Buaidh na bas!*"—"Victory or death!"

Religions tell people what they most want to hear: that those agents and processes that they most fear have no ultimate power over them or pose no threat to themselves or the people they care about. In particular, by providing an intensely memorable,

emotionally satisfying, and tension-releasing solution to the problem of mortality, religions make it possible for warriors to master their anxieties and do battle without emotional inhibitions. This makes them much more effective warriors, especially in the hand-to-hand combat that humans have fought throughout nearly all of our evolutionary history.

Consider the characteristics that are most often cited as central to religious experience. NEWBERG and D'AQUILI have presented an integrated model of the neurobiological underpinnings of religious experience. They have pointed out that central to most religious experience is a sensation of awe, combined with "…mildly pleasant sensations to feelings of ecstasy" (NEWBERG/D'AQUILI 2001, p89). They have shown that such sensations can be induced by rhythmic chanting and body movements, combined with loud music and colorful visual displays, all of which produce a condition of sensory overload. This process then induces a neurological condition characterized by a sense of depersonalization and ecstatic union with one's surroundings.

This is precisely what happens as the result of military drill and training. It is no accident that humans preparing for war use exactly the same kinds of sensory stimuli described by NEWBERG and D'AQUILI. They have tied such displays to religious activities, and shown the deep similarities between religious rituals and secular ones: "…patriotic rituals… emphasize the "sacredness" of a nation, or a cause, or even a flag…turn[ing] a meaningful idea into a visceral experience" (NEWBERG/D'AQUILI 2001, p90). The two types of activities—religious rituals and patriotic rituals—use the same underlying neurological pathways and chemistry.

Religious experience is often equated with a state of mystical union with the supernatural. But what exactly does this mean, and in the context of this presentation, is there a connection between mystical experience and warfare? The answer is almost certainly yes. That combatants have had experiences that would be classified as mystical before, during, and after battle is a simple historical fact. The Scottish flag is based on just such an experience: the white crossed diagonal bars against a field of azure of the St. Andrew's cross is said to have appeared to King Hungus and his warriors during a battle against the Saxons. Legend says this so encouraged the Scots and frightened their adversaries that a victory was won (MIDDLEMASS 2000). A common thread in all mystical experiences is a loss of the sense of self and a union with something larger than oneself (NEWBERG/D'AQUILI 2001, p101). Addi-

tionally, there is often a sense of submission to a higher power, in which one's personal desires and fears are subordinated to the purposes of that higher power. If that higher power were identified with the leaders of a military hierarchy, it is easy to see how such experiences could be used to increase one's loyalty and submission to that hierarchy.

It is likely that the same underlying neurological circuits that produce the sensations described by mystics also produce the sensations of fear, awe, and ecstasy that are experienced by combatants during the course of a battle. Like the evolutionary implications of rape, this is a topic that is rarely discussed outside of military circles, but is a well-known phenomenon during battle. The noise and movement, the confusion and excitement, intensified tremendously by the imminence of injury and death, combine to produce a state of massive arousal in the sympathetic nervous system of the combatant. This state of intense arousal is very similar to the state of arousal felt during copulation; indeed, some soldiers will candidly admit that during the heat of battle, they often experience a kind of sexual arousal, leading in some cases to ejaculation. This fusion of sensory and motor states in a condition of intense arousal, combined with a sensation of depersonalization, can easily produce in susceptible individuals a condition in which a kind of "blood lust" overwhelms most thoughts of self-preservation.

The Ultimate Sacrifice

Let us return to group selectionist arguments for the evolution of both religion and warfare. WILSON (2002) has proposed that the capacity for religion has evolved among humans as the result of selection at the level of groups, rather than individuals. Specifically, he argues that benefits that accrue to groups as the result of individual sacrifices can result in increased group fitness, and this can explain what is otherwise difficult to explain: religiously motivated behaviors (such as celibacy and self-sacrifice) that apparently lower individual fitness as they benefit the group.

At first glance, WILSON's argument seems compelling. Consider the most horrific manifestation of religious warfare: the suicide bomber. A person who blows him or herself up in order to kill his or her opponents has lowered his or her individual fitness. Doesn't this mean that such behavior must be explainable only at the level of group selection? Not at all: the solution to this conundrum is implicit in the basic principles of population genetics. Recall that

one of Darwin's requirements for evolution by natural selection was the existence of variation between the individuals in a population. (Darwin 1859, pp. 7–59) Variation within populations is a universal characteristic of life, an inevitable outcome of the imperfect mechanism of genetic replication. Therefore, it follows that if the capacity for religious experience is an evolutionary adaptation, then there will be variation between individuals in the degree to which they express such a capacity.

Furthermore, it is not necessarily true that when an individual sacrifices his or her life in the context of a struggle, the underlying genotype that induced that sacrifice will be eliminated by that act. Hamilton's principle of kin selection (Hamilton 1964) has already been mentioned as one mechanism, acting at the level of individuals (or, more precisely, at the level of genotypes), by which individual self-sacrifice can result in the increase in frequency of the genotype that facilitated such sacrifice. Trivers (1971) has proposed a mechanism by which apparently altruistic acts on the part of genetically unrelated individuals may evolve by means of reciprocal altruism.

Given these two mechanisms, all that is necessary for the capacity for religious behavior, including extreme forms of self-sacrifice, to evolve is that as the result of such behaviors, the tendency (and ability) to perform them would be propagated throughout a population. The removal of some individuals as the result of suicide would merely lower the frequency of such tendencies and abilities in the population, not eliminate them altogether. If by making the ultimate sacrifice, an individual who shares his or her genotype with those who benefit by that sacrifice will, at the level of his or her genes, become more common over time (Wilson 1975, p4).

To the Winner go the Spoils (of War)

Let us now consider the flip side of war: the benefits that accrue to the winners of warlike conflicts. Given the mechanisms of kin selection, one can see how warfare and the religious beliefs that facilitate it might evolve among the closely related kin groups that constitute the raiding parties characteristic of hunting/gathering and pastoral peoples. It is also possible to construct an explanation for militia warfare and professional warfare on the basis of a blend of kin selection and reciprocal altruism. However, a closer examination of the spoils of war make such explanations relatively unnecessary.

Betzig (1986) performed a cross-cultural analysis of the correlation between despotism and reproductive success in 186 different cultures. Her conclusion was that "…[n]ot only are men regularly able to win conflicts of interest more polygynous, but the degree of their polygyny is predictable from the degree of bias with which the conflicts are resolved. Despotism, defined as an exercised right to murder arbitrarily and with impunity, virtually invariably coincides with the greatest degree of polygyny, and presumably, with a correspondingly high degree of differential reproduction" (Betzig 1986, p88). In other words, males who most successfully use violence and murder as a means of influencing the actions of others have historically had the most offspring. In the context of warfare, this means that the winners of a battle, or even more so, of a war will pass on to their offspring whatever traits facilitated their victory, including the capacity to believe in a supernatural force that guides their destiny and protects them in battle. The effects of such capacities are not trivial; as Betzig points out, the differences between the reproductive success of the winners of violent conflicts and the losers are measured in orders of magnitude. As noted earlier, wars are bottlenecks through which only a relative few may pass, but which reward those who do with immensely increased reproductive success.

Putting all of this together, it appears likely that the capacity for religious experience and the capacity for warfare have constituted a co-evolutionary spiral that has intensified with the transitions from a hunting/gathering existence through subsistence agriculture to the evolution of the modern nation-state. As pointed out earlier, there is a correlation between the type of intergroup violence and the ecological context within which that violence occurs. Generally speaking, raiding/rustling is correlated with hunting/gathering and pastoralism, militia warfare with village agriculture, and professional warfare with urban society and the nation-state. There is a corresponding progression in the basic form of religious experience and practice: animism is most common among hunter–gatherers, while polytheism is more common among agriculturalists, and monotheism is most common in societies organized as nation-states. This is not to say there are no exceptions to this correlation. However, the fact that such a correlation can even be made points to the underlying ecological dynamics driving the evolution of subsistence patterns, patterns of warfare, and types of religious experience.

Genes, Memes, or Both?

It is extremely unlikely that any human behavior (or the behavior of any animal with a nervous system complex enough to allow learning) is the result of the expression of any single gene. On the contrary, it is almost universally accepted among evolutionary psychologists that all behaviors show a blend of innate and learned components. What is interesting to ethologists is not the question of "how much," but rather the much simpler question of "how"?

One answer that has been suggested is that there are two different carriers of information that can be transmitted among humans: genes and memes. According to DAWKINS, a meme is "…a unit of cultural transmission…" corresponding to things like "…tunes, ideas, catch-phrases, clothes fashions, ways of making pots or of building arches" (DAWKINS 1976, p206). DAWKINS even addressed the possibility that God Himself might be a meme:

"Consider the idea of God….What is it about the idea of a god which gives it its stability and penetrance in the cultural environment? The survival value of the god meme in the meme pool results from its great psychological appeal. It provides a superficially plausible answer to deep and troubling questions about existence. It suggests that injustices in this world may be rectified in the next… God exists, if only in the form of a meme with high survival value, or infective power, in the environment provided by human culture" (DAWKINS 1976, p207).

Is all of religion simply a meme, or more precisely, a "meme complex"? And does the answer to this question tell us anything about the connection between the capacity for religion and warfare? There are at least three hypotheses for the mode of transmission of the capacity for religious experience:

Hypothesis 1. The capacity for religious experience might be almost entirely innate; that is, it arises almost entirely out of "hard-wired" neural circuits in the human brain, which produce the sensations, thoughts, and behaviors that we call religious.

Hypothesis 2. The capacity for religious experience might be almost entirely learned; that is, it arises almost entirely from concepts (i.e., "memes") that are transmitted from person to person via purely linguistic means, and without any underlying neurological predisposition to their acquisition.

Hypothesis 3. The capacity for religious experience might arise from a combination of innate predispositions and learning; that is, like many animal behaviors, the capacity for religious experience might be the result of an innate predisposition to learn particular memes.

Both BOYER's and ATRAN's theories of the origin of religion are closest to the third hypothesis. From the foregoing analysis, it should also be clear that my own hypothesis for the origin of the capacity for religious experience is closest to hypothesis 3. However, unlike BOYER and ATRAN, I have proposed that the specific context within which the human nervous system has evolved has been persistent, albeit episodic, warfare.

A common objection to the hypothesis that the capacity for religious experience is an evolutionary adaptation is that there has been insufficient time for natural selection to produce the vast diversity in religious experiences and practices that exists in our species. I think there are two responses to this objection. First, although the diversity of religious beliefs and practices is quite surprising at first glance, this diversity is neither unlimited nor devoid of general trends. For example, virtually all religions include supernatural entities. However, the class of actual supernatural entities is not unlimited. Indeed, most supernatural entities bear a strong resemblance to humans, although with some qualities that humans are not observed to possess, such as the ability to fly, pass through walls, hear other's thoughts, etc. Furthermore, the qualities of most deities are remarkably similar to those attributed to kings, priests, and military leaders, although to a greater extent and with fewer "human" limitations. The global pantheon is overpopulated with warrior gods, and this overpopulation is not accidental.

Furthermore, there are circumstances under which selection can produce a dramatically accelerated rate of evolutionary change. LUMSDEN and WILSON (1981, 1983) describe this kind of evolutionary change as "autocatalytic gene-culture co-evolution" (LUMSDEN/WILSON 1981, p11). According to their theory, genes prescribe, not specific behaviors, but rather epigenetic rules of development by which minds are assembled (LUMSDEN/WILSON 1983, p117). The mind then grows

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by incorporating parts of the culture (i.e., memes) already in existence. Culture, therefore, is created constantly from the combined decisions and innovations of all of the members of society. Most importantly, some individuals possess genetically inherited epigenetic rules that enable them to survive and reproduce better than other individuals. Consequently, the more successful epigenetic rules spread through the population, along with the genes that encode them. In other words, culture is created and shaped by biological processes, while those same biological processes are simultaneously altered in response to further cultural change. Genes and memes co-evolve, with each change in one catalyzing a corresponding change in the other (LUMS-DEN/WILSON 1983, pp117–118).

The primary reason for the accelerated rate of evolution that results from gene/meme co-evolution is the alternation between the temporal modes of the two types of evolution. If one conceives of time as passing along a vertical axis, then genetic transmission is almost entirely vertical. That is, genes are passed from parents to offspring. Genetic transmission also involves a very low mutation rate, relative to memetic evolution. Memetic transmission, by contrast, is both vertical and horizontal. That is, memes can be transmitted between contemporaries, as well as between parents and offspring. Furthermore, as BOYER has pointed out, the mutation rate of memes is immensely higher than that of genes. "Cultural memes undergo mutation, recombination, and selection inside the individual mind every bit as much and as often (in fact probably more so and more often than) during transmission between minds" (BOYER 2001, p39).

Combining the concept of gene/meme co-evolution with the episodic nature of selection during warfare, it appears that the evolution of the capacity for religious experience evolves via a kind of bootstrap effect. Each change in the underlying neurological capacity for religious experience is followed by a corresponding change in the conceptual (i.e., "memetic") structure of the religions that are produced as a result of that capacity. This, in turn, sets the stage for further selection at the level of genes, as individuals with particular religious meme complexes succeed (or fail). Stir warfare into the mix, including the tremendous asymmetries in reproductive success described by BETZIG, and it appears likely that a substantial fraction of the whole of what we call "religion" is the result of gene/meme co-evolution in the context of intergroup warfare.

New Directions in the Evolution of Religion and Warfare

Given the current state of our knowledge of the underlying neurobiology of religious experience, the foregoing amounts to little more than a tantalizing hypothesis for the evolution of the capacity for religious experience. However, it suggests some avenues of investigation that would help to clarify the relationships between the capacity for religious experience and warfare. For example, it would be very interesting to know whether and to what extent religious experience and concomitant beliefs are reinforced by participation in warfare, and whether there is a positive or negative effect on such experiences and beliefs as the result of being on the winning or losing side in a warlike conflict. Collection of what would essentially be natural history data on the prevalence, spread, or disappearance of religious experiences or beliefs in the context of warfare versus peacetime would help to determine both rates of change and possible mechanisms of spread or extinction. Empirical studies using controlled test populations could also shed light on the connections between religious experiences and beliefs and stress and perceptions of potential threat. Finally, and most importantly, detailed demographic analysis of reproductive success and religious beliefs, especially as they relate to a history of warfare, might find the kinds of correlations suggested here.

In closing, it seems likely that throughout the history of our species warfare has contributed significantly to the evolution of the capacity for religious experience, which has in turn facilitated warfare. Intergroup warfare can be adaptive whenever resources are concentrated, predictable, and defensible. Agriculture and industrial/urban subsistence patterns have facilitated warfare, but have also steadily increased its costs. High technology warfare, especially when waged using weapons of mass destruction, has greatly increased the costs of warfare without appreciably increasing its benefits. In an age when the decisions of a single military leader can unleash nuclear annihilation, warfare is clearly maladaptive. As a consequence, it may be desirable to eliminate, or at least redirect, our capacity for warfare. However, if the deep evolutionary connections between the capacities for religion and warfare that I have proposed do in fact exist, this may mean redirecting (or possibly eliminating) the capacity for religious experience. Only time will tell, and only God (if He exists) knows how much time we have left.

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Jesper Sørensen

Religion, Evolution, and an Immunology of Cultural Systems

Introduction

Since Dan SPERBER's groundbreaking work on religious symbolism in 1975, there has been a growing interest in the cognitive foundation of culture. Recent works have focussed on how cognitive mechanisms, situated in individuals' head constrain and generate cultural products. In the study of religion this approach can be exemplified by the work of Dan SPERBER and Pascal BOYER. Both argue for an epidemiological model of the proliferation of representations, according to which the production and transmission of religious ideas is severely constrained by cognitive factors that exert a selective pressure favouring certain types of representations rather than others. Accordingly, the appearance of specific representations in a cultural context is explained solely with reference to cognitive constraints combined with pragmatic factors.

This approach is simultaneously invigorating and troubling for a scholar trained in the Scandinavian tradition of History of Religion and Comparative Religion. I shall return to the merits of the epidemiological approach to religious representations

Abstract

Recent works in cognitive science in general and the cognitive study of religion in particular have focussed on how cognitive mechanisms constrain and generate cultural products. In the study of religion this approach can be exemplified by the work of Dan SPERBER and Pascal BOYER. Both argue for an epidemiological model of representations according to which the production and transmission of religious ideas are severely constrained by cognitive factors that constitute a selective pressure favouring certain types of representations. Accordingly, the appearance of certain representations in a specific cultural context can be explained by reference to cognitive constraints combined by pragmatic factors alone. In this paper I will argue that this view must be complemented by an explanation of how cultural systems, such as clusters of religious representations, impose conceptual constraints on the acquisition of religious representations and therefore on the development of religious traditions. Cultural systems can be said to constitute an immunology functioning as a selective force that constrain the viability of novel ideas. Based on studies of distributed and externalised cognition it is argued that such system level explanation is necessary in order to capture the evolutionary significance of culture understood as memory and knowledge systems exceeding the limited capacity of individual cognitive systems.

Key words

Cognition; epidemiology; immunology; cultural systems; religion; evolution.

below, but will first restrict myself to the troubling aspects, as these are the direct cause for the writing of this paper.

The first concern is how we should represent what are ordinarily referred to as 'religious traditions' such as Buddhism, Christianity, Islam or Hopi religion. Can these traditions be explained solely as an expression of a statistical condensation, that is, as merely a reflection of a certain number of people using relatively similar mental representations and producing relatively similar public representations that effect new mental representations? Are cultures in general and religious traditions in particular really nothing but a relation of similarity between the mental content of a number of people without any causal significance (BOYER 2001, p35)? Or are other types of explanation needed to account for the apparent persistence of certain types of representations in specific social groups, that is, for the relative stability of certain representations and not others in particular regions and social groups?

My second concern is the same question from another angle. Are cultures in general and religious traditions in particular mere epiphenomena resulting

from human cognitive functions? Can we really explain what has until recently been referred to as cultural and religious traditions as merely the coincidental presence of certain representations that all conform to cognitive processes facilitating transmission and acquisition, but which otherwise have nothing in common or uniting them? Or do representational clusters constitute a real phenomenal level in concordance with but not reducible to human cognitive functioning?

My two objections can be summarised in (a) a rejection of the notion that culture is only a statistical phenomena without any causal efficacy, and (b) a rejection of the epiphenomenalism involved in the argument that all aspects of culture and religion can be explained by reference to cognitive processes of individuals. I believe that we need other explanatory principles in order to explain coherent and persistent clusters of public representations, i.e., cultural systems, than an epidemiology of representations. However, as I believe that the epidemiological approach contributes significantly, I will extend the metaphorical sense of the epidemiological program proposed by SPERBER and endorsed by BOYER, and propose an outline of an *immunology* of cultural systems. Such an immunology accepts most results from the epidemiological approach to culture and religion, such as the importance of basic cognitive processes and the inferential processes involved in relevance driven pragmatics (SPERBER/WILSON 1995; BOYER 2001). Both are understood as important selective mechanisms in transmitting and acquiring religious representations. But in addition, an immunology of cultural systems will propose a third selective principle based on the degree of fitness of a new cultural representations into what has been referred to as the existing ecology of representations (MALLEY 1997), in short, a selection based on how compatible new representations are with already existing public and mental representations organised in systems of mutual reference. According to this view, relevance is not just constrained by the immediate pragmatic context surrounding a public representation, but is equally constituted by the relation between public representations extending into prolonged and relatively stable cultural systems. Further, relevance is not just defined by cognitive optimality principles, but to a varying extend also by pre-existing clusters or networks of public representations used to understand, explain and interact with the surrounding world, both in its 'natural' and its 'cultural' aspects.

The immunological approach therefore seeks to complement the epidemiological approach in explaining the relative stability and persistency of religious traditions by reference to the coherence of pre-established systems of representations. This has obvious evolutionary consequences, as humans have been living in a culturally modified environment for tens of thousands of years. Below I will argue, first that cultural systems produce major changes in the environment and thereby crucially influence the construction of the human evolutionary niche. Culture thereby influences natural selection in modifying the environment that exerts selective pressure on individual phenotypes. Second, the system of cultural representations itself constitutes a selective environment for phenotypes due to sexual selection. Individuals who master the interrelation between cultural representations, that is, individuals that are more stable, consequent, and thorough and/or creative, innovative and eloquent in their use of broad systems of cultural representations will be more likely to gain both symbolic and economic prestige than individuals with none of these characteristics, and thus be favoured in sexual competition. Third, cultural systems are not just some strange side effect of otherwise functional cognitive systems, but are more fruitfully described as externalised cognitive systems that provide more or less adequate and accurate maps of the surrounding social and physical environment—maps that are absolutely crucial for human survival.

However, before we get to the evolutionary aspects, I will begin with a discussion of the positive contribution of the epidemiological approach in order to extract aspects not explained. This will lead to an outline of an immunology of cultural systems exemplified by the cases of cultural models and narratives, and prescribed bodily action, notably rituals.

The Epidemiology of Religious Representations

As mentioned above, an epidemiological understanding of culture in a significant manner changes the focus and scope of inquiries into religion and religious traditions. Dan SPERBER has framed the idea of an epidemiological approach to representations in an attempt to outline a materialistic and naturalistic approach to culture (SPERBER 1996). The basic premise is that ideas and representations, can be understood as spreading in a non-random manner through human populations, similar to the spread of pathogens. Instead of viewing cultures as mono-

lithic structures, SPERBER argues that they must be understood as causal chains relating mental and public representations that give rise to an uneven distribution of representations. In the course of transmission, some representations gain wider prevalence than others, and this statistical clustering constitutes what is ordinarily referred to by the concept of culture.

Whereas the traditional sociological and anthropological methods inspired by DURKHEIM treat representations as public and systemic, SPERBER argues that public representations have causal impact only if they effect the production of a mental representation, and in that sense mental representations have primacy over public ones. This points to a modest claim that culture cannot be described without reference to the cognitive systems underlying mental representations, as all public representations must be accessible to the cognitive system in order to be understood and transmitted. But according to SPERBER it also entails the more radical claim that the macro-phenomenon, usually referred to as culture, can be explained solely by reference to two micro-level phenomena, namely cognition and intra-individual transmission:

"An epidemiology of representations will attempt to explain cultural macro-phenomena as the cumulative effect of two types of micro-mechanisms: individual mechanisms that brings about the formation and transformation of mental representations, and the inter-individual mechanisms that, through alterations in the environment, brings about the transmission of representations" (SPERBER 1996, p50).

Thus the non-random distribution of mental and public representations is reducible to two interdependent explanatory levels. The first concerns various cognitive constraints on the construction, transmission and acquisition of diverse types of representations. Most important are the domain-specific properties of cognitive modules claimed by BOYER, SPERBER and others as fundamental to human cognition (see HIRSCHFELD/GELMAN 1994). These are genetically specified to handle certain types of information, and the representations that survive (i.e., are spread to many individual in time and place) are those that fit these modules. It is important to realize that according to this approach, cognitive modules are evolutionary adaptations to a Pleistocene environment both similar to and different than the environment facing modern humans. This difference entails that one must distinguish between a module's *proper* domain, i.e., the domain of

information that a module has adapted to process, and the *actual* domain that feeds the module with information in a modern environment. Thus modules handle more information than they were 'built' to do, and the additional information is in some sense 'parasitic' on the cognitive module, as it is subject to the same inferential process as information stemming from the proper domain.

The second explanatory level concerns the dynamics involved in concrete pragmatic situations involving several individuals, notably that of relevance-driven inferences applied in communicative situations (SPERBER/WILSON 1995). The principle of relevance implies that the transmission of concepts through production of public representations excites cognitive modules that supply large amounts of information not explicitly transmitted. The explicit information given to the cognitive system is complemented by mental theories already present involving knowledge from other representations and default inferences based on ontological categories. These factors influence the epidemiology of a concept: the more modules a concept excites the more relevant it becomes, and cognitively relevant concepts spread more easily than less relevant concepts (BOYER 2001, p60, 164).

Pascal BOYER applies this epidemiological approach to the domain of religion and religious representations. Instead of analysing religious representations as holistic systems of belief relatively independent of their human bearers, BOYER investigates what cognitive and pragmatic structures constrain and facilitate both the construction and the transmission of religious representations (BOYER 1990, 1994, 2001). He argues that religious concepts exist only in the minds of those that hold them, that culture is a shorthand term for a statistical resemblance of individual's representations without causal potential, and that, as such, descriptions of cultures are constructed from a specific vantage point, motivated by political motives that highlight certain similarities and downplay others rather than by scientific ones. He also argues against meme-theories of cultural transmission, as concepts are not simply replicated during transmission as in the case of genetic transmission. Instead, the transmission of concepts between humans involves a substantial degree of mutation, that is, of constant modifications due to error, schematization, and creative expansion. The primary modifying mechanism is the individual cognitive system that, due to its evolutionary inheritance, exerts a selective pressure on representations. Some concepts are more easily re-

called and transmitted, others evoke specific emotional responses, and yet others connect to cognitive systems dealing with social relations. According to BOYER, religious representations are particularly successful for several reasons. First, they combine *all* of these characteristics, and thereby become relevant to a whole range of mental systems (BOYER 2001, p50), conforming to the principle of relevance in exiting a large number of cognitive inferential modules. Second, they contain a small number of violations of normal expectations based on standard ontological categories. Religious categories are notorious for containing such entities as listening trees, animate statues, living dead, and omnipresent gods—in short they all contain what BOYER refers to as "counterintuitive properties" that make concepts highly memorable and that facilitate their transmission. Religious concepts are 'parasitic' on a host of cognitive systems and in this way produce actual domains extending beyond the proper domains of the cognitive modules (BOYER 1994, 2001).

According to SPERBER and BOYER, these characteristics can explain not only how religious concepts are constructed, transmitted and acquired, but also the apparent recurrence of certain types of religious concepts in different cultures and historical periods. Based on the limited repertoire of ontological categories (such as ANIMAL, ARTEFACT, and PERSON), the cognitive optimum mixing domain-specific inferences and violations with constraints imposed through cognitive aspects of pragmatic communication limits the number of possible religious representations that can survive and spread (BOYER 2001, p79).

The epidemiological approach has obvious advantages. It deconstructs monolithic conceptions of cultures and religions in favour of a dynamic view of constantly shifting patterns of representations. It points to important cognitive mechanisms and thereby explains why the conceptual structure of religious concepts seems to drift towards certain combinations. Thereby it also explains the recurrence of religious ideas that has puzzled scholars of religion ever since the emergence of the discipline. Finally it outlines methodological means to tackle the complex problem of how religious concepts are transmitted between generations, by pointing to the selective pressure exerted by the recipient party effectively weeding non-optimal concepts from the causal chain.

However, as indicated at the beginning of this paper, I believe the epidemiological approach to have some serious limitations that must be overcome if it

is to provide an adequate picture of religious representations and their incorporation in religious traditions. If the epidemiological approach were sufficient, the potential spread of a specific religious representation should be limited only by the degree to which it fulfils the cognitive optimum and by the frequency of encounters. Obviously, this is too simple an account to explain the various cases of successful or unsuccessful mission, conversion, spread and change of religious concepts found in the history of religious traditions. Mere frequency of encounter is not a sufficient parameter for deciding the spread of religious representations, *unless we extend the meaning of encounter considerably*. Is it only the number of times an individual directly encounters a certain representation or concept that count as an instance of contact, or does it also include indirect reference to the representation and even when people themselves evoke the concept when encountering something else? If we allow for such indirect inferences, we include a systemic level into our account in which a whole system will be strengthened by the encounter of a single element of the system. If this is the case, cultures are perhaps more adequately described as consisting of immunological systems, that on the one hand secure the propagation and spread of certain concepts through their embedding in self-referential systems ensuring numerous contacts, and on the other hand effectively impede or prevent competing and equally optimal concepts' access to the relevant systems. This, in turn, imposes a considerable limitation of both the frequency of encounters with new religious concepts and their pragmatic relevance, and thereby reduces their chance of survival in a given cultural environment.

This points to a related problem. At present, the epidemiological approach does not distinguish between different types of public representations. Following the common method in cognitive science of deconstructing complex phenomena into simpler mechanisms, the focus is directed towards individual concepts. There are good reasons for this strategy, as it facilitates the exposure of the basic principles underlying the individual concepts. However, people do not encounter Krishna as a concept involving the counter-intuitive properties blue skin and eternal life, but gradually construct a complex concept through encountering stories, songs, performances and depictions. This concept has numerous relations to other concepts in doctrinal treatises, narrative structures, bodily performances and material artefacts that not only influence its cogni-

tive strength and salience, but also how the concept is actually used to produce new public representations. While acknowledging the importance of basic cognitive mechanisms analysed through the decomposition of systems into atomistic elements, we should not loose sight of the importance of systems-level properties on both the spread and stability of conceptual structures.

Finally, a systemic approach is necessary in order to account for the cultural differences that despite much justified criticism against cultural and ethnic reification, can still be observed even among close neighbours. Even though it is notoriously difficult to pinpoint exact cultural and ethnic borders (COHEN 1978), not to mention the defining characteristics of these entities, this should not lead to the exclusion of a level of explanation in which groups of people interact through shared symbols and models of the world. Groups of a certain size seem to be a prerequisite to language formation, systems of reciprocity, and religious and ritual systems. This must be explained by reference to how cultural models or systems can influence individuals' 'moods and motivations' (to paraphrase GEERTZ 1974) by interacting with their cognitive systems, and as such have a causal influence on the world.

Toward an Immunology of Cultural Systems

The argument in favour of an explanatory level treating cultural systems is *not* intended as an argument in favour of a return to an old-style approach that sees cultures as monolithic and consistent systems determining individual cognition. Cultures are not monolithic wholes and it is questionable whether cultural models deductively determine how people act. Instead, a culture is a plethora of models, scripts and explanatory frames that can function as tools of interaction and interpretation of the world. Models function as maps directing individuals' actions towards certain goals, whether biologically or culturally preferred (or both). Further, they serve as interpretative frames that enable people to explain events and states through abductive inferences, i.e., using a model as a hypothesis that would deductively produce the state or event in need of an explanation (in short 'a qualified guess'). When describing culture as a plethora of such models and frames it is important to notice that they do not form a logically consistent system that can be described as a "culture's worldview," without making a strong idealisation (that can be defended in

some instances). In order to avoid reifications I will argue for a pluralistic model in which a culture is defined by the existence of a substantial number of cultural models and prescribed bodily actions related to each other through numerous conceptual, pragmatic and cognitive connections. On the one hand this causes a constant historical change and adaptability to new situations and environments, and on the other hand it ensures a certain degree of cognitive stability.

Cultural models and narratives

Cultural models are relatively simple relations between representations that work as models of aspects of the socio–cultural world and that are widely shared among a group of people (QUINN/HOLLAND 1987). Such models are to a certain extent exclusive, but a group of people can entertain different models that compete for the prevalence in mapping aspects of reality (as when Freudian and Christian models of the individual psyche clash in explaining somebody's behaviour). Further, cultural models are connected by concepts appearing in several models, by hierarchical organisation in which one model incorporates another model, and by systematization in which several models are incorporated into a more or less coherent (but seldom consistent) cultural system such as a religious tradition. These intricate relations between models and thereby between representations and concepts cause a stabilisation of interpretation, such that one model will frequently be interpreted by another model leading to a mutual strengthening.

The picture of culture as a network of interconnected cultural models giving rise to self-referential and mutually strengthening systems of representation introduces a further selective pressure on spreading representations. Not only will representations be selected for by their degree of fitness in relation to cognitive modules, memory, and pragmatic relevance, they will immediately be evaluated with and compared to already existing cultural models. As BOYER's example describing the misunderstanding of DAWKINS' concept of the selfish gene as a gene for selfishness illustrates (BOYER 2001, p39), novel concepts (such as the compound 'selfish gene') are interpreted in relation to existing models, in this case the models of natural evolution as a dirty fight for survival, a model for 'selfishness' and the blend between the two. DAWKINS' intended meaning, that genes' sole achievement is to replicate, did not 'survive,' not due to some domain-spe-

cific cognitive grounds, but due to the fact that the compound fit nicely into already existing models that were stronger than those intended by Dawkins.

An example of how religious concepts are non-randomly 'misunderstood,' i.e., reinterpreted, can be found in how the concept of reincarnation was transformed when introduced from India and other parts of Asia to Europe and America in the 19th century by Western Theosophists. According to Hindu theology, the transmigration of the soul can either be progressive or regressive, i.e., a human being can be reborn as a dog or a king depending on his deeds (e.g., *Vishnu Purana* Ch. 18, see Wlison 1972). The purpose of a religious life is to produce rebirths that will eventually facilitate the escape from this wheel of migrating souls (samsara). In contrast, European and American renderings of reincarnation were made with the help of explicitly progressionist and evolutionist models arguing for the constant evolutionary progression of the individual soul through numerous reincarnations, always on a higher or, in the worst case, the same evolutionary level (e.g., Blavatsky 1987; Leadbeater 1979. For analysis of metaphorical systems in theosophy, see Sørensen 2000b). The contrast between the two models used to interpret the concept of a soul inhabiting new bodies after death could hardly be greater. One envisages reincarnation as a deplorable state that must be transcended through religious life, whereas the other sees it as a wonderful state that gives a role to the individual soul in the constantly evolving universe.

Since its introduction in Denmark in small Theosophical and Spiritist groups in the late 19th century, it is estimated that at least 20% of the Danish population believes in reincarnation. This points both to a relative freedom of individual representations, as most of these people are still member of the Danish Lutheran Church which vigorously denies reincarnation any validity. However, the example also illustrates that the novel representation of reincarnation is interpreted with the help of other strong cultural models, namely those of cultural evolutionism and progress. Religious concepts *can* cross borders between religious and cultural systems, but apparently must be attached to already existing cultural models to do so. Religious concepts and representations are not only parasitic to domain-specific cognitive modules but apparently also to established cultural models. The historian of religion Jeppe Sinding Jensen has proposed that conceptual systems might themselves be domain-specific, implying that concepts relevant in one cultural model

need not influence other models (Jensen 2002). Thus, one can speculate whether the concept of reincarnation would have stood much of a chance if it had been introduced at a time without models in serious competition with established Christianity that could remould the concept and thereby place it in a systematic relationship with other models. I would further guess that modern, Western belief in reincarnation has such a close relationship to popular evolutionary and progressionist models that areas in the USA with a strong belief in Christian creationism and scepticism towards modernity will have next to nobody believing in reincarnation, as the belief has no or little conceptual support.

The examples given above not only point to how individual concepts are understood in relation to more or less established cultural models. They also point to the inherent valorisation of individual concepts through their relation to models. Most people, who, due to established cultural models, find selfishness a negative quality and survival of the fittest cruel, will negatively evaluate Dawkins' 'selfish gene' understood as a gene for selfishness. Similar, the concept 'reincarnation' has received a predominantly positive evaluation due to its relation to notions of progress and cultural and spiritual evolution. It is an interesting question how being embedded in larger cultural models with inherent valorisation influences survival of individual concepts. In studies of how memory influences the survival of particular ritual forms, Harvey Whitehouse has argued that two basic modes are available. Rituals are either in the *imagistic* mode, entailing a large degree of emotional excitement and infrequent performance, or they are in the *doctrinal* mode, which are rather dull, but frequently repeated. Both methods are effective in ensuring survival of the ritual by exploiting two different human systems of memory: episodic and semantic memory respectively (Whitehouse 2000). Perhaps similar factors influence the epidemiology of concepts. Individual concepts are interpreted through one or more conceptual models that are either emotionally exciting (whether positively or negatively) or often repeated. If this is so, an immunology of cultural systems will shed further light on the epidemiology of representations by pointing to the importance of pre-established cultural models that through their frequent use or emotional investment influence the future spread of individual representations. This could turn out to be especially important in the study of religion, as religious models often are both extremely emotionally valorised and frequently employed.

Above I pointed to the problems involved in not distinguishing between different types and sizes of public representations. Like concepts, cultural models in general and particularly those involved in religion, are seldom expressed in direct propositions but are embedded in narrative structures that can subsequently give rise to propositional models. When introduced in the Western world the idea of reincarnation did not attach itself to scientific evolutionary theory with explicit propositions, but rather to popular narratives of evolution framing the development from the simple and crude to the complex and sophisticated in the domains of biology, culture and spirit. Such evolutionism is a mythical narrative that explains the origin of the world, its historical development and the position of individuals in a larger scale, and it is exactly as a narrative that it is recalled, even in large parts of the scientific community not familiar with evolutionary theory. The importance of narratives in this context is that they relate cultural models to each other in a hierarchical network, which gives rise to a local interpretative frame that constrain the meaning of individual cultural models. Narratives organise concepts and cultural models in a progressive unfolding that imposes severe constraints on the interpretation of individual parts.

Some might object that interpretations of stories and other narratives vary considerably even, or perhaps particularly, among literary scholars. Therefore, it is argued, we should not overestimate the importance of the frame of interpretation constructed inside the narrative, but instead concentrate on how individual minds construct the meaning of stories in local pragmatic situations. However such a contradiction is only apparent, as what happens in 'classroom' interpretations is the application of text-external and explicit cultural models used to interpret the narratives that of course differ from one another considerably (they are competing models themselves). What I am referring to is the limits of meaningful interpretation, the basic patterns of meaning in a narrative without which there would be no narrative but only a random cluster of independent concepts.

The relation between the meaning inherent in a system of public representation, such as a narrative and that implied by applied interpretative models points to an interesting feature of the epidemiological account. When arguing that cultures can be described as causal chains of mental and public representation, SPERBER in fact restates in a materialist idiom Ferdinand de SAUSSURE's classic semiotic description of the sign as consisting of a concept or signified (mental representation) and a sound-image or signifier (public representation) (SAUSSURE 1966, pp66f). A mental representation can make me produce a public representation, say a sound, that in turn causes a mental representation in a listener, that can give rise to yet another public representation, etc. Even though the relations between mental and public representations are causal in this respect, there is a degree of arbitrariness involved. I can choose between different languages when making sounds or write it down instead of saying it, leaving the relation between mental and public representation one of arbitrary convention. This arbitrariness involved in the relation between public and mental representations will be further enhanced by adding a temporal or spatial distance between the causal relation leading from a mental to a public representation and that leading from a public to a mental representation. All things being equal, the number of misunderstandings increase the further the two cognitive events connecting mental and public representations are separated in space and time. This is the case of pure exclamations that only have meaning in the immediate pragmatic context, but there seems to be mechanisms that prevent such entropy of meaning in other cases. According to the epidemiological model, these mechanisms can only operate by means of the micro-processes of domain-specific cognition and pragmatic relevance. However, these mechanisms are not very efficient in preventing loss of meaning understood as the widening difference between the mental representations at each end of the communicative event, when the two causal events are moved further apart in space or time. A very efficient way to delimit semantic entropy is to embed individual representations in networks that restricts possible misconceptions through internal reference.

It can be argued that this is not beyond the explanatory scope of the epidemiological approach as a cumulative result of adding public representations that, when processed in consecutive order, will give rise to a specific pattern and sequence of mental representations. This is, of course, a part of the picture, but does not account for the importance of transcending the limit of time otherwise imposed by pragmatic situations. The production of cultural models, narratives and other systems of representations creates an interpretative history, in which new use of a concept is constrained by its former use. Without this, there could be no stabilisation of symbolic reference in, for instance, language (cf. DEA-

CON 1997). So if *A* wants to convey a message to *B*, she not only has to release the proper inferential structures in *B*'s mind, but in order to do so, she must be aware of the interpretative history of the public representations or signs she employs, that is, what models the concept takes part in. Further, when some models, narratives and cultural systems gain historical prevalence, it will be a self-enforcing process, as employment of the model or system in the act of understanding some type of representation will strengthen the model or system even further and thereby make it more likely that it will be employed again in the future. Thus the use of models to interpret other models and concepts will tend to create clusters with some immunity towards competing models and concepts with similar cognitive features.

Prescribed bodily actions (ritual)

In the description given above the epidemiology of representations is strongly constrained by already existing conceptual structures, whether in the form of cultural models or narratives. The selective pressure towards a cognitive optimum of religious representations as argued by BOYER, and the principle of relevance argued by SPERBER, are supplemented by a non-reified concept of religious traditions understood as ever-changing patterns of mutually strengthening models united by referential connections and loops—in short an immunology of cultural systems.

It is a problem that both the epidemiological and the immunological models have an intellectualistic flavour. They base an account of human culture or religion almost totally on how representations, concepts and models work, and thereby implicitly downplay what is possibly a much more important aspect of culture and religion, namely bodily actions and rituals.

The status of bodily actions in an epidemiology of representations points to the problem of different types of public and mental representations. A representational view of human cognition will of course see actions as the result of mental representations, and the actions performed as public representations that cause the creation of mental representations, thereby creating the causal string of representations claimed by the epidemiological approach. However it seems evident that representations of actions are different than representations of concepts, and that this difference will influence both the epidemiology of representations and the immunology of cultural

systems. In fact I will argue below that bodily actions in general and ritual actions in particular form a much better example of a pure epidemiological effect less restricted by cultural immunity, than it is the case with ideas and concepts, even though the immunological systems still play a significant role.

If we turn to the type of bodily actions of direct concern to the study of religion, a point of departure can be that ritual is a kind of action or actions that on several accounts differs from ordinary or instrumental actions. In order to find a basic level of ritual action we must first direct our attention to the process by which a functional action is transformed into a ritual action—a process denoted by the concept of *ritualization* (see HUMPHREY/LAIDLAW 1994, for discussions of ritualization). A broad definition inspired by ethology will define ritualization as an action-sequence that through removal from its original functional domain can function as a method of demonstration and communication (LORENZ 1966). Thus among animals, ritualized behaviour can entail the use of aggressive behaviour to confirm mate bonding or the display of sexual potency to scare off potential rivals, to mention just a few examples (BURKERT 1979). Of course human rituals contain much more than this type of ritualized behaviour, but the ethological account draws our attention to two important aspects of human rituals. First, as with other animals, humans have fast and possibly domain-specific mechanisms for the cognitive processing of actions belonging to functional domains. Second, ritualization, by means of which actions are removed from their original selective domain, is a common process among animals and humans and leads to automatic and unconscious processing of certain types of behaviour as acts of demonstration or communication (EIBL-EIBESFELDT 1989; EKMAN 1973). Human rituals contain significant amounts of ordinary actions removed from their functional domain. Wine and bread are consumed, but neither for taste nor nutritional value, stones are thrown against pillars, and parents disguised as spirits frighten their own children. These are all examples of ritual actions that are intended to produce effects in participants and that therefore can be said to be performed for some reason. However, the relation between ritual action and purpose is intriguing. Rituals are recognised as a special mode of human action by the opaque relationship between the actions performed and the result claimed. Domain-specific expectations connecting actions and results are radically violated when performing and perceiving ritual actions, as no causal connection can be estab-

lished between eating bread and receiving grace, throwing stones at a pillar and rejecting Satan or between frightening children and making them full-grown adults.

By violating expectations concerning both the functional domain and domain-specific intuitions about cause and effect, ritual actions provoke a cognitive search on two levels. The first is a basic level search for domain-general perceptual clues. These contain pre-conceptual meaning structures or weak causal relations (KUMMER 1995), such as relations of similarity, contagion and temporal contiguity, or basic biological communication between participants that appears when attention is withdrawn from the actions performed to the people performing it. Second, when prompted either by discourse or by events, people will search for adequate symbolic explanations of specific ritual actions among available cultural models. Thus participants and observers alike ascribe meaning to the fact that an object is consumed during the Communion, that the recipient must kneel while receiving the host from another person, and they will most likely employ one of the many available models interpreting this particular action if prompted to do so. The cognitive search can therefore lead to representations of a ritual's purpose or meaning on two levels: first, a basic level involving bodily postures, image-schemata and force-dynamics (JOHNSON 1987; TALMY 2001), and relations of similarity, contiguity and contagion (rituals represented in this manner are traditionally referred to as magic), and second, a symbolic level, where ritual actions are directly related to more or less conventional, cultural interpretations. The relatively loose connection between the ritual action and the possible symbolic interpretation has lead some scholars, notably Frits STAAL (1979), to argue that rituals do not mean anything at all, and that seeking their meaning is beside the point. It is true that the violations of both functional and ontological domains found in ritual actions prevent strong determination of the link between ritual actions and possible symbolic interpretations. Still, the bodily actions performed give rise to a basic meaning structure. Kneeling before an altar and consuming a piece of bread entail weak causal connections that loosely constrain relevant symbolic interpretations. Even if representations are underdetermined by the ritual actions performed (as argued by BOYER), it is unlikely that they will contradict basic patterns of meaning found in the actions performed. Further, the employment of concepts and narratives in the ritual performance establishes connections to already existing cultural models that can serve as available interpretative frames for participants.

The relation between simple and rudimentary meanings inherent in actions on the one hand, and more or less conventional symbolic interpretations based on established cultural models on the other, points to three perspectives of direct relevance to the present discussion. First, their relative independence from interpretative frames makes ritual actions prime candidates for epidemiological effects on a larger scale. Studies of ritual magic point to the rapid spread and cross-cultural and cross-linguistic potential of individual ritual actions (SØRENSEN 2000a). Magical rituals are seen as directly efficacious actions irrespective of whether symbolic meaning is attached to them. In fact, magical rituals actively seek to downplay conceptual reference by employing strange linguistic forms, exotic or even nonsense words and other means of deliberate mystification. Elsewhere I have referred to this as a process of "desymbolization" (SØRENSEN 2000a, forthcoming) that effects a highlighting of other aspects of the ritual performance, namely the aforementioned weak causal connection (similarity, contiguity and contagion), which in turn produce representations of efficacious ritual actions despite the absence of domain-specific intuitions. An interesting side effect of the desymbolizing practice is the cultural contagiousness of ritual performance. Not only are talismans, amulets and magical portions exported and imported (and apparently gain power the more exotic they are). Ritual sequences follow the same pattern. The more exotic, obscure and devoid of any standardised symbolic interpretation, the more our cognitive systems attach ritual power to the actions and the easier they spread over cultural and linguistic barriers. I will hypothesise that changes in religion on larger scales, such as rapid conversion to Islam and Christianity is not at the outset a conversion from one conceptual system backed by cognitive optimal religious ideas to another, but rather a *conversion to a new ritual practice represented as more powerful or addressing more imminent problems than existing ritual practices*. Ritual practices will eventually be related to relevant interpretations and doctrines, especially if conversion is related to political change, but this is a secondary process.

Second, as ritual practices contain a basic meaning structure by virtue of the actions performed, cultures will differ as to the type of ritual actions performed. Peter VAN DER VEER describes the relation

between Indian Muslim and Hindu conception of the living saint in Northern India (*pir* and *sadhu* respectively) as a combination of integration and boundary-maintenance. Whereas Hindus will participate in Muslim saints' rituals and Muslims in Hindu saints' rituals in order to get access to the power believed to reside in the saint, the parties sharply divide over other ritual practices. The mosque with its prescribed ritual sequence is an exclusive Muslim domain creating a community of believers that excludes people not identifying themselves as Muslims. The same is the case with Hindu temple worship of images, which is an exclusive Hindu and preferably high caste affair (VAN DER VEER 1994). Thus, we have practices based on representations of personal power that are shared by both religious communities and we have other ritual practices that effectively divide the two religious communities. This points to the importance of ritual actions in the creation group boundaries, or what Erik ERIKSON (1966) has referred to as "pseudospeciation." Even though ritual actions have strong epidemiological aspects, rituals are also one of the primary behavioural strategies used to signal group-identity. The form of ritual action can itself expose immunological aspects, for instance the Muslim rejection of idol worship based on strong iconoclastic models. In this relation WHITEHOUSE's hypothesis that the types of ritual performed are causally related to the types of social organisation is suggestive of even tighter relations between ritual actions and both conceptual and social structure (WHITEHOUSE 2000).

The third perspective relating ritual to both the epidemiology of representations and cultural immunology concerns the process of interpreting ritual actions. Even though the relation between ritual performance and local exegesis has often been described in much too deterministic a fashion as a one-to-one relation between action and belief, the exegetical practice provoked by ritual performance is not totally random. A Danish bishop once remarked that at dinner-parties people always tell him that they *do* believe in the divine, but that it is their own private and not the official religion. After several such occasions it struck the bishop that even though all claimed their religion to be their private and individual choosing, their beliefs were all remarkably similar.

The point of this anecdote is that even though people do not find that their interpretations, beliefs, or cultural models are part of a larger pattern, they usually turn out to be drawn from a restricted pool of available models. This is also the case with ritual actions, where peoples' interpretations tend to cluster around certain established models. However, even established models are very unstable due to the weak determination posed by the actions concerned. When only weak and very basic meanings inherent in the bodily actions constrain possible interpretations, there will be considerable room for changes over time. The tendency towards instability of ritual interpretations is driven by two interdependent factors. The first of these is the process of de-symbolization, by means of which representations of ritual power is created. The study of magical rituals points to a negative correlation between degrees of symbolic interpretation and representations of ritual efficacy (SØRENSEN, forthcoming). The more a ritual is subject to explicit symbolic interpretation, the less it tends to be able to effect, and the less interpreted, the more mysterious and powerful. Thus, ritualization entails an inherent tendency to deconstruct established symbolic interpretation in order to install power in the ritual action. Second, as rituals spread over linguistic and cultural borders, these new ritual forms challenge established cultural models, and provoke the construction of new ones. Even though the purpose or meaning of ritual action cannot be found in one model, rituals provoke the construction of interpretations that relate them to certain practices and pragmatic domains.

Evolutionary Aspects of an Immunology of Cultural Systems

In relation to recent interest in the evolutionary aspects of religion, one might ask to the evolutionary implications of an immunology of cultural systems. Space does not permit a thorough discussion in relation to the massive amount of literature in evolutionary psychology, co-evolution theory, dual inheritance theory, etc. Instead I will discuss a few aspects of the relationship between immunology and epidemiology and theories of human evolution.

Humans create an environment of public or cultural systems

As described above, the immunology of cultural systems suggests that cultures are not just the combined mental states of individuals, but that such systems gain relative independence from individuals and effectively constrain individual cognition. The bottom-up causation embraced by cognitive

science according to which all cultural phenomena can be explained by reference to cognitive structures, must be combined with a top-down causal explanation of how cultural formations influence individual cognition (JENSEN 2002). This can be framed in an evolutionary perspective as the way in which culture changes the reproductive environment of coming generations (ODLING-SMEE 1995). Culturally induced alterations of the environment, such as those resulting from agricultural techniques, weapons technology and industrial pollution, effectively change the selective pressure on coming generations by altering the evolutionary niche of our species. ODLING-SMEE refers to this as a process of *niche-construction*. The radical implications of this concept when dealing with human culture lie in the fact that human cultures are not just adaptations to already existing environmental niches, but that cultures effectively construct their own niche, a feat only possible due to the external knowledge storage in cultural systems. In a wider sense the existence of culture itself entails the emergence of a new selective pressure according to which individuals that are stable symbolizers have an selective advantage in both the social and physical environment thus initiating a co-evolutionary process of cultural and cognitive systems (cf. DEACON 1997). I do not claim a newly developed and specified brain–system coping with symbolic knowledge emerging together with culture, but rather that individuals, whose brain-structure allowed the development of cognitive abilities necessary for the comprehension and production of symbols, are placed at a selective advantage. Eloquent, strategic, and creative use of cultural systems leads to a preferential access to social resources that in turn will enhance reproductive success through sexual selection. The relative stability of cultural systems is crucial for this to take place.

Cultural systems provide external knowledge storage

As argued by anthropologist Edwin HUTCHINS (1994), a single individual cannot contain the knowledge of a whole culture in her mind. We all depend on external systems of gaining knowledge and of remembering and retrieving the knowledge we have already acquired, as this radically exceeds our biological capacity of memory. Cultural systems as clusters of interrelating models are exactly such external devices, as they not only connect existing models by using the same representational format

(e.g., language), but also effectively interact with the human mind, as this has been acculturated to existing cultural symbolic systems. According to neuropsychologist Merlin DONALD, externalised symbolic systems provided humans with a unique tool, as they facilitated a radical expansion of memory beyond the confines of the biological systems and thereby a gradual expansion of available knowledge (DONALD 2001). The other side of this is a degree of cultural constraint on worldviews, goals and modes of behaviour, even if these in some cases are less optimal according to cognitive theorising such as BOYER's. If DONALD is right, one cannot analyse large parts of the higher cognitive system without accounting for the cultural stuff that inhabits it and makes symbolic thinking possible. Thus the immunology of cultural systems is not just an external selective factor working on the epidemiology of representations. Learning to interact with cultural symbolic systems is a necessary prerequisite for acquiring new concepts as these depend on establishing relations to other concepts. Of course, concepts are acquired early in life without the aid of such systems, but once in place, all new knowledge relates to already established models. On higher cognitive levels, the distinction between individual cognition and cultural systems are blurred, as symbolic cognitive abilities are totally dependent on cultural systems in order to function. On an evolutionary scale this implies that the growth of culture has a cumulative momentum, as more and more knowledge is stored externally. As the amount of external knowledge expands, there will be a growing need for stabilising the system through formalising internal relations, thereby constraining meaning by locked referential relations. The loss of meaning correlating with the time lag between production of a public representation and its interpretation is restricted by embedding each representation in a larger framework of ever-growing formalisation. This has obvious advantages (for instance, in science) but it also entails that the systems of distributed cognition fragment into expert systems shared by relatively few people across social borders. This has consequences for the development of social systems.

The immunology of cultural systems and social structure

As described above, Harvey WHITEHOUSE has proposed that rituals come in two basic formats. An infrequently performed imagistic mode found in small-scale societies, and a frequently performed

doctrinal mode found in larger-scale societies. Further, WHITEHOUSE argues that the imagistic mode is related to a more ancient type of religion than the doctrinal mode that arises with agriculture, urbanisation and division of labour (WHITEHOUSE 2000). This seems to be in opposition to my argument above that ritualization entails an active process of desymbolization according to which conceptual structures in rituals (including doctrines) are deemphasised in favour of representations of ritual efficacy based on similarity, contiguity and contagion. This process makes ritual actions prime candidates for epidemiological effects, as they spread independently of cultural conceptual systems. However, I believe the contrast is only superficial. Both WHITEHOUSE and I acknowledge that ritual is the prime candidate for spreading religious belief. But, where imagistic rituals cause the spread of similar experiences inside a relatively confined group and thereby strengthen group cohesion through emotionally arousing actions and mimetic reproduction, ritual actions need to be intimately related to doctrinal systems if the purpose is to spread religious ideas over larger areas and to many individuals. There are at least two reasons for this. First, as they are only constrained by memory-systems and other cognitive optimum principles and not strongly related to interpretative cultural models, imagistic rites tend to spread quickly but also to mutate equally quickly. In contrast to dispersing cultural systems, such as religious ideas, these are only behavioural procedures spread by means of imitation and are eventually remoulded to fit already existing ritual and conceptual structures. To convert large numbers of people and create a large social group, such mutation must be prevented, even if the cost is slower progress.

Second, the purpose of conversion is not only to make people adopt a new ritual practice, but equally to adopt specific religious ideas and, normally in relation hereto, to follow a new political-religious centre of authority. To achieve this, new cultural models must follow the ritual practice and supplant some already existing models. Therefore, a doctrinal ritual approach with frequent performances is necessary in order to transmit the desired cultural models to a large number of people. In contrast to the imagistic mode, the doctrinal mode combines frequently repeated bodily actions with culturally legitimate symbolic interpretations and thereby avoids representational mutation.

This has an impact on our understanding of cultural evolution. Whereas imagistic rituals that produce specific emotions in participants can be a suffi-

cient source of social cohesion in small-scale society, larger social structures are dependent on externalised symbolic systems in order to obtain some degree of social cohesion. In an anonymous complex society, external cultural systems bind people together in a symbolic or imagined community (ANDERSON 1991). This gives a special role to religion in human evolution, as religious systems are among the earliest and most complex external storage systems. Doctrinal religions are often directly related to expansion of political dominion where they serve the function of uniting different people in a common community by means of participating in an overarching cultural system.

Concluding Remarks

In this paper, I have discussed why an immunology of cultural systems is needed as a supplement to the epidemiology of religious representations presented by SPERBER and BOYER. The case of such an immunology has been argued in relation to religious concepts organised in cultural models and narrative structures, and to ritual practices understood as the prime agent of an epidemiology of religion. On a general level, a cultural immunology seeks to describe how cultural models can serve as explanatory and interpretative frameworks for people, how cultural models are organised in more comprehensive and hierarchical systems such as narrative, and how these systems stabilise due to the internal relations of mutual reference and loops. Cultural systems create maps of the world, maps that are absolutely necessary for humans to organise otherwise chaotic perceptions enriched only by basic domain-specific inferences.

Proponents of the epidemiological approach may remain unconvinced of the necessity for an immunology of culture, and will argue that from a materialist perspective there are only mental states in individual minds and that every other claim is obscure or perhaps worse, idealist. I do not agree that this is the case. Cultural models are not free-floating abstractions but the combinatory result of the mental states of many people, behavioural patterns, and ordered material instantiations, i.e., signs. This type of interaction or network leads to the forms that we describe as cultures or religious traditions, in which relatively stable models combine into larger systems with some degree of logical coherence, and inform and legitimize certain types of behaviour. They thereby achieve relative independence from basic cognitive systems at any spe-

cific time, and of specific pragmatic situations, at the same time as the higher cognitive functions characterising humans are crucially dependent on such external systems in order to function. When arguing for this limited transcendence, I do not claim that culture is not constrained by the cognitive mechanisms described by epidemiology (and possibly others as well). I argue that in the same manner as cognition constrains the morphology of culture within certain parameters, conceptual and behavioural aspects of cognition are constrained by already established cultural configurations, and that these must be taken into account if we want to explain the nature and dynamics of religion and the persistence of religious traditions.

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Bradley Franks

Negation and Doubt in Religious Representations

Context-Dependence, Emotion and Action

Introduction

Amongst the key pre-the-oretic intuitions concerning religious representations, three appear to be predominant. The first is that these representations incorporate some form of counter-intuitiveness or conceptual contradiction as an integral part of their descriptive content. The second is that such descriptive aspects of content are intimately connected to non-descriptive aspects related to their "psychological modality," and in particular to a range of emotional connotations. The third is that both the descriptive and non-descriptive aspects of the content of religious representations are closely related to religious behaviour or rituals. Taken together, the three intuitions provide a general position that conceptual representation, emotion and action are intimately related to each other in the religious domain, but leave open the precise nature of their relations.

In this paper, I discuss some of the issues that arise when their relations are considered. In particular, I will explore the implications of a specific construal of the counter-intuitiveness of descriptive content, for the relations to emotion and action,

Abstract

Religious representations are often held to be counter-intuitive, in that they represent properties that contradict deeply-held assumptions about the natural world and its behaviour. In this paper, I consider some implications of understanding such counter-intuitiveness not in terms of simple negation of those assumptions (as is also widely assumed), but rather in terms of casting them into doubt. Such conceptual doubt and the promise of its resolution imply that the content of religious representations is more sensitive to context than widely countenanced. Now, since this doubt concerns ontological properties whose truth or falsity cannot be assessed by ordinary empirical means, the important kinds of context are ones that do not primarily offer new empirical information. Instead, they prompt resolution by providing input whose force can be to change belief in the doubted properties into belief in their truth or falsity. I argue that these inputs come from three key sources, which may interact—religious actions or rituals, emotions, and social deference. As a result, holders of religious representations are seen as recurrently revisiting their doubts, with rituals, emotions and social deference providing means of—usually, temporary—resolution.

Key words

Religious representations; counter intuitive concepts; ontological assumptions; context relevance; doubt; emotion.

and will suggest that this construal may lead to a more natural account of those relations than do other construals. This approach to counter-intuitiveness is one that sees a major role for doubt concerning the ontological properties of religious entities, as opposed to direct negation (see FRANKS 2003 for a detailed presentation), and consequently sees the content of religious representations as fundamentally more *dynamic* or *context-dependent* than the somewhat static approach often assumed elsewhere.

The paper is structured as follows. In the next section, I will outline the possible role for doubt in religious representations, contrasting this with accounts that assume that counter-intuitiveness involves simple negation of intuitive ontological properties. Following this, I will consider an implication of such doubt—namely, that religious representations are dynamic in their content, and I suggest that such context-dependence is evidenced in their relations to emotions, action and deference. I contrast the view presented with other accounts that seek to articulate the connections between content, emotion and action in religious representations.

Doubt and Counter-Intuitiveness in Religious Representations

Views of religious representations that are inspired by the cognitive sciences tend to agree that those representations are natural or intuitive in that they are represented, processed and understood by the same mechanisms as non-religious representations—so accounts of the former should be continuous with accounts of the latter. Hence, the account of our representations of gods and spirits should not be essentially different from the account of our representations of animals and people. However, the content of those religious representations is also seen as somehow counter-intuitive. The most straightforward interpretation of this notion is that religious concepts negate the intuitive ontological expectations about the natural world—about physics, psychology, and so on—which govern non-religious concepts.

To see this, it is useful to understand religious representations as involving a form of implicit concept combination, in which complex representations are derived from more basic ones. Those basic representations—concepts—are usually held to encode important properties of a domain such that, when entities in that domain are categorised as members or non-members of a category, these concepts are deployed. The kinds of contents represented in such concepts are widely agreed to be intimately connected with peoples' commonsense theories about the relevant domain (e.g., MURPHY/MEDIN 1985; MEDIN/ORTONY 1989; MURPHY 2000). Those commonsense theories are often taken to represent distinct types of properties of two broad kinds. One kind represents information about category members' surface properties—that is, characteristic shape, size, colour, movement, and other inspectable properties that function as more or less reliable indicators of category membership. Such surface or diagnostic properties of the category may act as evidence for a non-demonstrative inference about the possession of inner properties of the category: that is, if something has the appearance and/or behavioural properties of a blackbird, then (by non-demonstrative inference) it more than likely is a blackbird. These inferences are widely characterised as concerning the entity's possessing the hidden *essence* of the category; such essences constitute the second main kind of property held to be represented in concepts. The proper characterisation of an essence is not completely clear, but it is usually taken to comprise either properties that are necessary for

category membership, which could be inspectable under ordinary conditions (e.g., to be a blackbird, a bird has to have been born from another blackbird), or properties which give rise to other, category-defining properties, but which are not themselves inspectable under ordinary conditions (e.g., some hypothesised internal properties which give rise to a blackbird looking like a blackbird). Another—and less widely discussed—option is that the essence may be a property that might be possessed under ideal conditions, or which an ideal member of the category might possess (e.g., to be an ideal blackbird, a male would need to have perfectly black plumage). In this way, essential properties connect the representation of entities to fundamental ontological assumptions about a domain. For example, entities in the domain of folkbiology will be represented as possessing essential ontological properties of that domain, and the characteristic inference patterns for folkbiology will be supported by those properties. Such ontological assumptions may comprise sets of intuitive expectations that the natural world is implicitly expected to respect. For discussions of these and related points, see ATRAN (2002); MURPHY/MEDIN (1985); MEDIN/ORTONY (1989); BRAISBY/FRANKS/HAMPTON (1996); GELMAN/HIRSCHFELD (1999); MURPHY (2000).

Many theories of religious representations take it that concepts of religious entities are arrived at by contradicting some such ontological expectations. Perhaps the most detailed such account is offered by BOYER (1994a, 1994b, 2000), and echoed by ATRAN (2002) and BARRETT (2000). BOYER has argued that a religious representation activates at least one ontological category—for example, the representation of *spirit* activates the ontological category of "person." The representation then directly negates ("breaches") some of the intuitive expectations of that ontological category—for example, the representation of *spirit* is of a "person" whose properties definitely do not respect the intuitive ontological expectations concerning physics that normal people obey (e.g., spirits are usually invisible and able to move through physical obstacles). Additionally, such representations also activate ("transfer") the remaining intuitive expectations of that ontological category—for example, a *spirit* behaves like a "person" with a functioning mind, acting according to belief/desire psychology, and so on. The key factor, then, is the counter-intuitiveness of the representation—the fact that it runs counter to intuitive ontological expectations of the ordinary world. So the representation of a religious entity is in large meas-

ure constructed by applying direct negation to a subset of the essential properties of one or more non-religious categories.

Three principle sources of difference can be seen in extant accounts that view religious representations as counter-intuitive variants on ordinary concepts. The first concerns the nature of such counter-intuitiveness—the *qualitative* form of the contradictions of intuitive expectations in our religious concepts. That is, are intuitive expectations fully negated or merely cast into doubt? The second concerns the extent of such counter-intuitiveness—the *quantitative* preponderance of contradicted versus non-contradicted intuitive expectations in our religious concepts. That is, does counter-intuitiveness relate to the bulk of the content of religious representations, or to a restricted range of contents? The third concerns the representational *location* or type of content that is concerned. That is, does contradiction relate to ontological assumptions alone, or to other contents (including those inferentially related to ontological assumptions)?

Regarding the *quality* or nature of counter-intuitiveness, it is clear that ATRAN and SPERBER are in accord with BOYER's notion that the key quality of counter-intuitiveness lies in the direct *negation* of intuitive expectations—that is, in taking a category's ontological property *P*, and incorporating its negation, ¬*P* into a religious representation. I have argued elsewhere (FRANKS 1995, 2003) that such negation expresses only one—and indeed the most extreme—result of aligning two apparently contradictory domains. A less stringent form of contradiction can be referred to as *doubt,* where the result is a representation that incorporates *neither P nor ¬P* (this is equivalent to assuming a 3-valued logic of negation, where ¬¬*P* ≠ *P*). There may be, as it were, a truth-value "gap" that reflects the semantic doubt over the possession of the properties. Some non-religious examples of linguistically explicit concept combinations, which reflect doubt over essences, include *apparent friend, blue lemon, alleged criminal*. Here, the modifier concept casts doubt on the essential properties of the head concept: for example, an *apparent friend* is a person whose friendly behaviour may or may not be caused by true friendship; an *alleged criminal* is a person who has been claimed to be a criminal, but may or may not really have committed a crime. To take a religious example, concerning the Catholic Mass, it is possible that the wine and bread are represented by communicants as not determinately possessing either the essence of the blood and body of Christ, nor the essence of wine

and bread, nor their negation: i.e., ¬ *(essence of wine & ¬ essence of wine) & ¬ (essence of blood of Christ & ¬ essence of blood of Christ)*. Such conceptual doubt may take (at least) two different forms—a weaker and a stronger form (BRAISBY/FRANKS/HARRIS 1997). The form noted above is the weaker, "exclusion" doubt, which reflects the possibility that an entity *does not clearly possess property P nor ¬P*. Such a form has been employed in characterising conceptual "fuzziness" (e.g., MCCLOSKEY/GLUCKSBERG 1978; VAN MECHELEN et al. 1992). A stronger form of doubt—"inclusion" doubt—reflects the possibility that an entity *possesses both the property P and ¬P*. Inclusion-doubt appears to reflect the possibility of a tolerance of contradiction in certain forms of thought, as argued for by NISBETT and his colleagues (NISBETT et al. 2001). Whether such "gaps" in belief are actually eradicable, or believed to be eradicable, may well depend on the domain of the belief. In FRANKS (2003) I argued that it is important to the psychological sense of "mystery" that pertains to the doubt in religious beliefs, that the believer does believe in the possibility of that doubt being resolved. Below, I will argue that the presence of such "gaps" also renders religious representations on this account more context-dependent than on an account that assumes that counter-intuitiveness involves only property negation. And such context-dependence renders them the more susceptible to being influenced by emotions and rituals or actions. In a sense, then, we can think of such gaps or doubts as being usually unresolved in peoples' representations, but susceptible to temporary, situation-dependent resolutions, according to the context (and its attendant actions, emotions and possibilities for social deference). This possibility bears contrast with ATRAN, despite his assertion that religious beliefs cannot be truth-evaluated. ATRAN's point—of course, quite right—is that religious beliefs, because of their content, cannot be evaluated for truth via ordinary means of data gathering and observation, unlike other representations. His characterisation then appears to be based on the view that such evaluation is not promised or offered by religious beliefs. However, this is a view from, as it were, the "outside." My point is that a constituent quality of religious representations from the "inside"—for those who believe them—is that they are subject to certain limited forms of doubt, that they are not truth evaluable (or resolvable in the terms used above) in the ordinary manner, but that they are nonetheless believed to be resolvable. That is, the promise of resolution of the doubt is critical, as is the occasional and temporary sense—arising

through emotion, ritual or explicit semantic deference to authority—that the doubt has been resolved. Indeed, it is in part the promise or belief in the possibility of resolution that renders religious beliefs "relevant mysteries" (SPERBER 1996): a full understanding of them may be outside of the believer's grasp on any one occasion, but they are only just outside of that grasp (on the inside of the outside, as it were), and the believer may have the temporary sense on occasion that they have been understood, or that they could be understood in time.

Regarding the *quantity* or preponderance of counter-intuitiveness, BOYER appears to suggest that maximal counter-intuitiveness is related to religious representations—or at least to culturally resilient and successful representations, of which religious representations form a type (see, e.g., BOYER/RAMBLE 2001). By contrast, ATRAN (2002) and ATRAN/SPERBER (1991) argue in favour of minimally counter-intuitive representations—that is, religious representations involve negation of one or two key ontological assumptions for a domain, but preserve intact the bulk of the domain's ontological properties. This, according to ATRAN, contributes to the preservation and utility of religious representations in a world that is governed by non-religious principles, since it allows a clear interface between religious entities and non-religious ones. ATRAN bases this argument in large measure on empirical evidence of recall of ideas, which suggests that participants are no more likely to retain memories of highly counter-intuitive ideas than of minimally counter-intuitive ideas. Whilst this evidence is relevant to the issue in general, it is at best suggestive—the fact that people remember *ad hoc* minimally counter-intuitive ideas does not carry the inference that those religious ideas that are remembered under normal circumstances are minimally counter-intuitive. However, the present view would tend to concur with that of ATRAN and SPERBER. Given that the key form of counter-intuitiveness envisaged relates to doubt, and that the working assumption of a possessor of a religious belief must be that such doubt is in principle resolvable, then this would suggest (though not, of course, entail) that a key aspect of religious doctrine and ritual involves ontological doubt management. Put simply, doubts are more practicably managed when they are fewer and clearly represented (there is, as it were, little room for meta-doubt—doubt about what is open to doubt).

Regarding the location of counter-intuitiveness, it is useful to differentiate between the content of the representations themselves (and in particular, their ontological assumptions), and any inferences that are carried out using those representations as input (in particular, inferences about how to behave in respect of those entities). BOYER assumes that religious representations are determinate: that is, the ontological status of religious entities is clear, since the cognitive mechanisms through which the representations are produced involve simple negation and transfer of ontological properties. The implication is that we have clear knowledge of the essential properties of the things which religious representations represent. However, BOYER also suggests that such counter-intuitive ontology produces "inferential gaps"—that is, uncertainty concerning whether and how to adhere to behavioural implications of religious beliefs. So BOYER's approach appears to combine representational determinacy over ontology with inferential indeterminacy over resultant inferences about belief and behaviour. SPERBER's approach, in contrast, presents a higher degree of indeterminacy. SPERBER suggests intuitive contradictions may not result in a clear negation of one of the beliefs (unlike in BOYER's "breaches"). Rather, the cognitive mechanism for generating complex concepts may not produce an interpretation at all; instead, what results is a "semi-propositional" belief. Here, the two contradictory elements are preserved in the representation—although only partly understood (since the contradiction is not resolved), the belief is still a true belief. The contradiction may not be resolved at all, but if it is resolved, the outcome may depend on deference to an appropriate authority. Given the ontological contradiction, there may be indefinitely many possible interpretations of the ontological nature of the entity represented by the religious representation—and the preferred interpretation may or may not involve arriving at a determinate ontological interpretation. However, it is worth noting that the assumption of minimal counter-intuitiveness may at least limit the ontological indeterminacy to a finite subset of properties. The constituent ontological representational indeterminacy of such representations is combined with an inferential indeterminacy that is similar to that proposed by BOYER. ATRAN's approach presents a similar picture of indeterminacy to that of SPERBER.

So, for BOYER, religious representations have representational ontological determinacy coupled with inferential indeterminacy, whilst for SPERBER and ATRAN religious representations have representational (ontological) indeterminacy coupled with inferential indeterminacy. The current approach, in drawing on well-understood theories of mecha-

nisms for constructing complex concepts, allows a middle line to be pursued, in which religious representations are more representationally indeterminate than BOYER suggests, but not as open-ended as SPERBER and ATRAN appear to claim. The key difference being that the available mechanisms for arriving at an interpretation for contradictory concept combinations provide a delimited space of possible ontological interpretations, and a general account of how doubt might be resolved (for detailed discussion of such mechanisms, see FRANKS 2003).

In sum, regarding the nature, extent and location of counter-intuitiveness and contradiction in religious representations, the different extant approaches make different claims. The key to the rest of the discussion will be the issue on which there is the clearest difference between the current approach and those of ATRAN, BOYER, and SPERBER—that is, the characterisation of counter-intuitiveness as a form of conceptual doubt.

Doubt and Context-Dependence and Religious Representations

We have arrived at the view that some religious representations are (1) types of (usually, linguistically implicit) concept combination in which (2) a subset of the main features that represent ontology are cast into doubt. Both of these qualities also suggest a further aspect of religious representations, which has not been systematically addressed in the literature—the possibility of context-dependence in their content. Context-dependence has been central to understanding the structure and content of conceptual representations in cognitive psychology. In a sense, providing an account of conceptual content then involves providing an account of (a) the basic content represented (b) the content arrived at in different contexts (c) the mechanisms or principles by which (b) is derived from (a). So providing an account of content involves providing an account of the content as it emerges in different contexts. By contrast, the accounts of religious representations offered by ATRAN, BOYER, SPERBER and others have described content without explicit reference to contextual variation—that is, they have offered general accounts of "the" content of religious representations. In ignoring contextual variation, they have treated religious representations as somehow different from non-religious concepts, and have also bypassed issues concerning the processing of religious beliefs; in doing so they have also been unable to address in detail the dynamics of the relations between conceptual content, emotion and ritual.

We can see the lack of focus on context-dependence as in part emerging from those theories' commitment to counter-intuitiveness as clear property negation—for, if it is clear what the basic ontological properties in question are, there is no particular motivation for believers to seek further information (at least, about those properties). One general picture of how contextual variables might influence conceptual content is via the knowledge or information it yields—either by incorporating such knowledge from outside the concept into the concept itself, or by using that knowledge to change the weighting or assessment of knowledge already in the concept. As summarised by MURPHY, knowledge from outside the concepts will be actively used (for example, in categorisation), "when the decision is difficult, is slow, is based on little perceptual information, and in similarly straitened circumstances" (MURPHY 2000, p172); for automatic day-to-day categorisation or judgements which do not share these qualities, little or no concept-external information will be used. And categorising or thinking on the basis of doubtful ontological properties—that is, resolving doubt—in religious representations appears to be a case of just such "straitened circumstances."

The general view I suggest is that, for properties that are in doubt in particular, context can have a marked effect—in one context, the interpretation may incorporate that property, whilst in another context the interpretation might incorporate its negation; in still another context, the influences may remain insufficient to resolve the doubt, so that the interpretation retains the doubt over that property. The picture is one in which such a resolution may only hold for that specific context or situation—that is, in which at least some of the content associated with the interpretation is thus represented for that occasion, and not necessarily for others (see, e.g., CLARK 1983; FRANKS 1995; SPERBER/WILSON 1986, 1998). We can consider such context-dependent use of concept-external knowledge as being subject to general requirements of processing and task relevance. In particular, the effort to access additional information should be justified by the constructive impact of that information on the cognitive processing and action performance in hand.

There is a major difference between resolving doubt for religious representations, and doing so for the bulk of non-religious representations. Consider again the examples of an apparent friend or alleged criminal; in such cases, there is a determinate fact of

the matter which can be discovered by ordinary empirical means. So, contextual influences would have a role in resolving this kind of doubt by providing additional knowledge or information about the people in question. By contrast, doubt over ontological properties in religious representations does not appear to be resolved by such means—gods and their ilk rarely make unambiguous declarations, appearances nor provide other empirical evidence of their properties. Adequate empirical knowledge is not available in this case, and that which is available will not avail; rather, context's role here is largely to provide knowledge or influences that lead to a different assessment or evaluation of properties that are already represented in the concept.

The contextual influences are therefore not concerned with discovering more about the properties of the entity *per se*. Rather, they are concerned with the contexts and experiences in which the entities are held to be relevant, and their impacts on the believer's epistemic attitudes towards the entities' properties that are pertinent to those contexts and experiences.

Hence, "context" here, is being used broadly to include not only the physical and social situations of concept use, but also aspects of psychology and behaviour that arise differently in response to such different situations. I will suggest that the key elements of context that are important for resolving this kind of doubt in religious representations have three sources: the use of those representations in religious actions and rituals, the connections that emerge with emotions, and input from culturally relevant authorities. Each of these factors may have independent influences, but their impact also often arises through their interaction.

Concerning a role for action and ritual, it is likely that, if doubted properties are relevant to performing a given religious action or ritual, and that action is performed, this performance will contribute to resolution of that doubt. Let us take a very simple-minded example. Consider the property to be represented in the concept of a god, relating to a particular quality of theory of mind—being a kindly, benevolent god (or being the converse, a harsh, judgmental god). If this property is doubted or uncertain, then part of the concept will represent something like, ¬ *(benevolent & ¬ benevolent)*. Now consider a ritual or activity that presupposes that the property is in fact, true: that the god is benevolent—say, some kind of public absolution for misdemeanours. That is, it is a necessary condition on belief that a ritual has been enacted successfully to

believe that the god does possess this property. If this ritual is performed adequately and accurately, and therefore is seen to succeed by the social-religious group of which the concept possessor is a member, then that property is taken to be true. So the evidence of the truth of the property is the success of the ritual actions, since that success presupposes the truth of the property.

Such a possibility could be construed in either of two different ways, in terms of the nature of the representations employed. The first depends on the possibility that a single entity may itself be represented and categorised in two ways—in taxonomic or in script terms (see ROSS/MURPHY 1999; SCHANK/ABELSON 1977). Taxonomic representations are the kind that are normally assumed in discussions of concepts and categories, where items are understood in terms of basic properties that allow them to be ranked according to specificity/abstractness. Foods, for example, may be categorised in taxonomic terms into fruit, vegetables, and so on. By contrast, script-based categorisations are based on understanding items in terms of the characteristic patterns of behaviour and actions with which they are associated. In the case of foods, then, we might differentiate them in terms of the meals to which they are appropriate (settings, times and locations being relevant parameters)—for example, breakfast foods versus dinner foods, or weight-loss diet foods versus sports-playing fitness foods. Taxonomic and script-based categorisations of items are thereby likely to cross-classify each other. This is because, as ROSS and MURPHY found, although the items possess the same properties in the different categorisation frameworks, those properties will be differentially relevant to those frameworks. What is important to differentiating a fruit from a vegetable (e.g., some assumption about underlying essences) is not directly important to differentiating breakfast foods from dinner foods (e.g., cultural appropriateness, assumptions about digestibility). So a single property may be given different weight, or be assessed differently, or perhaps be understood as being possessed or not possessed on different grounds, depending on the type of representation involved. Assessing the ontological properties of a god relative to a taxonomy of the natural and non-natural world is one thing (and may result in all manner of conceptual doubts about ontology), but assessing them relative to performing an action or script in which that property is implicated is another entirely (and may remove conceptual doubts as a result of action).

The second possibility for considering the connection between action and doubt resolution does not involve postulating two separate ways of representing the same item by one person, but rather involves assessing the role of concept use in influencing a single conceptual representation. For example, MEDIN et al. (1997) have shown that people who actively work with category members as part of their everyday lives, develop representations that reflect their usual interactions with those items. For example, tree landscapers have somewhat different concepts of trees from biologists—the former more focused on functional attributes, relations to weeds and shrubs, and so on, and the latter more focused on botanical and chemical differentiations. This is not, however, simply to say that use and interaction with items is important in acquiring or learning the concepts. ROSS (2000) has further shown that, where the category of the items is noted by people during an interaction, that interaction will then feed back into the representation of the category. So the ways in which we interact with items in a category, or behave when using a conceptual representation, can then alter the way we represent that concept. Once again, then, if the use primes awareness of or salience of certain properties, we can expect that their role in the representation will be altered. This could involve either adding greater weight to properties that are already in the representation, or resolving doubt about properties whose appropriateness was uncertain prior to the interaction.

Turning to the possible role of emotion as a determinant of conceptual doubt resolution, the picture is similar. Here, however, there has been little theoretical or empirical work relevant to connecting concepts and emotions (as opposed to concepts of emotions), so my comments on process are necessarily more speculative. In what follows, I will use "emotion" to cover the general affective spectrum that includes emotions and moods. Since the current goal is to articulate connections between conceptual properties and the affective domain in general, the specific differences between emotions (as fleeting and directed states, for example) and moods (as enduring and undirected, by contrast), are not important. The general position is that the resolution of doubt over a property may be connected to the experience of an appropriate emotion (which itself may connect with an action or ritual)—for example, a doubted property may be associated with a positive emotional response in a ritual, thus leading to a resolution that prompts incorporation of its positive resolution into the representation. Consider again the possible property of a god as ¬ *(benevolent & ¬ benevolent)*. Adding to the claim about ritual above, the picture is: if the ritual assumes, for its successful completion, that the property is true, and if the ritual is performed successfully, and if that performance produces positive emotions, then the doubt may be resolved positively for that property. Here, it is the emotion that is assumed to play a key role, not the action itself. The more general case would be one where the ritual remains agnostic about the property being true—e.g., prayer does not necessarily presuppose a benevolent god; then if the act of prayer is itself connected to experience of a positive emotion, the doubted property may be resolved in favour of benevolence.

What kinds of process might support such a connection? The most direct relates to well-established characterisations of the process of arriving at an emotional experience. The general characterisation of such experiences is that both the quality or type of emotion experienced, and its intensity, may depend on cognitive interpretation or appraisal of the situation, which then provides an explanation for any physiological arousal experienced (e.g., LAZARUS 1992; SMITH/LAZARUS 1993). Such appraisal involves not only assessing the nature of the external situation or event that might cause the emotional response, but also the responses of other people exposed to that same situation or event (SCHACHTER/SINGER 1962). The picture, then, is one in which a doubted representation itself may induce uncertainty and hence some physiological arousal on entering a religious ritual. The additional arousing qualities of the ritual, arising from the panoply of sensory inputs and imagery, as well as social relations and activities, then serve to heighten that arousal. In interpreting the situation that has given rise to the arousal, the participant is then in a position of deferring to his or her peers and authority superiors in the ritual. In such emotional deference, if salient others construe the situation as a positive emotional one, then so should the participant. The further link being suggested here, is that this will then induce an appropriate resolution of conceptual doubt. This would then be a component of the cyclical feedback process between appraisal, arousal and emotional experience: if the doubt is resolved following feedback from the emotional experience, this new representation (with doubt removed) then adds to the ongoing appraisal of the emotion-inducing ritual, thus potentially both clarifying the valence or nature of the emotional experience and heightening its intensity.

An additional reason for thinking that emotions might have such an impact on concepts is to consider conceptual content as being related to the belief component of social attitudes. Attitudes, as evaluative stances on social objects, events or situations, are traditionally considered as having three components (e.g., OLSON/ZANNA 1993)—an affective component (roughly, positive or negative), a cognitive component (the set of conceptual representations that characterise the properties of the attitude object), and a behaviour component (a behavioural disposition towards the attitude object). The key point for current purposes is the general finding that people tend to operate on the basis of a consistency principle—that is, that the three components will tend to be consistent with each other (e.g., EAGLY/CHAIKEN 1993). A positive affect will be connected with a positively characterised set of properties in the cognitive component, and both will be connected with a particular kind of behaviour. If any of the components is not consistent with the others, there will be a tendency to change that component in order to bring it into line and thereby re-establish consistency. This overall result has been obtained both for explicit, consciously processes attitudes, and for implicit attitudes. Hence, where a religious ritual involves a positive emotion, related to or deriving from positively experienced shared ritual actions, then there should be a tendency to resolve any conceptual doubt in an appropriately positive manner. I am not suggesting that the questions here be recast as ones concerning attitudes; rather, I am suggesting that the assumption of consistency may be one that is invoked under certain circumstances—especially in religious rituals. Religious rituals very often involve precisely this expectation of consistency—that is, having the correct, sincere beliefs and intentions to accord with the actions and emotions that are experienced when in the presence of a god or gods who may have access to our thoughts.

A third aspect of the concept-emotion connection concerns the recall of conceptual properties themselves, within and outside the ritual setting. A key role here may be played by mood-dependent/state-dependent recall from memory. The general finding for this phenomenon is that recall from memory may be enhanced under certain emotion- or mood-related conditions: recall is improved when the mood at recall matches that at the time of learning (e.g., GILLIGAN/BOWER 1984), an effect that is enhanced when the mood is positive as opposed to negative, and when the material learned has high

personal relevance (UCROS 1989). For many religious rituals, the emphasis is on positive emotional culminations of activities that may have some stressful or negative components, and since they are geared towards bringing the supernatural and the personal in close contact the resulting memories have high personal relevance. I have already mentioned the relevance theoretic idea that processing depends on the possibility that resulting cognitive content should be of sufficient benefit to warrant the processing cost. In the domain of emotionally-charged processing, this can be related to the finding that, when in a given mood state, people are better able (hence, find it easier/less effortful) to recall events or items that are congruent with that emotion or mood. So if the prevailing emotion is one of elation, then similar events from the past will be recalled. In such a setting, if an action governed by a concept functions as the cue to recall, then there may be a multiplier effect of the emotional experience—the impact on the resolution of doubt will be based not only on the current emotional experience, but also on the additional memories recalled using the content as a way of recalling appropriate mood-dependent content. Such a role for emotions adds to the cognitive basis of the relevance framework; the clear connection with effort in processing suggests a fruitful line to pursue.

The third influence from outside the conceptual representation concerns social deference—the possibility that doubt over an interpretation can be resolved by reference to an external knowledge-source, in particular a culturally-sanctioned religious authority. I have discussed this elsewhere (FRANKS 2003), and will not elaborate here. Suffice to say that deference will interact with the impact of emotion and action/ritual, in that cultural relations are critical in determining when a ritual has been successfully enacted, and the interpretation of an emotion-arousing ritual may defer to the behaviour or interpretation of salient others.

Thus far, I have assumed that concepts of religious entities are laden with doubt concerning at least some of their ontological properties, and that, although this doubt may be resolved by action, emotion and deference, such resolutions may be temporary and situation-specific, as opposed to lasting and generalisable to other situations. Doubt was pursued in detail in FRANKS (2003), whilst the possibility of its temporary resolution remains to be argued. Why assume that resolutions of doubt are not always retained in the representations over the longer term? This is clearly a matter for empirical in-

vestigation, but there are some reasons to think that they may—at least, often—be temporary. As above, let us contrast ordinary truth-evaluation and doubt-resolution based on perceptual and other evidence, with the kind of doubt-resolution envisaged here. First of all, in the former case—for non-religious representations—any properties whose salience is increased by action, emotion or deference, are still present to be inspected/truth-evaluated by ordinary means afterwards. Those properties were merely marked out or made more salient by the action, emotion or deference. By contrast, those properties that are resolved for religious representations are not available to ordinary inspection afterwards—in fact, they are only unambiguously present under the precise conditions of the specific use/interaction/emotion that allowed their resolution. Outside of these situations, they are not observable, because those situations create the necessary conditions for their being grasped or accepted. Second, connecting, as above, the general relevance theoretic approach to mood-dependent recall, it is likely that emotional and action-based resolution will be more likely to be recalled only under similar conditions of emotion and action—under those conditions, the effort of recall and accepting the resolved property is matched by the outcome. For example, recall of emotion-laden reasons for belief under different or neutral emotional conditions may in fact increase the required effort whilst not increasing the resulting cognitive effects. The more extreme the emotions (within limits), or more arcane the ritual setting, it would appear the more arduous the cognitive effort of transferring a resolution to everyday situations (since the harder it would be to find a match between the everyday situation and the cues to recalling the ritual setting and its resolution)—though this might be tempered by the intrinsically memorable nature of extremely emotional events. So the resolutions of doubt just may not fulfil appropriate relevance-theoretic criteria for being recalled outside of the ritual settings in which they are produced. Ordinary, empirical resolutions of doubt do not carry this extra emotional baggage, and so have more promise of generalisation. Of course, these are not knock-down arguments—they really amount to empirical issues, which may help in evaluating the different theories. For example, ATRAN's view appears to be that emotional intensity *per se* is a guarantor of high mnemonic value, whilst the current view is that this will interact with mood-dependent phenomena and with the general semantic-conceptual issues regarding relevance. It may, as noted above, vary with the strength or nature of the associated emotion, with the specificity of the action/ritual, or perhaps also with the nature of the property itself. The overall position, then, is one in which at least some of the key ontological properties in religious representations—and especially those that are concerned with how the human believer can interact with or connect to the entities represented—are subject to recurrent doubt; this doubt is revisited recurrently in appropriate rituals, and may be temporarily resolved or alleviated to different degrees by those rituals.

Now, drawing a close connection between semantic/conceptual representation and emotions as mediated by actions and rituals, is by no means inevitable in the domain of religious representations. For example, in BOYER's account emotions do not play a central role; a similar sense emerges from SPERBER's account. Another view draws a sharp distinction between two modes of representation, dissemination and development of religious rituals—the "imagistic," which is emotion-laden, and the "doctrinal," which is semantic and emotion-free (WHITEHOUSE 2000). The doctrinal mode of ritual activity is said to be based on frequently repeated routines, whose repetition creates representations of ritual and attendant entities that are doctrinally accurate—the result is an abstracted, relatively impersonal representation of the "logical" structure of the ritual events, where the logic amounts to an automatic sequence of actions, akin to a script in its force (SCHANK/ABELSON 1977). There is no scope for uncertainty over ontology or agency in such a representation, nor for deep emotional commitment.

By contrast, the imagistic mode of ritual organisation involves emotionally loaded experiences that are represented in terms of specifics of location, timing and personal or autobiographical involvement. Such a mode often relates to one-off or infrequent (if predictable) events such as rites of initiation, and indeed WHITEHOUSE suggests that the most sacred rites may occur only once in a lifetime. Rather than being semantic or verbalised, the resulting representations are unverbalised, and may take the form of highly emotionally-charged and detailed multi-sensory "flashbulb" memories of the specific events and people.

WHITEHOUSE provides detailed empirical analyses to suggest that these two modes of ritual do interact in rather complex ways over *historical* time, so that any one religion may be highly imagistic in early historical-developmental phases, progressing to a more doctrinal phase as the religion coalesces with

relevant social normative and organisational structures, and then perhaps undergoing imagistic "reinvigoration" in times when the aridness of doctrine begins to deplete the commitment of adherents. However, despite such historical interactions, the approach clearly separates the two styles of understanding and representing ritual in any one cognitive agent over normal, moment-to-moment or day-to-day processing time.

By contrast, as ATRAN (2002) argues, experience of frequently repeated liturgy and ritual is not "logical," and emotional arousal during ritual—though varying in intensity—is not rare. ATRAN's own approach paints with similarly broad brush strokes to WHITEHOUSE, but is nonetheless the most thoroughgoing attempt to integrate emotional and cognitive aspects of religious representations. He suggests that emotionally intrusive and eruptive existential anxieties motivate religious beliefs—concerns about mortality, about the future, and so on. Religious beliefs, through allowing the construction of elaborate counterfactual worlds of non-natural causality (based on the kinds of minimally counter-intuitive representations discussed above), hold out the promise of addressing those existential anxieties. However, because such representations cannot be truth-evaluated by ordinary means, they cannot be logically or empirically verified or falsified. Hence, they appear to hold out hopes for anxiety reduction that cannot be satisfied by rational means; as a result, acceptance of those beliefs also cannot be validated by such rational means. ATRAN's claim is that such ontological uncertainty is addressed by the emotional arousal of religious rituals. Key rituals involve the recreation of exactly the same existential anxieties that prompt the origin of the religious beliefs—they are costly, stressful, anxiety-producing and exhausting "life rehearsals." But the most important aspect of such rituals is that they permit the removal or amelioration of such anxieties via the invocation of religious entities and via the sharing of the ritual experience in a community. By using strong sensory pageantry, creating intense emotions and enabling strong social bonds, such rituals thereby produce vivid, shared memories that can be applied not only in future repetitions of the ritual, but, crucially, in the day-to-day situations in which the same existential anxieties are met. Finally, the stress and anxiety that rituals engender produces costly and memorable commitments to both the social group and its supernatural agents.

ATRAN's account involves a relatively open-ended set of religious representations being augmented by emotionally-intense rituals that can provide the validation for the representations that would not be available in ordinary circumstances. It represents a marked advance on accounts that allow for little or no systematic role for emotions. However, it is best viewed as complementary to the view presented here, since it has a different focus.

The first difference is that ATRAN's account retains a relatively context-independent view of the content of religious representations, and does not see that content interacting with or being sensitive to religious rituals or their associated emotions. Although he is not entirely clear about this, there appears to be no change to the *content* of the representations as a result of these rituals and emotions: those representations remain minimally counter-intuitive, and they remain non truth-evaluable. The sense in which rituals provide validation is a social-emotional one, and not one that pertains to belief content. Overall, it seems that the only context-dependence is not in belief content, but in the degree, strength or emotional and motivational quality of the belief. Commitment and motivation are heightened by the emotions of ritual, but the content remains the same. By contrast, the current view sees content and emotion as interacting in a more fine-grained manner, at a more basic level, with emotions resulting in (possibly temporary) changes to content via resolving doubts about ontological properties—so different things may be believed as a result of ritual, as opposed to the same things being believed in different ways.

The second concerns the nature of the emotions and motivations with which ATRAN's account is concerned. These are major, existential emotions, concerned with significant rites of passage, and providing the ultimate emotional reasons for religious beliefs. Indeed, ATRAN suggests a similarity between the outcomes of some of the emotional experiences of major religious rituals and post-traumatic stress disorder. And it seems intuitive to say that such resounding emotional responses might well function as a form of validation of quite general associated themes or patterns in a set of religious beliefs, possibly without the need for any alteration in or processing of detailed belief content. By contrast, the current approach is perhaps more concerned with the routine, daily emotions (and moods) of believers regarding rituals which are regularly repeated; of course, more extreme emotions may also interact with the conceptual representations so as to remove doubt over ontological and other properties.

So for ATRAN, powerful and vivid emotions associated with key rites provide the validation for complexes of counter-intuitive beliefs—for explanations of the state of things in this world now, for promises of changes, for other worlds and non-natural agents and their interventions in this world. Such validation is socio–emotional in nature and does not alter the fundamental quality of the major themes of religious representations as being non truth-evaluable. By contrast, the current approach hypothesises a connection between cognition and emotion at the more basic level of specific conceptual representations of the ontological properties of religious entities, based on recurrent interactions between conceptual contents and the possibly less extreme emotions of frequent rituals. Such interactions do prompt changes to conceptual content, and thus provide the contexts in which believers believe that at least some of their beliefs are truth-evaluable. It is possible to view the current view as providing a micro-level analysis to ATRAN's macro-level analysis; alternatively, the basic conceptual cognition–emotion interactions could provide a form of input to the larger-scale emotional validation of beliefs suggested by ATRAN.

Summary and Conclusions

I have presented a picture in which three key aspects of religious beliefs are connected—the counter-intuitiveness of their content, their associated actions and rituals, and parallel emotional responses. The closeness and fine-grain of the hypothesised connections result from the characterisation of counter-intuitiveness as a form of conceptual doubt rather than direct property negation. Such doubt suggests that religious representations are highly context-dependent. And the precise aspects of context considered were those of action/ritual, emotion and deference—all of which can be seen to operate on exactly the same principles for both religious and non-religious content. These aspects of context function to provide temporary resolutions of conceptual doubt over the ontology of religious entities. The approach offered is complementary to existing accounts, in providing an alternative explanation of counter-intuitiveness which directly links to context-dependence. In sum, the account offered promises a direction for fine-grained empirical and theoretical development concerning the interaction of emotions, belief, ritual and culture in religious representations.

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Robert E. Haskell

Sub-literal (SubL) Schemata of Deity in Verbal Narratives

Stop here yourself for a while, that I may make known to you the word of God (Book of Samuel 9:27.44).

Western culture has a set of religious beliefs predominately derived from a Judeo-Christian ethic, with a God high in a heaven who is omniscient, omnipresent, and omnipotent. This image of God is a deeply rooted cognitive schema that is often unconsciously expressed in social narrative situations involving authority roles. HASKELL has termed such unconscious referents sub-literal ($S_{ub}L$). The purpose of this paper is to present examples of God Schemata.

There are two ways to understand the notion of an abstract God Schema. First, the God Schema is like a simple arithmetic formula 1 + 1 = 2. This is an empty calculus into which can plugged almost anything, e.g., apples, pears, jaguars. Second, the God Schema implies an analogical reasoning structure. For example,

> *Above : Below :: God : Mankind :: Parent : Child :: Employer : Employee*[1]

The term God Schema is used not only because it has the form of an abstract universal structure, an empty calculus, but because it likely has an evolutionary-based neurological substrate. In this sense it is a generic term. In addition, the concept of a

Abstract

Western culture religious beliefs, derived predominately from a Judeo-Christian ethic, elicits beliefs in an omniscient, omnipresent, and omnipotent God residing in a heaven. For those raised to believe in such a God, the images they become deeply rooted cognitive schemata that tends to cognitively undergird relationships with authority figures. On an unconscious level, experience with authority figures resonate to unconscious God Schemata. When in a relationship with authority, subordinates may unconsciously experience themselves as God's children. Accordingly, narratives about Deity are often unconscious or sub-literal ($S_{ub}L$) references to authority figures present in the narrative setting. Abstract God Schemata are like the simple arithmetic formula 1 + 1 = 2, an empty calculus of slots into which most anything can be cognitively inserted, e.g., apples, pears, jaguars. These God Schemata seem to be pervasive in social situations involving authority roles. Narrative examples are presented and implications discussed.

Key words

Methodology; experimental design; epistemology; logico-mathematic; unconscious; cognition; language; sub-literal; narrative analysis; linguistics; psychodynamic.

God Schema is used in a more concrete sense. This second sense involves the affective content that is plugged into a particular abstract structure. In this paper, the affective content involves schemata about deity, but as the content of a God Schema narrative changes, these are referred to as sub-schemata. The basic God Schema as used here is one of *authority* in relationship to *subordinates*. Accordingly, on an unconscious level experience with authority figures in everyday settings resonate to this unconscious God template. Put schematically, the form is represented in Figure 1.

As Figure 1 shows, any authority position automatically belongs in the "God slot" and any subordinate position belongs in the "God's Children" or subordinate slot. Further, as well be shown below, within any given God Schema, there are sub-schemata. For example, there are affective sub-schemata about whether God is (a) benevolent, (b) mean, (c) competent, or (d) fair, etc?

There are a host of other affective God Schemata. For example, there are *privacy* schemata, where narratives about newspaper reporters, novelists or the governmental Freedom of Information Act where all may be $S_{ub}L$ references to actual privacy concerns within the narrative situation in which they are

Above	Below
[God]	[God's Children]
Authority Figures	*Subordinates*
Parents	Children
Employers	Employees
Teachers	Students
Psychologist	Patients
Priests	Parishioners
Government Officials	Citizens
Leaders	Followers

Figure 1: The God Schema.

Figure 2: Isomophic Mapping Matrix

generated. There are as many God Schemata as there are human emotions, feelings, and concerns.

Historically, when simple precursors to what is here termed $S_{ub}L$ referents in narratives have been sporadically noticed, they have largely been explained as unconscious "metaphors," or "analogies," expressing concerns a speaker has about the narrative situation. The problem has been that lacking both a theoretical or conceptual framework as well as a systemic methodology the analysis of the phenomena have been largely arbitrary and serendipitous. HASKELL has developed both a cognitive and psycho-linguistic theoretical framework and systemic methodology for the analysis and validation of $S_{ub}L$ meaning in verbal narratives. For further theoretical bases see HASKELL (2004a, 2004b, 2003a, 2003b, 2003c, 2002a, 2002b, 2001, 2000, 1999, 1991, 1989, 1987a, 1987b, 1986, 1983, 1982) and for a mathematical basis see HASKELL/BADALA-MENTI (2003).

Methodological Considerations

Since the purpose of this paper is not primarily methodological but illustrative, the extensive set of methodological procedures and operations on which the following narrative analyses are based will not be presented; to do so would become unwieldy. Selected procedures and operations, however, will be briefly incorporated. Two of these procedures and operations are important, however, and need to be initially outlined. The first is the role of *context* in $S_{ub}L$ analysis. Just as in assessing the meaning of words in everyday life, context is crucial to assessing $S_{ub}L$ meaning. There are two types of context, cultural contexts and the contexts within a specific narrative situation. The two provide a reciprocal link to the other.
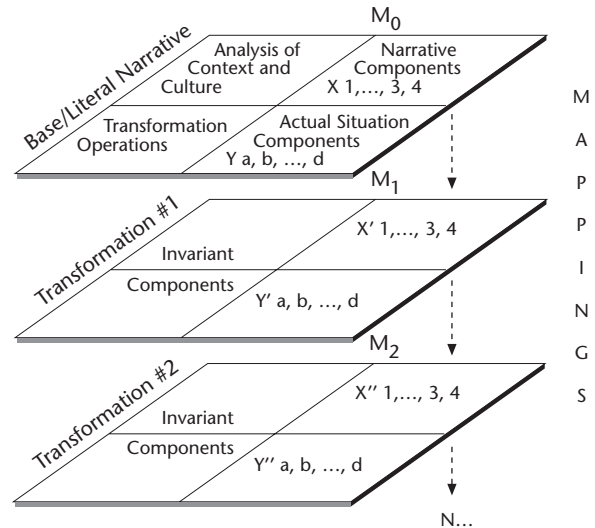
Second, the concept of *mapping* is critical. Mapping involves comparing topics and their content in a literal narrative to the dynamics in the actual narrative situation.[2] See Figure 2. If a match between the two situations is established and the context is congruent with it, then—given other methodological operations—the literal narrative is hypothesized as representing unconscious schemata about the actual narrative setting and internal dynamics. Both context and mapping will become clearer in the narrative analyses below.

While the narrative data on which the following analyses are based are from the author's small group dynamics laboratory where the discussion was unstructured and free flowing, $S_{ub}L$ narratives are pervasive in everyday settings (An extensive array of $S_{ub}L$ illustrations can be found in HASKELL 2001, 1999). The advantage of using data from a laboratory setting, however, is that data can be gathered, controlled and analyzed more systematically. For example, audio tapings are available and the history of both past and present contexts of the narratives are known by documentation and can be check and referred to when needed.

It should also be noted that though $S_{ub}L$ material has been validated using laboratory data and systemic methodological procedures and operations, extensive data from everyday settings showing that the basic procedures of context and mapping are easily applied to such settings renders them ecologically valid (see NEISSER 1976).

Illustrations of God Schemata

Understanding the mind of God

In terms of general contextual information, because the Judeo-Christian God is believed to be all-knowing, people often wonder what God is thinking, especially about them. Similarly, subordinates wonder what a person in a position of authority is thinking, especially in relation to them. Specific to the narrative situation, the use of context involves knowing that in the group setting a number of members had been absent for a couple of sessions. The group had split into two factions. *Subgroup 1* who wanted the group to be more highly structured and who wanted the trainer to provide direction by having their questions answered, and *Subgroup 2* who were more independent and who wanted the group to naturally evolve. Again contextually, this is a standard split in the classic T-group literature (see BRADFORD/GIBB/BENNE 1964). From time to time, Subgroup 1 would voice innuendos at the trainer for not helping them.

The group briefly discussed the topics of /*divorce*/ /*aging*/ and /*death*/. These are $S_{ub}L$ references to the absences being unconsciously experienced as *separations*/ and *loss*. This discussion was followed by a more extended discussion about the pros and cons of religion. Some discussants felt that church was terrible because

/*Ministers and priests don't answer questions in church, like they should*/. A few members mentioned that their /*Philosophy instructor didn't really like to have questions asked in his class*/. Others felt that /*You just have to 'believe,' what priests say, for mortals cannot understand the workings and complications of the world*/. And, /*At any rate, when you're young, you couldn't understand religion, anyway*/. Another remarked that he /*Could not believe in God when He let little children die*/. In response, it was then said /*Men can't understand what God is doing and thinking*/. Some maintained that /*Religion is too commercial*/, and that /*Billy Graham types make money by helping others but withhold their wealth*/.

Finally the topic of religion petered out, and the topic switched to *divorce* again.

Mapping the topic onto the actual narrative situation suggest that the discussion of the otherwise literal topic of /*God*/ was a $S_{ub}L$ reference to *the authority role of the trainer,* with the literal reference to /*Church*/ being $S_{ub}L$ for *the room and/or the organization* where the sessions were conducted. References to /*Priests and Ministers*/, were also about *the trainer.*

That ministers and priests /*Don't answer questions in church like they should*/ is a $S_{ub}L$ reference that maps onto *the trainer being non directive and not answering their questions.*[3] The topic about /*A philosophy instructor who didn't really like to have questions asked in his class*/ is also a $S_{ub}L$ reference mapped on to the trainer *not answering questions in the sessions.* Having the topic of not answering questions mentioned in two different contexts is further support of its $S_{ub}L$ meaning (see below). This issue sub-literally shows that some members did not accept the T-group philosophy of instruction: On an unconscious level, it *felt* like *the trainer did not like questions asked in during the sessions.*

The statement, /*You just have to 'believe' what priests say, for mortals cannot understand the workings and complications of the world*/ is a $S_{ub}L$ reference that maps on to the fact that *some members, while not really understanding the trainer's philosophy of education and the group process, felt that it just had to be taken on faith*; that the trainer's non directive stance had a valid purpose behind it. The statement about being /*too young to understand religion*/, is a $S_{ub}L$ reference that maps on to members *not having the years of experience that the trainer did that enabled him to understand the group dynamics.* It also reflects members of Subgroup 2 accepting on faith that the trainer knew what he was doing and that they were not demoralized about the process as the topics shows Subgroup 1 was; it is also indicated by the remark of a member who said he could /*not believe in God when He let little children die.* This is a $S_{ub}L$ reference to *his perception of not learning anything from the non-directive style of the trainer; that the trainer was just letting them "die,"* which again, other members in Subgroup 2 were willing to accept on faith as indicated by the statement that /*Men can't understand what God is doing*/; that *like mortals* (= group members) *who can't understand God's purposes, so they too can't understand the purpose that a non directive leader has in mind.* This feeling was again expressed as $S_{ub}L$ reference about /*God having abandoned them*/.

A total disbeliever who maintained that /*Religion is too commercial*/ and that *Billy Graham type ministers make money by helping others but withhold their wealth*/ is a $S_{ub}L$ reference about *their tuition paying the salary of the trainer, and their perception that he was not giving them anything in return.* In short, the non directive style of the trainer was equivalent to withholding information from them.

One of the means for verifying $S_{ub}L$ meaning is transitional narrative. A transitional narrative is a literal narrative that more directly belongs to the

same category as the affective schema that generated it. For example, unlike the topic of /God/, which logically belongs to a different category than the trainer, the topic about a /*Philosophy instructor who didn't like to have questions asked in his class*/ belongs to the same logical category as their here-and-now concerns about *the instructor* and *the classroom*. Transitional literal narratives, then, provide direct links to S$_{ub}$L schemata.

Figure 3, below, is a schematic mapping of the literal topics of this entire narrative onto the narrative situation.

Literal Topics	Map pings	Sub-literal Meaning
God/Priests/Ministers	↔	Trainer as the authority figure
Billy Graham	↔	Trainer
Children	↔	Group members
Church	↔	The classroom
Priests/Ministers not answering questions in church	↔	Trainer not answering their questions in group sessions
The philosophy instructor who didn't like questions asked in his class	↔	Trainer not answering their questions in the sessions
Just have to 'believe' priest on faith	↔	Just have to 'believe' trainer on faith
Can't understand what God is doing	↔	Can't understand trainer's purpose
Mortals cannot understand the complicated world	↔	Those new to T-groups don't understand them
Too young to understand religion	↔	Not having trainer's years of experience
Not believe in a God who lets little children die	↔	Not believe in a trainer who lets members flounder
Ministers making money	↔	Trainer paid by their tuition money
Ministers who withhold their wealth	↔	Trainer withholding his knowledge

Figure 3: The Mind of God Sub-Schema

Lost Child of the Tribe Sub-Schema

Some groups who unconsciously express their God Schema generate even more complex affective reactions to a nondirective and ambiguous authority/leadership situation.

In terms of cultural context, in understanding the basis for the following illustration, it is important to recall that from the earliest days of childhood, an eternal concern is separation and loss, whether the loss is separation from significant others like parents and siblings, or just from familiar friends and surroundings. In fact life can be seen as a series of separations and losses beginning with the loss of our childhood, then separation from parents, and later perhaps divorce, loss of a job, betrayal by a friend, loss of our youth, and ending with the loss of our very life. This concern plays out on multiple levels in many different situations.

In terms of the narrative context, a group session began with (1) a member who had been absent a number of times, (2) announcing that she was going to withdraw from the group. She had threatened this in an earlier session, but the group had persuaded her not to do so. After announcing this for the last time, (3) the members said their goodbyes to her; (4) at that point the trainer did not say anything. There was a long silence. A male member then said (5) that /*The group seems to have stabilized to 10 members*/. Silence, ensued. A young woman broke the silence by telling about an interview on a morning TV program,

/*The Today Show*/ where /*3 guests*/ gave their opinions on /*whether or not legal records should be made available to those who were adopted as children*/. She told of /*a young woman who gave up her child for adoption 10 years earlier*/ but /*now wanted to know about the child*/ because /*it was still a part of her emotional life*/. She said /*Another person on the show had been adopted and had been looking for his parents for 30 years*/. A third panelist maintained that /*Once given up for adoption, that should be the end of the matter; there should be no more communication between the biological parent and the adopted child*/. A male then told of children /*who had been abused and then placed with foster parents, but not given up forever*/. The idea was /*to eventually return the child to his natural parents*/. There ensued a long silence. The male broke the group silence by relating religion to the previous topic. He said that he /*Wondered about a God who lets terrible things happen, like child abuse*/. On the other hand, he said /*Maybe God is 'non-directing'* /adding that maybe /*He* [meaning God] *created mankind and let it 'naturally evolve'*/. At this point, the trainer interjected, saying that he agreed, explaining that /*Being a microcosm of the larger world, the group, too, has similar experiences*/. I again, interjected with /*you know, just like in here*/. The group saw the implication of the trainer's statement: To the group, he was God. The group emotionally reacted to this implication as if it were blasphemous, with the young man—half under his

breadth, saying /*Hummm, God, just like an instructor*/ to which he quickly and repetitively added /*Only on a much, much, much, much smaller scale*/. Silence befell the group.

In this brief set of exchanges, a number of unconscious schemata are expressed as $S_{ub}L$ meaning. The first is the group's concern about *separation and loss*. They were more concerned about losing a member than their surface reaction would indicate. They did not overtly react or discuss the member who withdrew from the group, and on the surface, it did not appear that they were overly concerned. But, as can be seen by the narrative topic about /*Parents giving up their children for adoption*/ which expresses a $S_{ub}L$ concern that group was experiencing the loss a "child," i.e., a group member. Indeed this also expressed their resentment toward the trainer because he was perceived as the *parental figure in the group* who by not responding to the member's withdrawal implicitly was responsible for the loss. Contextually, groups often feel guilty when a member withdraws. But often they secretly or unconsciously blame the leader, thinking that s/he could have avoided it.

This blame was sub-literally referenced by some members who /*Wondered about a God who lets terrible things happen like child abuse*/ i.e, why the trainer let the situation become what the member perceived as intolerable.

Other members, however, saw the loss as not necessarily due to *a mean God* but rather in terms of their /*Not being able to understand God's reasons for letting the loss occur*/. In other words, maybe the trainer had his reasons that they did know about for letting the member withdraw from the group. That the trainer equaled God, is indicated by the particular characterization of God's motives as seen in the statements that /*Maybe God is 'non-directing'*/ and maybe /*He created mankind and let it 'naturally evolve'*/.

Linguistically, these are strange characterizations of God. Certainly normatively unusual. For example, why the particular wording and phrasing to characterize God's actions? The answer is that these references to God being /*nondirective*/ and a letting /*mankind naturally evolve*/ are from the language of their text book and the trainer's initial lecture describing the T-group experience.

The question is, why the use of this group language to apply to God. It is certainly not normative to use the term *nondirective* nor to refer to *mankind naturally evolve*. Sub-literally, then, the use of these particular words function to link the literal topic of

God to the the here-and-now narrative setting. In this latter case the speaker was fully aware of the terms literal implication. He was using them simply as conscious metaphors to extend the implication that the trainer was equivalent to God in the group. Often, however, such linguistic linkages are totally unconscious.

A further linguistic link is the use of the pronoun "*it*" in referring to letting mankind naturally evolve. In terms of linguistic norms, it is not grammatically typical to refer to *mankind* as an "it." Referring to a *group*, however, as an "it" is linguistically normative. In referring to mankind, the discussant should have left the 'it' out of the sentence, by saying He created mankind and let *them* evolve. Thus the "it" is again a sub-literal linkage to the here-and-now feelings in the group.

That the group was not entirely conscious of their equation of the trainer to God in their narratives is indicated by their responding to the trainer's sub-literal interpretation of the topic /*You mean just like in here*/ as blasphemous. Yet another linkage to the here-and-now group is that the topic came from the /*Today Show*/ which is $S_{ub}L$ for *the show today* in the here-and-now group. Still another linkage that supports the topic sub-literally referring to the group is the fact that it is not by randomness or coincidence that there are *3 people* on the *Today Show*, as there were *3 very dominant members* in the group. In like manner, it is no accident that the woman on the show gave up her child /*10* /*years ago*/, the exact number of the remaining membership of the group. Recall, too, that right after the young woman left the group, the young man then noted that /*The group seems to have stabilized to 10 members*/.[4]

Like most sub-literal conversations, this conversation also reveals some of the differences between how members were viewing the group. The topic of losing children to adoption reflects a member's negative reaction to losing a group member. On the other hand, the young man who introduced the topic of a mean God causing it all, at least has some doubts as to his being able to understand God's (= trainer's) motivation. This is supported by the fact that in the here-and-now group the young man had been understanding the group process better than most of the other members, so on some level, he understood that it wasn't my "fault." Figure 4 is a schematic mapping of the literal topics of this entire narrative onto the narrative situation.

Literal Topics	Map pings	Sub-literal Meaning
The Today show	↔	The show today in the group
3 people on the Today Show	↔	3 dominant group members
10 years ago, gave up her child	↔	10 remaining group members
Adoption	↔	Member who withdrew
Parent	↔	Trainer
Children	↔	Group members
Parents giving up their children for adoption	↔	Trainer "gave up" member who withdrew
God	↔	Trainer
Wonder about a God who lets terrible things happen like child abuse	↔	Wonder why trainer let the loss of a member happen
Not being able to understand God's reasons for letting the loss occur	↔	Not able to understand trainer's reasons for letting the member withdraw
Maybe God is 'non-directing'	↔	Reference to trainer's non-directive style
Maybe He created mankind and let 'it' 'naturally evolve'	↔	Trainer who created the group and his philosophy of letting it naturally evolve

Figure 4: Lost Child of the Tribe Sub-Schema

Q and A prescript

At this point, it is useful to note that there is a set of fundamental questions for domains concerned with linguistics and verbal narrative analysis that remain virtually unasked and therefore unanswered. Syntactic rules describing which words can go together, in what order, and stochastic analyses of word frequency associations, notwithstanding, lacking any other explanations to this set of fundamental questions answers become clear within a sub-literal framework. *First*, out of the many possible topics or stories in an unstructured verbal discussion, why does a particular topic or story get selected into a conversation? *Second*, why out of all possible times, occasions, or circumstances is a topic or story introduced into the conversation at a particular point in time? *Third*, why out of the numerous stories selected-in to a conversation is one sustained and elaborated upon either by an individual or by a sub group in the conversation? *Fourth*, of all possibilities, why is a particular wording, phrasing or syntax used? The answer to these four questions is because they seem to allow the expression of concealed affective schemata.

Fifth, why does the content, structure, or plot of a topic or story match what is occurring in the actual narrative situation? The likely answer is that because the parallel structure or plot resonates to, and emotionally derives from, similar past or current feelings within the narrative situation. *Sixth*, why is a topic or story repetitively transformed and permuted into variations of the initial topic or story? The answer is that the story variations show and allow the individual(s) to further sub-literally address and comment on various different aspects of a basic affective schema. And *seventh*, Why are various internal linguistic structures and content of the of the story transformations and permutations all internally consistent and integrally parallel to each other as if there were a generic or abstract schema that each story-meaning fits into? The likely answer is that this is the way the mind/brain efficiently stores and retrieves information. It is easier to store and retrieve an abstract or generically structured schema into which many individual pieces fit than to store and retrieve structurally unrelated individual pieces of information. Indeed, it may be the way the brain is wired (see HASKELL 2000).

In lieu of the complete methodology, given the context and the isomorphic mapping of literal narrative content onto the actual narrative situation, along with the fact that such mappings have been found in multiple protocols across numerous groups with diverse compositions both in an out of the laboratory, such correspondences can not be reasonably explained by coincidence or chance.

The written word of God

In terms of context, this group had been discussing the increased conflict that occurred during the previous session. When unproductiveness or conflict reaches a certain level, the trainer typically intervenes. It is this intervention that generated the affective schema undergirding this illustration of the God Schema. The trainer asked the group (1) if they had read Albert Ellis' book, *A Guide to Rational Living* which he had assigned. The trainer (2) suggested that Ellis had important things to say and that reading the book would help them as a group. The trainer (3) then explained that conflict in a group was not undesirable but, was in fact, necessary for development; that the problem was the management, not the elimination of conflict. There was a very brief discussion, then a typical silence ensued.

Following the silence, a number of topics were introduced but did not catch on (Methodologically,

an important point is to explain why certain topics are selected for extended discussion with other quickly falling by the wayside). A member then brought up the topic of religion, which the group began to discuss at some length. Contextually, it was immediately clear that there were members who were religious and members who were not. One of the disbelievers said that

"/*God never helped anyone*/ and that /*The Bible is only the work of man and not to be taken as the last word*/. Then another member said that /*You don't have to go to church to be religious*/, and that /*These great cathedrals that look like* [the name of a college] *are just to brainwash you*/. It was further asserted that /*When you missed church, you were made to feel guilty*/. Finally, it was said that /*Many Christians were hypocrites, who coveted their neighbors' wives and husbands*/."

This series of topics about *God* are, again, S$_{ub}$L references about the trainer *as the authority figure* in the group.

Mapping the literal topics shows that the topics are S$_{ub}$L references as indicated by the statement that /*God never helped anyone*/. Just as in the above group, this a reference to their perception of *the trainer not helping them learn*. That /*The Bible was only the work of man and not to be taken as the last word*/ is a S$_{ub}$L reference about their negative attitude toward *Albert Ellis's book* that the trainer had recommended, i.e., Ellis's book is sub-literally *the Bible*. This literal reference about the /*Bible*/ is also a negative reference to their *textbook* that the trainer had authored.

The statement that /*You don't have to go to church to be religious*/, is likely a S$_{ub}$L reference to the widespread belief that a person does not have to go to college to acquire significant learning. The stereotypes about college courses: Ivory Tower academics v. knowledge about the "real world" are well-known. The statement that /*These great cathedrals that look like*… [name of a college]… *are just to brainwash you*/ is a S$_{ub}$L reference to *colleges* being places of "brainwashing." The statement /*When you missed church, you were made to feel guilty*/ is a S$_{ub}$L reference about a remark the trainer had made in the previous session about *absenteeism* in the group; that his remark made them feel *guilty*.

The comment that /*Many Christians are hypocrites, who covet their neighbor's wives and husbands*/ is a S$_{ub}$L reference about a female member who earlier in the session had told of *going with a married man*, and who had also expressed that *she was religious* but did not go to church. It is also likely a S$_{ub}$L reference

to the various sexual tensions present in the group. As with the previous narrative, a transitional topic is evident by the topic about churches and cathedrals that were said to look like certain *college* buildings. Once more in using the concrete example of a *college building* to describe a church or cathedrals directly links to their here-and-now college experience. Figure 5 is a schematic mapping of the literal topics of this entire narrative onto the narrative situation.

Literal Topics	Map pings	Sub-literal Meaning
God	↔	Trainer as the authority figure
God never helped anyone	↔	Trainer not helping them
Bible	↔	Course texts
The Bible is only the work of man and not to be taken as the last word	↔	The Trainer/Ellis's books are not the only truth
Church	↔	Classroom/College
You don't have to go to church to be religious	↔	College isn't the only place to learn things
These great cathedrals that look like…	↔	Places of Higher Learning
[name of the college]… just brainwash you	↔	Colleges brainwash people
When you missed church, you were made to feel guilty	↔	Trainer's remark on absenteeism made them feel guilty
Many Christians are hypocrites, who covet their neighbors' husbands, and wives	↔	A member who told of going with a married man; and a reference to sexual tensions present in the group

Figure 5: The Written Word of God Sub-Schema

Many are called but few are chosen

A final and somewhat more complex piece of God talk is the following. In terms of cultural context, in the history of humankind one of the most enduring concerns is that someone else will get more than someone else, especially ones self. Again, this eternal template is illustrated in the Christian Bible numerous times, beginning with the stories Cain and Abel, and with Jacob and his brother. This illustration will show in detail how such concerns are expressed in God Schemata. First some context specific to the narrative situation.

In the previous eighteen sessions of this group, the trainer had limited his interventions to brief clarifying remarks, as always, focusing on the group level of behavior, very rarely upon an individual, and virtually never taking sides or commenting on the literal content of the narratives. In the previous session, however, he had (1) spent a great deal of time pointing out the implication of how people perceive each other. (2) The trainer did this by focusing on a young man who will be called, John, (Because of the length of this illustration, names will be attached to speakers for memorial ease). (3) John had been strongly criticized in past sessions by most members of the group for being so vocal. The trainer had (4) also openly loaned him a tape recording of a group session, and (5) at one point in the session had loaned him his pen. It should noted, too, that (6) there was a colleague in this group who was being trained. These four events are the main contextual aspects responsible for creating the following God Schemata.

After a few preliminary questions to the trainer regarding a required term-paper, the group began discussing whether or not they had been too hard on John during the last session. At this point *John entered the room and sat in the vacant seat on the trainer's left.* A couple of members asked him if they had /*Come down on him too hard*?/. He replied /*No, I really enjoyed it*/. John then returned the audio tape recording of the last session to the trainer, saying that he had not finished listening to it. The trainer told him he could keep the tape until next session. John then asked the trainer if he could /*borrow his pen*/ and the trainer said /*sure*/.

John had been outspoken in past sessions about his religious convictions. In response to further questioning by the group on his religious views, he said /*If I seem that way, it's because I have God and I go by it. You really roasted me last time. I know I can't expect all of you to act like me just because I am that way*/. Another male member, Peter, said /*You really had to stand against the onslaught… of the devil*/. Much anxious laughter ensued.

John then said /*You've all seen that TV program where people are roasted and called names. That's how you all got to me Thursday*/. Then another member said /*It's hot in here*/ to which a member responded /*Last week when this was mentioned, I said we were going through The Change*/ [referring to menopause]. Much laughter and a brief silence.

Then someone questioned whether the group was adhering to the here-and-now rule. This is a rule that says all discussion must be about something within the group, not about outside topics. A member responded, saying /*I think it's a here-and-now situation… you know, how we each project to others… am I being received the way I hear things*/. At this point the trainer intervened, suggesting that groups frequently /*use an individual as a symbol of, or a scapegoat*/ for wide-spread concerns within the group as a whole, but which the group doesn't want to deal with so they deflect them onto an individual. Whenever a group spends session after session concentrating on a particular individual as we have, it's often an indication of *scapegoating*. There then followed a lengthy and anxious silence. When the discussion resumed, no mention was made of the trainer's comments.

Resuming the discussion, an older member who also had made no secret about his religious convictions, said to John /*I've been seeking clarification of your Christian views*/. John interjected, saying /*I know for a fact that I am the only one in here that's apostolic*/ [Note: Deriving from Catholicism apostolic generally means being a symbolic spiritual descendent of the 12 Apostles by *successive ordinations* and baptisms]. John went on to say that /*I'm the only one who has been baptized in Jesus' name. I am quite sure*/. Some members then immediately objected. But John went on to say /*You have been baptized Father, Son, and Holy Ghost, or sprinkled, but not in Jesus' name*/.

At this point a heated discussion ensued in which John said /*I was baptized underwater in Jesus's name*/. He went on to say that regular baptism was not the same; that /*Just because you were baptized Father, Son and Holy Ghost… those are just titles. When Jesus arose from the dead, he told his disciples that all power is in the name of the Father, comma, the Son, comma, and the Holy Ghost. He didn't say 'in the 'names with an 's' on it, he said name*/ (i.e., singular). Another member replied that he was hung up on words. The trainer once more inquired if the conversation had any here-an-now significance. He was ignored.

John then reiterated /*I know that I'm the only one in here that has been baptized in Jesus' name. Just because I am different*/. At this point, a member interjected with /*If others had been baptized the same as you, you're saying they would have known it*?/ John replied /*Right*/. Another member then asked, /*If we were all baptized underwater, then would we all be the same*?/. He responded that /*If you got the Holy Ghost, we would all be alike*/. It was objected that /*First you say in Jesus' name, now it's the Holy Ghost. Which is it*?/. John replied that /*Those two scriptures went together. If you would all go to the Bible, then we would all have the same goals*/.

In a delayed response to the trainers question about the here-and-now relevance of the topic, Peter, who had previously supported John, said /*There is the same process happening in here: Jesus was scrutinized, stoned and called crazy. It's a parallel*/. There were some joking references to John as being like Jesus Christ. He of course denied it as did the other members—and, it might added, quite vociferously. Then a member said that perhaps John was /*Jesus' son*/. A member then said /*What's this got to do with the here-and now?*/ to which another responded to John /*It's the way you are coming off to the group, putting yourself above us*/. Someone then asked /*Because I haven't gone through the same process that you have gone through, can I be accepted in this class?*/. John responded /*On that train of thought, dealing with this class, 'yes'*/. The member who was asking if he could be accepted, continued, /*Whatever goal we as a group have, as a class, can you accept us?*/.

Then, referring to the trainer, a supportive member said /*He is our leader*/ to which two other members immediately responded /*He's not my leader. He has taught me nothing in here*/. Peter then interjected /*You'll change your mind when you hit the gates*/. Silence ensued. The trainer then inquired /*What side of Jesus did Judas sit on at the Last Supper?*/ The was much laugher and puzzlement about the meaning of the trainer's comment. Then John, who was sitting next the trainer /*put his arm around and on the back of the trainer's chair*/. There were looks of surprise at this gesture of familiarity. Silence. Addressing the trainer's question, a couple of members said they thought /*Judas sat on the left of Jesus*/ at least according to artists conceptions. John added /*He sat close to Jesus because Jesus said whosoever shall sup with me on bread—and he put something in Jesus' cup—shall have everlasting life. And then Jesus told him [Judas] to go and do what he had to do—and to do it quickly*/.

The discussion then revolved around whether the biblical quote and about whether where Judas sat was correct or not. Silence. A member then directed the group into how they perceived each other. Unannounced, John got up and *quickly* left the group, leaving his coat and books behind. A few minutes later, he rushed back into the room out of breath and announced that he looked up the quote and that he was right, about what side of Jesus Judas sat on. The group continued giving their perceptions of each other until the end of the session.

Now, what does this narrative say sub-literally? First, it is important to note a little more about the social contexts of human behavior. Whenever a person is perceived as having been singled out by someone in a position of authority, it isoften unconsciously felt—both by the person being singled out and by the other people involved—as the person being singled out as special (as if the person had been specially "anointed"!).

John's remark /*I know for a fact that I am the only one in here that is apostolic; that I'm the only one who has been baptized in Jesus' name. I am quite sure*/ sub-literally means that he is the special one in the group. What his remark is essentially all about is (1) the trainer singling him out by calling attention to him (2) being used as a scapegoat, (3) having loaned him an audio tape of a session, and (d) having loaned him a pen by personally handing it to him. Indeed, he was "anointed" by the trainer. Recall that John repeatedly emphasizes that he knows he is the special one by his saying that he /*Knows for a fact*/ that he is the only one /*in here*/ that is apostolic, and that he is quite /*sure*/. The question arises, on a literal level how could he be so *sure*? After all, he doesn't really know the life history of all members. Yet, he repeats that he is certain. He can be so *sure* precisely because he is not really talking about what he knows of the members lives outside the group, but what he has actually observed /*in here*/ i.e., in the group. How else could he be so adamantly certain? Thus, the prepositional phrase /*in here*/ literally cues and is a link to $S_{ub}L$ referent.

Moreover, after already saying /*I know for a fact*/ why did he use the word /*sure*/? Why not simply say "I am quite *certain*," or "There is no doubt about it," or "It's incontestable," or any other equivalent phrasings and words? The answer is that his use of the word *sure* is yet another clue and linkage to the $S_{ub}L$ meaning of this conversation. Recall that when he asked if he could use the trainer's pen, the trainer responded by saying /*sure*/.

John's asserting that /*You have been baptized Father, Son, and Holy Ghost or sprinkled, but not in Jesus' name*/ sub-literally means that the other group members have only been the recipients of general remarks by the trainer (= Father) the co-trainer (Son) and by the group-as-a-whole (= Holy Ghost), but not in a direct and personalized way by the trainer (= in Jesus' name) and thus his $S_{ub}L$ Apostolic status derived directly from the trainer, i.e., he had been directly i.e., "*successively*" ordained by the trainer.

John's remarks about /*I was baptized underwater*/ means that by being focused on, he was submerged in the group process compared to the rest of the members; indeed, like no one else had been. His comment that /*Just because you are baptized Father,*

Son, and Holy Ghost… these are just titles/ again likely means that each member has only been the recipient of general remarks by the trainer, the co-trainer, and the group as a whole. His comment about /*When Jesus arose from the dead*/ is $S_{ub}L$ for finally becoming active (= alive) in the group. Continuing, he said /*Jesus told his disciples* (i.e., the group) *that all power is in the name of the Father, comma, the Son, comma, and the Holy Ghost. He didn't say in the 'names' with an 's' on it, he said name*/ [meaning singular]. That Jesus did not say in the *names of* with an '*s*' (denoting a plural noun) is $S_{ub}L$ for all power in the group, all action being derived from the trainer (= Father/Jesus) not from the co-trainer (=the son) or the group (=Holy Ghost). They do so only in Jesus' name (i.e.,. "Name" singular). That this likely $S_{ub}L$ for the trainer is indicated by the fact that the trainer's name does not end with an "s," i.e., HASKELL. The co-trainer's name, however, Heape*s*, does have an "s." Further, his statement /*If you had the holy ghost, we would all be alike*/ is a $S_{ub}L$ reference to the fact that if the trainer had focused on them in the same way they would all be equal.

Moreover while the Holy Ghost (which also equals the perceived messages from the trainer) did not tell John how he should behave, but it was *perceived* that he should behave in a certain manner. In response to the charge by another member that /*First you say Jesus, now it's the Holy ghost, which is it?*/ to which John responded /*Those two scriptures went together*/. This is a likely a $S_{ub}L$ reference to the trainer and his word and/or textbook. This is indicated by the remark /*If you would all go to the Bible, then we would all have the same goals*/ i.e., if the group would *all go by the trainer's textbook*, then the group would all work smoothly. The term *goal*, too, is a rather strange term to use in relation to the Bible and the discussion about religion. It is a term, however, that was repeatedly used in the textbook material. The term is thus a linkage of the literal topic to the here-and-now discussion. The comment of two scriptures may also be a reference to the trainer and his colleague whom he was training.

In the trainer's question about /*What side of Jesus did Judas sit on at the Last Supper?*/ he was indirectly referring to John who was sitting on his left. He was felt to be Judas because he was "betraying" his peers by always mentioning the course material which made the others look bad. The trainer was trying to indirectly cue them into the $S_{ub}L$ nature of their conversations. John's reaching over and placing his arm around and on the back of the trainer's chair was either a conscious or semi-conscious action

and likely recognition of his understanding—on some level—the $S_{ub}L$ meaning of the discussion. A member's comment that he thought *J/udas sat on the left of Jesus*/ was perhaps an unconscious recognition of John symbolically being Judas. John's response that Judas /*sat close to Jesus because Jesus said whosoever shall sup with me on bread—and he put something in Jesus' cup—shall have everlasting life*/ is likely, again, $S_{ub}L$ for the trainer "sharing" the audio tape and pen with John. And of course, he was sitting next to the trainer. This analysis is indicated by shortly after concluding his statement that /*Jesus told him [Judas] to go and do what he had to do and to do it quickly*/ John got up and without saying a word—and like Judas—*quickly* left the group.

The inquiry about if the rest of the members could be accepted in the course even though they had not gone through the process that he had gone through, John's response /*On that train of thought dealing with the class, 'yes'*/ means: from the point of view of it being a course they could be accepted, but they were still not equal as they had not been favored like he was perceived to be by the trainer. Literally referring to the trainer, the remark by another member that /*He's not my leader; he has taught me nothing in here*/ means that since he believed *that the trainer had taught the group nothing that he would not be the trainer's disciple*. Finally, Peter's comment that /*You'll change your mind when you hit the gate*/ is $S_{ub}L$ for *they will change their mind when their evaluations are due*, i.e., the time of judgment in the course.

Finally, it should be noted that the group was composed of 12 members—the trainer's disciples?"

Figure 6 is a schematic mapping of the literal topics of this entire narrative onto the narrative situation.

In closing, it should be noted that a series of literal narratives differing in their surface representation but which are generated from a given undergirding affective schema can be cognitively collapsed into single abstract matrix. See Figure 7.

Finally, analyzing $S_{ub}L$ meaning is a useful method of acquiring information that may not be otherwise available. For example, on a literal or surface level the trainer in the narrative sessions described above did not know (or at least was not certain) about how discussant were experiencing the group sessions. Such social concerns and attitudes are often not evident in the surface or literal level of social narratives. While the unstructured character of the T-group optimizes $S_{ub}L$ narrative, they occur in everyday settings. If the above narratives were by

Literal Topics	Map-pings	Sub-literal Meaning
I know for a fact that I am the only one in here that is apostolic; that I'm the only one who has been baptized in Jesus' name. I am quite sure.	↔	The only member that has been singled out by the trainer as special
You have been baptized Father, Son, and Holy Ghost or sprinkled, but not in Jesus' name	↔	Other members have only been he recipients of general attention by trainer
The Father	↔	The trainer
The Son	↔	Co-trainer
Holy Ghost	↔	Attention by the group
In Jesus' name	↔	Trainer's name
Baptized underwater	↔	Submerged in the group process
When Jesus arose from the dead	↔	Trainer finally being active
When Jesus told his disciples	↔	Trainer told the group
Jesus said all power is in the name of the Father, comma, the Son, comma, and the Holy Ghost. He didn't say in the 'names' with an 's' on it, he said name	↔	All power derives from the trainer whose name does not end with an "s" as does the co-trainer's name.
If you had the Holy Ghost, we would all be alike	↔	If they had been focused on individually, they would be alike
Those two scriptures went together	↔	My verbal and written words
If you would all go to the Bible, then we would all have the same goals	↔	If all would read my text book then would have same goals
Judas	↔	Is the scapegoated member
The 12 disciples	↔	12 group members
He sat close to Jesus because Jesus said whosoever shall sup with me on bread—and he put something in Jesus' cup…	↔	Member sitting on trainer's left shared the trainer's audiotape and pen.
Shall have everlasting life	↔	Shall be favored by a higher course evaluation
Jesus told him [Judas] to go and do what he had to do and to do it quickly	↔	Scapegoated member then got up quickly left the group to go do something
You'll change your mind when you hit the [pearly] gate	↔	They will wish they changed their view at the end when they are evaluated for grades

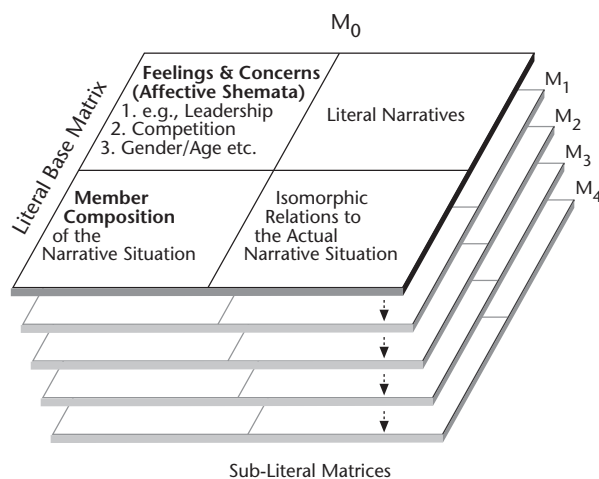**Figure 6:** Many are Called But Few Are Chosen Sub-Schema

M_0

Literal Base Matrix

Feelings & Concerns (Affective Shemata)
1. e.g., Leadership
2. Competition
3. Gender/Age etc.

Literal Narratives

M_1
M_2
M_3
M_4

Member Composition of the Narrative Situation

Isomorphic Relations to the Actual Narrative Situation

Sub-Literal Matrices

Figure 7: Collapsed Lattice Matrix

members of a professional staff or business meeting the information could be quite useful.[5]

Conclusion

The data and theories of the evolutionary and neurological (see HASKELL 2000) origin of religion need not be reiterated here.[6] Most of the papers in this volume present such bases as have a burgeoning literature (e.g., ALPER 2001; ATRAN 2002; BOYER 2001; PERSINGER 1987). Suffice it to say the abstract God Schemata are likely piggy-backed on the evolution of neurologically based abstract schemata used in all cognition. For a more detailed evolutionary explanation of origins of $S_{ub}L$ phenomena, see HASKELL (2003b, 2002a) and SMITH (2004).

Notes

1 Depending on whether one is religious or secular, the master schema can change. Many clinical psychologists—perhaps most—would consider the Parent Schema as the master template. From this perspective, it is childhood experiences with parents that generalize to a later belief in an all powerful God.

2 For example, see, *[1.] Analogical and Isomorphic Operations*; and *[2.] Contextual Analysis* in HASKELL (2003a).

3 It should be pointed out that the numerous references to the trainer in this and the following narratives are not personal but refer to the "role" of trainer. Contextually, in such situations, especially in the initial stages of an extended narrative the role of trainer is a significant affective concern of members.

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4 The article by HASKELL/BADALAMENTI (2003) showing an algebraic structure underlying $S_{ub}L$ narratives involved the analysis of set of numeric references in literal narratives that also functioned sub-literally to track the various factions and alliances in the narrative setting. The validational support of having demonstrated an undergirding algebraic structure using numeric references, lends support to the semantic analyses of $S_{ub}L$ referents.

5 There remains a question that can not be addressed here. The question is, under what conditions does the information contained in a $S_{ub}L_{it}$ narrative translate into actual conscious attitudes and behaviors on the part of the discussant.

6 See chapters eleven and twelve (HASKELL 2000).

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Stephen W. Kercel/Donald C. Mikulecky

Why Do People Behave Religiously?

Introduction: What Do We Mean by the Religious Experience?

It makes no sense to offer an algorithmic definition of religious experience. It is a complex process, and defies simple definition. To characterize complex processes we must first recognize that entailment structures are inherent *within* the process. To appreciate what that means, consider that in an ontological process, a *causal entailment* ($a \rightarrow b$) is a specific instance of "event *a* causes event *b*." The *causal entailment structure* is an interconnected system of such entailments. Similarly, in an epistemological process, an *inferential entailment* ($p \rightarrow q$) is a specific instance of "proposition *p* causes proposition *q*." The *inferential entailment structure* is an interconnected system of such entailments. In either case, the entailment structure is the deepest feature that characterizes a process (ROSEN, 1991, p98).

In identifying the scope of the religious experience we take some guidance from the attributes that JAMES uses to distinguish religious experience from other types of experience (JAMES 1994, pp528–529). However, it must not be forgotten that JAMES was an unapologetic pragmatist. He was concerned with effect, and had little use for causation. Thus in identifying causally-based features,

Abstract

By religious experience, we mean a cognitive process with several causative attributes. Its scope is a noumenal world, inaccessible to human sensibilities. Its goal is to achieve a relationship between human mind and some process in the noumenal world (typically envisioned as God). That relationship is typically facilitated by prayer. God is supposed to cause phenomenal mind to become informed through a process of mystical revelation. Most significantly, He breaks the infinite regress of efficient cause.

Traditional religion and reductionistic science share a bizarre complementarity. Religion considers top-down causation. God provides the efficient cause of the regress of efficient causes that ultimately cause even the smallest effects. Religion dismisses upward causation as insignificant. Reductionism is the belief that large processes are merely the cumulative effects of the behaviors of their parts. If so, upward causation suffices to account for everything, and questions of downward causation are unworthy, being "merely religion." As an alternative to both of these extremes, we present a structure of endogeny that encompasses both upward and downward causation, includes reductionism as a degenerate case, and neither affirms nor denies the existence of God, although it does deny the possibility of any mind that is omniscient and omnipotent.

Key words

Upward causation; downward causation; mysticism; reductionism; modeling relation.

his guidance serves as little more than a starting point.

JAMES begins with the observation "that the visible world is part of a more spiritual universe from which it draws its chief significance." Does this idea differ fundamentally from the notion of an unknowable noumenal reality as distinguished from a knowable phenomenal reality as put forward by KANT and SCHOPENHAUER? KANT argues for the existence of the numinous by claiming that freewill is an effect of causes in the noumenal world that produce effects in the phenomenal world. Thus, we might be better off to say that one of the attributes of the religious experience is that it is concerned with effects in the visible world that are caused by processes in a larger world, inaccessible to human sensibilities.

JAMES' second observation is "that union or harmonious relation with that higher universe is our true end." How one is to form a union or any other sort of relationship with a world inaccessible to human sensibilities seems to be a problem. However, coherence of its entailment structure does not appear to be a presupposition of religious experience.

Thus far, there seems little to distinguish religion from KANTIAN philosophy. However, JAMES' third observation provides such a distinction. Remarkably,

he couches it in KANTIAN terminology. "Prayer or inner communion with the spirit thereof—be that spirit 'God' or 'law'—is a process wherein work is really done, and spiritual energy flows in and produces effects, psychological or material, within the phenomenal world." The source of this "spiritual energy" is not necessarily presumed to be a personal God.

Elsewhere JAMES' identifies another distinguishing feature of religious experience, and it seems to be a possible resolution to the paradox of forming a relationship with processes in a world inaccessible to human sensibilities. "One may say truly, I think, that personal religious experience has its root and centre in mystical states of consciousness; so for us, who in these lectures are treating personal experience as the exclusive subject of our study, such states of consciousness ought to form the vital chapter from which the other chapters get their light" (JAMES 1994, p413). Religious experience claims to be informed by mystical revelation. More than that, the big ideas of the religious experience, notions about God, the unseen world, *et cetera*, are inaccessible by any means but mystical revelation.

It is worth noting that JAMES' concept of mysticism refers to "states of consciousness" without any presupposition as to whether those states are caused by either the mystic's internal cognitive processes or some unknown causal entailment originating in the unseen world. As with the concept of religion, he does not offer an algorithmic definition of mysticism. Instead he offers two distinguishing features of which he says, "These two characters will entitle any state to be called mystical, in the sense in which I use the word" (JAMES 1994, p415).

The first of these is ineffability. "The handiest of the marks by which I classify a state of mind as mystical is negative. The subject of it immediately says that it defies expression, that no adequate report of its contents can be given in words. It follows from this that its quality must be directly experienced; it cannot be imparted or transferred to others. In this peculiarity mystical states are more like states of feeling than like states of intellect. No one can make clear to another who has never had a certain feeling, in what the quality or worth of it consists" (JAMES 1994, p414).

The second attribute of mysticism is noetic quality. "Although so similar to states of feeling, mystical states seem to those who experience them to be also states of knowledge. They are states of insight into depths of truth unplumbed by the discursive intellect. They are illuminations, revelations, full of significance and importance, all inarticulate though they remain; and as a rule they carry with them a curious sense of authority for after-time." (JAMES 1994, pp414–415)

Although he did not include the following in his key distinguishing features of mystical experience, it is nevertheless a major point. Mystical revelation is claimed to be a superior source of information from that provided by the evidence of the senses or our reasoning upon that evidence. "Thought, with its remoteness and abstractness, has often enough in the history of philosophy been contrasted unfavorably with sensation. It is a commonplace of metaphysics that God's knowledge cannot be discursive but must be intuitive, that is, must be constructed more after the pattern of what in ourselves is called immediate feeling, than after that of proposition and judgment. But our immediate feelings have no content but what the five senses supply; and we have seen and shall see again that mystics may emphatically deny that the senses play any part in the very highest type of knowledge which their transports yield." (JAMES 1994, p442)

Mystical revelation offers an answer to the question of "what causes efficient cause?" Speaking of causation, ARISTOTLE (1924) says "… causes are spoken of in four senses. In one of these we mean the substance, i.e. the essence (for the 'why' is reducible finally to the definition, and the ultimate 'why' is a cause and principle); in another the matter or substratum, in a third the source of the change, and in a fourth the cause opposed to this, the purpose and the good (for this is the end of all generation and change)." (ARISTOTLE, Book I, Part 3) The substratum is the *material cause*, that which is changed into an effect. The essence, or the principle which determines the form of the effect, is the *formal cause*. The source of the change is the *efficient (or moving) cause* (distinct from, and not to be confused with the modern concept of efficiency).

There is a temptation among modern students of ARISTOTLE to confuse efficient and material cause. Often the flight of a ball is characterized as having been efficiently caused by a kick. However, suppose we ask why does a ball, given a particular kick, or set of dynamical initial conditions, follow a trajectory of subsequent dynamical conditions? It is forced or constrained to do so by external forces such as gravity and aerodynamic drag. It is these constraints which are the "source of change" in the trajectory. In other words, these constraints, often characterized as a "dynamical law" are the *efficient cause* in the progression of states.

The problem is that if we can ask what caused a certain event, and if we answer that it is the effect of dynamical laws, we can just as easily ask what caused the dynamical laws, and what caused their causes, *ad infinitum*. ARISTOTLE recognized this problem. "But evidently there is a first principle, and the causes of things are neither an infinite series nor infinitely various in kind. For neither can one thing proceed from another, as from matter, ad infinitum (e.g. flesh from earth, earth from air, air from fire, and so on without stopping), nor can the sources of movement form an endless series (man for instance being acted on by air, air by the sun, the sun by Strife, and so on without limit)." (ARISTOTLE, Book II, Part 2) Then he offered his answer. There must be an eternal and uncaused first cause and "if there is no first there is no cause at all." (ARISTOTLE, Book II, Part 2) In other words, one way to break the infinite regress of efficient cause is to hypothesize the existence of God, as a metaphor for immanent causation (ROSEN 1991, pp236–237).

To summarize, when we speak of religious experience, we speak of a cognitive process with several causative attributes. Its scope is a noumenal world, inaccessible to human sensibilities, in which causes can arise that produce effects in the phenomenal world of sensible experience. It has a goal of achieving a relationship between human mind and some process in the noumenal world (often, but not always, envisioned as God). That relationship is facilitated by prayer, an attempt by phenomenal mind to exert an effect on the noumenal process. The noumenal process is supposed to cause phenomenal mind to become informed through a process of mystical revelation. The noumenal process is supposed to break the infinite regress of efficient cause.

Why Do Questions of Religious Experience Matter?

Questions of religious experience matter because it leads to profound effects, on both theoretical and practical levels. It claims to solve perplexing problems like the explaining the existence of freewill in a causally entailed world. More profoundly it claims to answer the question of what causes the causal entailment structure of reality. The merits of such claims should be judged critically.

On a more practical level, religious experience profoundly affects human behavior. As JAMES notes, it imparts "a new zest which adds itself like a gift to life, and takes the form either of lyrical enchantment or of appeal to earnestness and heroism." Fur-

ther it provides "an assurance of safety and a temper of peace, and, in relation to others, a preponderance of loving affections." (JAMES 1994, p529) JAMES does not see the religious experience as an unmixed blessing. He poses two questions of utmost urgency. "…what are the dangers in this element of life? and in what proportion may it need to be restrained by other elements, to give the proper balance?" (JAMES 1994, p529)

To appreciate just how unbalanced unrestrained religion can be, we need only consider that the common thread that JAMES sees as running through all religious experience. That common thread is the notion that humankind is fundamentally corrupt. "There is a certain uniform deliverance in which religions all appear to meet." He asserts that all religions include "a sense that there is something wrong about us as we naturally stand," and "a sense that we are saved from the wrongness by making proper connection with the higher powers." (JAMES 1994, p552)

This idea of the fundamental corruptness of humankind runs deep and even biases scientific inquiry. Due to this bias, researchers investigating the behavior of intelligent non-humans were shocked and disappointed to discover that their subjects are not nice. Gorillas tell lies. Tribes of chimpanzees wage organized war against each other. Dolphins commit rape against unwilling females. Ignoring of what we have learned about biology, we see an emerging cult of Gaia that proclaims "the hopeful alternative to the extinction of millions of species of plants and animals is the voluntary extinction of one species: Homo sapiens… us." (KNIGHT 2003)

Other religious perspectives offer less seemingly less extreme deliverances from this commonly shared notion of the fundamental corruptness of humankind, but that deliverance is still offered at a very high price. It is paid for by the removal of a great deal of personal responsibility. Instead, the believer is exhorted sacrifice everything for the cause. "Everything" means everything, includes human identity. This is only a short step away from the voluntary extinction of the radical Greens. The altruistic "new man in Christ" and his analogs in other religious epistemologies are no longer human.

It must be urgently asked if this gloomy assessment of the human condition is as good as it gets. Must we settle for it? Humans do seem to differ from other animals in that we have more power to choose what we feel. Many humans misuse that power and make bad choices. However, is that the same as supposing humanity to be fundamentally evil? Unless

there is a possibility of making bad choices, no possibility for choice exists. Humanity has developed to fit the ambience in which it finds itself, and seems to be fundamentally right (or no more fundamentally wrong than gorillas or dolphins) for its situation. Does this not rather suggest that there might be something wrong with this common thread of religion? Might we not be better off by asking the difficult question of how to make the right choices for our situation rather than asking the more simplistic question of how to eliminate the supposed scourge of humanity from the face of the Earth?

A Strategy for Addressing Difficult Questions

There is a strategy for both posing and answering difficult questions. It is called the modeling process, and is characterized as "the art of bringing entailment structures into congruence." (Rosen 1991, p152) This statement seems to leave us no wiser than when we started. How does art enter into the discussion; are we not instead supposed to be scientific? What does it mean that two different entailment structures are congruent? In what sense are they not identical? If they are not identical, what similarity between them causes us to declare them congruent? Most crucially, why do these questions matter?

The first point to appreciate is that the Modeling Relation is a relation in the mathematical sense. This particular relation has been known for well over a century. "We form for ourselves images or symbols of external objects; and the form which we give them is such that the logically necessary (*denknotwendigen*) consequents of the image in thought are always the images of the necessary natural (*naturnotwendigen*) consequents of the thing pictured" (Hertz 1994, pp1–2). In set theoretic parlance, a Modeling Relation exists if A and B are sets, and there exists a set, R, of ordered pairs, such that the first element of each pair in R is an element of A, and the second element of each pair in R is an element of B. In mathematical notation: $a \in A$, $b \in B$, $(a,b) \in R \Leftrightarrow aRb$. In the Modeling Relation, the members a and b of each ordered pair in R are entailments from two different systems. (Rosen 2000, p374)

There are two sorts of systems that might appear in the Modeling Relation, natural systems and formal systems. Natural systems are systems in physical reality, and their behavior is driven and constrained by causal entailments. (Note of
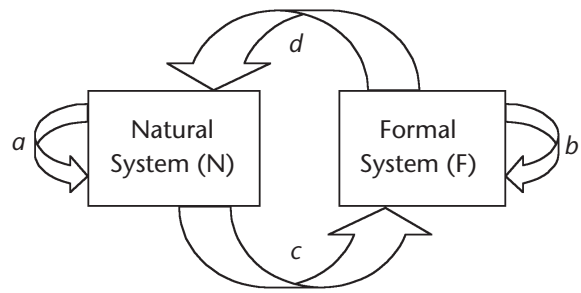
$$MR = \{(a, b) \mid a = c + b + d\}$$

Figure 1: The Modeling Relation.

clarification: As Rosen uses the term "formal system," he means a process that is not limited to the conventionally recognized notion of a strict mathematical formalism defined by a finite list of predicative propositions. Many sorts of processes are admissible as the "formal system" in the Modeling Relation, including, but not limited to strict mathematical formalisms, impredicative objects, semiotic objects, and even other natural systems. The only requirement for admission as the "formal system" in the Modeling Relation is that the candidate for admission must have congruency of entailment with the natural system to which it is supposed to correspond.)

Entailment structures are inherent within a system; they are the distinguishing features that characterize the system. (Rosen 1991, p98) They do not cross over from one system to another. The idea is represented in Figure 1, where we see a natural system, N, distinguished by its structure of causal entailments, *a*, and a formal system, F, distinguished by its structure of inferential entailments, *b*. The entailment structures of two distinct systems are distinct from one another; causes or hypotheses in one do not produce effects or conclusions in the other.

The fact that distinct systems are non-identical does not preclude them from being regarded as being in some sense similar. Similar systems should have distinguishing features that closely correspond to each other. Dissimilar systems should have distinguishing features that do not closely correspond to each other. As already noted, the distinguishing feature of a system is its entailment structure. Thus, we would expect similar systems to have entailment structures in which there is some degree of correspondence between the entailments.

To establish this correspondence, consider a system of encodings and decodings. (Rosen 1991, p59) For example, we might have a system of encodings

that encodes a set of events in the natural system, N, in Figure 1, into a set of propositions in the formal system, F. We might also have a system of decodings that decodes a set of propositions in the formal system, F, into a set of phenomena in the natural system, N. Although the two systems remain independent in the sense that causes or hypotheses in one do not produce effects or conclusions in the other, encodings and decodings can link the two systems.

This linkage between entailment structures provides the means of assessing the similarity between two systems. Suppose that an event, e_1, in N can be encoded to a proposition, p_1, in F; we can think of the encoding arrow, c, in Figure 1 as a measurement on a natural system. Suppose further that the proposition, p_1, when applied as a hypothesis in the inferential structure in F entails another proposition, p_2, in F as a conclusion. In other words, the two propositions are entailed as an implication, $b = (p_1 \rightarrow p_2)$, in F. Suppose that this entailed proposition, p_2, in F can be decoded into an event, e_2, in N; we can think of the decoding arrow, d, in Figure 1 as a prediction by a formal system.

ROSEN defines congruency between the entailment structures in the following way. (ROSEN 1991, p61) Suppose that in the underlying reality, the event e_1 in N causes event e_2 in N. In other words, the two events are entailed as a causal linkage, $a = (e_1 \rightarrow e_2)$, in N. Suppose further that the linkages commute. Event e_1 is encoded by c to proposition p_1, which implies proposition p_2, which decodes to event e_2, and that there is exact correspondence between the predicted event e_2, and the caused event e_2. The commutation is also described as $a = c + b + d$. (Note: In this context, + is the symbol for concatenation.) If there exists no such entailment b in F, having a commutative relationship with some entailment a in N, then the two systems do not have congruent entailment structures. Entailment structures are congruent to the extent that such correspondences between entailments exist.

Note that the similarity relationship "*a* commutes with *b*" can be interpreted as a falsifiable hypothesis. The hypothesis is *a* is similar to *b* if and only if for the given entailments $a = (e_1 \rightarrow e_2)$ and $b = (p_1 \rightarrow p_2)$ there exist entailments $c = (e_1 \rightarrow p_1)$, and $d = (p_2 \rightarrow e_2)$ such that $e_1 \rightarrow p_1 \rightarrow p_2 \rightarrow e_2$. Unless instances of all these entailments can be produced, the hypothesis of similarity of *a* and *b* fails.

If such correspondences between the entailments in the two systems do exist, then we can learn something about one entailment structure by observing the other. This is the essence of the Modeling Rela-

tion. When it is applied to a formal system to obtain predictions about a natural system, the inferential entailments in the formal system correspond to the causal entailments in the natural system. Where the relationship holds up and where it breaks down are both understood. This is where the Modeling Relation differs from "black box" approaches. Construction of a "black box" makes no claims about the causal links in underlying reality, offers no understanding of the natural system it purports to describe, and offers no warning as to when the description will break down.

In contrast, for any valid Modeling Relation, the identification of the encodings and decodings between two systems is an act of discovery based on insight or understanding. The benefit of this understanding is the awareness of the specific entailments so described, and a clear indication of the scope of applicability (or non-applicability) of the formal system as a model. The cost of this understanding is that it is an art and not a science in the reductionist sense; there is no automatic or algorithmic method for determining either the encodings or decodings. In fact, there is not even any necessity or assurance that the system of decodings can be obtained from some straightforward inversion of the encodings.

ROSEN draws a distinction between modeling and simulation. Modeling involves the discovery of congruent entailments. Simulacra, or "black box" algorithms, find coincidences in observations of effect, and proceed from the hope that these coincidences of effect are extrapolatable. The distinction is nontrivial because in real-world settings causally based models are far more trustworthy than simulations.

Complex Ontological Processes

VON NEUMANN (1966) claimed that the production of a more complicated object from a less complicated object is the completely decisive property of complexity. He attempted to show that the Universal Constructor (an automaton that can make identical copies of itself from materials available in its environment) produces this effect. However, his concept contains a deep seated contradiction, simultaneously forbidding and requiring the possibility of random noise. Even worse, VON NEUMANN attempted to characterize the process by the effects it produced, or what some would call a PTOLEMAIC explanation. Just as the epicyclists focused planetary motion but ignored the driving forces, he looked at complicated behavior instead of complex entailment.

A more satisfying alternative is to think of the decisive property of complexity in terms of causation instead of effect. We see that a closed-loop hierarchical structure of causality produces its own goal, which is incidentally the effect, an instance of the more complicated process produced from a less complicated process, that VON NEUMANN sought but failed to find. Thus, when we speak of complexity, we refer to its decisive property as being the structure of closed-loop hierarchical of causation that produces its own final cause. (KERCEL 2002)

This discussion has accumulated quite a few differences in causation between an organism and a mechanism, and it is useful to pause a moment and compare them. A mechanism is closed to material cause, open to efficient cause, and operates for the good of some external agent of final cause (supposing that it has one). A mechanism may have a closed loop of causal entailment, but the entailments in the loop are a progression of material causes. The kinds of causes in a mechanism are all separable.

In contrast, an organism is open to material cause, closed to efficient cause, and its internally created final cause drives it to operate for its own good. It must have a closed loop of causal entailment, but the entailments in the loop form a bizarre hierarchy of efficient causes, where each cause appears to be in the middle of the hierarchy. At least some of the causal entailments are inseparably entangled, simultaneously serving as material and efficient causes of different effects.

Recall that FREEMAN says that this is exactly what brains do. "Intelligent behavior is characterized by flexible and creative pursuit of endogenously defined goals." (FREEMAN 1999a, p185) Notice particularly that he calls this multi-level self-referential process of causation by the medical term, *endogenous*. The term *endogenous system* is conventionally used in medicine to describe the property of a system that grows from within itself, or makes itself up as it goes along (CLAYMAN 1989). The term is used for a similar concept in economics (GAVIN/KYDLAND 1999).

Endogenous system is the most descriptive and least confusing term for describing a natural system that is distinguished by a closed-loop multi-level structure of efficient cause. This causal entailment structure is observed in fundamental biological processes by ROSEN, in salamander neurophysiology by FREEMAN, and in human neurophysiology in (DAMASIO 1994, p244). In cognition it is characterized as being caused by a structure of and "layers and loops" in (EDELMAN 1992, pp147–154). In aesthetics,

it is characterized by a structure of "strange loops" in (HOFSTADTER 1999, p709). It is even seen as the causal entailment structure at the foundations of physics, called "implicate order" in (BOHM/HILEY 1993, pp350–351).

Complex Epistemological Processes

It is worth noting that the causal entailment structure of an endogenous natural system is similar to the inferential entailment structure in an impredicative logical system. The conventional meaning of the term impredicative is given by KLEENE. "When a set M and a particular object *m,* are so defined that on the one hand *m* is a member of M, and on the other hand the definition of *m* depends on M, we say that the procedure (or the definition of *m,* or the definition of M) is *impredicative.* Similarly, when a property P is possessed by an object *m* whose definition depends on P (here M is the set of the objects which possess the property P*).* An impredicative definition is circular, at least on its face, as what is defined participates in its own definition" (KLEENE 1950, p42).

Impredicativity has been known to mathematicians for over a century, and there are various philosophical objections to the concept. Addressing those objections is beyond the scope of this paper. However, they are readily answerable and have been answered (PICARD 1993). Hypersets, as an instance of impredicative objects, are legitimate and useful mathematical objects.

An epistemology based on impredicative processes has several crucial implications. It is possible to construct impredicative processes that fit into a commuting Modeling Relation with endogenous natural processes. Either process in the Modeling Relation can be interpreted as a model of the other, and novel information can be gained about either process by asking questions about the other. Indeed, this is the payoff. The Modeling Relation is a tool for reasoning about complex processes, particularly the processes of life and mind.

However, it comes with several caveats. The model *cannot* be represented by a computer algorithm. Algorithms are inherently unambiguous and impredicatives are inherently ambiguous. Since it is non-algorithmic, every successful application of an impredicative model is an abductive act of discovery. Most crucially, although the entailment structures in both the model and the process being modeled are finite, their multi-level closed-loop structures are each capable of entailing limitlessly

many consequences, and those two sets of consequences never overlap completely. In other words, there is no largest or complete model of a complex process.

Complex Functionality

The notion of a closed-loop multi-level entailment structure is clearly a reasonable alternative to traditional reductionism and has been articulated buy very well regarded thinkers such as EDELMAN and BOHM in describing ontological processes, and KLEENE in describing epistemological processes. An obvious implication of such an entailment structure is that it describes a wholeness in reality and congruent representations of reality that is completely missed by the reductionistic strategy of characterizing the behavior of a process strictly in terms of the behavior of its parts.

However, the other extreme can be just as misleading. That is a concept of complexity that assumes that "since everything is connected to everything else, one cannot consider anything but the whole." That "total connectedness" concept presumes that one cannot consider some "less than the whole" aspect of reality in the Modeling Relation, because "reality is unfractionable." At the same time it is futile to attempt to model the whole, since we cannot construct a largest model of it. If we construct a partial model of the whole, since every entailment is as important as every other, every model misses something crucial. This leads to an attitude that since we can never understand reality, all we can do is admire it in awe.

The fallacy in that kind of thinking is often unnoticed presupposition that every entailment is just as important as every other. What ROSEN adds to complexity theory that seems to have been missed by the more widely recognized thinkers is the notion that each entailment *is not* just as important as all the others. He articulates this in his notion of complex functional component, and in so doing gives us gives us a way of distinguishing more important entailments from less important ones. Given the notion that some entailments are more valuable than others, we can consider a complex functional component of complex reality in the Modeling Relation, and use complex partially congruent models to ask questions about the process, such as the semantic question of "which entailments *are* more valuable than others?"

Thus, what complex function gives us is a way (an enabling strategy, not an algorithm) of scientifically understanding reality, without the necessity of either ignoring the context or considering a context that includes *all* the entailments. Complex function is a concept that we need if we are to 1) use the Modeling Relation to ask questions about religious experience, and 2) use the Modeling Relation to assess whether or not "mystically revealed" claims have congruency of entailment with reality.

To appreciate the properties of function, suppose we have a perceptibly heterogeneous process (ROSEN 1991, pp116–123). One part has different features than other parts. If we leave the system alone, it will exhibit some sort of behavior. If we remove or change a part, we get a change in behavior of the overall system. Crucially, the change in behavior that we get is unlikely to be the effect that we would predict by merely subtracting the behavior of the part from the overall behavior of the unmodified system. The effect of changing or removing one part is to replace the original system with a new system. The function of a part is the discrepancy in behaviors between the original system with the full complement of parts, and the new system with one part removed.

These parts must not be confused with the directly summable parts of a reducible system. ROSEN avoids this confusion by offering a new term for a part that embodies function. He calls it *a functional component*. In this terminology, the difference between the two systems defines the component, and the difference between the two behaviors defines the function. In a complex system, a component with a function is the unit of organization.

A functional component is context dependent. It has inputs, both from the larger system of which it is a component, and the environment of the larger system. It also has outputs, both to the larger system, and the environment. If the environment, A, changes, then the function of the component, B, changes. A can typically be described by a family of mappings that carries a set (the range X, where $x \in$ X) to another set (the domain Y, where $y \in$ Y), such that, $y = a(x)$, or more formally, A: X $\rightarrow$ Y. B can typically be described by another family of mappings that carries a set (the range U, where $u \in$ U) to another set (the domain V, where $v \in$ V), such that, $v = b(u)$, or more formally, B: U $\rightarrow$ V.

The functionality, F, of the functional component can be described as a mapping that maps a domain set of mappings (A, where mapping $a \in$ A) to a range set of mappings, (B, where mapping $b \in$ B), such that $b = f(a)$, or F: A $\rightarrow$ B. The concept of a mapping that maps one set of maps to another set of

maps is not unfamiliar to engineers. This is precisely what happens with a symbolic LAPLACE Transform.

A functional component differs from the idealized particle in NEWTONIAN physics. The particle's identity (defined in terms of parameters such as mass) is unaffected by context. A particle does not acquire new properties by being associated with other particles. A functional component's context dependency requires that its properties be dependent upon its function in a larger system. A functional component often does not even exist out of context. It has an ontological organization greater than the collection of atoms and molecules that give it a material substrate. It a whole that is more than the sum of its parts.

Traditional Science and Traditional Religion

BATESON makes three rather startling observations about religion. "Consider, for example, the central origin myth of Judaeo–Christian peoples. What are the fundamental philosophic and scientific *problems* with which this myth is concerned? 'In the beginning God … saw that it was good' (Holy Bible, Genesis 1: 1–12) and it is strange, almost eerie, to note how many of the fundamentals and problems of modern science are foreshadowed in the ancient document.

(1) The problem of the origin and nature of *matter* is summarily dismissed.

(2) The passage deals at length with the problem of the origin of *order.*

(3) A separation is thus generated between the two sorts of problem.

It is possible that this separation of problems was an error, but—error or not—the separation is maintained in the fundamentals of modern science. The conservative laws for matter and energy are still separate from the laws of order, negative entropy, and information." (BATESON 2000, pxxx) He also cites the Iatmul creation myth in which exactly the same distinction is made. In other words, both primitive and modern religion and reductionistic science presume that organization and its material substrate are separable, with nothing being lost in the separation.

Immediately following this is a second major insight from Bateson, his point being that the people who wrote Genesis make another fundamental error the same as modern reductionists, not separating a process in reality from our description of it. He is essentially saying that the people who wrote Genesis equate order with our description of order, attribute the order to its description, postulate a describing mind, and attribute the mind to God. "(4) Order is seen as a matter of sorting and dividing. But the essential notion in all sorting is that some difference shall cause some other difference at a later time. If we are sorting black balls from white balls, or large balls from small balls, a difference among the balls is to be followed by a difference in their location—balls of one class to one sack and balls of another class to another. For such an operation, we need something like a sieve, a threshold, or, *par excellence*, a sense organ. It is understandable, therefore, that a perceiving Entity should have been invoked to perform this function of creating an otherwise improbable order." (BATESON 2000, pxxx–xxxi)

His third insight is even more remarkable. "Let me approach the bigger problem historically. From St. Thomas AQUINAS to the eighteenth century in Catholic countries, and to the Reformation among Protestants (because we threw out a lot of Greek sophistication with the Reformation), the structure of our religion was Greek. In mid-eighteenth century the biological world looked like this: there was a supreme mind at the top of the ladder, which was the basic explanation of everything downwards from that—the supreme mind being, in Christianity, God; and having various attributes at various philosophic stages. The ladder of explanation went downwards deductively from the Supreme to man to the apes, and so on, down to the infusoria."

"This hierarchy was a set of deductive steps from the mast perfect to the most crude or simple. And it was rigid. It was assumed that every species was unchanging."

"LAMARCK, probably the greatest biologist in history, turned that ladder of explanation upside dawn. He was the man who said it starts with the infusoria and that there were changes leading up to man. His turning the taxonomy upside dawn is one of the mast astonishing feats that has ever occurred. It was the equivalent in biology of the COPERNICAN revolution in astronomy."

"The logical outcome of turning the taxonomy upside dawn was that the study of evolution might provide an explanation of *mind.*"

"Up to LAMARCK, mind was the explanation of the biological world. But, hey presto, the question now arose: Is the biological world the explanation of mind?" (BATESON 2000, p433)

What we see here is a rather remarkable division of labor in the tasks that the ontologies of modern

religion and modern science have set for themselves. Starting with NEWTON in physics and ending with LAMARCK in biology, reductionism has chosen to consider questions of bottom-up causation, dismissing top-down causation as irrelevant. Religion has traditionally been concerned with downward causation and is quite satisfied to dismiss upward causation as insignificant. (Note: The concept of evolution as a serious intellectual idea begins with LAMARCK. DARWIN's contribution was the concept of survival of the fittest, an entailment that made evolution credible to a general audience.)

We see from BATESON an amazing complementarity in the ontologies of traditional religion and traditional science. Both agree that the organization and its material substrate are separable. Both agree that no distinction need be drawn between a process and a sufficiently large description of the process. Each has agreed to concern itself with only one side of the bottom-up and top-down aspects of causation.

An Untraditional Approach to Causal Entailment

Traditionally, final cause is considered the province of religion rather than science. This is due to the fact that traditionalists in both religion and science do not believe that it can be investigated rationally. As ARISTOTLE hypothesized the existence of an otherworldly uncaused First Cause to break the infinite regress of efficient causes, he likewise sees final cause somehow other-worldly. "That a final cause may exist among unchangeable entities is shown by the distinction of its meanings. For the final cause is (a) some being for whose good an action is done, and (b) something at which the action aims; and of these the latter exists among unchangeable entities though the former does not." (ARISTOTLE, Book XII, Part 7) He defines final cause as goal seeking, and for a changeable entity, that goal is the good of some being. Can the changeable entity be an organism? Can the being whose good the entity seeks be its very self? He did not think so. "And so, in so far as a thing is an organic unity, it cannot be acted on by itself; for it is one and not two different things." [ARISTOTLE, Book IX, Part 1]

However, modern observations show that organisms do exhibit self-determined goal-seeking behavior. "I will begin by giving a name (intentionality) to the process by which goal-directed actions are generated in the brains of humans and other animals." (FREEMAN 1999b, p8) FREEMAN goes further than
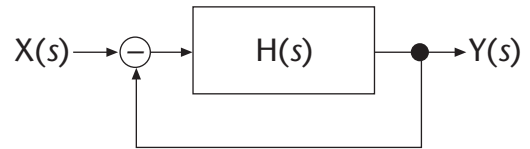

Figure 2: A linear servomechanism.

merely admitting goal-seeking behavior to the discussion; he sees it as crucial. "Intelligent behavior is characterized by flexible and creative pursuit of endogenously defined goals." (FREEMAN 1999a, p185) He is not the only modern physician to observe this property in living processes. "A simple organism made up of a single cell, say, an amoeba, is not just alive but bent on staying alive. … the form of the intention is there, nonetheless, expressed by the manner in which the little creature manages to keep the chemical profile of its internal milieu in balance, while around it, all hell may be breaking loose" (DAMASIO 1994, p136).

In processes of life and mind, self-determined goal-seeking behavior is consistently observed by reliable witnesses. Yet, ARISTOTLE did not believe that an entity could simultaneously be both cause and effect. From this perspective, shared by most modern scientists, he missed the fundamental difference between mechanisms and organisms. To appreciate how deep that difference is, recall the structure of causation for the servomechanism shown in Figure 2. A *causal entailment* ($a \rightarrow b$) is a specific instance of "event *a* causes event *b*." The *causal entailment structure* of a servomechanism is nothing more than a single-level closed-loop of entailments of material causes.

Contrast the causal entailment structure of a servomechanism with the one of the simplest conceivable causal entailment structures of an organism, as shown in Figure 3. In the diagram in Figure 3, originally devised by Robert ROSEN, the nodes represent events and the directed edges represent causal entailments. The dashed edges are material causes, and the solid edges are efficient causes. The organism is a physical *process* consisting of several different causally entailed subprocesses (ROSEN 1991, pp248–253). (Note: The causal entailment structure is fully consistent with MATURANA and VARELA's concept of *autopoiesis* (MATURANA/VARELA 1981). ROSEN has filled in some blanks as to how the causal entailments interact.)

Subprocess M is metabolism. Living processes differ from the thermodynamic closure of mecha-
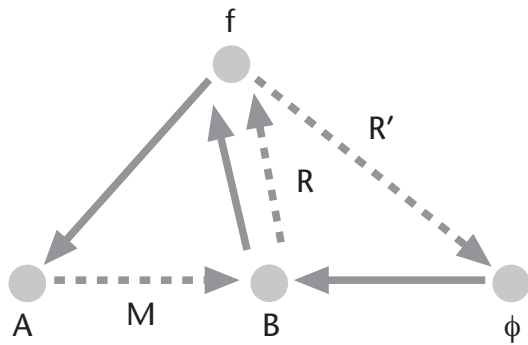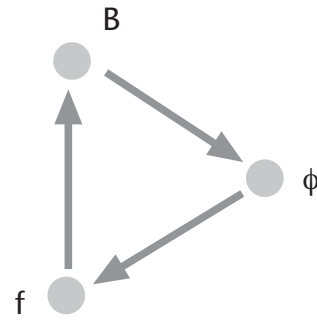
Figure 3: Closure to efficient cause.

Figure 4: Closed loop of efficient cause.

nisms. "Living organisms continually obtain energy and materials from the external environment and eliminate the end products of metabolism. Being open systems, they are not subject to the limitations of the second law of thermodynamics" (MAYR 1997, p22). From Figure 3, we see that in subprocess M, the material cause, A, input from the outside world, is transformed into the effect B, the substance and organization of the organism, and the transformation is regulated by efficient cause f. The important point to note is that the organism is open to material cause.

Since the organism is open to material cause, it receives more than nutrients from the environment. It is open to an enormous array of environmental insults that can disrupt its internal subprocesses, including metabolism, M. To survive these environmental insults, "it continually self-repairs" (MARGULIS/SAGAN 1995, p17). The repair subprocess, R, keeps efficient cause *f* in repair. From Figure 3, we see that in subprocess R, the material cause, *B*, is transformed into the effect, *f*, and the transformation is regulated by efficient cause ϕ.

Of course, the repair subprocess, R, is no less vulnerable to environmental insult than the metabolism subprocess, M. How do we keep the repair process in repair? ROSEN showed that we could do so by constructing a replication subprocess R'. R' produces ϕ, a replica of *f*. The material cause, *f*, is transformed into the effect, ϕ, and the transformation is regulated by efficient cause *B*.

We see the beginnings of the dreaded infinite regress of efficient cause. R repairs M. R' repairs R. However, the organism is finite, having a bounded identity. "Islands of order in an ocean of chaos, organisms are far superior to human-built machines" (MARGULIS/SAGAN 1995, p17). Such an "island" is incompatible with an infinite regress of repair subprocesses. The inventiveness of ROSEN's causal entail-

ment structure is that it keeps everything in repair without recourse to an infinite regress, and without the necessity of any other-worldly efficient cause reaching out from a mysterious noumenal reality to anchor the process

Except for A, the externally imposed material cause, all the nodes in Figure 3 are internally generated effects, and all serve as the efficient cause of some other effect within the organism. Stated slightly differently, all the efficient causes, or constraints on the behavior of the organism, are themselves effects caused by subprocesses within the organism. In other words, an organism is "closed to efficient cause."

This structure of causal entailment has some peculiar properties. *B* is the efficient cause of ϕ. ϕ is the efficient cause of *f*. *f* is the efficient cause of B. We see this in Figure 4, and we note a remarkable fact; this structure is identical to a three-node hyperset hierarchy, an almost trivially simple impredicative process. In other words, each efficient cause is a member of a hierarchy, and each is exactly in the middle of the hierarchy. We would be tempted to dismiss this structure as incoherent, except that ACZEL (1988) has proved that it *is* coherent.

Most significantly, this structure shows why ARISTOTLE's argument against self-causation is needlessly restrictive. He saw causes as operating in a linear hierarchy; B causes f causes *f*, and argues that B could not be both the cause and the thing caused. The fact that there is a non-contradictory way to form a multi-level closed-loop hierarchy, such that B causes ϕ causes *f* causes B, is a 20th century discovery, and was unknown to him. Nevertheless, the hyperset hierarchy allows us to relax ARISTOTLE's restriction in a coherent and non-arbitrary way. B can be both cause and effect in the same hyperset-like hierarchy, and there is no difficulty in seeing B as being self-caused.

The hierarchy of causation appears to move in two directions. Bottom-up causation is where the parts drive a whole structure of parts, and traditional reductionism has no difficulty with this concept. Top-down causation is where the whole structure drives the action of the parts, and this is dismissed as mysticism. However, in a hyperset-like closed loop of causation we note that while the direction of the causation around the loop is indeed unidirectional, we can move from any node to anywhere else we like. *f* causes B, bottom-up. However, it is also the case that B causes φ causes *f*, also bottom-up, but it creates exactly the same effect as if B causes *f*, top-down.

The hyperset-like multi-level closed-loop hierarchy of efficient cause gives us a way of obtaining seemingly impossible effects through a progression of bottom-up moves the long way around the loop, provided the loop has finitely many nodes. As is evident from Figure 4, we can transit the loop bottom-up from any given position until we end up exactly one position down from where we started; this gives us top-down behavior, final cause, or the whole operating on the parts. We can also make the one last move that causes us to end where we started, thus having any cause in the loop serving as its own cause.

Juxtaposing both of these facts, an entity can serve as its own final cause. To paraphrase ARISTOTLE, the entity acts for the good of the agent of its final cause. The bizarre result of the hyperset-like structure, that the entity can be the agent of its own final cause. Thus, it follows that final cause can operate for the organism's own good, just as FREEMAN and DAMASIO have observed. The reason that ARISTOTLE excluded this possibility was that he was unaware of hyperset-like hierarchical structure of causal entailment.

Notice several dramatic implications of this process. It accounts for both upward and downward causation, and shows that both can be rationally understood. It shows that a finite process can produce all of its own efficient causes and its own final cause with no need of any interaction with any mysterious noumenal or other-worldly realm. As demonstrated in a previous paper, a similar structure of endogenous causation solves seeming paradox between determinism and freewill, again without the need for any other-worldly interaction (KERCEL 2002).

In other words, using the Modeling Relation to construct impredicative models of endogenous processes affords rational answers to the questions posed by both traditional science and traditional religion. It does so using a fundamental strategy that flies in the face of both traditions. It insists that organization cannot be separated from its material substrate without destroying the process irreparably. It insists that there can be no complete or largest model of any process. It also insists that neither upward nor downward causation operate in isolation from the other.

The principle that there is no largest model of a complex system means that some aspect of reality is inaccessible to human sensibilities. However, it does not require a dualism between an accessible phenomenal reality and a completely inaccessible noumenal reality. Cognition is model-based, and any model of reality is necessarily an incomplete description. Given sufficient resourcefulness, we can model *any* causal entailment in reality. However, the endogenous causal structure is capable of producing limitlessly many causal entailments. However, given the necessarily partial congruency of entailment between an impredicative model and an endogenous process, we cannot model them *all*. This limitation is fundamentally different from the KANTIAN or mystical notion that some aspects of reality are inherently inaccessible to human sensibilities no matter how resourceful we might be in attempting to model them.

ROSEN's strategy is arguably superior to both reductionism and mysticism as a way of gaining knowledge of the world because, unlike either tradition, the Modeling Relation does not admonish us to ignore anything. If we find something that we wish we could ignore, the requirement of the Modeling Relation is that we discover the model and mapping entailments that let us ask the right sort of questions. This is more difficult than ignoring inconvenient propositions, but ROSEN never claimed that adhering to his strategy was cheap.

Even in ROSEN's epistemology, two explicit but unprovable assumptions are made as the foundation. One is causality, the notion that events in reality are caused by other events, and that the structure of causation is coherent. The other is logic, the notion that propositions in a formal system are implied by other propositions, and that the structure of inference is non-contradictory. It is necessary to consider both, because both are necessary for the modeling process. Neither the coherence of the causal entailment structure of reality nor the coherence of inferential entailment structure of logic are provable from anything more fundamental.

Does Religious Experience Yield New Truths?

Even the Modeling Relation cannot escape a minimal element of belief. However, using impredicative models in the Modeling Relation, we can discover rational answers to the questions of how life, mind, final cause, and closure to efficient cause can all arise, without the necessity of hypothesizing God. The fact that we can do so does not by itself disprove the existence of God, or directly invalidate other claims attributed to mystical revelation. However, the Modeling Relation does provide us a means of judging the merit of such claims. It is instructive to examine JAMES' assessment of these questions from the ROSEN's perspective.

"My next task is to inquire whether we can invoke it as authoritative. Does it furnish any warrant for the truth of the twice-bornness and supernaturality and pantheism which it favors? I must give my answer to this question as concisely as I can. In brief my answer is this,—and I will divide it into three parts:

(1) Mystical states, when well developed, usually are, and have the right to be, absolutely authoritative over the individuals to whom they come.

(2) No authority emanates from them which should make it a duty for those who stand outside of them to accept their revelations uncritically.

(3) They break down the authority of the non-mystical or rationalistic consciousness, based upon the understanding and the senses alone. They show it to be only one kind of consciousness. They open out the possibility of other orders of truth, in which, so far as anything in us vitally responds to them, we may freely continue to have faith" (JAMES 1994, pp460–461).

"I now turn to my second question: What is the objective "truth" of their content?" "The word "truth" is here taken to mean something additional to bare value for life, although the natural propensity of man is to believe that whatever has great value for life is thereby certified as true" (JAMES 1994, p553). In JAMES' time there was not much thought to separating the model from the process modeled. Despite the fact that HERTZ conceived a notion similar to ROSEN's Modeling Relation, and that SCHOPENHAUER made rather a big issue of the distinction between an epistemological description and an ontological process, this distinction does not loom large in the thinking of the leading minds at the beginning of the 20th century. Thus, there was a muddle about the concept of truth as JAMES indicates above.

The concept of "objective truth" is something of an oxymoron, mixing an ontological concept of object with an epistemological concept of truth. One of the more radical ideas of 20th century scientific thought is the idea that (still ignored by most serious thinkers even at the beginning of the 21st century) put forward by KORZYBSKI, BATESON, JAYNES and ROSEN that the distinction between the map and the territory is of paramount importance to clarity of thought. What we say about reality is that has a coherent causal entailment structure; its effects are consistent with its causes, the attributes of "true" and "false" are non-descriptive. Reality is simply "there."

When we draw the distinction between the map and the territory, truth becomes a purely epistemological concept. We construct congruent models of processes in reality. The models include logical propositions, and *truth is simply one of the values a proposition might have.* There are two serious theories about how we distinguish whether a proposition has the value of true or false. One is by Russell, and fails to account for the context dependency of the truth value of a proposition and does not include a coherent concept of falsehood. The other theory is by AUSTIN, and does take into account the context dependency of the truth value of the proposition, and offers somewhat technical, but coherent, concepts of both the values of truth and falsehood (AUSTIN 1961).

With this in mind, the issue is not a question of whether or not the content of mystical revelation is objectively true. Rather, there are two questions. First, is the collection of propositions contained in as mystical revelation non-contradictory? If we find that it fundamentally contradictory, and that the mystic is willing to live with contradiction, then there is no room examining the revelation with the Modeling Relation, and no room for rational discussion with the mystic who has chosen to live with irrationality. Second, if the "revelation" is coherent, do the inferential entailments in the content of revelation commute with causal entailments of some process in reality? If they do not, then we can say that despite the truth value of the propositions in the epistemology, asking questions about them affords us no insights about reality (DRESS 1999).

From this perspective, we can ask about such insights. "Let me then propose, as an hypothesis, that whatever it may be on its farther side, the 'more' with which in religious experience we feel ourselves connected is on its hither side the subconscious continuation of our conscious life. Starting thus

with a recognized psychological fact as our basis, we seem to preserve a contact with 'science' which the ordinary theologian lacks. At the same time the theologian's contention that the religious man is moved by an external power is vindicated, for it is one of the peculiarities of invasions from the sub-conscious region to take on objective appearances, and to suggest to the Subject an external control. In the religious life the control is felt as 'higher'; but since on our hypothesis it is primarily the higher faculties of our own hidden mind which are controlling, the sense of union with the power beyond us is a sense of something, not merely apparently, but literally true" (JAMES 1994, pp556–557).

Part of the "more" that some mystical revelations offer is the notion of the traditional omniscient God of Judaeo–Christian tradition. The concept is incompatible with ROSEN's epistemology. In fact, it illustrates the problem with the notion of a largest model. Since God "knows all" He necessarily has a largest model of reality in His mind. Of course, part of what He knows is all the choices that that His creatures are supposed to make as an act of freewill, and for which He will hold them accountable on the Great and Terrible Day of Judgment. On the face of it, the whole idea is contradictory. ROSEN forecloses such a contradiction by disallowing a largest model, even in the mind of God.

There is a tendency among some modern thinkers to attribute the name of God to immanent mind. "The individual mind is immanent but not only in the body. It is immanent also in pathways and messages outside the body; and there is a larger Mind of which the individual mind is only a sub-system. This larger Mind is comparable to God and is perhaps what some people mean by 'God,' but it is still immanent in the total interconnected social system and planetary ecology" (BATESON 2000, p467). JAMES evidently believed much the same idea. "God is the natural appellation, for us Christians at least, for the supreme reality, so I will call this higher part of the universe by the name of God" (JAMES 1994, p561). Does such an Immanent Mind exist?

The answer is not presently known, but is perhaps discoverable with the Modeling Relation. According to JAMES, "We and God have business with each other; and in opening ourselves to his influence our deepest destiny is fulfilled. The universe, at those parts of it which our personal being constitutes, takes a turn genuinely for the worse or for the better in proportion as each one of us fulfills or evades God's demands. As far as this goes I probably have you with me, for I only translate into schematic language what I may call the instinctive belief of mankind: God is real since he produces real effects" (JAMES 1994, p561). However, if God is nothing but the larger complex process of which each of us is a complex functional component, then that which JAMES calls God is in no sense mystical or supernatural, or even cognitive. This God may be nothing more than the engine that SCHNEIDER and KAY (1995) say develops increasing complexity in order to more rapidly dissipate the thermal gradient of the Universe.

A Larger (but Never Largest) Epistemology

All belief structures aim at providing a world model that is capable of serving both aspects of the mind as it deals with percepts arising from both external and endogenous sources. The Modeling Relation is a powerful way to examine these processes. The assumption underlying this assessment is that there is a need in the human's mind for entailment. Human experience suggests that things that happen are not just random events. There is order in the world and that order comes about due to causal entailments that can be identified.

Once this is accepted, the role of religion and science become clearer. They are ways of satisfying this need. Through the Modeling Relation, the ongoing process of modeling the world by identifying its order can be examined. What is found is that the mind must play an active part in the making of this world model.

Science and logic were developed to supply a formal representation of this order. The resulting model and the methodology for setting it up (encoding, decoding and test for commutivity) were made as "democratic" as possible in that given sufficient training in the method large numbers of people could arrive at the same model and use it for prediction and control. Religion as a social institution also strived for a similar end, but with a very different methodology.

This divergence has existed in Western culture since the time of DESCARTES. His dualistic epistemology presumed that the effects of upward causation constituted the natural world, and that reductionism could give us a complete description of it. He also presumed that the effects of downward causation constituted the supernatural world, and discovering its description of was beyond the capability of human inquiry, although we might become informed about this aspect of reality through mystical revelation.

In spite of this segregation, the common thread is through the Modeling Relation as it describes the mind's activity in forming a picture of the world. Traditional science has worked hard at keeping this activity as free of the mind's active shaping of that picture using formal procedures and rules, in the hope that this would lead to an unambiguous model of the world. The resulting illusion of objectivity actually obscures the real procedural value of science which, even in its most reductionistic form, has provided useful models of the world and thereby fueled technology, commerce and politics.

Despite its undeniable productive power, this perspective is illusory. It ignores ambiguity in a demonstrably ambiguous world. A close look at the mental activity carried out as this was accomplished shows that, in spite of the use of strict rules and formalism, science has formed its models through the Modeling Relation with the necessary subjective and ambiguous components still there even though they were not acknowledged. Indeed, the very concept of falsehood, one of the two "truth values" of logic, turns out to be ambiguous, in some contexts exclusively signifying negation, and in other contexts exclusively signifying denial, and in most contexts, signifying both inseparably.

Since both science and religion are belief structures, since both must accommodate ambiguity, and both can utilize the Modeling Relation to form world models are they therefore equivalent? In fact they are distinctly different in their domain of influence in the realm of offering entailment for the observed events in human experience. The description of upward causation has become largely the domain of science and description of downward causation the domain of religion. The dead hand of DESCARTES dominates science and philosophy even after 400 years.

The key to the Modeling Relation is its utility in providing explanations for the world as it is observed. By encoding perceived causal events into appropriate formal systems, the seeker of a coherent picture of the world is provided with a manipulable formal system to be controlled in place of a natural world beyond that control. The Modeling Relation and its formal systems are where we must look to understand the relationship between religious epistemology and that of science. Events in nature are entailed by things in nature according to natural law. The outcomes are predictable and understandable as long as the simple mechanistic models are not taxed too far. They can be and when they are we invoke a need for something else to provide entail-

ment. Complexity theory in its many forms is but one of the attempts made to patch things up.

Yet large realms of human experience and activity have been modeled through a different kind of formal system. In this case a supernaturally caused efficient cause provides closure to a potentially infinite chain of causal questions. A close look at this tells us that the machine metaphor for the entire universe has to be dealt with in this way. Reductionist science carries over in a subtle way to the religious world view and makes the supernatural efficient cause the only answer!

An alternative to this dualistic picture is ROSEN's notion of complexity and its accompanying epistemology. In this view there are not just two, but limitlessly many domains and the two we have been examining are relegated to their rightful place as just two models of a world that is not amenable to description by any largest model. Proponents of either view will recoil at this, yet it is surprisingly useful for their own needs to adopt this if understanding is all that is sought.

ROSEN's epistemology opens things up and, in particular utilizes the unavoidable impredicativities extant in the world to help us get closer to a more complete model. Does this negate scientific or religious models? On the contrary, by spelling out why they exist and what they can and can not do it enhances their overall utility in a larger context. It also opens the way for further creativity and still more ways to interact with and model the world.

ROSEN has been called the NEWTON of Biology for having truncated a potential chain of causal entailments without having to invoke an outside supernaturally caused efficient cause. He shows that efficient causes can themselves be effects of other efficient causes in a natural process. Indeed, he shows that one of the distinguishing features of living processes is that all its efficient causes are effects of internal subprocesses. By introducing this concept that an organism is "closed to efficient cause," he solved an enormous problem. His solution satisfies the need of both religion and science to provide entailment and does so without forcing a choice between the alternatives of upward and downward causation. The complex world, the effect of both kinds of causation acting simultaneously, becomes available to us through a variety of models and asks us to be creative in providing still more.

ROSEN's epistemology also resolves another paradox. A complex whole, a "system" can always be reduced to its material parts, but not without the loss of its identity as a complex whole. This does not

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mean we must chose between the system view and the reductionist view. Both tell us useful things about the world. The whole system model is but one more way to deal with the multifaceted complexity of the world. The whole is indeed more than the sum of its parts, but the parts are also more than what they seem to be in a particular whole. In other words, context dependence cuts both ways.

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Religion provides a way to involve a supernaturally caused efficient cause as a largest model. In our new context, the model is not a largest model. We can say similar things about art, poetry, music, drama and other aspects of human experience. They clearly provide avenues for the exploration of that which lies outside us, that which is within us, and their interactions.

The Modeling Relation deals with mind processes which we name "percepts." These can arise in the conscious/unconscious because of sensory input or endogenous activity or some combination/interaction of the two. Visual arts, poetry, music drama all are responsible for percepts coming into being. Each has its own unique qualities but they share the ability to generate a perceptible pattern in the conscious/unconscious. Does this involve our world model? Yes, it definitely does since these percepts both mix with and help shape others. This is a complex, self-referential whole. The reason we are so naïve about this process from the standpoint of analysis is that the process is complex from the onset and has never lent itself to reductionist methods.

Conclusions

So what have we learned? Traditional science has claimed upward causation as its purview. Traditional religion has claimed downward causation as its purview. Much wisdom is ignored by assuming this dichotomy. One particularly unwise tenet is shared by many adherents to both traditions. It is the PLATONIC notion that all is right with the world except for the corrupting influence of Man. Its corollary is equally unwise, that in the absence of Divine intervention, Man is doomed to inevitable self-destruction.

The human mind is observed to have entangled upward and downward causal entailment structures. From the perspective of the Modeling Relation, this endogenous process leads to both individual identity and collective aspects. In the language of complexity theory, the human is a functional component in a complex whole. The individual and collective aspects are not cleanly separable.

Because of this, the role of politics in its broadest sense is intertwined with both science and religion and can not be fractioned out. The issues surrounding predictability and control and the resultant power they afford permeate everything in which humans partake. In all domains the individual's model of the world is subject to criticism and attack if it affords too much freedom. Civilization asks for something to be given up. How that happens and what it is depend so strongly on the dominant world model of those in control.

If a world model can offer satisfaction of many or all of the needs of a body politic, it becomes a tool in the quest for power and control. If the world model is abductive, if it provides a way to create novel value, the power it imparts can be positive and beneficial. It opens the way for further study of the issues addressed here both individually and collectively. The resulting insights should be liberating. It especially promises to liberate us from the notion that we are doomed to fall under the weight of our own corruption. A sufficiently large world model provides us instead with the means to become the authors of our own deliverance.

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Ryan McKay

Hallucinating God?

The Cognitive Neuropsychiatry of Religious Belief and Experience

Introduction: Religion as Pathology

"[Religion] is the opium of the people"
(Karl MARX 1963)

"Religion would thus be the universal obsessional neurosis of humanity" (Sigmund FREUD 1995)

At least since MARX and FREUD there has existed a conceptualisation of religious belief as pathological.[1] 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 via which religious people form and evaluate beliefs.

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.

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 processes 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 neuropsych*ology*, 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 beliefs 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 equivoca-

tion 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.[2]

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.[3] 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,[4] and evaluate the historical religion-as-delusion claim[5] 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 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 (DAVIES/COLTHEART 2000; LANGDON/COLTHEART 2000; BREEN et al. 2001; DAVIES et al. 2001). 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/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, "subpersonal 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-deficit 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-deficit 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-deficit 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" (p253). 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 de-afferentiation (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 localisable 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 neuro-electrical 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-focused 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-focused 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 contents "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-deficit 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)

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 external stimulation. Given visual experience of an apple, for example, identification of that experience as veridical or hallucinatory is simply a matter of de-

termining 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."[6] 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 need only 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).

Ultimately it would seem 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."[7] If we thus take religious experience as an *explanandum* (that which requires explanation), to posit God in our *explanans*[8] (that which does the explaining) is to posit a superfluous entity, because the most parsimonious *explanans* involves construing religious experience as mere *hallucination*.[9] 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)

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?[10] 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).[11] 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-fulfilment. 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-fulfilment origin, religious beliefs must be *false*, the genetically fallacious charge would clearly be in order.[12] 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 and reasons for justification, 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-fulfilment, believers in their turn have attempted to expose the motivational underbelly of atheistic belief. VITZ (1999), for example, put forward a "defective father" hypothesis, arguing 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).[13] 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.[14] 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 detail. 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 Cen-

tre 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 his 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 solace, for example, or perhaps increase the likelihood of survival.[15] 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 excessively 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 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.

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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).[16] It is conceivable that both propositions are motivated, but OCCAM's razor requires only that the latter be scientifically justified.[17] In the absence of compelling objective evidence for God's existence, therefore, religious belief is, alethically speaking, pathological and, by two-factor standards, delusional.[18]

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 praetor necessitatem* (PLANTINGA 2000, p370). The force of OCCAM's razor really just follows from probability theory: any hypothesis *x* is inevitably more probable than *x* conjoined with *y* (Georges REY and Barry LOEWER, personal communication).

8 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 experience-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 God's 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-fulfilment 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 God's 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.

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Jesse M. Bering

Natural Selection is Nondenominational

Why Evolutionary Models of Religion Should be More Concerned with Behavior than Concepts

ALTHOUGH THERE HAVE been several recent experimental attempts to examine the natural foundations of religion, such investigations are mostly consigned to phenomenal states, including research on the neuropsychology of religious experiences (see NEWBERG/D'AQUILI 2001) and the representation of religious concepts (for a review, see BARRETT 2000). Thus far, studies in the area of religion and cognition have focused on the latter—on the transmission and maintenance of culturally acquired religious concepts (ATRAN 2002; BOYER 2001). This research has been developed mainly around the ideas of cognitive anthropologists arguing that religion can primarily be understood as the systematic exploitation of mundane psychological systems by especially virulent strains of cultural concepts (ATRAN 2002; BARRETT 2000; BOYER 1994, 2001; BOYER/WALKER 2000; HIRSCHFELD 1994; PYYSIÄINEN 2001; SPERBER 1996).

Several laboratory experiments, for instance, have shown that the type of minimally counterin-

Abstract

Conceptual and empirical work on the natural cognitive foundations of religion has tended to concentrate on religious concepts. Research has shown that the generation, transmission, and maintenance of religious concepts can be explained by the architectural constraints of mundane human cognitive systems. Although such research is invaluable in that it has served to clearly lay out the conceptual parameters of religious beliefs, and to explain why there is cultural overlap in the 'morphology' of general categories of belief, it has been unsuccessful in showing how the representation of religious concepts can cause behavior, the only currency natural selection can operate on. Religious concepts, such as supernatural agent concepts, might in fact be little more than epiphenomena that map onto a specialized cognitive system which is functionally designed to abstract meaning from life events and personal experiences. This system might have evolved from human social cognition, but in the present context is designed to detect intentionality in events rather than behavior. Specifically, it may promote teleodeontic reasoning, *a form of causal reasoning where individuals envision that the purpose of certain random events is to inform them of what they ought to do in the face of moral uncertainty. If this orients them toward engaging in adaptive behaviors in diverse socio-ecologies, then the capacity to see meaning in events and experiences might be a unique complex adaptation.*

Key words

Evolutionary theory; natural selection; cognition; psychology of religion; meaning; supernatural

tuitive concepts (e.g., concepts combining human agency with inanimate objects; a clever tree) associated with religious beliefs are more easily recalled over long periods of time than are intuitive concepts (e.g., an old tree) (BOYER/RAMBLE 2001; see also WALKER 1992). Such findings are taken as evidence of the 'stickiness' of religious concepts, in that they show how such concepts are easily lodged in human brains—an empirical demonstration meant to simulate, apparently, processes of religious indoctrination in early childhood.

It remains somewhat unclear, however, how the representation of counterintuitive religious concepts can actually cause behavior, adaptive or otherwise. Indeed, BARRETT and KEIL (1996; BARRETT 1998) have demonstrated that implicit representations of religious concepts, arguably the variants that are responsible for behavioral decision making, effectively shed these counterintuitive assumptions. These authors were able to empirically demonstrate that people routinely distinguish be-

tween explicit "theologically correct" religious beliefs (e.g., God is everywhere) from their implicit representations of such concepts (e.g., God is temporally constrained, the same as other intentional agents).

Because natural selection operates directly on overt behavior, and indirectly on the psychological mechanisms driving behavior, research that focuses on phenomenal experiences associated with the cultural construct of religion fall short of actually explaining evolutionary processes. Of course, if the types of concepts involved with religion activate intuitive psychological systems, such that these concepts co-opt such systems and serve adaptive ends, then such an approach seems reasonable. This, in fact, appears to be the dominant perspective of evolutionary theorists studying the cognitive bases of religion (ATRAN 2002; BOYER 2001). It is how these concepts are used to drive behavior that is at issue in evolutionary models—not just how they are generated and transmitted. BOYER (1994, 2001), for instance, has repeatedly stressed the role of counterintuitive religious concepts (e.g., a god or ghost as a human agent absent of physical form but with an intact mind) in activating intuitive psychological structures, such as a folk psychology. In that such representations can actually lead to adaptive behavioral decision making, such explanations are evolutionarily plausible. For example, ascribing privileged epistemic access (i.e., "true" mindreading) to an unseen agency that is preoccupied with the self's moral transgressions might lead to the adaptive inhibition of socially proscribed behaviors. An individual who is under the impression that she is alone, for instance, when in actuality she is being watched by social others, might inhibit some socially maligned behavior for fear that God or some other supernatural agency is watching and judging her. In doing so, she avoids the punitive repercussions of her peers, which directly translates into the retention of her current level of genetic fitness.

Are Religious Concepts Merely Epiphenomena?

Plausibility aside, however, such theoretical models have not been subjected to experimental analysis, and so it remains premature to assert that religious concepts actually serve a causal role in activating psychological mechanisms in a manner that leads to adaptive behaviors. That is, although religious concepts clearly trigger implicit inferences that draw from the psychological systems designed for use in the everyday world (e.g., ghosts can see and hear) (BOYER 2001; but see BERING 2002a), how such intuitive representations actually foster adaptive decision-making in the natural environment remains unclear. Alternatively, religious concepts might be epiphenomena that are forced out through cultural channels because of the basic cognitive architecture of the human brain (BERING 2002a, 2002b). This account, for instance, would hold that religious concepts are post-hoc descriptors that merely map onto and enrich an already existing representational system dedicated to processing events in terms of intentionality and perceiving agency in the absence of behavioral cues. The concepts themselves would therefore shadow the operations of this native system, not activate them.

This account of religion would also be similar to evolutionary models of language claiming that mental representational processes were not enabled by language, but instead generated language (BLOOM 1998). Because religious concepts are envisioned as being transmitted almost entirely by language, such issues of causality in driving adaptive behavior are especially important. For example, do we even need such counterintuitive concepts in order to represent natural events (e.g., misfortune) as being intentionally caused? Or does the intuitive representation of events in terms of intentional causation only thrush out such concepts from the cultural copse?

Cognitive Adaptations in Religious Thought

Ultimately, experimental data will lead us in the right direction, but researchers are currently far from being able to convincingly answer these core questions of religion's origins. To do so, investigators must adopt the empirical approaches of evolutionary psychology, but also expand such approaches to include developmental and comparative perspectives (e.g., see BJORKLUND/PELLEGRINI 2002; DALY/WILSON 1999). According to the central tenets of evolutionary psychology, the contemporary appearance of human behaviors (and the domain-specific cognitive programs underlying them) can both be explained by, and also explain, the recurrent features of the species ancestral environment (BUSS 1995; TOOBY/COSMIDES 1992; see also KENRICK/LI/BUTNER 2003). The genetic substrates of those individuals that either lacked or possessed deficient psychological systems that were designed to cope with, exploit, or manage such environmental

challenges through the instantiation or inhibition of adaptive behavior became successively diminished. Indeed, eventually, such individuals would necessarily become altogether absent in the population. When the heritability of a trait, psychological or otherwise, reaches floor values because of the inescapable maladaptiveness associated with not possessing the trait or with possessing a dysfunctional version of the trait, then it is said to have become an adaptation (Mayr 2001; Symons 1992). That is, all individuals within a circumscribed, naturally occurring population of the species (e.g., adult females, senescent males, infants) are normatively endowed with the trait.

This is not to say that normal genetic variability in individual organisms will no longer occur for some dimensions of the trait (e.g., Buss 1996), only that it has become reproductively stabilized in the species genome such that it is now part of the default genotypic profile. For example, individuals are somewhat variable in the age of onset for certain adaptations that emerge over the course of human development, such as the presence of secondary sexual characteristics. Individual differences at this trait level are critical and are what likely serve, ultimately, as the impetus for radical evolutionary changes in the adaptation (e.g., heterochronic shifts), but they do not constitute genomic differences for possession of the adaptation itself. Regardless of relatively minor variability in age of onset, all healthy members of the species develop secondary sexual characteristics. From a selectionist perspective, such trait stability in the population makes sense; given that secondary sexual characteristics signal sexual viability in both genders because they co-occur with reproductive maturity, an inherited proneness for failing to ever develop such signals would substantially interfere with the organism's genetic success.

Research in behavioral genetics has, in fact, found similar evidence for the heritability of religiosity; although individuals do not inherit explicit religious beliefs through biological means, they do appear to inherit the degree of religious verve possessed by their genetic relatives (Kendler/Gardner/Prescott 1997; Pogue-Geile/Rose 1985). Although such findings of individual differences in religiosity are crucial for a complete understanding of the evolution of religion, however, they are of little interest to evolutionary theorists concerned with the phylogenetic emergence of cognitive capacities involved in religion. This is because such capacities are viewed as part and parcel of the standard psycholog-

ical hardware of the human brain (Atran 2002; Boyer 2001; Hinde 1999); religiosity represents only superficial differences along the dimension of personality characteristics involved in religious behavior. Individual differences in personality cannot seriously alter the basic organization of deeper cognitive structures associated with religious thinking. Indeed, Weeks and Lupfer (2000) have found that despite their explicit atheistic stance, nonbelievers are just as likely to invoke intentional causes for life-altering or ironic events as are believers. Bering (2002a) has also shown that even people who classify themselves as *extinctivists*—stating that death is a permanent cessation of the subjective, conscious personality—find it cognitively effortful to censor some types of mental state attributions (e.g., emotions, epistemic states) to dead agents. Pepitone and Saffiotti (1997; Deridder et al. 1999) have reported cross-cultural evidence that intentional causal attributions that are not expressly religious in nature (e.g., fate, luck, justice) are selectively applied to specific categories of events, for example justice as "the belief in a dynamic moral order of the universe that influences outcomes so that they are proportional to the moral worth of persons to whom they happen. The belief in just punishment is used to explain life events in which bad persons experience proportional punishment or other negative outcome, and the belief in just reward explains positive outcomes that are proportional to the good persons to whom they happen" (Pepitone/Saffiotti 1997, p27). From an early age, children prefer to explain natural objects and events by applying teleological reasoning, prompting Kelemen (2004), for instance, to argue that preschoolers are "intuitive theists."

Do Religious Concepts 'Activate' Psychological Systems?

Such findings suggest that focusing solely on religiosity, or explicit religious beliefs, is potentially misleading in that such beliefs do not accurately reflect the cognitive imperative in applying meaning to certain categories of random events (see McCauley 2000). Rather, it seems to be the case that the small percentage of individuals (about 5% of Americans) who profess not to believe in God or some other supernatural agency are simply more adamant in muzzling this cognitive imperative than others. Without meaning, there would be no such construct as religion, but the reverse is not necessarily true. This puts such cognitive capacities in line with

a host of more well-established adaptations, such as the craniomorphology of the human face, pentadactylism of human appendages, the sexual jealousy of human males, the ability to explain other agents' behaviors by appealing to mental states, and the rooting reflex in young infants, that are strongly canalized and appear in all individual members of the species population that have not encountered errors in intrauterine cellular division serving to disrupt normal developmental systems.

Other adaptations, however, may be highly dependent on a number of ontogenetic contingencies, such as the effects of birth order on the adoption of certain risk strategies, or be very sensitive to the effects of separate heritable traits, such as the effects of personality characteristics on mate-guarding behavior (BUSS 1996). Indeed, to take the earlier example, adaptive early menarche in females that are cohabiting with biologically unrelated adult males will lead to the relatively precocious expression of secondary sexual characteristics (BELSKY/STEINBERG/ DRAPER 1991; ELLIS et al. 1999). Such adaptations demonstrate considerable plasticity in their phenotypic expression and show greater sensitivity to the ecological context of the organism.

If, as many cultural epidemiologists hold, the intuitive psychological systems involved with religious behavior are "activated" by explicit religious concepts (e.g., BOYER in press; SPERBER 1996), then any adaptive behaviors concomitant with such a one-way causal interaction would be dependent on similar epigenetic processes, possibly reflecting sociocultural variability in the ancestral past where some environments were not as rife with religious concepts because the behaviors they instantiated were not adaptive in such ecologies. That is, adaptive religious behaviors would be enabled by indoctrination, or at least through exposure to religious concepts. If, however, the developmental systems supporting religious behaviors are relatively canalized, and the cognitive mechanisms underlying these behaviors are only ontogenetically receptive to, but not dependent on, religious concepts, then it becomes more likely that the system solved adaptive challenges faced under a wide range of ecological conditions.

Tracking Cognitive Adaptations in Religion

In this vein, one of the most convincing demonstrations of the adaptive nature of human psychological traits is evidence of increasing systematic complexity at phylogenetic and ontogenetic levels (TOOBY/COSMIDES 1992). Although adaptations are not necessarily equivalent to increasing complexity, there is a strong trend toward increased complexity because additions or changes to existing structures introduce new constraints that must be addressed by the reorganization of the overall system (see PINKER/BLOOM 1992). At the phylogenetic level, comparative analyses showing component parts, or precursor competencies, of human cognitive programs in closely related species suggest that the underlying system has been modified or adumbrated over the past several million years to accommodate the adaptive interests of modern humans.

SUDDENDORF and WHITEN (2001) highlight this approach, for instance, in their detailed review of secondary representation in humans and other species. Secondary representation refers to the cognitive capacity enabling the "decoupling" of primary perceptual features of an object, behavior, or event from a mental representation of its "aboutness" (PERNER 1991). The capacity is essential for many different categories of natural human behavior, such as children's pretend play (e.g., imagining that a banana is a telephone), artistic activities (e.g., depicting an animal through a drawing), and communication (e.g., understanding that eye gaze is "about" seeing). Secondary representation has been implicated as a critical component of the human intentionality system because, at the most basic level, it permits children access to the "aboutness" of behaviors (ASENDORPF 2002; PERNER 1991; SUDDENDORF/WHITEN 2001). Developmental psychologists have found that even 12 to 18-month-old infants might possess such a basic representational understanding of behavior, in that they appear to be sensitive to the goal states of intentional agents (GERGELY et al. 1995; MELTZOFF 1995 but see POVINELLI 2001). This understanding becomes increasingly sophisticated throughout early childhood, such that at about four years of age, children are able to predict and explain behavior by reasoning about other agents' knowledge and beliefs (for reviews, see FLAVELL 1999; WELLMAN/CROSS/WATSON 2001). BERING (2001, 2002a) has argued that secondary representation is central to the area of religion, as well, in that it allows humans to see meaning in otherwise random events (e.g., to believers, a thunderstorm on one's wedding day is not just a thunderstorm on one's wedding day, but is taken as a "bad sign" for the marriage). Upon reviewing the evidence, SUDDENDORF and WHITEN (2001) conclude that although chimpanzees share with humans a

fundamental capacity for secondary representation that is used to diagnose intentions, they fail to develop their secondary representational skills into an understanding of higher-order cognitive states, such as beliefs and knowledge. Other scholars have argued against such a liberal interpretation of the nonhuman primate findings, suggesting that there is little compelling evidence that chimpanzees possess even this degree of representational competency (POVINELLI/BERING 2002; TOMASELLO/CALL 1997).

Nevertheless, the approach itself, which involves elucidating the biological emergence of cognitive programs through cladistics, while also charting epigenetic pathways leading to the expression of these programs in human children, is a powerful tool in reconstructing the evolution of adaptive systems. In almost every respect, religion has not been investigated at this level of analysis—that is, at a level that concentrates on the phylogeny and ontogeny of possibly specialized systems devoted to extrapolating intentional agency (i.e., "meaning") from a subjective domain of personal experience. Rather, most approaches to the evolution of religion have plundered the "traditional" tool-kit of evolutionary psychology, which, although adequately addressing the adaptive nature of unique categories of religious behaviors (e.g., altruism, ally recruitment) does not seem to provide well for investigations into the organization and structure of complex representational systems underlying the behavior.

Consciousness as a Conduit to Intentionality

Historically, evolutionary psychology has actually deemphasized the importance of higher-order cognitive mechanisms, viewing consciousness, for example, as an epiphenomenon (see BADCOCK 2000; PINKER 1997). One of the reasons for this is that while cross-cultural comparisons of human behavior reveal remarkable similarity, individual cultures vary wildly in explaining the causes of identical categories of behavior. Behavioral isomorphism is not surprising when considering that across human societies, and across the human life cycle, individuals encounter the same set of basic challenges in the social and physical environments (BJORKLUND/PELLEGRINI 2002; REYNOLDS/TANNER 1995). Although humans are born into and are rapidly embedded within a complex social network that is characterized by a preexisting cultural infrastructure with a unique narrative history, individual members of the species are guaranteed to face the same ensemble of common challenges. To maximize their genetic fitness in any ecological or sociocultural context, individuals must, for example, be successful in getting their primary caregivers to support them during a prolonged juvenile period, avoid poisonous foods and dangerous animals, acquire the cultural norms and extant technologies of their social group, identify and attract potential mates and guard them against the sexual encroachment of competitors, establish and maintain coalitions of allies and help their genetic relatives, successfully rear their children, and protect their own interests against those who would exploit or deceive them. In their discussion of infanticide, for instance, DALY/WILSON (1988) report that infants meeting certain maladaptive criteria in a given ecological context, such as those that are sickly in a resource deprived environment, are significantly more likely to be killed than other infants. Infanticidal behavior is adaptive under such conditions because sickly infants countermand their mother's limited resources, delaying parturition of potentially healthy offspring. While individuals in one culture might explain the infanticide of the sickly infant as a necessary means of removing the curse of a displeased ancestor, however, those in another might explain the behavior in terms of the caregiver's psychopathology.

Evolutionary psychologists view such explanatory disjunctions as evidence for the causal irrelevance of consciousness; in selectionist terms, so long as adaptive behaviors occur under like ecological conditions, it matters little whether people engaging in the behavior believe that the gods or the state of the economy made them do it. Along such lines, evolutionary theorists are careful to distinguish between ultimate causation and proximate causation (see FRENCH/KAMIL/LEDGER 2001). Although the distinction is not limited to humans, there are special implications for *Homo sapiens* because the species is naturally endowed with conscious awareness of its own intentional states.

In humans, *ultimate causes* refer to the class of behavioral motives that operate independent of conscious awareness but that were carved out through natural selection. Examples of ultimate causes include the biological motives for adult caregiver's differential responsiveness to the cries of their own infants, or the preferential treatment of biological offspring over stepchildren. Throughout human evolution, the failure to engage in such behaviors compromised the inclusive fitness—the relative dis-

tribution or representation of one's genes within an interbreeding population—of parental figures. It is arguably this ultimate level of causation that evolutionary psychologists have been most concerned with. This is entirely reasonable, since the central question to be addressed in evolutionary inquiries of human behavior is how the behavior promoted biological success in the ancestral past. If this question cannot be clearly answered, then it is impossible to frame research hypotheses concerning such human behavior in evolutionary terms.

Such an emphasis on ultimate causation, however, does not mean that evolutionary psychologists have failed to apply selectionist thinking to psychological mechanisms that promote adaptive behaviors (e.g., BROSNAN/DE WAAL 2002; COSMIDES 1989; MCGUIRE/TROISI/RALEIGH 1997). In humans, *proximate causes* refer to the class of behavioral motives that are largely accessible to conscious awareness and that are responsible for promoting ancestrally adaptive behaviors. Proximate causes orient the individual to engage in adaptive behaviors, and, in humans, are often the conscious expressions of ultimate causes. For instance, the physiological arousal associated with sexual intercourse is a proximate motivator of sexual behavior, which is designed to serve the ultimate function of producing offspring.

To the extent that other species are capable of experiencing first-order psychological states (e.g., sex as a pleasurable state), their adaptive behaviors, as well, are governed by proximate causes. Humans may be unique in possessing a separate cognitive capacity, however, that allows them to represent such first-order psychological states (i.e., consciousness or self-awareness), and that is *also* capable of influencing behaviors. In some cases, the emergence of such self-awareness, or consciousness, actually served to interfere with more ancient psychological adaptations (BERING/SHACKELFORD in press; BURLEY 1979; NESSE/LLOYD 1992; TRIVERS 1981, 1985). TRIVERS (1981, 1985), for instance, has argued that with the appearance of consciousness, individuals became aware of their own socially maligned intentions (e.g., for cheating); this, in turn, activated emotional responses such that the individual's behaviors "leaked" (EKMAN 1993) these untoward intentions and compromised his or her deceptive aptitude. In response to this new challenge, humans may have evolved a catalogue of self-deceptive mechanisms designed to bar conscious access to proscribed, proximate causal states. If an individual is in denial of his own intentions then he should be more successful in deceiving others about his true intentions as well.

In another hypothesis illustrating consciousness's ability to disrupt more ancient adaptations, BURLEY (1979) has argued that some females might have become sensitive to subjective physiological indices signaling ovulation and abstained from sexual intercourse during such periods for their own "egocentric" interests (e.g., avoiding pain, accruing additional resources). Because such women would have given birth significantly less frequently than those that could not consciously detect their own ovulations, the genetic substrate underlying such abilities was effectively weeded out of the population through natural selection.

Taken together, such models suggest that consciousness emerged as a domain-general mechanism (possibly a byproduct of the dramatic expansion of the human frontal cortex over the course of hominid evolution) that presented a new series of adaptive challenges; these challenges, in turn, can be envisioned as spawning new domain-specific adaptations (e.g., self-deception; loss of estrus) designed to cope with the possibly sudden onslaught of self- and other-awareness. This interpretation envisions consciousness not as an adaptation itself, but rather as a conduit that provides access to intentionality—a new brand of "information" in the environment that required special handling by the human brain through the use of specific psychological structures.

The Role of Consciousness in Intuitive Religious Thought

In stressing the transmission and representation of religious concepts, cognitive anthropology has overlooked the role of personal consciousness, and potentially the adaptations created thereof, in the evolution of religious behaviors. Because religion deals mainly with people's personal interests and affairs—how the world bears directly on *their own* individual existence—the self is an extraordinarily important, but sorely neglected (for an exception, see MCNAMARA 2001), constituent in evolutionary interpretations of religion. Religion is only impersonal for those viewing human minds as convoluted vessels that have been designed for shuttling and shuffling counterintuitive concepts. In contrast, for those actually experiencing religion (and, arguably, for everyone else as well), it is an entirely personal part of their lives that is based on communion and communication with an abstract intentional agency (BEIT-HALLAHMI/ARGYLE 1997; KIRKPATRICK 1999). The ability to represent super-

natural agent concepts that are transmitted through cultural channels hinges on cognitive capacities designed to perceive such agents' "actions" in the environment. These "actions" do not take behavioral form, but rather are perceived in the form of personal experiences and life events (BERING 2002b).

The ability to ascribe meaning, and hence the ability to represent a supernatural agent, would seem to rest on both shared and unique psychological mechanisms from those employed in a "theory of mind" system. For example, the ability to attribute mental states to behaving agents (e.g., "Stacey left the room because she *forgot* her baby") and the ability to attribute meaning to personal experiences (e.g., "I got into a car accident because God *wanted* me to drive more carefully") both "borrow" from the same general class of unobservable causes (i.e., intentionality). In the social domain, however, individuals can weigh and measure different theories of mind against each other in order to devise the most accurate theory about the relationship between behavior and different types of mental states (GOPNIK/MELTZOFF 1997; GOPNIK/WELLMAN 1994; PERNER 1991; WELLMAN/GELMAN 1992). This is possible only because such attributions involve behavioral agents, which allows individuals to systemically and objectively probe behavioral causes by inferring intentionality through language or by observing predicted outcomes dealing with the relationships between mental states and overt behavior. In contrast, causal reasoning about life events and experiences is limited to the postulation of theoretical constructs or post-hoc interpretations. Devising a theory of meaning that is analogous to a theory of mind is impossible, because the natural phenomena to which meaning is applied are not amenable to the same type of empirical testing. Because they are not controllable, "meaningful" experiences cannot, in essence, ever be recreated and are unlikely to naturally occur again. Thus, deferring to the characteristics of previous cases of such experiences in an effort to aid in the prediction of future experiences will likely fail. There is no way to establish or test the validity of causal theories involving relationships between meaningful events and mental states. Colloquially, this is referred to as *faith*.

These differences between behavioral and event-related attributions aside, however, researchers must be careful not to get lost in sterile debates about the "unknowableness" of religious experiences—progress in the field was stilted for quite some time over just these kinds of empty assertions. A true science of "meaning" can, in fact, be developed on the heels of advances in cognitive science if investigations focus on general processes of meaning attributions, such as reflected in children's cognitive development. Just as the existence of mental states in behaving agents can never really be empirically established, neither can the existence of meaning in the natural world. Nevertheless, people's intuitive appeals to such causal concepts can be investigated through scientific pursuits; just as theory of mind is the subject of intense empirical investigation, so too can a theory of meaning become the focus of high-constraint experimental research.

On 'Meaning' in Religion: The Self as a Receptive Audience

The importance of bringing the self into dialogues of natural religion was anticipated by William JAMES, as is evidenced by the following quotation in *The Varieties of Religious Experience* (1994, p534):

"The pivot round which the religious life revolves, is the interest of the individual in his private personal destiny. Religion, in short, is a monumental chapter in the history of human egotism. The gods believed in—whether by crude savages or by men disciplined intellectually—agree with each other in recognizing personal calls. Religious thought is carried on in terms of personality, this being, in terms of religion, the one fundamental fact. Today, quite as much as at any previous age, the religious individual tells you that the divine meets him on the basis of his personal concerns."

Insomuch as the cognitive bases of religion indeed center on making attributions of meaning to random events (e.g., "the dead bird on the floor means that I shouldn't buy this house"), detecting reasons for having had personal life experiences (e.g., "if it weren't for the accident, I'd still be an alcoholic"), and imposing teleological purpose on one's autobiographical self ("I just don't feel like I'm supposed to be a waiter"), the domain-general capacity for inferring intentionality might have similarly hammered out adaptations for engaging in these forms of "existential" causal reasoning. Religion, of course, is merely a social construct under whose ontological boundaries many structural units of behavior can be characterized (SALER 2000; PYYSIÄINEN 2002), and so it is impossible and therefore inappropriate to speculate on the "evolution of religion" or "religion as an adaptation." It is equally absurd to discuss the "evolution of culture," so sweeping and immense are those forms of behaviors constituting cultural activities. Researchers can, and

have, however, identified and extracted those behavioral units comprising religion (e.g., rituals suggesting kinship between unrelated individuals)—and culture (e.g., pedagogical practices), for that matter—for selectionist interpretations. Still, because religious behaviors recruit the intentionality system in many important ways (e.g., attribution of mental states to supernatural agents, identifying social others who possess dissident religious beliefs), the evolution of such representational abilities as they are employed in religious behaviors should not be neglected in favor of a solitary emphasis on ultimate causation. In doing so, investigators would potentially be overlooking the phylogenetic and ontogenetic unfolding of a functionally organized cognitive system—a system whose operations may reflect adaptive trends and evolutionary innovations that were specifically designed to detect *intentional communication* in the form of life events.

The possibility of finding such a specialized system has been largely disregarded by cognitive theorists studying religion. Rather, some have proposed that such causal reasoning is merely a byproduct of agency detection in the social or biological domains—a sort of hyperactive agency detection which facilitated survival in the ancestral past because it alerted to the presence of predators or hostile out-group members (Barrett 2000; Guthrie 1993). This interpretation is insufficient, however. Reasoning that a stack of leaves rustling in the wind is caused by some intentional agency in the environment, or that a rock outgrowth on the horizon is another person, is qualitatively different from reasoning that the leaves are rustling in the wind because we should be going home, or reasoning that the rock outline reminded us of someone we know because we should be reconciling with him or her. Furthermore, reasoning that our friend's diagnosis of cancer is a warning for us to get our own lives in order, or that our wife was struck with a terminal illness because we had an affair last year, requires even more of a conceptual leap.

What these examples demonstrate is a distinction that, again, must be made in cognitive approaches in religion—that of the causal attributions made toward *agent-mediated actions* in the natural environment from *abstract agent-mediated events* in the subjective environment. Although both apparently trigger implicit inferences from folk systems, only the former makes such inferences on the basis of behavioral cues. For example, a behavior is a type of event; people routinely attribute causes to behaviors by appealing to the mental states of the behav-

ing agent, or by making deductive inferences of a behaving agent's intentions from cues that the behavior occurred (e.g., footprints). However, in religion, individuals frequently extend their causal reasoning beyond the domain of objective actions of the self and other agents, and attribute *independent* intentional causes to the *occurrence* of the behavior as an independent event. That is, one might ask "why did my wife leave me for another man?" and answer by saying "because she thought I wasn't paying enough attention to her." In addition to this, however, the person might also answer "because I'm meant to be with someone else." The latter captures the prototypical form of theistic questioning, which more often than not can be boiled down to the following basic existential query: "Why did this happen to *me*?"

These ideas can best be conceptualized, perhaps, by envisioning a personal, and hence highly unique, ontological causal frame, where the contents of the frame contain the unobservable causes of behaviors (e.g., beliefs, desires, intentions, knowledge), the movements of inanimate objects (e.g., mass, gravity, velocity), and biological transformations (e.g., illness, growth, death) as these events occur in an individual's unique perceptual construal. In religion, it is the disposition of this unique frame that is at issue. Why does the frame contain these particular behaviors, inanimate movements, and biological changes, and not some other behaviors, inanimate movements, and biological changes?

Does the Capacity to Attribute Meaning Reflect Adaptive Design?

With this in mind, however, the key remains in establishing the biological usefulness of this form of causal reasoning. That is, what fitness-related problems did finding meaning in random life events and personal experiences manage to solve (cf. Dawkins 1986; Williams 1966)? Clearly, as existential psychotherapists have shown, failing to find meaning in life or a purpose for one's individual existence is associated with an overgeneralized negative affect, and even clinical depression and suicide (Frankl 1959; Yalom 1980). This is captured quite starkly in the following passage, which was contained in a now fairly well-known suicide note written by an anonymous author (cited in Cantril/Bumstead 1960, p308):

"Imagine a happy group of morons who are engaged in work. They are carrying bricks in an open

field. As soon as they have stacked all the bricks at one end of the field, they proceed to transport them to the opposite end. This continues without stop and everyday and every year they are busy doing the same thing. One day one of the morons stops long enough to ask himself what he is doing. He wonders what purpose there is in carrying the bricks. And from that instant on he is not quite as content with his occupation as he had been before.

"I am the moron who wonders why he is carrying the bricks."

It is not enough, of course, to simply note that seeing purpose or reason in events is adaptive because the loss of meaning is detrimental to one's psychological well-being (cf. YALOM 1980). Such logic is circular in that it perpetually fails to explain precisely *why* it was disadvantageous to take such a counterintuitive stance in the context of human ancestral history—or rather, why a world stripped of meaning caused anxiety to begin with.

To arrive at a satisfactory, empirically derived, answer to this question of genetic fitness, researchers must begin reverse engineering the critical mechanics of the meaning attributional system, and determine the universal parameters in which attributions of meaning are made. This includes (1) identifying those separable cognitive mechanisms that are necessary for making attributions of meaning (e.g., secondary representation, counterfactual thinking, protodeclarative communication, autobiographical narratives, etc.); (2) searching for homologous mechanisms in closely related species, such as chimpanzees; (3) investigating the developmental emergence of these mechanisms in human ontogeny and, finally; (4) exploring the dynamic relations of these mechanisms with each other and how they operate in the real world.

Only once we know how the system is designed will we get any closer to understanding what its function is—if any. One reason to suspect that the cognitive ability to find meaning in events indeed *has* some adaptive value is because it is closely tied to motivational and affective components that are capable of gas-pedaling overt behaviors, the only currency that natural selection can operate on. There is good reason to believe, in fact, that such causal attributions serve their primary role in moral matters (ATRAN 2002; BOYER 2001; HINDE 1999; REYNOLDS/TANNER 1995) or, more generally, in the organization of adaptive behaviors in the face of decision uncertainties. In particular, we can refer to the attribution of meaning as evidence for a kind of intuitive *teleodeontic reasoning*—a form of causal rea-

soning about the purposeful nature of specific life events, whose purpose, in particular, is to tell us what we *should* and *should not* be doing. That is, representation of events in such a manner appears to tap into both culture-specific (e.g., "one should never wear a hat in a church") and species-wide (e.g., "one should never steal from his neighbor") deontological assumptions about how we ought to act.

The capacity to represent one's own intentions can give rise to conflicts between our personal desires for capitalizing on or selfishly exploiting social others and our assimilated social prescriptions for obeying moral order. Events often take on their "aboutness" in the subjective domain whenever we become aware of these discrepancies between our own proximate intentional states and the moral directives under which we are forced to live. For example, an individual might be planning on leaving his wife because he feels that he does not care deeply enough for her, but he is having second thoughts because of the disruption it would cause his family and because he does not want to be alone. In ultimate causal terms, leaving might also be a maladaptive decision, because he is risking his inclusive fitness by allowing his children to be step-parented, and because his reproductive opportunities outside of his marriage may be limited due to his low socioeconomic status. Under these conditions, this person might be especially likely (e.g., via "existential priming") to see meaning in ambient random events, because he perceives them as referential communicative devices that endorse the more adaptive behavioral decision—in this case, to stay with his current wife and family.

If this example accurately portrays people's decision-making under similarly uncertain conditions, then teleodeontic reasoning might serve to promote adaptive behaviors whenever conscious, proximate motivations are steering the individual toward potentially maladaptive courses of action. Random events, therefore, are not only directive, but also biologically corrective. This requires consciousness in that the individual must be capable of representing his own intentional states, because whatever abstract intentional agency is divined to have inspired the meaningful life events that have swayed his decisions in an adaptive direction is also envisioned as knowing what his intentions are.

In this light, meaning rests fundamentally on metarepresentation—whereby some event occurring "out there" in the natural world is about some abstract intentional agency's knowledge about the

self's subjective states "in here." This model predicts that the ability to engage in teleodeontic reasoning should be bootstrapped to the development of children's metarepresentational skills. Specifically, teleodeontic reasoning should co-occur with the expression of *second-order representation*, which is the embedding of propositional higher-order mental states (e.g., beliefs and knowledge) within the social cognitions of two co-acting intentional agents (e.g., "I know that you *know* what Maxx *intends* to do") (PERNER/WIMMER 1985). In contrast to first-order representational tasks, which involve asking subjects to predict Maxx's behavior on the basis of that character's false belief about some environmental reality (e.g., Maxx's false belief about the location of the candy bar), second-order representational tasks involve asking subjects to predict Maxx's behavior on the basis of Maxx's false belief about Jakob's mental states (e.g., Maxx's false belief that Jakob knows where the candy bar is hidden). Children are able to embed propositional mental states in such recursive fashion around their seventh birthdays (PERNER/WIMMER 1985; SULLIVAN/ZAITCHIK/TAGER-FLUSBERG 1994).

In conventional religious terms, the capacity is used to represent God's beliefs or knowledge about the self's mental states (e.g., I know that God *knows* what I *intend* to do) and to see random events as being God's "behavioral" responses to having such knowledge. Again, however, it is unclear (1) how cultural exposure to religious concepts (e.g., the explicit concept of God) could actually endow individuals with the requisite cognitive mechanisms to disambiguate a random event such that the event is represented as an intentionally communicated message designed to share deontic information, and; (2) whether such implicit ascriptions of meaning are even isolated to the institutionalized domain of religion.

Concluding Remarks

Few would disagree that the potential for applying the emerging experimental paradigm of evolutionary psychology to the scientific study of religion has not yet been realized. Fortunately, given that the relatively recent encampment of evolutionary biology in the social sciences has led to substantial

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changes in empirical approaches to the scientific analysis of human behavior, the potential for such data-driven advances in our understanding of religion are certainly there. In other areas, such as language research and social psychology, research designs are increasingly taking into consideration not only the *structure* of psychological mechanisms, but also how such structures may reflect evolutionary design (e.g., see PINKER/BLOOM 1992; SIMPSON/GANGESTAD 2001). Specifically, evolutionarily oriented psychologists attempt to uncover the *function* of the mechanism, both in terms of its structural organization and its operational procedures, as it occurred in ancestral environments.

The cognitive sciences have pioneered these advances, laying down the theoretical foundations upon which all developments in the field have been based. Central among evolutionary assumptions in the cognitive sciences is that the human brain is specially designed to handle environmental information in a manner that promotes the individual's genetic fitness (TOOBY/COSMIDES 1992). Because there are different categories, or domains, of information in the environment (e.g., fidelity of a sexual partner, physical health of offspring, reproductive viability of members of the opposite gender, social status of others), each with some stake in the genetic fitness of the human organism, the species should possess dedicated neurocognitive structures equipped to process the specificity of that information in programmatic ways.

The ability to abstract meaning from a universe devoid of intentional agency, but which is envisioned to be immensely concerned with certain, moral categories of the self's behavior, and which can sway the self's decision-making toward adaptive ends, are indications that the cognitive system sponsoring this cognitive imperative toward meaning is a product of natural selection. It remains, however, for empirical investigators in this area to adopt the high-constraint research designs of cognitive science and to provide convincing evidence for such speculative ideas—or, at least, to remove the insufferable weight of such ideas from the shoulders of theologians and philosophers, who are no longer the proper authorities for handling them.

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With or Without Belief

A New Approach to the Definition and Explanation of Religion

I N 1965, THE ANTHRO-pologist EVANS-PRIT-CHARD wrote:

"I find [the existing theories of religion], as they have been pro-pounded, unacceptable in that they contain con-tradictions and other log-ical inadequacies, or in that they cannot, as stated, be proved either true or false, or finally, and most to the point, in that ethnographic evi-dence invalidates them" (EVANS-PRITCHARD 1965, p18, see also pp1–2).

Recent attempts to ex-plain religion by evolu-tionary and cognitive psychologists are clearly superior to the explana-tions EVANS-PRITCHARD re-ferred to. However, we suggest that they share an assumption with these earlier explanations that makes them susceptible to the second of EVAN-PRITCHARD's criticisms: as stated, they cannot be proved either true or false. This is the assumption of religious belief. That is, the assumption that people believe the religious claims they make, and that it is this belief that causes people to make these claims. Hence, these recent explanations, like their prede-cessors, have attempted to explain why people be-lieve in supernatural (i.e., non-verifiable) beings

Abstract

Cognitive and evolutionary psychologists have fol-lowed earlier attempts to explain religion by assuming that religious behavior is caused by religious belief. Hence, they have focused their efforts on explaining why people believe in supernatural beings and forces. We argue that this approach is unacceptable because it is impossible to tell whether or not an individual be-lieves in supernatural beings and forces, and thereby impossible to identify religious beliefs. Until a way is found to identify religious beliefs, we suggest that ex-planations of religion attempt to explain identifiable religious behavior instead of religious beliefs. We ar-gue that the only identifiable behavior distinctively religious is a certain type of talk, more specifically, the communicated acceptance of a supernatural claim. Different types of religious behavior, such as ancestor worship, magic, divination, and shamanism, are dis-tinguished by different specific supernatural claims. Efforts to explain religion should focus on identifying the identifiable effects of such talk on the behavior of others. We suggest that the clearest identifiable effect of religious behavior is the creation of kinship-like co-operation. This may be the effect of religious behavior that has caused it to be part of an evolutionarily suc-cessful descendant-leaving strategy.

Key words

Religion; belief; behavior; communication; co-operation.

and forces. The problem with these explanations is that religious beliefs cannot be identified. This makes explanations of re-ligion based on religious beliefs scientifically unac-ceptable. Although sev-eral scholars have at least partially recognized this problem, no one has pro-vided an alternative ex-planation of religion re-stricted to what is empirically verifiable. We suggest some steps to-ward such an explanation of religion, that is both scientific and consistent with evolutionary theory.

Defining Religion

The supernatural?

As a first step in forming a scientifically acceptable explanation of religion, it is essential to define reli-gion. That is, to identify, as best we can, the neces-sary and sufficient ele-ments distinguishing phenomena as religious. This would not only specify what we need to account for, but what to test hypotheses against. According to most scholars it is the supernatural, meaning liter-ally beyond nature and hence beyond identification by the senses, that distinguishes religion. For exam-ple, EVANS-PRITCHARD (1937, p12; 1965, pp108–

110), although specifically rejecting the term supernatural, associates religion with mystical ideas, those ideas which are not derived, or logically inferred from observation. He points out, religion concerns beings which cannot be directly apprehended by the senses (EVANS-PRITCHARD 1965, p108). TYLOR (1958, p9) bases his definition of religion on spiritual beings. LEVY-BRUHL (1966, pp96, 447) equates religion with the mystical or pre-logical (which, he argues, wholly characterizes primitive mentality), pointing out that such thought is not verifiable by the senses (p61). LOWIE (1952, pxvi), along with MARETT and GOLDENWEISER, specifies supernaturalism as the differentia of religion. HORTON (1964) defines religion by reference to entities inaccessible to normal observation and unobservable beings; GOODMAN (1988), on the basis of alternative realities; VAN BAAL (1981), as the nonverifiable world; YINGER (1977), as the superempirical; JAMES (1902, p53) as the belief that there is an unseen order; and SPIRO (1966, p96) as, "culturally patterned interaction with… superhuman beings." HULKRANTZ (1983, p231), after pointing out the crucial role of unidentifiable things in the definitions of theorists like MULLER, FRAZER, and ROBERTSON SMITH, concludes that religion cannot be defined without reference to the concept of the supernatural. WELLS (1921, p275), after referring to the similar emphasis on unidentifiable phenomena in the definitions by PLATO, KANT, and JAMES, concludes that regard for correct usage of the term requires that religion be defined in such a way as to include supernatural belief. Recent evolutionary approaches also assume religion is defined by the supernatural. For example, NEWBERG/D'AQUILI/RUSE (2001, p66) refer to a realm of beings and forces beyond the material world. BURKERT (1996, p177) calls religion a tradition of serious communication with powers that cannot be seen. HINDE (1999, p2) defines religion as a systems of beliefs that have always been unverifiable. ATRAN (2002, p4) refers to supernatural agents, and BOYER (2001, p7) states that "religion is about the existence and causal powers of nonobservable entities and agencies; that is, supernatural matters" (BOYER 2001, p307).

But because the supernatural is beyond nature and hence beyond identification by the senses, it cannot by itself be used to identify religion. Although social scientists sometimes write as though they were reporting their direct observations of supernaturals, they typically do not claim to actually observe them. In reading such reports, it is clear that what has actually been observed are *statements* people make about supernaturals, and that it is only these *statements* that distinguish the activities as religious.

This is perfectly illustrated by the delightful list of examples of religion Pascal BOYER provides at the start of his book *Religion Explained*:

"1. A neighbor in the village *tells* me that I should protect myself against witches.

2. A shaman burns tobacco leaves in front of a row of statuettes and starts *talking* to them. He *says* he must send them on a journey to distant villages in the sky.

3. A group of believers goes around, *warning* everyone that the end is nigh… The group carries on, *telling* everyone the end is nigh…

4. An assembly of priests finds offensive what some people *say* about what happened several centuries ago in a distant place, where a virgin is *said* to have given birth to a child.

5. Members of a cult on an island decide to slaughter all their livestock and burn their crops. All these will be useless now, they *say*, because a ship full of goods and money will reach their shores very shortly in recognition of their good deeds.

6. My friends are *told* to go to church or some other quiet place and *talk* to an invisible person who is everywhere in the world.

7. I am *told* that if I want to please powerful dead people who could help me in times of need I should pour the blood of a live white goat on the right hand side of a particular rock" (BOYER 2001, pp1–2; emphasis added).

What is it about all of these examples that identify them as religious? It is the *claims* made by the people engaged in the activities about supernaturals—witches, flying statutes, invisible persons, powerful dead people—and only these claims, that make the activities religious. Because supernaturals cannot be identified, the accuracy of statements about them have the distinctive quality of being unverifiable. Social scientists support their claims about the presence of spirits by reporting *statements made by their informants*, not by presenting evidence that such spirits exist.

What can be identified about supernaturals, then, is what people *say* about them; if no one said anything about them, they would have no discernible existence. To identify religious behavior, therefore, it is neither necessary nor possible to identify supernatural phenomena; only *statements* about such phenomena need be distinguished. The only activity distinctively religious in Boyers examples is the talk about supernaturals.

Belief in the supernatural?

While social scientists, as opposed to religious or theological writers (see VERKAMP 1995), generally do not attempt to account for statements claiming the existence of supernaturals by the reality of the supernaturals, they almost invariably attempt to account for such statements by *belief* in them. Indeed, probably the most widely accepted definition of religion is something like, belief in supernaturals. The problem with this definition is that unlike knowledge, which can be identified by correlations between behavior and experiences with identifiable phenomenon, *religious belief* cannot be identified by correlations with *supernatural* phenomena because such phenomena cannot be identified. Hence, such beliefs can only be *assumed* to exist in the minds of individuals, to motivate their behavior, and to be identifiable simply by observing the individuals *talk*.

While it *may* be true that religious statements are indeed consequences of beliefs in supernaturals, the problem of identifying religious beliefs is rarely fully confronted. An author's claims about the beliefs of the people he studies, like those about supernaturals, are usually supported by citing people's statements. For example, Boyer refers to beliefs as explicit thought (2001, p305). But there are obvious problems with this assumption.

It is often the experience of ethnographers that when people are questioned about supernaturals they exhibit some uncertainty, even to the point of asking the ethnographer for guidance. People can also consciously lie about what they believe and it may be difficult, if not impossible, to discover these lies. Because of the potentially disagreeable consequences of a no answer, most Europeans in the Middle Ages would presumably have answered the question, Do you believe in God? by saying yes, no matter what they believed. On the other hand, in the Soviet Union of the 1950s a no answer would have been more acceptable than a yes, to the same question. How is one to determine, then, who is the true believer and who is not?

Many authors have pointed out problems with what HILTY calls this simplistic approach to religious belief (1988, p243) that assumes a direct equation between people's statements and their beliefs. EVANS-PRITCHARD also warned that statements about a "people's religious beliefs must always be treated with the greatest caution, for we are then dealing with what neither European nor native can directly observe" (1965, p7). The authors making such criticism almost invariably assume that the problem of identifying beliefs can be solved indirectly merely by determining if there are other behaviors consistent with the stated beliefs. For example, many scholars attempting to explain the ritual taboos of fishermen have assumed that the efficacy of a taboo is believed only when people state their belief *and* actually observe the taboo (see MULLEN 1969; POGGIE/POLLNAC/GERSUNY 1976; TUNSTALL 1962; POGGIE/POLLNAC 1988; VAN GINKEL 1987; ZULAIKA 1981). A study of Maine lobster fishermen, however, found that some fishermen observed taboos that they denied believing in and other fishermen failed to observe taboos in which they professed belief (PALMER 1989).

Similarly, Franz BOAS reports the case of a Kwakiutl Indian, Quesalid, who was skeptical about the alleged supernatural powers of shamans. Quesalid told BOAS that in an attempt to expose shamans, he became an apprentice curer and learned all of their tricks designed to give the appearance of supernatural powers—such as appearing to suck a bloody worm, alleged to cause disease, out of a patients body. By the time he had finished his training, however, Quesalid had gained quite a reputation as a curer. He continued to practice as a shaman, very successfully, in spite of claiming disbelief in their powers. Such an example suggests that the participation in activities asserted to involve supernaturals, even involving religious leaders, does not necessarily require their belief. To all outward appearances, Quesalid behaved the same as other shamans who did not reveal (at least to BOAS) their skepticism, and was even more successful than most (BOAS 1930, pp1–41; see also LEVI-STRAUSS 1963, pp175–178). Such behavior challenges the assumption that religious beliefs can be deduced from behavior.

Just as humans can say things they dont believe, they can also behave like things they are not. That is, they can act. When faced with contradictions between statements and accompanying behavior, how can we decide whether the talk or the accompanying action is what reflects the person's belief? Either choice appears to be arbitrary—merely a guess—and hence, unacceptable in a scientific analysis: "For as long as we admit guesswork of any kind social anthropology cannot be a science" (RADCLIFFE-BROWN 1979, p52).

There are many activities which, when examined, can be found to be inconsistent with religious statements made by the participants. ELKIN (1964) reports that the Australian Aborigines believe that a

man can be killed through sorcery by pointing a sharpened stick or bone at him and singing a special chant. Yet, when Aborigines, including other sorcerers, decide that an overly-active sorcerer should be stopped, they try to kill him with a spear. Why would they risk their lives in a direct attack if they believed that sorcery is sufficient? We are not claiming that these behaviors prove the participants *do not* believe in their supernatural claims, we are simply saying we cannot tell whether they believe or not from their behavior.

The difficulties caused by ignorance, uncertainty, the possibility of false statements, and inconsistencies in statements and other behavior, force one to question the validity of any claim of an individuals religious beliefs. Only statements and actions, not the religious beliefs which are so often assumed to motivate them, are distinguishable. People may make statements about what is inside their heads. If a person says they believe in ghosts, they *may* believe in ghosts; indeed, there *may* even be ghosts—there is no evidence that can disprove such a claim. However, when religious beliefs are claimed to be the cause of behavior, the cause is unidentifiable and hence the claim is unverifiable.

A few authors have come close to recognizing this profound problem in the scientific study of religion, but they have all failed to fully face it, perhaps because of an inability to see any alternative. RAPPAPORT (1979), for example, recognizes that what distinguishes religious ritual from nonreligious ritual is not beliefs, but supernatural claims, or what he calls "unverifiable propositions" (p262). For example, he states that "a religious ritual *always* includes an additional term, such as a statement about or to spirits" (p260; emphasis in original). The realization that it is certain talk, not certain beliefs, that is identified as religious leads RAPPAPORT to ask the question of whether or not participants in religious rituals actually believe the supernatural claims they make. Although he has just finished stressing the fact that humans can lie (p261), he ignores this possibility and concludes: "It is thus plausible to assume a belief on the part of at least some of the participants in the existence of deceased ancestors; to assume otherwise would make nonsense of the proceedings" (p262). In this statement RAPPAPORT acknowledges that he cannot tell how many, or which ones, of the participants actually believe the supernatural claims. Further, since this inability implies that the behaviors of believers and nonbelievers is indistinguishable, they will both have the same effects. Hence, the ritual will

make just as much sense whether all, or some, or none of the participants believe their claims. There is simply no logical basis for his conclusion that it is safe to assume that some must believe.

Speculating about beliefs, by introspection or otherwise, is still speculation. Speculating about what could be a cause is not identifying or discovering causes. The analysts claims about religious beliefs, like the supernatural claims of the individuals being studied, are invulnerable to disproof by evidence. When such claims cannot be verified, counterclaims cannot be resisted, other than arbitrarily.

Perhaps the clearest realization of this problem was made by NEEDHAM (1972). In regard to the Penan of interior Borneo, NEEDHAM reports that although he had been accustomed to say that they believed in a supreme god, he suddenly realized that he had no evidence at all to this effect. Not only this, but "I realized that I could not confidently describe their attitude to God, whether this was belief or anything else… In fact, as I had glumly to conclude, I just did not know what was their psychic attitude toward the personage in whom I had assumed they believed" (NEEDHAM 1972, p1).

NEEDHAM is also virtually alone in realizing the profound implications of this fact:

The question then was whether the reports of other ethnographers were much better founded, and what evidence these really had that their subjects believed anything. Clearly, it was one thing to report the received ideas to which a people subscribed, but it was quite another matter to say what was their inner state (belief for instance) when they expressed or entertained such ideas. If, however, an ethnographer said that people believed something when he did not actually know what was going on inside them, then surely his account of them must, it occurred to me, be very defective in quite fundamental regards. (NEEDHAM 1972, pp1–2)

We agree with NEEDHAM that there is no known method that can identify the internal states called religious beliefs. Only statements and actions, not the religious beliefs so often assumed to motivate them, are distinguishable. However, this does not lead us to NEEDHAM's dismal conclusion: "The solitary comprehensible fact about human experience is that it is incomprehensible" (NEEDHAM 1972, p246). While religious beliefs are not identifiable, religious behavior is, and this aspect of the human experience can be comprehended. What is needed is an explanation of this observable religious behavior that is restricted to what can be observed.

Supernatural claims?

But how then can attempts to scientifically explain religion proceed once the need to exclude unidentifiable religious beliefs from those explanations is accepted? The answer, we suggest, is simply by restricting hypotheses to what can be identified as religious, certain *talk*, and the identifiable effects of that talk. But exactly what kind of talk constitutes religious behavior? That is, what is the definition of religion?

While a claim of the existence of something unidentifiable by the senses (i.e., supernatural) appears necessary for behavior to be distinguished as religious, such a claim alone may not be sufficient. A claim asserting the existence of something nonidentifiable may be considered evidence of being demented, perhaps even the basis for incarceration. An outright lie, a claim of seeing a unicorn, dragon, or flying saucer, the interpretation of a dream, a claim of being a teapot, a claim based on misperception, may all be supernatural assertions by definition, but are not normally considered religious (see Douglas 1975, p75). Certainly none is distinctively or necessarily religious.

To arrive at a definition of religion that specifies its necessary and sufficient elements, one that can withstand the skepticism of our senses, let us focus on the first element in the definition of religion being belief in the supernatural. According to the Shorter Oxford Dictionary, cited by Hinde (1999), belief means "mental assent to or acceptance of a proposition, statement, or fact, as true, on the ground of authority or evidence" (Hinde 1999, p34). Religious beliefs, since they are not subject to empirical verification (ibid.), can be defined as mental assent to or acceptance of a supernatural proposition or statement on the ground of authority. Now while it is possible that it may be a statement made by a supernatural, such a source cannot be verified. More importantly, while it is also possible that the person is experiencing *mental* assent, what can be identified, by both social scientists and believers, is the explicitly communicated acceptance of another person's claim about something supernatural. When a person claims he is a flying saucer incarnate we do not necessarily conclude they are religious. But when others regularly communicate their acceptance of that claim, it would be difficult to conclude that such behavior is not religious.

Thus, we propose, *the communicated acceptance of a supernatural claim (a claim than cannot be shown to be true)* constitutes the necessary and sufficient ele-

ments identifying behavior as religious. This definition can be checked by examining behavior we agree is clearly religious to see if it consists of this behavior (Steadman/Palmer 1995). If this definition can withstand our skepticism, the essential task in the study of religion will be to account for this communicated acceptance. Evans-Pritchard (1965, p77) asserts, religious conceptions can only be derived from experiences. If this is true, the main task in the study of religion would be to identify the experiences leading to such a communication of acceptance of a supernatural claim.

Explaining Religion

Evans-Pritchard (1965, p94) correctly pointed out that previous explanations of religion have been guided by the question, "how does it come about that people capable of logical behavior so often act in a non-logical manner?" That is, why do people capable of logical behavior engage in the non-logical act of believing in nonverifiable claims. Because they assume religious behavior is produced by religious beliefs, recent evolutionary explanations parallel many of these older explanations. Whether they see religion as an evolutionary by-product, or an adaptation created by either individual level or group level selection (see Wilson 2002, p45), recent evolutionary explanations attempt to explain religious *belief* (although sometimes the term belief is replaced with the terms memes or psychogenes).[1] Perhaps the most popular view is that the reasoning that leads to religious beliefs is a side-effect of a variety of evolved psychological mechanisms. In the words of Pascal Boyer, religious beliefs are the result of the successful activation of a whole variety of (evolved) mental systems (2001, p298; see also Pinker 1997; Kirkpatrick 1999; Hinde 1999; Ashbrook/Albright 1997, Atran 2002). We fully agree with the proposition that evolved psychological mechanisms are operating during religious, and all other, behavior. However, the specific explanations of this involvement, as stated, are unacceptable because they propose explanations of religious beliefs which cannot be themselves identified. It is only the unverifiable assumption that people believe their claims that leads to the assumed involvement of reasoning mechanisms allegedly producing the belief.

Until a way of identifying religious beliefs is found, we suggest that cognitive and evolutionary psychologists change their approach to religion to one that rephrases Evans-Pritchard's question to

read: why do people assert and communicate acceptance of statements that are not demonstrably true by the senses? That is, we suggest that cognitive psychologists switch from attempting to identify the psychological mechanisms producing unverifiable religious beliefs, to attempting to identify the evolved psychological mechanisms producing verifiable religious talk To complement this shift, we suggest evolutionary psychologists focus on the question of whether or not the identifiable effects of religious talk could have increased the descendant-leaving success of our ancestors. Toward these ends, we make the following specific suggestions.

Suggestion one: Religion as communication

It has often been argued that the most significant effect of religion lies in its expression; religion is said to express people's beliefs, values, emotions, needs, confidence, social structure; and now, their evolved psychological mechanisms. Indeed, communication itself is often said to be self expression. While much has been written on communication and communication theory, and here is not the place to discuss it adequately, it must be emphasized that communication is not simply expression. Expression, from the verb meaning literally to squeeze out, such as juice from grapes, is a widespread phenomenon. Communication, however, occurs only when a message sent by one organism is received by another. The most significant effect of communicative behavior, the only effect that can account for its persistence through generations, is its influence on the behavior of others through their senses. Communicative behavior is aimed at influencing the behavior of others through their senses. If religious behavior is certain talk, it is a form of communication. If it is a form of communication, attempts to explain it should focus on the influence of religious talk on the behavior of others, and the consequences of such influence during our evolutionary history.

Suggestion two: Religion as (denied) metaphor

A key to identifying the influence of religious behavior, is to recognize that religious talk is a certain type of metaphor. While a metaphor is an assertion that must be recognized as not literally true (according to the senses), it is more than simply an untrue statement. The claim, that man is a rat, must first be recognized as untrue, and then decoded as a simile: that man is only like a rat (in certain respects). A metaphor, then, is a disguised simile, disguised by

its untrue assertion. Hence, metaphors are, by definition, statements that are accepted as true although they are not literally true. Metaphors are used to enhance communication, by making claims more interesting, and hence, more influential. However, regular metaphors, in contrast to religious metaphors, are acknowledged to be false. Therefore, their acceptance does not communicate a willingness to accept the speakers influence non-skeptically. For example, if we call a person a rat, when questioned we would acknowledge that he or she is only *like* a rat, in some way. This is why no one would consider this talk about rats as religious. Religious behavior differs from normal metaphor in that the supernatural claims are *denied* to be metaphors. Totemism is religious because the practitioners deny that their claim of being a rat is only a metaphor. It is this denial that makes the claim a supernatural claim, and its communicated acceptance, religious behavior. The claim that the statement (the metaphor) is literally true communicates a willingness to accept the speakers influence non-skeptically, and thereby promotes cooperation.

A religious metaphor is distinguished from other kinds of metaphor by the explicit claim that the metaphor is literally true, thus denying that it is metaphor. This communicates a great willingness to suspend skepticism, and hence, to accept the influence of the speaker. The bread and wine taken at communion by Catholics is said to be literally the blood and body of Jesus, despite remaining, on the basis of the participant's own senses, only bread and wine. What distinguishes them as flesh and blood is only the supernatural claim. The communicated acceptance of a religious metaphor, then, because it includes the claim that it is literally true—that it is not a metaphor—communicates a much greater willingness to accept the speakers influence than the communicated acceptance of a normal metaphor. We suggest that the cooperation engendered by the acceptance of religious claims, may be the fundamental function of religious behavior. That is, the effect of religious behavior that has caused it to be repeated through the generations.

Suggestion three: The remembered kinship-like consequences of religious behavior

Finally, we suggest that the evolutionary significance of religious behavior can best be understood as an intensification and extension of kinship cooperation. For millions of years, kinship cooperation has clearly been an integral part of the human strategy

to survive and reproduce. Kinship cooperation is produced by parents encouraging cooperation among their offspring (PALMER/STEADMAN 1997; PALMER/FREDRICKSON/TILLEY 1997; COE 2002). This encouragement of cooperation is facilitated by a child's willingness to accept the influence of his parent non-skeptically—indeed, the child is rarely in a position to judge it—while a parent rarely accepts as true a non-demonstrable claim made by his or her child. Religion *intensifies* this kinship cooperation by having individuals, including adults, communicate acceptance of supernatural claims, and thus, communicate their willingness to accept the influence of religious leaders as they encourage cooperative behavior. Religion *extends* this kinship cooperation by referring back to more distant dead ancestors as the source of the supernatural claims, allowing the encouragement of cooperation to apply to a wider circle of currently living co-descendants of those ancestors (STEADMAN/PALMER/TILLEY 1996; PALMER/STEADMAN 1997). Eventually, in what are known as world religions, the kinship-like cooperation is extended to non-kin.

The proximate mechanisms producing this intensification and extension of kinship cooperation involves the remembered consequences of the religious behavior itself. When individuals witness consequences, including social consequences, of behavior, their decision to repeat, modify or abandon that activity inevitably will be influenced thereby. We propose that the most significant effect of religious behavior, the effect that has led to its persistence, is in its encouragement of enduring family-like cooperation between either kinsmen in different families, or between non-kin (who nevertheless are usually spoken of metaphorically as kin), and that such behavior thereby has promoted the leaving of descendants. It is in the context of this kinship-like behavior that the success of both primitive and modern cults—from the simplest form of ancestor worship found in tribal societies to modern Judaism, Islam, Hinduism, Buddhism, and Christianity—can be understood. It is this same general effect that can account for the persistence and frequency of magic (including sorcery), divination, taboos, the telling of myths, and even the killing of witches. Indeed, to the extent such religious activities are traditional, their very existence depends on cooperation between ancestors and descendants—that is, they depend on kinship cooperation (STEADMAN/PALMER 1995). Hence, identifying the evolved psychological mechanisms involved in human kinship cooperation would be a major contribution toward the goal of explaining religion.

Conclusion

We have argued in this paper that the effect of religious behavior that can account for its ubiquity and antiquity is that, through denied metaphor, it promotes kinship-like behavior among individuals who are not close kin.

If religious claims are metaphors denied to be metaphors, the meaning of religious claims may only be understood when they are translated into a simile. Once this is done, the effect of the talk that contributed to the leaving of descendants may be revealed. To guide further studies of specific types of religious behavior, we propose the following definitions and hypotheses:

Talk of *souls* implies the continued existence of an individual after they die, literally a contradiction. As a metaphor, the simile is that we act, or talk *as if* the dead individual is still alive.

Ancestor worship is distinguished by the claim that dead ancestors influence, and are influenced by, their living descendants. The rituals associated with such claims have the dual effect of both promoting cooperative relationships between the kinsmen involved, descendants of those ancestors, and encouraging respect for the influence of those ancestors—the source of both their kinsmen and traditions. It is the encouragement of kinship relationships and the transmission of traditions, we propose, that can account for the persistence and spread of the claims and rituals involved in the apparently universal worship of ancestors in all societies without a modern religion (STEADMAN/PALMER/TILLEY 1996).

Totemism is identified by the claim that an ancestor common to a particular set of kinsmen, and hence the living kinsmen, has a supernatural relationship to a category of something non-human, usually a species of animal or plant. The most important effect of this metaphor, the effect that can explain its persistence, is the metaphorical embellishment of social relationships among a set of living co-descendants.

Magic is distinguished by the communicated acceptance of a claim that certain techniques have an effect that cannot be demonstrated. The distinctive effect of such claims and techniques lies in their communication: of sexual desire, anger, support, concern for someone's well being, and so on. The general effect of such messages is to promote particular kinds of cooperation. Even sorcery, which communicates anger, is a substitute for violence.

Divination is identified by the supernatural claim that certain techniques accurately predict the fu-

ture. Such claims cannot be shown to be true. The most important effect of divination is that it reduces responsibility in decision-making, and thereby reduces the acrimony that can result from bad decisions.

A *witch* is an individual accused of being supernaturally, that is non-demonstrably, evil. The killing or injuring of a witch includes the acceptance of the accusation. Because actual evidence is irrelevant, by such acceptance individuals uniquely communicate their willingness to support, and cooperate with the accusers in injuring or killing the accused. People accept such accusation and support such action, we propose, in order to intimidate a category of people who actually pose an identifiable threat to their social hierarchy. The witch is a symbol used to communicate a readiness to use violence to protect the hierarchy on which their social relationships are based (STEADMAN 1975, 1985).

An individual's acceptance of supernaturally justified *taboo, pain and sacrifice,* communicates their willingness to suffer for those individuals, including ancestors, who encourage such acceptance, and promotes thereby the willingness of everyone involved to suffer for one another, an element essential in social relationships.[2]

Through *myths,* or traditional stories, ancestors transmit experiences vicariously to their descendants to encourage them to cooperate in particular ways with one another. The various supernatural claims involved in myths not only suggest that such claims are important but also depend upon their non-skeptical acceptance by the listeners (STEADMAN/PALMER 1997).

The acceptance of a claim that a *shaman* or *prophet* has supernatural powers uniquely communicates a commitment by the acceptors to the shamans or prophets influence. While the task of a sha-

man is to lead traditional cults of (mainly) identified kin (see STEADMAN/PALMER 1994), the activity distinguishing a prophet is the creation of a modern cult, maintained by his representatives, *priests*. While ancestral cults are distinguished by the creation of family-like relationships between distant kin, modern cults (including the world religions) are distinguished by such relationships between non-kin, individuals who (usually) by virtue of alleged descent from a creator God are said to be kin, a kind of supernatural kin. The acceptance of such supernatural descent, then, communicates a willingness to act like a kinsman toward the actual, and potential, members of the cult.

The common thread running through all these activities is the encouragement of individuals to sacrifice themselves in various ways for others, the encouragement of selflessness. The willingness to sacrifice lies at the heart of social relationships, the *sine qua non* of human societies. By encouraging voluntary sacrifice, religious behavior creates and strengthens social relationships between individuals. Due to the force of DARWINIAN selection, religious behavior that has become traditional has favored the descendant-leaving success of the participants, and has thereby increased the frequency of the religious activities themselves.

Determining the truth of the above hypotheses depends on empirical identification of the facts asserted. While statements whose facts cannot be so identified may be true, simply asserting them does not make them so. In an enterprise such as science, which is concerned with the demonstrable accuracy of statements, the statements proposed and considered must be restricted to those whose accuracy is subject to the skepticism of our senses. The above hypotheses must be so judged.

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Notes

1 For examples of evolutionary explanations of religion attempting to explain religious *belief,* see CAMPBELL (1975), WILSON (1978), ALEXANDER (1987), IRONS (2001), RICHERSON/BOYD (1989), DAWKINS (1998), BLACKMORE (1999), BURKERT (1996), MCCLENON (1994, 2002), HINDE (1999), ASHBROOK/ALBRIGHT (1997), WILSON (2002), NEWBERG/D'AQUILI/RUSE (2001), GIOVANNOLI (1999), BOYER (2001).

2 This view of religious behavior as communication is similar to the hypothesis that religious behavior is a hard-to-fake signal of commitment (see SOSIS 2000; IRONS 2001). The main difference between the two theories is that while the costly signaling theory focuses on only the sacrifices often encouraged by religions, our theory attempts to account for the talk that actually distinguishes religion. The explanations also differ in that the costly signaling theory still assumes belief.

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Zusammenfassungen der Artikel in deutscher Sprache

Robert A. Hinde
Religiöse Systeme: Evolution, kultureller Wandel und die Entwicklung von Religiosität

Das Ziel dieses Artikels besteht darin aufzuzeigen, dass für ein tiefgehendes Verständnis eines jeden religiösen Systems eine Integration evolutionärer, kultureller und individueller Prozesse notwendig ist. Dabei werden keine Details erarbeitet, sondern es soll eine Möglichkeit zum Verstehen und zur Synthese der Grundlagen von Religion aufgezeigt werden.

Indem religiöse Systeme als komplexe Gebilde betrachtet werden, die aus zahlreichen interdependenten Komponenten bestehen, denen in unterschiedlichen religiösen Systemen unterschiedliche Wertigkeiten zugesprochen werden, wird deren Verständnis erleichtert. Dabei ist es wichtig zu bemerken, dass jede dieser Komponenten teilweise von pankulturellen psychologischen Merkmalen abhängt, die wahrscheinlich in anderen Kontexten adaptiv sind. Obwohl die Unterschiede zwischen Glaubenssystemen auch zu zahlreichen Grausamkeiten, Kriegen und Leid geführt haben kann die Ausübung von Religion die Nöte und Ängste vieler Menschen beträchtlich erleichtern.

Hank Davis/Andrea Javor
Religion, Tod und Horrorfilme: Einige erstaunliche evolutionäre Parallelen

Ausgangspunkt unserer Untersuchung ist der evolutionäre Ansatz BOYERS (2001) der sich mit dem kulturübergreifenden Erfolg von Religion beschäftigt. Ausgehend von einer Fülle anthropologischen Datenmaterials versucht BOYER die gemeinsamen Aspekt unterschiedlichster Religionsformen aufzufinden. Als zentrales Element erweist sich dabei der Tod bzw. der ritualisierte Umgang mit dem Tod. Religion stellt dabei evolutionär bedingte und erfolgreiche Umgangsformen mit dem Phänomen des Todes zur Verfügung.

Wenn diese Annahme BOYERS zutrifft, dann sollte diese Form von Logik auch auf andere erfolgreiche und weit verbreitete Formen von Kultur, die mit dem Tod zu tun haben anwendbar sein. Dazu gehören Horrorfilme, die ein überaus erfolgreiches Genre der Filmindustrie seit deren Bestehen darstellen. Unsere Fragestellung lautet: in welchem Ausmaß treffen die Vorhersagen BOYERS über Tod und Religion auch auf Horrorfilme zu.

Unsere Ergebnisse deuten darauf hin, dass die von BOYER postulierte erfolgreiche Strategie des Umgehens mit dem Tod sowohl auf Religionen wie auch auf Horrorfilme anwendbar ist.

Joseph Bulbulia
Religiöser Aufwand als Anpassungen, die altruistische Absichten signalisieren

Im Rahmen der kognitiven Psychologie werden übernatürliche Repräsentationen als kognitive Nebenprodukte interpretiert, die unter bestimmten kulturellen Gegebenheiten erworben wurden. In diesem Beitrag wird ausgehend von der evolutionären Spieltheorie und den Erkenntnissen tierischer Kommunikation eine andere Perspektive entwickelt. Religiöse Kognition wird dabei als Anpassungsphänomen verstanden welches den individuellen Reproduktionserfolg steigert indem reziproker Altruismus begünstigt wird. Ein wesentlicher Punkt hinsichtlich des Verstehens von religiösem Altruismus findet sich in dem spezifischen Aufwand, der dem Glaubenden durch religiöses Denken und religiöse Praxis erwächst. Dieser Aufwand spielt eine strategisch wichtige Rolle im Rahmen sozialer Austauschprozesse und deren Absicherung. Diese Arbeit eröffnet weiters überprüfbare Voraussagen über die psychische Architektur religiösen Denkens.

Allan D. MacNeill

Die Fähigkeit für religiöse Erfahrung ist eine evolutionäre Anpassung an die Kriegsführung

Auch eine oberflächliche Betrachtung der Geschichte von Kriegen und kriegsähnlichen Konflikten macht deutlich, dass Religion eine zentrale Rolle gespielt hat. Hier stellt sich die Frage nach den Beziehungen zwischen Religion und Krieg, d.h. ob diese in einem kausalen (in beide Richtungen) oder in einem anderen Verhältnis stehen.

Die hier vertretene These lautet: die Fähigkeit von Menschen religiöse Erfahrungen zu machen existiert vor allem, weil sie die Kriegsführung erleichtert hat, die wiederum diejenigen, die Religion bedingenden Faktoren verstärkt. Die Fähigkeit zu religiöser Erfahrung und zur Kriegsführung entwickelten sich in einem ko-evolutionärem Prozess.

Jesper Sörensen

Religion, Evolution und die Immunisierung kultureller Systeme

Dan Sperbers und Pascal Boyers Untersuchungen von Religion gehen davon aus, dass die Entstehung und die Ausbreitung religiöser Ideen bzw. Überzeugungen vor allem auf folgende Faktoren zurückzuführen ist: bestimmte kognitive Faktoren (Module) bedingen die Entstehung spezifischer Repräsentationen, die wiederum nach rein pragmatischen Faktoren bestehen bleiben oder wegselektiert werden.

Meine Kritik richtet sich vor allem gegen die Dominanz von zwei Annahmen:

(1) die Annahme religiöse Phänomene seien nichts anderes als gleichförmige Repräsentationen, die von den Mitgliedern einer Kultur aufgrund gleichartiger kognitiver Funktionen geteilt werden

(2) die Annahme dass Kulturen bzw. religiöse Traditionen bloße Epiphänomene – als Resultanten bestimmter kognitiver Prozesse darstellen.

Meine Position geht über diese Perspektiven hinaus und beinhaltet die sog. „Immunisierung kultureller Systeme". Dieser Ansatz versucht die bestehenden Konzepte zu ergänzen, indem er auch die interne Kohärenz neuer Repräsentationen mit bestehenden Repräsentationen geltend macht. D.h. als selektives Kriterium gilt dabei nicht nur der unmittelbare pragmatische Kontext, sondern ebenso die Passung mit bestehenden Mustern und Repräsentationen. Darüber hinaus können religiöse Tra-

ditionen eine gewisse Form von relativer Unabhängigkeit von den zugrunde liegenden kognitiven Systemen und pragmatischen Kontexten erlangen. Kognitive Mechanismen bedingen dabei die kulturelle Morphologie ebenso, wie auch die etablierten kulturellen Muster auf die kognitiven Prozesse rückwirken.

Bradley Franks

Negation und Zweifel innerhalb religiöser Repräsentationen: Kontextabhängigkeit, Emotion und Handlung

Religiöse Repräsentationen sind häufig kontra-intuitiv und widersprechen basalen Annahmen über die Beschaffenheit der natürlichen Welt. In dieser Arbeit wird der Versuch unternommen diese Form der kontra-intuitiven Annahmen nicht als einfache Verneinung, sondern als Zweifel an diesen Annahmen zu interpretieren. Der Zweifel an religiösen Repräsentationen beinhaltet eine Form der Unsicherheit der Zweifelnden hinsichtlich der ontologischen Grundannahmen welche die natürliche Welt betreffen. Derartige Zweifel werden jedoch durch Versprechen der Religion aufgelöst. Dieser basale Zweifel und das Versprechen seiner Beseitigung durch die Religion legen jedoch die Annahme nahe, dass der Inhalt religiöser Repräsentationen wesentlich stärker vom Kontext abhängt und damit eine höhere Dynamik aufweist als vielfach angenommen wurde. Der Kontext bezieht sich dabei vor allem auf rituelle Handlungen und Emotionen. Der hier vorgestellte Ansatz eröffnet dabei eine empirische und theoretische Analyse der Wechselwirkungen zwischen Emotionen, Glauben, Riten und Kultur innerhalb religiöser Repräsentationen.

Robert E. Haskel

Reden über Gott: Sub-literale Schemata von Gottheit in verbalen Narrativen

Religiöse Glaubenssätze im Bereich jüdisch–christlicher Tradition beruhen auf der Annahme eines allwissenden, allmächtigen und allgegenwärtigen Gottes. Dieses Gottesbild beruht auf einem tief verwurzelten kognitiven Schema welches unbewusst mit Autoritätsrollen innerhalb sozialer Situationen in Beziehung gesetzt wird. Diese unbewussten Bezüge werden als sub-literal bezeichnet.

So können sich beispielsweise untergeordnete Personen im Rahmen von Beziehungen mit Autoritäten als Kinder Gottes erfahren. Es ist ein Ziel dieses Beitrages Beispiele dieses kognitiven „Gottesschemas" darzustellen und es sowohl in seine abstrakten wie konkreten, affektiven Dimensionen darzustellen.

Stephen Kercel/Donald C. Mikulecky
Warum verhalten sich Menschen religiös?

Religiöse Erfahrung ist auf eine noumenöse Welt hin ausgerichtet und versucht eine Verbindung zu dieser Welt (die manchmal, aber nicht immer als Gott bezeichnet wird) herzustellen. Dabei wird Gott als jene Instanz gedacht, welche den infiniten Regress hinsichtlich der Frage nach der Wirkursache unterbricht. Religiöse Denkbewegungen argumentieren hier im Rahmen sog. „top down" Ursachen und stehen dabei im Gegensatz zu den wissenschaftlich ausgerichteten „bottom up" Denkformen. Letztere argumentieren reduktionistisch den „bottom up" Verursachungen umfassende und zureichende Erklärungen zugesprochen werden.

Als Alternative zu diesen Extrempositionen präsentieren wir eine ganzheitliche Perspektive, wie sowohl bottom up, wie auch top down Ansätze umfasst und dabei die Existenz Gottes weder verneint noch bejaht.

Ryan McKay
Eine halluzinierter Gott? Die kognitive Neuropsychiatrie religiösen Glaubens und religiöser Erfahrung

In diesem Beitrag wird ein kognitives neuropsychiatrisches Modell der Entstehung und Aufrechterhaltung monothematischer Wahnideen vorgestellt. Ausgehend von diesem Modell soll das „Religion als Wahn" Argument bewertet werden. Das Modell ist unter der Bezeichnung „Zwei Faktoren Modell des Wahns" bekannt und sieht Wahnideen nicht als Resultanten defekter Verstandestätigkeit, sondern als Folge von ungewöhnlichen perzeptuellen Erfahrungen, die wiederum durch neuropsychologische Abnormitäten bedingt sind.

Zwei Bedingungen sind dabei wichtig: es müssen Belege für den ersten Faktor (perzeptuelle Aberrationen bedingt durch neuropsychologische Anoma-

lien) gegeben werden. Ebenso müssen Individuen existieren, die abweichende perzeptuelle Erfahrungen machen, die denjenigen vergleichbar sind die sich bei Menschen mit religiösen Wahnideen einstellen, die jedoch dabei keine Wahnideen hinsichtlich dieser Erfahrungen entwickeln.

Jesse M. Bering
Natürliche Selektion ist konfessionslos: Warum evolutionäre Modelle von Religion mehr mit Verhalten als mit Konzepten befasst sein sollten.

Empirische Arbeiten hinsichtlich der naturalen kognitiven Hintergründe von Religion befassen sich in den meisten Fällen mit religiösen Konzepten. Dabei wurde deutlich, dass die Entstehung, Übertragung und Aufrechterhaltung religiöser Konzepte durch die Rahmenbedingungen des menschlichen kognitiven Systems erklärt werden können. Was dabei jedoch vernachlässigt wurde ist die Art in der religiöse Konzepte verhaltenswirksam werden. Dies ist insofern von tragender Bedeutung, als natürliche Selektion nur am Verhalten ansetzt. Religiöse Konzepte (wie beispielsweise diejenigen des „übernatürlichen Wesens") könnten demnach mehr sein als bloße Epiphänomene und darauf hin ausgerichtet sein „Absichten" von bestimmten Ereignissen anzuzeigen. Damit wäre eine Art von Kausaldenken verbunden, welches im Falle von Unbestimmtheiten dem Individuum Verhaltensanleitungen vermitteln könnte.

Craig T. Palmer/Lyle B. Steadman
Mit oder ohne Glaube: Ein neuer Ansatz zur Definition und Erklärung von Religion

Die kognitive wie auch die evolutionäre Psychologie gehen von der Annahme aus, dass religiöses Verhalten durch religiösen Glauben verursacht ist. Daher sind deren Bemühungen in diesem Bereich auf die Frage hin ausgerichtet warum Menschen an übernatürliche Kräfte und Wesen glauben. Das Problem dieser Ansätze liegt darin, dass religiöser Glaube nicht eindeutig identifiziert werden kann und es an sich unmöglich ist zu sagen ob ein Individuum an übernatürliche Kräfte glaubt oder nicht. Damit sind diejenigen Erklärungsmuster, die Reli-

gion als Glaube an übernatürliche Wesenheiten definieren wissenschaftlich nicht annehmbar.

Im Gegensatz dazu gehen wir davon aus, dass religiöses Verhalten nur innerhalb einer bestimmten Redeweise festgemacht werden kann. Dabei werden innerhalb dieser Redeweise übernatürliche Ansprüche kommunikativ akzeptiert. Unterschiedliche religiöse Verhaltensweisen, wie beispielsweise Ahnenverehrung, Magie, Schamanimus etc. unterscheiden sich durch verschiedene übernatürliche Ansprüche und die Erklärungsversuche in diesem Bereich sollten sich vor allem auf die jeweilige Redeweise und deren Verhaltensrelevanz beziehen.