EVOLUTION AND RELIGION: THEORY, DEFINITIONS, AND THE
NATURAL SELECTION OF RELIGIOUS BEHAVIOR

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Introduction

Beginning in the late 1960’s, revolutionary breakthroughs within evolutionary biological theory led to great advances in the study and understanding of animal behavior. It was inevitable that these new ideas that contributed so much insight into the evolution of behavior would soon be applied to our own species. Today, the study of humanity from a Darwinian perspective addresses nearly every aspect of our lives. One topic that has been increasingly investigated over the past twenty years by evolution-minded researchers is that of religion. This wholly unique human attribute is perhaps one of the most challenging issues facing students of evolution and human behavior. Natural selection punishes those organisms not in touch with reality, yet everywhere in the world, in every culture, we find a pre-occupation with an unobservable realm of supernatural beings, powers, and forces. What is it about the natural history of our species that has led to the universal presence of religion? Was religion favored by natural selection? Is it merely a side effect of the way our minds have evolved? More importantly, what is religion, anyway? None of the important evolutionary questions about religion can be satisfactorily answered without first reaching agreement on a definition.

This thesis attempts to advance evolutionary understanding of religion by identifying what is meant by the word religion—that is, what behaviors should and should not be considered religious, and exploring the implications this definition has for explaining the evolution of this behavior. In the first chapter, a brief and impartial summary of recent theory and research into religion from the perspectives of evolutionary cognitive psychology and behavioral ecology is presented. This is intended to orient the reader to the
contemporary approaches and to pave the way for critical thinking about these approaches in the chapters that follow. Chapter 2 discusses one of the prominent points of contention in the evolutionary study of religion; this is the issue of whether or not religion is an adaptation directly favored by natural selection in human history, or if religion is a by-product of other traits that were not favored for their effects in producing religion. The implications of how religion is defined for how it is explained are also introduced in chapter 2, as well as a discussion of what is required to build a valid argument for religion as an adaptation. In Chapter 3, focus is shifted from the topic of explanation to that of definition. Here, critical discussion of what is and is not appropriate criteria for an accurate definition of religion is presented, existing definitions are scrutinized, and in their place, an alternative definition is proposed. Chapter 4 presents the results of two studies formulated to test the definition of religion posited in chapter 3. Finally, Chapter 5 lays out an explanation of the evolution of religion as a traditional behavior that was directly favored by natural selection for its effects on the descendant-leaving success of ancestral humans.
Chapter 1: A Review of Some Recent Evolutionary Approaches to Religion

The past two decades have witnessed a resurgence of scientific interest in the study of religion. At the forefront of this revitalization have been scholars employing various approaches rooted in biological theory. Although all of these approaches share a common core metatheoretical foundation, they also differ in significant ways. Researchers working in cognitive psychology, cultural anthropology, behavioral ecology, neuroscience, and other fields approach the topic of religion using different research methods, theoretical frameworks, and paradigmatic assumptions. The result is a rather heterogeneous body of theory and research concerning the evolutionary study of religion. In this chapter I review some of the more prominent and influential evolutionary approaches to religion, focusing on only a narrow sample of theory, studies, and authors. This scope should allow for a greater understanding of the central key topics than could be accomplished with wider-ranging treatment with less coherence.

In organizing the present chapter, I distinguish between two broad classes of approaches; specifically, evolutionary cognitive psychology and behavioral ecology. As the reader will see, however, this classification is for organizational and heuristic convenience, and, in reality, the distinction between these classes of approaches is not sharp, but fuzzy and often superficial for many areas of inquiry on human behavior in evolutionary perspective, and this seems to be increasingly the case on the topic of religion. Nevertheless, with this caution in mind, I proceed to employ this method of division. The first part of this chapter reviews current approaches to religion from a sub-field of evolutionary psychology, namely that of evolutionary cognitive psychology. The second part is a review of approaches to
religion from behavioral ecological oriented perspectives. The review of these broad classes of approaches is intended to give the reader a brief but informative introduction to the main ideas, empirical findings and major issues in the contemporary study of religion.

_Evolutionary Cognitive Psychological Approaches to Religion_

Within the traditional field of the psychology of religion, it is evident that a profound misunderstanding persists about both evolutionary theory and what a biological approach to religious behavior entails. For example, in the authoritative textbook, _The Psychology of Religion: an empirical approach_ (2003), Spilka and co-authors, in their chapter entitled “Religion and Biology”, portray the biological approach to religion as being concerned only with a possible genetic basis of religion, heritability of religiosity, and with physiological and neurological correlates of religious behavior. They imply that the biology of religion is concerned with behavior only insofar as it reveals a proximate genetic basis, or distinctive neurophysiological activity. Whereas the genetics and neurology of religion is the concern of some researchers (e.g., Kapogiannis, et al. 2009; Inzlicht, et al. 2009; Newberg 2006; Newberg, et al. 2001; Azari 2006; Azari, et al. 2001; McNamara, et al. 2006; Koenig & Bouchard 2006), this is not an accurate summary of the recent evolutionary approaches to religion.

Another line of research on religious behavior has been led mostly by evolutionary cognitive psychologists, and is characterized by a radical departure from the theoretical views of conventional psychology. In the remainder of this section I discuss the theories and ideas that exemplify recent work within the framework of evolutionary cognitive psychology.
The evolutionary cognitive psychological approach to religion, like all other topics of human behavior this paradigm addresses, is based on the theory that the mind consists of numerous domain-specific or content-specific psychological mental modules, each dedicated to processing information related to specific adaptive problems that would have been experienced with sufficient frequency in ancestral environments such that natural selection would have been expected to shape solutions to these recurrent problems (Symons 1989; Barkow et al. 1992; Buss 2004). These solutions come in the form of psychological adaptations. Since fitness-relevant situations are numerous and qualitatively different in nature, so are the psychological mechanisms that evolved to respond to them. The logic of domain-specificity is that different sorts of problems necessitate different sorts of information processing procedures that produce appropriate behavioral output. For example, mate choice involves fundamentally different criteria (fertility, reproductive value, status, etc.) than prey choice (rates of encounter, caloric and nutritional value, procurement costs, etc.), and thus the two problems require fundamentally different modes of cognition in order to reach an adaptive solution (see Tooby & Cosmides 1992).

The different domain-specific mental mechanisms are not posited to operate in isolation, however. The flexibility and novelty of human thought is suggested to be the result of the ability of these dedicated mechanisms to essentially transcend their modular boundaries, exchange information across domains and apply their algorithms to problems they weren’t necessarily designed for. Mithen (1996) has coined the term “cognitive fluidity” to characterize this property of the modern human mind (see also Pinker 1997; Anttonen 2002). This information exchange and novel application of psychological mechanisms are key concepts in the evolutionary cognitive psychological approaches to
religion, and one of the reasons why cognitive researchers feel it unnecessary to argue for the existence of a specific “religion” domain of the mind.

The psychological domains given the most attention, to date, are those of intuitive (or naïve or folk) physics or mechanics, intuitive biology, and intuitive psychology. The majority of evolutionary cognitive psychological research on religion focuses on the cognitive processing of religious concepts and the psychological domains or modular systems that are hypothesized to generate and be activated by these concepts, which gives rise to the manifest forms religion takes across human societies.

To begin to understand how cognitive psychologists address the form and content of religious concepts, it is necessary to first become familiar with a central theory of the paradigm: Intuitive ontologies. Intuitive ontology refers to a species-typical collection of mental modules that organize input from the external environment to generate a set of expectations or quasi-theories about the kinds of things in the world and how the world works (Boyer 2000). These ontologies are called intuitive because “they include all sorts of default inferences that help us acquire new kind-concepts …On the basis of very little information, we spontaneously use ontological categories and the inferences they support to create particular expectations” (Boyer 2001: 61). Some authors (e.g., Pyysiainen 2001; Atran 2008; 2002) describe these modules and the cognitive processes they execute as “innate”, because like language, they develop reliably and on a predictable regular schedule during the ontogeny of normally developing humans, and the knowledge in these domains emerges in the absence of much explicit instruction (i.e. their content is underdetermined by experience) (Keil 1996; Hirschfeld & Gelman 1994). The cognitive processes involved in intuitive ontology break the world up into nested levels of conceptualization. Conceptual categories
(Boyer [2000: 98] identifies five: person, animal, plant, artefact, natural object) generate ‘kind-concepts’ (for example tiger, tree, table [from Boyer 2002: 71 emphasis added]).

Rules and expectations about these category and kind concepts are governed by the intuitive principles of three main inferential domains: intuitive physics (Carey & Spelke 1994: 171-175; Resnick 1994: 487-489), biology (Keil 1994), and psychology, including ‘theory of mind’ [ToM] (Leslie 1987).

There is a dynamic relationship between conceptual categories and inferential domains. For instance, the inferential content of the intuitive biology domain is activated by and applied to those categories of things that are ‘living’ or ‘alive’—animal and person and plant. The principles of intuitive biology stipulate that living things have essential qualities that make them members of distinct taxonomic ‘kinds’, that living things grow, move, and reproduce themselves. Intuitive physics and psychology are also applied to the categories of living things and generate additional inferences and expectations about the nature of the phenomena in each category. For example, living things are solid physical objects that cannot pass through other solid physical objects, and are propelled by self-locomotion (intuitive physical principles). Living things are also volitional entities with goals and intentions (intuitive psychological principle).

According to Pyysiainen, a necessary characteristic of a religious concept is counter-intuitiveness (2001: 235; 2002). What makes a concept counter-intuitive is that it violates the intuitive assumptions or expectations of ontological categories (Pyysiainen 2001; 2002; Boyer 2003; 2000). Violations of intuitive expectations are produced in two ways: by breach or by transfer (Boyer 2000: 198). A breach violates expectations associated with a category. A transfer extends the intuitive expectations of one category to another. Counterintuitiveness
created by violations of intuitive ontology, however, is not the whole story on what characterizes the form of “religious” concepts. This simple formula, however, begs the question: If all religious concepts are counterintuitive, are all counterintuitive concepts religious? Cognitive psychologists answer in the negative. As Boyer states, “[r]eligious representations are particular combinations of mental representations that satisfy two conditions. First, the religious concepts violate certain expectations from ontological categories. Second, they preserve other expectations” (2001: 62; see also Boyer 2002: 72).

According to Boyer (2000), the vast catalogue of religious concepts corresponds to a very limited number of cognitive templates. The finite number of templates result from the finite number of ontological categories and their derivative principles. These templates combine activation of a domain concept with culturally postulated limited violations of the expectations for the domain (see Boyer 2000: 197-198). The limited violations make the concept ‘minimally counterintuitive’. Minimal counterintuitiveness is seen as a key characteristic of religious concepts for two reasons. First, the fact that only some aspects of ontology are explicitly violated allows other intuitive principles of the category to remain intact, and this give the concept inferential power (Mithen & Boyer 1996: 720). Take, for example, the concept of a spirit of a deceased person. The counterintuitive aspect of this concept is that the deceased no longer inhabits a corporeal body (a violation of expectations in the domain of intuitive physics), but the intuitive psychology domain, unviolated by this counterintuition, generates inferences from the ontological category of *person* to the effect that the spirit retains the human capacities for thought, feeling, perception, and so on. In short, our categorical inferences fill-in-the-blanks around the violated expectations to form a cognitively salient concept; minimizing counterintuitiveness gives the mind something to
work with. Second, minimally counterintuitive concepts are argued to be more attention arresting, cognitively salient, and memorable than both grossly counterintuitive concepts and intuitive concepts. It is the quality of minimal counterintuitiveness that is said to facilitate the social transmission of such concepts, and hence contribute to their cultural success (Boyer 1994; 2001; see also Sperber 1994).

There have been a handful of attempts at testing the hypothesis that minimally counterintuitive concepts have an inherent transmission advantage. For example, Barrett and Nyhof (2001) conducted a series of four experimental studies that examined whether, all else equal, concepts that minimally violate intuitive assumptions are better remembered and transmitted than other concepts. The first experiment consisted of participants reading a story containing both counter-intuitive and ordinary concepts. Participants were then asked to recall the story immediately after reading it and record their recollection. Barrett and Nyhof found that counterintuitive elements of the story were indeed better recalled than the control (ordinary) concepts (60.3 % vs. 43.3%). Experiment 2 was similarly structured but with the addition of “bizarre” concepts that possess a highly unusual feature but do not violate categorical assumptions (e.g. a pink newspaper) and also involved the retelling of the original story through three “generations” to simulate cultural transmission. By the third retelling of stories, significantly more of the counterintuitive elements had been preserved than both the bizarre and ordinary elements (with more bizarre than ordinary elements being retained).

Experiment 3 involved telling a story containing counterintuitive items and control items to several participants who then were instructed to relay the story to other groups of participants. These participants were then asked to recount the story they heard in writing. Analysis of immediate recall of the story showed that significantly more counterintuitive than
control items were remembered (71.1% vs. 43.5%) and remembered accurately (57.2% vs. 21.0%). Three month delayed recall revealed a similar pattern. Experiment 4 was a replication of experiment 3 with ‘bizarre’ items replacing the control items. Results again demonstrated that counterintuitive items were remembered better than non-counterintuitive items. The experimental studies of Barrett and Nyhof (2001) do provide some empirical evidence that minimally counterintuitive concepts are more memorable and likely to be socially transmitted. And to the extent that religious concepts are minimally counterintuitive, the experiments may provide some support for the argument that religious concepts take this form because of their advantages in cultural transmission.

Another important characteristic of religious concepts, according to evolutionary cognitive psychologists, are that they involve agents, or the notion of agency (Guthrie 1993; Atran 2002; Barrett 2000). “Agents are entities that instigate and control their own actions as well as those of other objects and agents…more often than not, they appear to act ‘on purpose’ to achieve some preexisting goal” (Atran 2002: 59 emphasis in original). Agency, then, is the ability for, or the engagement in, self-volitional action. Many religious concepts are not described as passive phenomena, but rather are depicted as active forces or beings (e.g., karma, spirits, gods, demons, etc.).

Attribution of agency is argued to be the product of a specific cognitive domain that includes mechanisms dedicated to processing and interpreting information about intentional animate beings (see Barrett 2008: 177-178). Agency detection in humans, it is further argued, has been designed by natural selection to be biased towards attributing agency to phenomena under conditions of uncertainty or opportunity (Barrett 2000). This is because over the course of evolutionary history, the generation of behavioral responses by the agency
detection mechanism that were false positives were presumably less costly than committing false negative errors--failing to detect agency when it is, in fact, present (see Atran 2008; see also Guthrie 1993; Badcock 2008: 441; Geary & Huffman 2002).

Barrett refers to this hair-triggered agency mechanism as the “hyperactive agent detection device”, or HADD (Barrett 2000: 31-32). Because of our HADD, humans (and other animals) may commonly err and detect agency when there actually is none (this idea is similar to Nesse’s “smoke detector principle” of immune response and other defense regulation mechanisms [see Nesse 2005]). There does exist some experimental evidence to suggest that humans are quite ready to attribute agency to things not properly regarded as agents, such as moving dots on a computer screen (see Bloom & Veres 1999; Csibra, et al. 1999; Heider & Simmel 1944; Tremoulet & Feldman 2000). Atran connects this hyperactive agency detection system with religion by arguing that, “[h]umans are cognitively susceptible to invoke supernatural agents whenever emotionally eruptive events arise that have superficial characteristics of telic event structures with no apparent controlling force” (2002: 66 capitalization in original). In other words, Atran is arguing that when important events occur that have no apparent controlling force, or causation, people tend to invent one for the purpose of anxiety relief and ambiguity reduction.

These invoked agents are often anthropomorphized in both psychological attributes and, in many cases, morphology (Guthrie 1993; Boyer 1996; Norenzayan, et al. 2008; Knight, et al. 1998). The study of anthropomorphism in connection with religious concepts has a long history within the Western intellectual tradition. It was the ancient Greek philosopher Xenophanes (c. 500 B.C.) who pointed out that man created the gods in his own image (Russell 2007: 40). David Hume first gave serious study to the topic in 1757 in The
Natural History of Religion (1966). Recently, a number of theorists have revived the topic within an evolutionary cognitive psychological framework (Guthrie 1993; Dennett 2006; Boyer 1996; Bulbulia 2004b; Mithen & Boyer 1996; Lawson & McCauley 1990). The tendency to anthropomorphize real or conceptualized agents is explained by Kirkpatrick (2006: 174-175) as the misapplication of theory of mind. Theory of mind refers to the ability of individuals to attribute goals, desires, motivations, and emotions to others that are recognized as different from their own. Thus, the anthropomorphization of agents is the result of the application of theory of mind to these invoked, but unobservable agents.

In an experimental test of whether counterintuitive concepts, and those involving agency are more likely to be judged as religious than non-counterintuitive concepts, Pyysiainen, Lindeman, and Honkela (2003) carried out a series of three studies. The first two studies examined whether counterintuitive concepts in general were regarded by subjects as more likely to be religious. The third study evaluated the hypothesis that counterintuitive concepts that involve agents (and particularly agents concerned with human affairs) will be judged to be more religious than those counterintuitive concepts lacking an element of agency. To this effect, Pyysiainen et al. (2003) devised surveys consisting of a series of statements, some that included counterintuitive concepts and some that did not. “The counterintuitive elements were formed by transferring human cognitive properties to an animal, or by transferring psychological properties to an artifact or to a natural object or phenomenon, or by denying physical or biological properties to an intentional agent” (Pyysiainen et al. 2003: 345). The subjects were asked to rate the likelihood that the statements were religious on a five-point scale.
The results of the first two studies showed that individuals did in fact judge the counterintuitive statements as more religious than intuitive statements (study 1: $M=3.52$, and $M=2.14$; study 2: $M=3.46$ and $M=1.80$). And the results of the third study showed that not only were counterintuitive statements rated more religious ($M=3.14$) than intuitive statements ($M=2.52$), but that counterintuitive statements involving an agent were rated more religious ($M=3.39$) than those statements lacking an agent ($M=2.47$). Further, those counterintuitive statements that included an agent interested in human affairs were seen as more religious ($M=3.57$) than counterintuitive statements with an unconcerned agent ($M=3.12$).

Thus, Pyysiainen et al. (2003) do provide some empirical evidence that concepts considered religious include the elements of counterintuition and agency. It should be pointed out here that the statements judged by subjects as most religious all three studies were of two types. First, statements that included concepts similar to those of the doctrine of modern world religions (Christianity, Judaism, Islam), such as a punitive and retributive agent who dwells in the sky and speaks moralistically to humans, as illustrated by the following sentence from the second study: “A voice from the sky said: ‘You should not do that!’” (pg. 346). It is very likely that these types of statements were judged religious because of their familiarity to the subjects. The other type of statements that were judged most religion were those formulated in a way that implied a shared acceptance by a group of individuals of the counterintuitive concept, as illustrated by this sentence also from the second study: “The Hopo believe that an evil-doer will be eaten up by invisible beings.” (pg. 346). The authors, however, do not point this out, and thus leave many questions unanswered.
As this section has demonstrated, evolutionary cognitive psychological researchers concerned with religion have been for the most part concerned with elucidating the cognitive mechanisms responsible for generating, processing, and making inferences about concepts that are regarded as religious. As described above, evolutionary cognitive psychologists have identified a set of criteria that are argued to be characteristic of religious concepts cross-culturally. These criteria are minimal counterintuitiveness, agency, and psychological and/or morphological anthropomorphism. These three criteria are claimed to be the product of species typical cognitive mechanisms; namely those of the intuitive ontological domains, agency detection mechanisms, and the theory of mind mechanism allows humans to attribute goals, intentions, and motivations to not only other humans, but also real or imagined non-human agents. With their focus on the workings of human psychology, what these cognitive researchers have devoted less attention to are the effects of religious concepts on human behavior. How does religious cognition enter into social dynamics, and are religious concepts associated with any particular patterns of behavior?

*Behavioral Ecological approaches to Religion*

Alongside recent developments in the evolutionary cognitive psychological study of religion over the past decade, another approach to the study of religion has emerged that draws heavily from the theoretical wellsprings of sociobiology and behavioral ecology. The main focus of this research program is not the cognitive underpinnings of religious concepts, but the analysis of behavior associated with these concepts. Primary interest is in elucidating the social functions or reasons for the enactment of behaviors such as participation in rituals and the observance of religiously mandated taboos, prescriptions and proscriptions, and
understanding religion in terms of the benefits and costs to the individual who does or does not engage in such behavior.

Starting from the observation that religious behavior is often conspicuously costly (in terms of sacrifice of personal resources), and universally present in human societies, behavioral ecologists point out a paradox created by a Darwinian view of religious behavior: If natural selection favors those designs that are maximally efficient at capturing energy from the environment and converting that energy into progeny, why would it have shaped the human organism in such a way that many of its members frequently engage in seemingly counterproductive behaviors in connection with religion (Sosis 2004; Bulbulia 2004a)? The question poses a challenge, indeed, to those employing conventional optimization and rational-choice models to religious behavior (Sosis & Alcorta 2003). There are, however, other theoretical tools in the behavioral ecology arsenal that have been employed in attempts at elucidating the evolutionary logic of religious behaviors.

Costly signaling theory is one of those tools. According to costly signaling theory, in some instances, such as when deception carries a high cost for the deceived, selection may favor the evolution of expensive behavioral or morphological signals designed to convey honest information benefiting both signaler and receiver (See Smith & Bleige Bird 2005; Zahavi & Zahavi 1997; Zahavi 1975; Grafen 1990). In the human case, these signals may include extra-somatic signals such as bodily adornments and other material objects (see Low 1979; 2000: 86-87). Because the signals are costly, they are consequently difficult to fake; meaning that there is a direct positive correlation between the signal and the quality of the trait it advertises such that individuals of poor genetic or phenotypic quality cannot “afford” the signal. Because the signal is difficult or impossible to fake, the information about the
underlying qualities it represents is therefore honest (see Gintis, et al. 2001). It is the costly nature of the signal that is its adaptive value.

Costly signaling theory is the launchpad for the majority of behavioral ecological oriented research on religious behavior. Foreshadowed in the works of social scientists such as Frank (1988) and Allison (1992), who suggested that some otherwise puzzling cultural behaviors may be difficult-to-fake signs of group commitment, the work of Lee Cronk represents some of the earliest suggestions within behavioral ecology of the possibility that signaling theory, in its contemporary formulations, might be productively applied to the study of religious behavior, stating that “[r]eligious rituals and other practices…may have the effect of making religious devotion a costly-to-fake signal and thus a better indicator of commitment to a specific moral code and to the well-being of one’s fellow believers” (1994: 92; see also Cronk 2005). William Irons (2001) has also pointed out that many aspects of religion may constitute hard-to-fake signals of commitment to a specified group. In support of this postulation, Irons notes the complexity and costly nature of many religious traditions such as mandatory prayer schedules, episodes of fasting, and obligatory alms to the poor, as among the Yomut Turkmen Muslims, would be difficult for a non-committed outsider to imitate. Irons also put forth the hypothesis that, “Other things being equal, we should expect that more costly religions are more effective at creating intragroup cooperation. We also might predict that the greater the need for cooperation, or the greater the difficulty of creating cooperation, the more costly will be the religious institutions that support it” (2001: 299).

There does indeed exist some support for these predictions. Iannaccone, in his studies of various religions in modern America, found that those “churches” (read: religions) that are most “strict” (that is, demanding the most time and/or resources from their adherents) are
characterized by stronger commitment, higher levels of participation, and also are able to offer greater benefits to members than other more liberal churches that demand less of their members. Furthermore, strict churches have been experiencing rapid growth in membership within the last several decades, while membership of less strict, liberal denominations have been steadily declining (Iannaccone 1994). The main reason for this effect, according to Iannaccone, is that strictness resolves the free-rider problem, “it screens out members who lack commitment and stimulates participation among those who remain” (1994: 1204; see also Iannaccone 1992 for similar arguments applied to cults and communes; see also Sosis 2000; Sosis & Bressler 2003 for similar studies of costly commitment and commune longevity).

Along with Cronk, Irons, and Iannaccone, Richard Sosis (2002; 2004; 2006) has perhaps been the most prolific in pointing to the costly nature of religious rituals and other behavioral requirements as the key to their effectiveness in the promotion of cooperation and commitment. “[T]he significant time, energy, and financial costs involved serve as effective deterrents for anyone who does not believe in the teachings of a particular religion. There is no incentive for nonbelievers to join or remain in a religious group, because the costs of maintaining membership…are simply too high” (Sosis 2004: 169). In his costly signaling theory of religious behavior, Sosis emphasizes religious belief as the primary mechanism that ensures the commitment of coreligionists and the deterrence of free-riding nonbelievers. If one is willing to endure the costs of rituals, obligations, and taboos mandated by doctrine, they can be trusted to be genuine believers and their commitment to the group can be counted upon. Furthermore, Sosis (2003: 98; see also Sosis 2006; Alcorta & Sosis 2005) argues that
repeated engagement in public and private ritual enhances and can even create religious beliefs:

[R]itual, by employing the same psychological processes that translate value-laden actions into attitudinal changes, is the mechanism through which religions maintain belief among adherents…self-perception or cognitive dissonance processes will cause nonbelievers to either modify their belief or discontinue the ritual actions.

Commitment fostered by beliefs, and beliefs fostered by commitment, minimizes the monitoring and enforcement costs related to free-riding, and allows religious groups to overcome the problems of collective action (Sosis & Alcorta 2003; Sosis 2000).

Sosis and colleagues have conducted studies and collected data in support of the hypothesis that religion promotes cooperation. For example, Sosis and Bradley Ruffle (2004) conducted field experiments in Israeli kibbutzim using a common-pool resource game to test their hypothesis that shared ideological commitment and participation in communal rituals would be positively associated with cooperative behavior in the experimental games. Sosis and Ruffle found that members of collectivized kibbutzim exhibited higher levels of cooperation when their partner was identified as a fellow group member than when paired with non-kibbutznik city residents or members of privatized kibbutzim, and as compared to pairings of fellow privatized kibbutz members. Furthermore, higher levels of cooperation occurred between fellow male members of collectivized religious kibbutzim compared to fellow male members of collectivized secular kibbutzim. In their conclusion, Sosis and Ruffle argue that, “the inherent link between unverifiable beliefs and ritual actions enables religious ideologies to enhance intra-group cooperation and cohesiveness more effectively than their secular counterparts can” (2004: 113).
Montserrat Soler (2008) has conducted field experiments using a public goods economic game among Brazilian Candomble practitioners. Consistent with the costly signaling theory of religion, Soler’s results showed that higher scores on a religious commitment scale were positively correlated with more cooperative behavior in the economic game. While scores on the subscale of “personal religiosity” were not predictive of individual offers in the games, measures on the “group commitment” subscale were positively related to individual offers. In discussion of the results of his studies, Soler maintains that his findings are supportive of the thesis that, “ritual functions as a reliable signal of an individual’s willingness to cooperate with members of their own group…it is the public aspects of ritual that are important to cooperation because that are more open to inspection and easily monitored” (Soler 2008: 173).

Similarly, Joseph Bulbulia (2004a) has developed a rather sophisticated theory of religion’s role in altruism and reciprocity based on game theoretic concepts and models. Bulbulia also sees religious behaviors primarily as costly, and thus reliable, signals of commitment and altruistic intent. Religious behaviors are advertisements that allow reciprocators or cooperators to find each other. Integral to his theory is that belief in the supernatural, what Bulbulia calls “supernatural cognition” is an evolved human psychological adaptation whose function is to “facilitate efficient solutions to otherwise difficult or intractable co-ordination problems” (2004a: 19). Religious individuals are motivated to altruism from their beliefs in the retributive powers of supernaturals who oversee human affairs. In the language of game theory, Bulbulia explains that:

Belief in gods capable of altering individual fortunes promotes efficient play by prompting the motivational structure to produce strategically co-operative behaviour. The sacrifice of the defection pay-off is understood as a kind of investment, the god acting to ensure desirable outcomes through supernatural
causation (2004a: 25 emphasis in original).

Bulbulia (2004a; [in press]) elaborately describes supernatural cognition as a multifaceted and costly system that prompts signaling and altruistic behavior. Religious signaling is made honest by underpinning beliefs in the supernatural, which are evidenced in emotional displays and ritual participation; and these supernatural beliefs are maintained through cognitive distortion and denial that generates commitment in the face of zero, and even disconfirming evidence of the existence of the supernatural. The function of this self-deception is to facilitate the production of maximally convincing displays of conviction and commitment; “[t]he strategy works because it is based on an illusion, not in spite of any illusion” (Bulbulia 2004a: 25 emphasis in original).

Dominic Johnson and colleagues have also argued that belief in supernatural retribution for earthly misdeeds serve as a deterrent to defection in cooperation and collective action, and hence is an adaptive psychological trait favored by natural selection (see Johnson & Kruger 2004; Johnson, et al. 2003; Johnson & Bering 2006). In a pilot test of the supernatural punishment hypothesis, Johnson (2005) surveyed 186 societies from the Standard Cross-Cultural Sample. Using the variable of “high gods” (defined loosely as ‘supernatural beings who created and govern the world’) as proxy for a measure of “the extent of belief in supernatural punishment for selfishness” (Johnson 2005: 418 emphasis in original). For the variable of “high gods”, each society is coded for the presence of absence of this variable as well as the extent to which these supernaturals are concerned with and involved in human affairs and morality (see chart in Johnson 2005: 419). Johnson reasons that the importance of high gods should correlate positively with the extent to which morality
is supernaturally imposed, and the likelihood of belief in supernatural punishment of moral transgression.

Comparing the “high god” variable against 19 other independent variables identified as indexes of the extent of cooperation and contribution to collective goods within each society, Johnson found that high gods are significantly associated with societies that are large, (to some extent) more norm compliant, use and loan abstract money, are centrally sanctioned, policed, and pay taxes, and have more internal conflict (2005: 426; see also Swanson 1964 for an earlier similar study). Although Johnson claims that he has gathered some support for the hypothesis that beliefs in supernatural punishment should be associated with high levels of cooperation, his conclusion is shaky and contains many qualifications.

Azim Shariff and Ara Norenzayan (2007) have also conducted tests designed to examine the relationship between supernatural beliefs and prosocial behavior. In the first of two experiments, Shariff and Norenzayan investigated the effects of implicitly primed “God concepts” on subjects’ behavior in an anonymous dictator game. The priming procedure consisted of having subjects unscramble sentences containing the target words spirit, divine, God, sacred, and prophet, while the control group of subjects were given only neutral sentences to unscramble. Results showed that implicit priming of God concepts did indeed increase prosocial behavior as subjects primed with religious concepts left significantly more money for the anonymous receiver than neutrally primed subjects.

The second experiment included three groups of test subjects, those primed with God concepts, neutrally primed subjects, and subjects primed with concepts associated with “secular moral institutions” (target words: civic, jury, court, police, and contract). Results of this experiment showed, again, that subjects primed with God concepts behaved more fairly
(i.e., left more money for the receiver) than neutrally primed subjects. However, priming with secular moral concepts had as large an effect as God concept priming on the prosociality of subjects. One interesting outcome of the second study, which used a larger and more heterogeneous pool of subjects (75 community members versus 50 university students), was the finding that priming with God concepts has a nonsignificant effect on the prosocial behavior of subjects identified as atheists, whereas in the first study such priming affected theists and atheists alike. Shariff and Norenzayan suggest as an explanation of their results “that the religious prime aroused an imagined presence of supernatural watchers, and that this perception then increased prosocial behavior” (2007: 807).

It can be seen from the studies just described, as well as those above in the section on the evolutionary cognitive psychology of religion, that several researchers have begun to integrate theory and findings from cognitive science into costly signaling and game-theoretic models of religious behavior. Disciplinary and paradigmatic boundaries are increasingly blurred as increasing amounts of empirical research is conducted and fields mature. However, there is one issue on which battle lines seem to be drawn quite definitively, and this is the question of whether religion is an adaptation or by-product of human evolution. This topic is the subject of the next chapter.
Chapter 2: Adaptation-Byproduct Debate in the Evolutionary Study of Religion

One of the principle questions that arises from the application of evolutionary biological theory to the study of religion is whether religion is best seen as an adaptation or a by-product of adaptations selected for their effects in other domains of human life. Not surprisingly, there is currently no consensus on this matter. The by-product view finds most of its advocates within evolutionary cognitive psychology, whereas those who endorse the adaptation perspective are identified as behavioral ecologists and evolutionary anthropologists. Theories of religion as by-product and adaptation alike hinge crucially on the issue of how religion is defined. How an author conceptualizes religion, how he delimits what is and is not to be included under the rubric of “religion”, will obviously influence how religion is characterized from an evolutionary perspective.

Religion as Evolutionary Byproduct

Many authors define religion in a multifaceted way, such as Kirkpatrick (2008: 65), who sees religion as a “cobbled together patchwork of psychological systems” that “involves in varying degrees to various people in various places, beliefs in the supernatural, systems of ethics and morality, group or individual ritual, and so” (Kirkpatrick 2005: 231); or Atran (2002: 4), who characterizes religion as “a community’s costly and hard-to-fake commitment…to a counterfactual and counterintuitive world of supernatural agents…who master people’s existential anxieties, such as death and deception”; or Boyer(2001: 90), who states that, “we generally call concepts ‘religious’ when they have such important social
effects, when rituals are performed that include these concepts, when people define their group identity in connection with them, when strong emotional states are associated with them, and so on…”; or Pyysiainen (2001: 227), who defines religion as “a concept that identifies the personalistic counter-intuitive representations and the related practices, institutions, etc. that are widely spread, literally believed, and actively used by a group of people in their attempts to understand, explain and control those aspects of life, and reality as a whole…”.

Not surprisingly, these authors support a multiple by-product theory of religion. According to Atran, “religions are not adaptations and they have no evolutionary functions as such” (2002: 264), he goes on to explain that “religious belief and practice involve a variety of cognitive and affective systems, some with separate evolutionary histories, and some with no evolutionary history to speak of” (ibid. pg 265; see also Boyer 2003; Boyer & Bergstrom 2008; Granqvist 2006; Hinde 1999).

A definition that considers religion to consist of many things is what leads the authors cited above to the conclusion that religion is a by-product of numerous domain-specific adaptations that were not naturally selected because of their contribution to the production of religion. Indeed, as pointed out by Kirkpatrick, “given the extreme fuzziness of the construct [of religion], it is reasonable to ask whether religion is in fact a thing that could be an adaptation in the first place” (2008: 63 brackets added). Similarly, Atran argues that “[t]here is no such entity as ‘religion’” and thus there is “not much sense in asking how ‘it’ evolved”…for religion there is no integrated set of cognitive principles that could represent a task-specific evolutionary design” (2002: 265; see also Martin 2008).
Although by-product advocates acknowledge that religion is a cultural universal, the diversity found within different religious traditions is pointed out in support of the position that religion is not an adaptation. The possession of species-typical psychological mechanisms prone to the production of these by-products is what leads to religion being culturally universal. The cross-cultural and inter-individual diversity of religion is explained as the result of different combinations and relative weighting of the involvement of these psychological mechanisms in producing “religious” output (Kirkpatrick 2008: 176; see also Atran 2002: 264).

A similar argument against the religion-as-adaptation idea follows from the characterization of religion as a multifaceted phenomenon. This is the unlikelihood of any one theory being able to account for all aspects of religion (Kirkpatrick 2006: 165-166). As Kirkpatrick (2006) points out, if researchers investigate the evolutionary history of ritual behavior, they neglect the origin of religious belief and emotions. Conversely, if one focuses on religious belief, ritual remains unaccounted for. For cognitive theorists, evidence that religion is an adaptation would require demonstrating that some aspect(s) of human psychology was designed by natural selection to produce specifically religious belief and/or behavior. However, an evolutionary approach is still considered worthwhile by by-product theorists in analyzing religion, and the main task consists of unpacking the psychological mechanisms involved in generating the by-product(s) of religion.

Religion as Evolutionary Adaptation

Authors such as Alcorta and Sosis (2005), who, while accepting a multifaceted definition of religious behavior, argue that its multifaceted nature is not grounds for declaring
it a by-product, but rather see religion as an ‘adaptive complex’, a coalescence of cognitive, emotional, and behavioral elements that has been directly acted on by natural selection and which forms the unit of their adaptationist analysis—*the religious system*, which Sosis defines as a universally recurring set of core elements such as “ritual, myth, taboo, emotionally charged symbols, music, altered states of consciousness, commitment to supernatural agents, and afterlife beliefs among others” (Sosis [n.d.]: 5). Sosis ([n.d]: 7) explicitly admits that “many adaptationists agree that the cognitive and emotional mechanisms that produce religious beliefs and behaviors did not evolve for this purpose” but suggests that such mechanisms were later co-opted or exapted (Gould & Vrba 1982) into the religious system and subsequently modified through the process of natural selection by the socioecological niche created by the system.

Rather than going into detail about the numerous specific hypotheses put forward by authors who argue for religion as an adaptation, I here want to outline the requirements for showing that religion was favored by natural selection. I do this because it is my contention that most of the adaptationist advocates have not successfully formulated a convincing scenario for the natural history of religion as being a direct product of selection. The major reason why previous attempts have failed to develop plausible models of religion’s evolution as an adaptation concerns the characterization, or definition of religion used by these authors. If religion is defined as to include a multitude of elements (e.g., the “adaptive complex” idea of Alcorta & Sosis 2005) then one is faced with the problem of deciphering the phylogenetic history of each constituent element along with its temporal entry into the realm of the religious complex. Other problems related to the issue of defining religion, however, will be circumvented presently, and shall be returned to in the next chapter.
To understand what the construction of a solid and convincing model of religion (however defined) as an adaptation would entail, it will be helpful to begin by considering what, exactly, an adaptation is. According to Buss, an adaptation is a trait that “exists in current organisms because it led, on average, to the successful solution of a specific adaptive problem for that organism’s ancestors” (2004: 53 emphasis added). Sober has defined adaptation thusly: “A is an adaptation for task T in population P if and only if A became prevalent in P because there was selection for A, where the selective advantage of A was due to the fact that A helped perform task T” (1984: 208 emphasis added). Crawford, revising E. O. Wilson’s (1975: 577) definition of adaptation as “any structure, physiological process, or behavior pattern that makes an organism more fit to survive and reproduce in comparison with other members of the same species”, suggests replacing “Wilson’s word makes with the phrase made an ancestral to emphasize that adaptations came into being in an ancestral environment” (Crawford 1998: 278). Thornhill concisely defines adaptation as “an organism’s feature that was functionally designed by the process of evolution by selection acting in nature in the past” (1997: 4 emphasis added).

Note from the preceding definitions that adaptation is an essentially historical concept, concerned with past selection pressures and past differentials in reproductive success. As Mayr has pointed out, “[t]he one thing about which modern authors are unanimous is that adaptation is not teleological, but refers to something produced in the past by natural selection” (1983: 324 emphasis added).

When one attempts to explain the features of something that is a product of evolution, one must attempt to reconstruct the evolutionary history of this feature…the most helpful procedure in an analysis of historical narratives is to ask ‘why’ questions; that is, questions…which ask what is or might have been the selective advantage that is responsible for the presence of a particular feature (Mayr 1983: 325).
Another key feature of an adaptation is that it is inextricably tied to the environmental context in which it was selected. Dobzhansky defines adaptation as “an aspect of the developmental pattern which facilitates the survival and/or reproduction of its carrier in a certain succession of environments” (1956: 347 emphasis added). Barash states that “[i]nsofar as behavior patterns are subject to evolution, they should be adaptive, i.e., given the available alternatives, they should confer maximum reproductive success upon their practitioners within the environments in which they evolved” (1977: 57 emphasis added; see also Tooby & Cosmides 1990; 1992). “To claim that a trait is an adaptation is to make a claim about the past…the very description of an adaptation must embody, at least implicitly, a description of particular environmental features to which the adaptation is adapted” (Symons1990: 428).

The above discussion points up a critical distinction that must be made between the terms “adaptation” and “adaptive”. Adaptation is a term that refers to a trait that exists because it itself was favored by natural selection in ancestral generations. Adaptive is an adjective that refers to the fitness-enhancing consequences of some exhibited trait, and speaks nothing about the evolutionary history of the trait. Indeed a trait could, at any point in time, correlate positively with reproductive success (i.e., be adaptive) even if the trait in question was not favored because of this effect in the past. On the other hand, an adaptation could, at any point in time, correlate negatively with reproductive success for any number of reasons (see below), even though the trait was favored by natural selection in the past.

Many authors have been concerned with showing that religion is adaptive because it promotes cooperation between co-religionists (e.g., Bulbulia 2006; 2004a; Sosis & Bressler 2003; Sosis & Ruffle 2004; Sosis 2000; 2002; Sosis & Alcorta 2004; Shariff & Norenzayan
Another often-proposed adaptive benefit of religion is its promotion of physical and mental health (Bulbulia 2006; McNamara, et al. 2006; McClenon 2002; Newberg, et al. 2001; for reviews of relevant literature see Hood, et al. 1996: 377-405; Koenig, et al. 2001). This approach has two flaws if one is attempting to explain religion as an adaptation.

Demonstrating that religion fosters cooperation or health is not the same as demonstrating that religion is *adaptive* in the evolutionary sense of the word. It is not enough to show that religion promotes group cohesion and increases cooperation, or that religion contributes to well-being to correctly conclude that religion is adaptive. One must provide evidence that these effects increase the genetic representation in descendent generations of religious participants relative to non-participants.

Furthermore, the argument that religious behavior is adaptive is a fundamentally different argument than that religious behavior is an adaptation. The concepts cannot be used interchangeably. To argue that religious behavior is an adaptation, one must provide evidence for a particular function of religious behavior, and then be able to convincingly demonstrate that the trait is designed to perform that function, as well as show that the evolutionary success of the trait is due to its function in the environments of ancestral generations. Current measures of fitness are logically irrelevant to hypotheses about Darwinian adaptation (which are hypotheses about long-term historical evolution), as are measures of the current selection on a trait (see Thornhill, 1997, pp. 7-9). Simply showing that religious behavior promotes cooperation is not sufficient grounds for concluding that religion is an adaptation, nor is it sufficient grounds for concluding that religion is adaptive.
One of very few authors to consider the evolution of religion explicitly in terms of its effects on reproduction is Michael Blume (2007; see also Reynolds & Tanner 1983). In his study he lays out several features of religion that he argues to have evolved as cultural traditions because of their positive impact on the reproductive success of individual practitioners. Blume has gathered demographic data from Switzerland showing that women of all religious denominations have higher fertility rates than non-affiliated women (see table in Blume 2007: 17). While there are some problems with using modern demographic data to support inferences about the evolutionary significance of some behavior, his “reproduction-mindedness” (Symons 1992: 151) is a welcome approach and provides a fresh perspective in comparison to many alternative accounts that rely on the promotion of altruism to explain religions evolutionary success. According to Blume, “[r]eligion is only secondarily involved with survival. Its main evolutionary function is reproduction” (2007: 7). It is unclear in Blume’s paper, however, as to whether he sees religion as merely adaptive, or as an adaptation.

Another flaw in many arguments regarding religion as an adaptation can be illustrated with the following examples. Harris & McNamara (2008) have argued that the “capacity” for religiousness rather than religiousness itself is an adaptation. Religiousness being defined by the authors as “(1) the positing of belief in supernatural agents and (2) the tendency to perform rituals to relate to those agents” (2008: 79). To what selective pressure the capacity for religiousness is an adaptation to, the authors are hesitant to specify. A similar adaptationist argument identifying “capacities” or “potentials” is illustrated in a rather head scratching passage from Sanderson (2008). Following in the theoretical tradition of authors such as Winkelman (2000) and McClennon (2002), Sanderson states that:
The shaman’s role in the evolution of human consciousness derives from adaptive potentials of ASC [altered states of consciousness], animistic beliefs, visionary perceptions, soul flight, and death-rebirth experience. These universal adaptations to biocognitive potentials derive from systemic integration of brain functions (2008: 148 emphasis in original, brackets added).

Nevermind the multitude of diverse adaptive problems to which Sanderson suggests such phenomena might be an evolved solution (that is, an adaptation), the important thing to point out about these arguments is that terms such as “potentials” and “capacities” imply unrealized manifestation, and thus are poor, or at least not sufficient, candidates for identifying adaptation. Natural selection can only operate on exhibited phenotypes. If a phenotype was shaped by natural selection, it necessarily was exhibited by ancestral individuals. Therefore, it is the phenotype itself, not the potential or capacity for exhibiting the phenotype that is the proper subject of an adaptationist analysis.

Thus, in conclusion, I hope to have set some preliminary guidelines that should be followed by authors who wish to develop proper adaptationist theories of religion. These guidelines are: First, one must identify a function of religion, and convincingly demonstrate that religion is designed to perform the proposed function. Second, one must provide evidence that the function of religion promoted its own evolutionary success through its effects on the evolutionary success of religious individuals. And third, one must identify religion according to some phenotypic manifestation, and not underlying capacities or potentials.

Of course, no conclusion is likely to be reached in the debate over whether religious behavior is an adaptation or by-product unless consensus is achieved regarding the definition of religious behavior. If religious behavior is defined as constituting a multiplicity of otherwise disparate psychological and behavioral phenomena, then by-product supporters
have good reason for rejecting a religion-as-adaptation argument. However, if religious behavior is defined such that it refers to some distinct and delineated phenotype, then it may be examined for evidence of adaptation using the same criteria for the investigation of any trait suspected of being designed by natural selection (see this work, chapter 5; Williams 1966; Thornhill 1997; Gangestad 2008, for additional criteria of adaptations).
Chapter 3: Defining Religion

The Problem with “Belief” in the Definition of Religion

“Any theory of religion and religious behavior must explain the relevance of belief to religious life” (Sosis 2003: 97; see also Pinker 2006:1). Virtually every author who has been concerned with the topic of religion has addressed the subject of religious “belief”. Indeed, every author cited in this work thus far (with the single exception of Soler [2008] who does not employ the term) takes it as a given that religion involves belief in some sort of unidentifiable entity or power or force. Most scholars of religion today and in the past have treated belief in the supernatural as the defining criteria of religion (see Palmer, Steadman, & Ellsworth 2009; see also Steadman & Palmer 2008a: chapter 2), and placed it at the heart of their theories and explanations of religion, discussing religious beliefs and their importance to the study of religion, as if they were an obvious given variable in an explanation of religious behavior. However, defining and explaining religion in terms of beliefs in supernaturals represents, for the simplest of reasons, a most profound error: the fundamental problem with all attempts at understanding how it is that people come to have beliefs in the supernatural and how these beliefs affect behavior is that beliefs themselves cannot be identified by the outside observer. The problem is not circumvented by the study of behaviors that are said to be motivated, or caused, by underlying beliefs. Assigning causality of behavior to underlying beliefs amounts to nothing more than speculation and assumptions. Thus, theories and studies maintaining that belief in the supernatural is the mechanism by which religion promotes altruism and cooperation, such as those described in chapter 1 (e.g., Sosis 2004; 2003; Sosis & Ruffle 2004; Bulbulia 2004; Johnson 2005; Shariff &
Norenzayan; Bering, et al. 2005), and studies purporting to investigate the difference between stated beliefs and actual beliefs (Barrett 1998; Barrett & Keil 1996; Slone 2004; Purzycki & Sosis 2009), base their conclusions on the assumed presence or absence of certain beliefs in and about supernaturals—assumptions about variables that cannot be observed and verified—and therefore are untestable, and hence unscientific. What all of these studies have in common is that they measure some behavior as a proxy for belief; that is, what they are identifiably examining are the effects of one behavior on another behavior. As such, these studies cannot possibly be proven to have demonstrated any effect of belief on behavior.

A little introspection tells one that it is not necessary to hold certain beliefs to behave in certain ways; everyone has done some acting in their lives. Thus, it is clear that behavior is not a transparent, reliable window to the mind; nor can belief be given a causal role in behavior with any degree of certainty for any individual. The study of religion, when concerned with belief, is a futile endeavor if one seeks scientific validity.

Despite arguments against the possibility of the empirical study of religion, such as that from Idinopulos who argues that, “the authentic religious life is so filled with ‘non-observables’ as to defeat any application of the so-called ‘empirical method’” (1998: 37)*, whether or not “non-observables” exist in regard to religion is a moot and irrelevant question to scientific inquiry. In contrast to Idinopulos’ argument, nothing is lost by the restriction of the study of religion to observable—hence empirical—aspects. The empirical approach is not defeated by the argument for the speculated presence of non-observable things. These are, for

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* One wonders what exactly is meant by the “authentic” religious life? What would constitute the “non-authentic” religious life?
the moment at least, beyond the purview of science and in no way constitute an impediment
to scientific study.

Contrary to such arguments, as well as those from evolution-oriented authors such as
Purzycki, et al. (2008), who emphasize the importance of studying religious belief, and claim
that numerous studies have actually done so, the entire topic of belief can be ignored without
compromising the integrity of the scientific study of religion. In fact, the standards of
empirical science would seem to demand that we refrain from reliance on untestable,
unverifiable assumptions. In response to the statement of Sosis at the beginning of this
section that any theory of religion must be able to explain the relevance of belief to religious
life, I answer that the relevance of belief to religious life is that it is irrelevant.

As it stands, there is currently no method by which to empirically observe beliefs.
Until a time comes when beliefs themselves—mental ascensions to certain propositions (see
Steadman, et al. 2009)—can be empirically documented, researchers purporting to be
scientists should refrain from using what amounts to nothing more than assumption and
speculation to build theory and “test” hypotheses. I know of no better way to illuminate the
danger in assuming beliefs to Scientifically study religious behavior than to point to the
relatively enormous potential for deception in human verbal communication. Because, like
beliefs, the supernatural cannot be identified, statements about the supernatural, and
especially statements about belief in the supernatural have no basis in reality whatsoever
other than the fact that they were, in reality, uttered by an individual (Steadman & Palmer
1995). As such, they are very poor data for those who wish to study human cognition. If an
individual states that they “believe in God”, one cannot possibly know with any degree of
certainty whether or not the individual mentally assents to the concept of God as true fact.
To base a theory or hypothesis on an unidentifiable assumption is to render it untestable, and hence scientifically unacceptable. Reliance on congruency between statements and behavior to identify the existence or absence of belief, contrary to the suggestions of some authors on religion, is also scientifically unsatisfactory (Steadman and Palmer 1995; 2008a). To illustrate why, consider a situation in which there is a discrepancy between what an individual says and what he does, as Palmer (1989) has observed among a fisherman with regard to statements about taboos and their observance. What then, do we grant privilege to as being truly reflective of the belief held by the individual: the vocalized claim or the behavior action? Even if there is parity between statements and behavior, this is not proof positive of the existence of some belief.

If others are critical of the argument laid out here about the non-empirically demonstrable, unverifiable, and hence scientifically useless, nature of religious “belief”, they should outline their protocol of a “science of religious beliefs”, and show how it is possible to study beliefs per se, without relying on assumptions of the existence or absence of a particular belief from observations of behavior (Steadman & Palmer 1995; 2008a; Palmer & Steadman 2004); the method that all of the studies conducted to date have relied upon in their experiments that allegedly tap the religious “beliefs” of subjects (e.g., Barrett & Keil 1996; Barrett 1998; Bering, et al. 2005; Slone 2004; Johnson 2005). There is no method known which can identify the internal entities called religious beliefs. Only statements and actions, not the religious beliefs that are so often assumed to motivate them, are observable. Therefore, a definition of religion that seeks to accurately delimit what it is that the term refers to in the empirical world of human sensation must omit the word “belief”.
Because the issue of belief in relation to the study of religion has been thoroughly treated elsewhere (see Steadman & Palmer 2008; Steadman, et al. 2009; Palmer, et al. 2008; Palmer & Steadman 2004), I only mention one more point here: because beliefs are unidentifiable, belief cannot be a component of a scientifically useful definition; similarly, because phenomena such as “institutions” and “systems” are, aside from being inherently vague concepts, only identifiable through the behaviors of individual entities constituting them, religion should be defined as some particular behavior or behaviors. Therefore, “religion” and “religious behavior” refer to the same phenomenon, and thus the terms are interchangeable; their definitions are the same. I now move on to other issues related to the formulation of a scientifically acceptable and useful definition of religion.

Further Issues in Defining Religion

In the scholarly study of religion, there have been about as many definitions as there have been authors. Indeed, this situation has appeared to cause as much confusion as understanding, and this confusion extends even to the level of what, exactly, it is that scholars of religion are supposed to be studying (see Vernoff 1983). Therefore, in this section I attempt to draw attention to the importance of delimiting the topic of the study of religion, and propose a methodology for how the task of defining religion can be accomplished.

By defining religion, I refer to the act of describing all of the elements needed to distinguish all behavior that is religious from all behavior that is non-religious. This would not only specify what an explanation of religion needs to account for, but what to test hypotheses against. A proposed definition of religion that fits only some of the literal (as
opposed to metaphorical) uses of the term is unacceptable. If the definition fits only some of
the literal uses of the term, the definition would need to be expanded to become congruent to
all observed cases of its literal use. The definition of religion must contain the word
elements needed to identify all of the behaviors that evoke the literal use of the term. In
other words, the definition must contain the elements that are *sufficient* for the identification
of religion. A definition of religion such as ‘belief in the supernatural’, lacks a reference to
anything observable, and hence does not contain the elements sufficient for identifying
religion.

On the other hand, if a proposed definition includes elements that are not always
present when behavior is identified with the term, the scope must be narrowed. That is, the
definition should contain only the criteria that are *necessary* to the identification of religion.
If a proposed definition of religion contains elements that are not present when a behavior is
identified as religious, those elements become unnecessary and superfluous to the definition,
and provides evidence that they themselves are not, in fact, what is being used for
identification.

Segal (1985: 78) mentions that “a search for ever more comprehensive definitions
spans the history of the anthropology of religion.” I would argue that this should be a major
goal in the study of religion, however, “comprehensive” need not mean ever more
complicated and multifaceted. Including only the necessary criteria in a definition will
provide the science of religion with a framework that is universally applicable and open to
the methods of comparative study. As Goody points out, “the difficulties which arise from a
failure adequately to delimit one’s universe of discourse become much more complicated
when comparative studies are involved” (1961: 142). Thus, if the development of a true and
comparative science of religion is to be accomplished, the definition must contain only the elements necessary and sufficient to the identification of religious behavior cross-culturally.

Examples of definitions that include elements that are not sufficient, or necessary, or both include the one provided by Long (1987: 6): “For my purposes, religion will mean orientation in the ultimate sense, that is, how one comes to terms with the ultimate significance of one’s place in the world.”; or Tillich (1983): “religion, in the largest and most basic sense of the word, is ultimate concern.” (in Wilson 1998: 153); or Bellah (1964: 359): [A] set of symbolic forms and acts which relate man to the ultimate conditions of his existence”; or Radin (1937: 1 brackets added): “[Religion] consists of two parts: the first an easily definable if not very specific feeling; and the second certain specific acts, customs, beliefs, and conceptions associated with this feeling”; or Fromm (1950: 21): “any system of thought and action shared by a group which gives the individual a frame of orientation and an object of devotion”; or Lowie (1924: xvi-xvii brackets added): “Religion is…a universal feature of human culture…Those cultural phenomena…[which] center about or are somehow connected with the sense of mystery or weirdness”; or Yinger (1970: 7): “Religion…can be defined as a system of beliefs and practices by means of which a group of people struggles with these ultimate problems of human life. It expresses their refusal to capitulate to death, to give up in the face of frustration, to allow hostility to tear apart their human aspirations”; or Idinopulous’ (1998: 38) describing of “religion as energy, faith, a vision of transcendence and the will to live in relation to it”; or Lessa & Vogt (1958: 1) who argue that “religion is concerned with the explanation and expression of the ultimate values of a society”; or McCutcheon’s (1998: 59) redescription of religion as a “rule driven system…of socio-retorical strategies that facilitate the development of enduring social and self identities.”
Definitions that mention such things as ‘ultimate values’, or ‘ultimate problems’, only raise the additional problem of identifying what those ultimate values and problems themselves are. Definitions of religion such as ‘socio-rhetorical strategies’, or ‘systems of thought and action’ are not sufficient definitions because they don’t adequately isolate any unique variable that could be used to distinguish religion from any other behavior; they are too broad. For example, McCutcheon’s definition could equally apply to political discourse, or any kind of talk or action that influences others sense of social and individual identity. Similarly, Yinger’s definition could be used to describe many worldviews or philosophies such as Marxism, existentialism, or feminism.

Definitions of religion such as that given by Bulbulia (2004a: 19): “beliefs, emotions, and practices relative to supernatural beings and powers…and forces to which individuals are committed”; or Sanderson (2008: 142): “beliefs and rituals associated with and focused around postulated supernatural beings and forces”, are not sufficient definitions because they do not specify exactly what behaviors must be observed to identify them as religious. They are also insufficient because they do not indicate how one would be able to discern that the practices and rituals were, in fact, relative to, or associated with, or focused on supernatural beings or forces. These definitions also contain the unnecessary element of belief. If belief is not necessary to engage in religious behavior, and if it is not necessary to the identification of religious behavior, it should not be part of the definition of the term.

Definitions of religion that contain several elements, such as that of Atran and Norenzayan (2004: 713), who argue that religion involves:

Widespread counterfactual and counterintuitive beliefs in supernatural agents (gods, ghost, goblins, etc.) 2. Hard-to-fake public expressions of costly material commitments to supernatural agents, that is, offering and sacrifice (offerings of goods, property, time, life) 3. Mastering by supernatural agents of people’s
existential anxieties (death, deception, disease, catastrophe, pain, loneliness, injustice, want, loss). 4. Ritualized, rhythmic sensory coordination of (1), (2), and (3), that is, communion (congregation, intimate fellowships, etc.).

As well as the multifaceted ‘adaptive complex’ definition proposed by Alcorta & Sosis (2005; Sosis [n.d.]), run the risk of being either unnecessarily broad, or too narrow. If all of these elements are not required to co-occur for some behavior to be considered religious, then they are too broad. If all of the elements must co-occur for a behavior to be considered religious, they are too narrow.

Pyysiainen (2001; 2003) has addressed the problem of defining religion with respect to identifying the necessary and sufficient elements, and argues that:

Even if counterintuitive representations serve as an especially good defining characteristic of religion, the presence of counterintuitiveness alone is not a sufficient criterion for something being an instance of religion. Nor is it possible to say what more is needed, as it seems that there are no jointly sufficient and singly necessary criteria according to which judge something as an instance of religion…Thus, there is no one thing that decides whether something is or is not religious, the decision always being more or less a matter of opinion (2001: 227).

Pyysiainen’s pessimism over delineating the sufficient criteria of religion and his admission of guesswork and opinion in identifying religion threatens the entire prospect of a science of religion. For reaching an agreed upon definition of the subject matter of a field of inquiry is the foundation of a discipline. Furthermore, Pyysiainen’s statement is logically self-contradictory. How can he know if his defining characteristic of religion is not sufficient, unless he knows what else is necessary (C. Palmer, personal communication)?

Elsewhere on the same page Pyysiainen seems to contradict his expressed confusion over what more is needed to identify religion by stating that:

Religion is a concept that identifies the personalistic counterintuitive representations and the related practices, institutions, etc. that are widely spread,
literally believed, and actively used by a group of people in their attempts to understand, explain and control those aspects of life, and reality as a whole, that escape common sense and, more recently, scientific explanation. The precise boundaries of the class of such phenomena, however, are fuzzy (2001: 227).

The boundaries of the concept are only fuzzy because the definition offered makes them so. Distill a definition and the boundaries become clear and precise. It is puzzling that a researcher literally creates his own definition of a phenomenon, and then laments over the fact that he cannot fully understand the phenomenon, or even precisely delimit it! This quandary may be more understandable if one cannot understand or precisely identify some phenomenon using another’s definition; but to put one’s self into such a position is bewildering indeed.

Pyysiainen is not the only author to discuss religion as if it were not precisely definable. Paden (1998: 91) speaks of the “permeable and contested definitional boundaries” of religion (see also Saler 2004; 1999; 1993; Nadel 1954). Similarly, Adams argues that, “we find in the end that religion really cannot be defined empirically; that is, by any specifiable content…In short, religion in practice has no clearly defined boundaries” (2005: 134). And Idinopulos asserts that, “no single definition of religion seems possible” (1998: 31; see also Fitzgerald 1997).

Authors taking this position, however, are as Goody explains, “merely taking refuge in an implicit rather than an explicit judgment of what constitutes [religion]” (1961: 142 brackets added). Despite such arguments to the effect that religion is undefinable, it appears necessary to do so, and to do so in an explicit, accurate and precise manner to maintain any sense of coherence on the topic. For if scholars of religion can’t agree what the term religion refers to, then it cannot be determined what it does not refer to, and if this is the case, the
entire enterprise of the study of religion is apt to persist in the “endless and entirely barren argument about whether a given item of human behaviour is or is not religious” (Horton 1960: 201; see also Freeman 1964).

Establishing an agreed upon definition is important, and for the exact reasons give by Clarke & Byrne:

The task of defining religion appears to be a necessary underpinning of the explanation and theory of religion for three reasons. In the first place the researcher must delimit the area of inquiry with some statement which will indicate what is to be included and what is not. In the second place, a definition is necessary to offer some initial interpretation of religion. And lastly, defining religion relates to the need for a theory to show religion’s unity (1993: 3).

Showing religion’s unity refers to identifying the common thread running through all behavior considered to be religious. The very fact that the term religion exists is evidence that there is something that is common to all phenomena described with the term. I suggest that the common element uniting all religious behavior is an obvious one; and paradoxically, its obviousness may have caused it to be overlooked in efforts to explain the unique and exotic forms this common element can take across time and human societies, and the often fascinating if not bizarre features that have sometimes come to be associated with this common element.

Following Lyle Steadman, I argue that the key to establishing a useful definition of a word is to view definitions as testable hypotheses. Just as any phenomena that would be subject to scientific investigation, words must be defined empirically, that is it must refer to qualities or attributes that can be identified with the senses. The test of a definitional hypothesis consists of observing what identifiable things people refer to when they use the word in its literal (as opposed to metaphorical) sense, and comparing the proposed definition
against what the word is literally used to refer to. Thus, the question that must be answered in the pursuit of a definition of religion is: what has been the criterion that individuals have learned to distinguish the behaviors that should be called “religion” (literally) from the behavior that should not be called “religion” (literally)? That is, what do individuals identify with their senses that causes them to label some behaviors as religious? As Horton explains regarding the criteria of a “good definition” of religion:

First of all, we are concerned with a term that has a clear common usage in our own culture. To avoid confusion, therefore, any definition we put forward as the basis of its use in anthropology should conform as closely as possible to the usage of common sense. At the same time, we must look for the universal aspect of the phenomena commonly denoted by the term...This universal aspect, fortunately, is not hard to discover; for laymen have freely used the word ‘religion’ to happenings observed in a wide variety of cultures other than our own (1960: 211).

In the following chapter, I present the results of two survey studies formulated to address these questions of the criteria of a cross-culturally useful definition of religion using the judgments of non-specialists. Testing the definition of religion using non-specialists is important because it allows us to examine the accuracy of a proposed definition against the public usage of the word, who, unlike many academics, presumably have no vested interest in any particular theory, and who, presumably, have their own working definition that is used in everyday, non-academic contexts to identify those behaviors considered religious.

A Proposed Definition of Religion

In conclusion of this section, I now offer a definition of religion that I offer a definition of religion hypothesized to contain both the necessary and sufficient criteria (the common elements) for identifying religious behavior that is at least implicitly used wherever
and whenever the term “religion” or “religious” has been used to describe a phenomenon:

Religion is the communicated acceptance of supernatural claims (Steadman & Palmer 1995). I say that this criteria is at least implicitly used because often the words “religion” or “religious”, like any other word, is used in the absence of the stimuli that it literally refers to. That its, words are often used to refer to present stimuli remembered to be associated with the previously experienced stimuli that actually constitute the referent of the word. For example, a cross might be called religious even though there is nothing inherently religious about a figure consisting of two perpendicular intersecting lines. Thus, when a cross is labeled “religious”, what is really being referred to is some stimuli remembered to be associated with that particular cross figure, or other figures sufficiently similar to it. According to the definition of religion given above, the stimuli remembered to be associated with the cross that causes it to be labeled religious are the communicated acceptance of certain supernatural claims. However, a cross may be called religious in the immediate absence of the communicated acceptance supernatural claims because the stimuli of the cross is remembered to be associated with this behavior.

Using the term “supernatural” in the definition of religion is preferable to the term “counterintuitive”. The term “counterintuitive” is problematic because it relies on assumptions about what is intuitive, or spontaneously or automatically comprehended by individuals. What is intuitive to one person may or may not be intuitive to another. Many phenomena, such as insect metamorphosis and quantum physics could be, according to cognitive psychological theory, considered counterintuitive; however, these phenomena are not considered religious. Although cognitive authors have argued that only those counterintuitive concepts that have psychological significance, or important social effects,
are considered religious, this still doesn’t sufficiently delineate what should be considered religion. While the term counterintuitive may be used to characterize empirically observable phenomena like insect metamorphosis or the behavior of light as both particles and waves, or non-empirical concepts such as the number of angels that can dance on the head of a pin, the term supernatural, by definition, refers exclusively to the unempirical and unverifiable—to that which does not exist in nature or is not subject to explanation by natural laws. As such, supernatural is the more appropriate label to apply to religious concepts. Great difficulty is predicted for anyone who might attempt to provide an example of a counterintuitive concept that is reliably judged to be religious but that is not also supernatural.

As a final note, I should point out that if religion can be precisely and accurately, and necessarily and sufficiently defined as the communicated acceptance of supernatural claims, many of the arguments against the religion as adaptation position no longer apply. If religion is a form of communication, no longer do adaptationist accounts need to explain anything but the adaptive value of this behavior to ancestral humans. Things such as ritual, emotion, and transcendent or ecstatic experiences no longer need to be wrestled with in the context of the evolution of religion because these behaviors themselves are not religious, per se.

In the next chapter I present the results of two tests formulated to evaluate the accuracy of this definition of religion. The first test examines whether or not the communicated acceptance of supernatural claims influences subjects’ judgments of behavior as religious. The second test pits this definition against two other hypotheses regarding the cross-cultural criteria for identifying religious behavior.
Chapter 4: Testing the Definition of Religion as The Communicated Acceptance of Supernatural Claims

Survey #1: Testing the Hypothesis that Supernatural Claims are Judged “Religious”

The initial test of the hypothesis that religious behavior is distinguished by the communicated acceptance of supernatural claims was conducted by myself and Craig Palmer, and focused on answering the question: Does adding talk influence whether or not people label a behavioral scene as “religious” or not? Specifically, we examined whether adding talk indicating that people communicated acceptance of supernatural claims about dead ancestors, or adding talk that indicated only natural claims (claims potentially verifiable with the senses) were associated with a behavioral scene, influenced whether or not the scene was judged by subjects as depicting religious behavior.

Predictions

We predicted that adding statements that indicated the communicated acceptance of supernatural claims about dead ancestors were associated with the behaviors shown in the slides would increase the religious rating of the slides, and adding statements that indicated only natural statements were associated with the behaviors shown in the slides would decrease the religious rating of the slides.

Method and Procedure of Survey #1

Our subjects consisted of 126 undergraduate students enrolled in one of two lower-level anthropology courses, one a four-field introduction and the other an introduction to
cultural anthropology class, at the University of Missouri- Columbia. To identify any possible effects of previous exposure to anthropology courses, subjects were asked to identify previous anthropology courses they had taken. To limit the influence of these courses, the survey was conducted on the second day of the course before any discussion of religion had taken place. To maximize anonymity, a minimum amount of data was collected from each subject, which included the gender of the participant as well as any previous university level anthropology courses taken. Consent forms indicated there were 76 females and 50 male participants in the study. No monetary payment was used, and students did not receive extra credit for their participation. The subjects were read the consent form with emphasis on how their participation or nonparticipation would not have any influence on their grade in the course. Ellsworth performed the solicitation of subjects because Palmer was teaching the classes. Subjects were then shown a slide with the following instructions:

*Imagine that you are a new anthropologist and this is your first day in the field. On this day you witness a series of 15 interesting and unfamiliar scenes. As an ambitious new anthropologist, you naturally want to make sense of and understand what you see. For each of the following 15 slides, consider each scene carefully (you have 15 seconds to view each slide). Then decide if you think the activities depicted in the image are religious.*

On your answer sheet, circle the number on the scale that best corresponds to your interpretation of each slide. Treat each slide independently.

Subjects were then shown 15 slides depicting behavioral scenes from cultural groups of Papua, New Guinea and Africa with no accompanying words and told to circle the number of the best response on their answer sheet (1= I am certain this activity is NOT religious, 2= I think this activity is probably NOT religious, 3= I do not have enough information to tell if this activity is religious, 4= I think this activity is probably religious, 5= I am certain that this activity is religious).
After viewing and responding to the 15 slides, subjects were then shown a slide with the following instructions:

*Now imagine that you are witnessing the following scenes in the company of a native informant who is telling you things about what you are seeing in the image. Then, using both the image and what you are being told about the image, decide if you think the activities are religious. Treat each slide independently.*

Subjects then were shown each slide depicting the behavioral scenes twice again, once with a natural only statement and once with a statement that implied the communicating acceptance of a supernatural claim. The order of these thirty slides was random. The following sentence is an example of a supernatural claim about dead ancestors: “We climb this mountain because our dead ancestors speak to us here.” The following is an example of a natural statement that also indicates it is the only claim associated with the scene: “We only climb this mountain so we can watch both our herds and our enemies.”

*Results of Survey #1*

The addition of both kinds of talk significantly influenced the ratings of the pictures in the predicted direction (see table 1).
Table 1: Table showing comparison of total ratings for slides with images only, slides with type indicating that natural claims were associated with the behavior in the image, and slides with type indicating that supernatural claims were associated with the behavior in the image.

<table>
<thead>
<tr>
<th></th>
<th>Certainly Religious</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image Only</td>
<td>229</td>
<td>626</td>
<td>458</td>
<td>489</td>
<td>88</td>
<td></td>
</tr>
<tr>
<td>Natural Claims</td>
<td>1223</td>
<td>514</td>
<td>80</td>
<td>42</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Supernatural Claims</td>
<td>42</td>
<td>91</td>
<td>119</td>
<td>728</td>
<td>910</td>
<td></td>
</tr>
</tbody>
</table>

Chi square = 4389.61  
p < .001

Survey #2: Testing Three Hypotheses Regarding Cross-Cultural Criteria for the Identification of Religious Behavior

In the second study, we attempted to make further progress toward answering the question “What do people identify with their senses in order to distinguish what they should call ‘religious’ behavior from what they should call ‘nonreligious’ behavior?” by conducting a test of three separate alternative hypotheses that purport to be cross-culturally useful in the identification of religious behavior. The first we refer to as the Make-Oneself-Lower-or-Smaller-or-More-Vulnerable hypothesis (hereafter referred to as LSV), the second is referred to as the Emotive Ritual hypothesis, and the third we call the Communicated Acceptance of Supernatural Claims hypothesis (hereafter referred to as CASNC).
**Hypothesis Number One: LSV**

The LSV hypothesis predicts that religious behavior can be identified by the non-vocal aspects of petitioning prayer, which are local variations of the human species-typical “make-oneself-lower-or-smaller-or-more-vulnerable behavior” (Feierman 2009). According to the LSV hypothesis, “if one ever observes this type of behavior being exhibited anywhere in the world and it is not directed to someone else in close proximity, and if fear is absent on the face, one can be almost certain that one is witnessing the non-vocal aspect of petitioning prayer” (Feierman 2009). Thus, the religious behavior of prayer is said to be identifiable by these criteria.

**Hypothesis Number Two: Emotive Ritual**

According to proponents of the Emotive Ritual hypothesis, “the critical element differentiating religious from non-religious ritual...[is] the conditioned association of emotion and abstract symbol” (Alcorta & Sosis 2005: 323). This hypothesis predicts that “behaviors cross-culturally associated with religion would incorporate emotive ritual in conjunction with non-utilitarian ‘sacred’ symbols” (Candace Alcorta, personal communication, January 28, 2008). Thus, the Emotive Ritual hypothesis includes as criteria important to the identification of religious ritual behavior displays of emotional affect among participants in association with the presence of sacred symbols.
Hypothesis Number Three: Communicated Acceptance of Supernatural Claims

The CASNC hypothesis predicts that religious behavior will be universally identifiable by behavior (verbal or nonverbal) that communicates acceptance of supernatural claims.*

It is important to note here that although the proponents of the two alternative hypotheses were explicitly asked to provide definitions of religious behavior, each later qualified the criteria they provided with disclaimers that they did not intend their formulations as definitions. Rather, they refer to the identification of more or less specific types of religious behavior: petitioning prayer and religious ritual, respectively. As a result, while the criteria of all three hypotheses can be evaluated for accuracy, the LSV and Emotive Ritual hypotheses are only open to assessment in terms of the sufficiency, but not necessity, of their inclusive criteria. Stated differently, we can only examine whether or not LSV behavior or emotive ritual are enough to elicit judgments of depictions of these behaviors as “religious”. However, the empirical testing of these hypotheses is no less important for not providing the requested definition. Examination of the validity of their proposed criteria in the identification of particular forms of religious behavior may serve as an important step towards solution of the necessity/sufficiency definitional issue discussed above.

* An example of a verbally communicated acceptance of a supernatural claim is the reply of “Amen!” after a claim about the resurrection from death and ascension into heaven of Jesus Christ. An example of non-verbal communicated acceptance is the ‘sign of the cross’ made after the blessing of the bread and wine during the Christian ritual of communion. This identification of this behavior as religious, however, is contingent upon the observer knowing that these responses represented a signal of acceptance of the supernatural claim.
Method and Procedure of Survey #2

To test these three hypotheses, Ellsworth solicited the participation of 166 undergraduate students from three introductory anthropology classes at the University of Missouri to take part in a survey. The survey was described as part of a research study concerning peoples’ perceptions of religious behavior. A minimum amount of data was collected from each subject to maximize anonymity given that the subject of religion is potentially sensitive. Data collected from each subject included subjects’ gender and any previous anthropology courses taken at the university level. No monetary payment was used, and students did not receive extra credit for their participation. The subjects were read the consent form with emphasis on how their participation or nonparticipation would not have any influence on their grade in the course.

Participation in the survey consisted of viewing slides depicting behavioral scenes projected onto a screen and making a judgment, on a five-point scale, as to whether or not the slide depicted religious behavior. (5= I am certain that this activity is religious, 4= I think this activity is probably religious, 3= I do not have enough information to tell if this activity is religious, 2= I think this activity is probably NOT religious, 1= I am certain this activity is NOT religious).

The students from each class were divided into 3 groups, the participants in each group viewed and scored a series of 20 slides. Subjects in Group 1 viewed a slide with the following instructions:

*Imagine that you are a new anthropologist and this is your first day doing fieldwork. On this day you witness a series of 20 scenes. As an ambitious new anthropologist, you naturally want to make sense of and understand what you see. For each of the following 20 slides, consider each scene carefully (you have 5 seconds to view each slide). Then decide if you think the activities depicted in the image are religious.*
On your **answer sheet**, circle the number on the scale that best corresponds to your interpretation of each slide. Treat each slide independently.

Subjects in Group 1 viewed and scored 20 slides containing images only.

Subjects in Groups 2 and 3 viewed a slide with the following instructions:

*Imagine that you are a new anthropologist and this is your first day doing fieldwork. On this day you witness a series of 20 scenes in the company of a member of the local culture who is telling you things about what you are seeing in the image. As an ambitious new anthropologist, you naturally want to make sense of and understand what you see.*

*For each of the following 20 slides, consider each scene carefully (you have 5 seconds to view each slide). Then decide if you think the activities depicted and commented upon are **religious**. On your **answer sheet**, circle the number on the scale that best corresponds to your interpretation of each slide. Treat each slide independently.*

Group 2 viewed and scored 20 slides with the same images accompanied by 7 statements indicating that the communicated acceptance of supernatural claims were associated with the activities depicted in the image and 13 statements indicating skepticism of a supernatural claim associated with the activities depicted in the image. Group 3 viewed and scored 20 slides with the same images accompanied by 13 statements indicating that the communicated acceptance of supernatural claims were associated with the image and 7 statements indicating skepticism of a supernatural claim associated with the image. The inclusion of slides with statements indicating skepticism of a supernatural claim were added in this study to test the necessity of “communicated acceptance” in the definition put forth by the CASNC hypothesis.

To avoid the possibility of biasing the study by selecting the images for the study ourselves, we asked proponents of the other two alternative hypotheses to provide the images. Candace Alcorta provided us with five images in response to our request for images.
meeting her criteria of emotive ritual. Jay Feierman provided us with five images meeting his criteria of LSV behavior and ten control images showing neither LSV behavior nor emotive ritual. Each group viewed 5 LSV slides, 5 Emotive Ritual slides, and 10 control slides.

**Responses to the Slides With Only Visual Images**

Predictions:

1) The *LSV hypothesis* predicts that the five images portraying LSV behavior will be rated higher than the ten control images.

2) The *Emotive Ritual hypothesis* predicts that the five images portraying emotive ritual will be rated higher than the ten control images.

**Results**

Both the five *LSV* and five *Emotive Ritual* images were rated higher (i.e., more likely to be called religious) than the ten control images (see tables 2 and 3).
Table 2: Table showing comparison of total ratings for slides showing control images and slides showing LSV images.

<table>
<thead>
<tr>
<th></th>
<th>Certainly Religious</th>
<th>Not Religious</th>
<th>Certainly Religious</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Control</td>
<td>513</td>
<td>203</td>
<td>91</td>
</tr>
<tr>
<td>LSV</td>
<td>10</td>
<td>61</td>
<td>59</td>
</tr>
</tbody>
</table>

Chi square = 741.09  
p< .001

Table 3: Table showing comparison of total ratings for slides showing control images and slides showing emotive ritual images.

<table>
<thead>
<tr>
<th></th>
<th>Certainly Religious</th>
<th>Not Religious</th>
<th>Certainly Religious</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Control</td>
<td>513</td>
<td>203</td>
<td>91</td>
</tr>
<tr>
<td>Emotive Ritual</td>
<td>10</td>
<td>35</td>
<td>79</td>
</tr>
</tbody>
</table>

Chi square = 786.59  
p< .001
Responses to the Slides With the Addition of Statements Indicating the Communicated Acceptance of a Supernatural Claim or Skepticism of a Supernatural Claim.

Predictions:

1) The LSV hypothesis predicts that the addition of statements indicating the communicated acceptance of supernatural claims will not necessarily influence the religious ratings of the images.

2) The Emotive Ritual hypothesis predicts that the addition of statements indicating the communicated acceptance of supernatural claims will not necessarily influence the religious ratings of the images.

3) The CASNC hypothesis predicts that the slides depicting behavioral scenes accompanied by statements indicating the communicated acceptance of supernatural claims will receive higher scores (ratings of 4 and 5). Slides depicting behavioral scenes accompanied by statements indicating a skeptical response to a supernatural claim will receive lower scores (ratings of 1 and 2).

Results

Adding statements indicating the communicated acceptance of supernatural claims did increase the religious rating of the control image slides compared to control slides without statements (see table 4) and the LSV and Emotive Ritual image slides compared to slides without statements (see table 5).
Table 4: Table showing comparison of total ratings for slides showing control images without statements indicating the communicated acceptance of supernatural claims (CASNC) and slides showing control images with statements indicating the communicated acceptance of supernatural claims.

<table>
<thead>
<tr>
<th></th>
<th>Certainly Religious</th>
<th>Not Religious</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Control without CASNC</strong></td>
<td>513</td>
<td>203</td>
<td>91</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td><strong>Control with CASNC</strong></td>
<td>313</td>
<td>217</td>
<td>130</td>
<td>109</td>
<td>36</td>
</tr>
</tbody>
</table>

Chi square = 149.23
p < .001
Table 5: Table showing comparison of total ratings for slides showing LSV and emotive ritual images without statements indicating the communicated acceptance of supernatural claims (CASNC) and slides showing LSV and emotive ritual images with statements indicating the communicated acceptance of supernatural claims.

Also, slides accompanied with the communicated acceptance of supernatural claims were rated significantly more religious than slides accompanied by skepticism of supernatural claims (see Table 6).

<table>
<thead>
<tr>
<th>Certain Not Religious</th>
<th>Certain Religious</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CASNC</th>
<th>333</th>
<th>315</th>
<th>205</th>
<th>440</th>
<th>315</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skeptic SNC</td>
<td>358</td>
<td>323</td>
<td>234</td>
<td>439</td>
<td>250</td>
</tr>
</tbody>
</table>

Chi Square = 10.39457, p < .034

Table 6: Total scores (control, LSV, and Emotive Ritual) for slides with the communicated acceptance of supernatural claims compared with total scores for slides with skepticism of supernatural claims.

Discussion

All three of the hypotheses received some support from our study. This indicates that each of the hypotheses include criteria at least sometimes associated with what is called “religious” behavior. However, two key questions remain unanswered: First, why did the addition of statements indicating the communicated acceptance of supernatural claims influence the ratings of the images less in this study than in the previous study (survey #1,
above) where we found the addition of statements indicating that people communicated acceptance of supernatural claims increased the religious ratings of images far more than was found in the present study (see table 7)?

<table>
<thead>
<tr>
<th>Certainlty Religious</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image Only</td>
<td>229</td>
<td>626</td>
<td>458</td>
<td>489</td>
<td>88</td>
</tr>
<tr>
<td>Natural Claims</td>
<td>1223</td>
<td>514</td>
<td>80</td>
<td>42</td>
<td>31</td>
</tr>
<tr>
<td>Supernatural Claims</td>
<td>42</td>
<td>91</td>
<td>119</td>
<td>728</td>
<td>910</td>
</tr>
</tbody>
</table>

Chi square = 4389.61
p < .001

Table 7: Table showing comparison of total ratings for slides with images only, slides with type indicating that natural claims were associated with the behavior in the image, and slides with type indicating that supernatural claims were associated with the behavior in the image (from Survey #1).

We suggest that the addition of such statements had a greater influence on religious ratings in the previous study because it involved showing our subjects images of non-western behavioral scenes that were familiar enough to know what kinds of supernatural claims might go with them, but not familiar enough to know for certain whether or not such claims went with any particular image. This degree of uncertainty was ideal for demonstrating the influence of adding statements to the image. We also chose supernatural claims about dead
ancestors that would have been at least somewhat plausible given students’ likely previous exposure to such claims—and their acceptance—associated with nonwestern cultures.

In contrast, the second study involved many images that were more familiar to the subjects (i.e. modern Western behavioral scenes), causing the subjects to be more certain whether supernatural claims were or were not associated with the behavioral scenes depicted in the images. Further, we used a variety of supernatural claims, including some that were purposefully very different and “strange” from those likely remembered to be associated with the images. These factors reduced, but did not eliminate, the influence of adding statements to the image. The deliberate construction of what we term “discordant” slides, was done in an effort to examine the generality of the definition proposed by the CASNC hypothesis, and to allow for further analysis of the slides for the identification of contextual factors and their impact on judgments of behavioral scenes as religious or not religious.

The likely role of the influence of memory is also relevant to the second question left unanswered by our study: Were the LSV and Emotive Ritual images without accompanying statements rated more religious than the control images because they portrayed LSV or emotive ritual behavior, or was it because they portrayed something (LSV, emotive ritual, or any number of other things) remembered to be associated with the communicated acceptance of supernatural claims?

There are several types of evidence indicating that the interpretation that it was memories of people communicating acceptance of supernatural claims instead of the stimuli of LSV behavior or emotive ritual per se, that led to these slides being labeled “religious”. For instance, it is easy to think of many examples of both LSV behavior (e.g., a person performing a kneeling prostrate stretch in a fitness club) and emotive ritual behavior (e.g.,
chants by the audience at a sporting event) that would not be called literally “religious”.

Even though the examples just given seem to fit the criteria of the LSV and emotive ritual hypotheses, there is undoubtedly something about these behaviors that leads them to be considered “not religious”, while quite similar behaviors are considered “religious”. What is the difference between Hindu Yoga and stretching at a fitness club, and between chanting phrases at a football game and chanting phrases at a Billy Graham performance in the very same stadium?

The answer may be found in the specific wording of the LSV and Emotive Ritual hypotheses. As stated by their proponents, both of the hypotheses seem to imply that religious behavior is distinguished not by LSV or emotive ritual per se, but by the communicated acceptance of supernatural claims associated with these behaviors. The LSV hypothesis does not predict that all instances of ‘make-oneself-lower-or-smaller-or-more-vulnerable’ behavior will be called religious behavior, and the Emotive Ritual hypothesis does not predict that all instances of emotional ritual will be called religious behavior. Instead, the LSV hypothesis predicts that only instances of this behavior constituting the non-vocal aspects of petitioning prayer “when individuals relate directly to a higher power, deity, [or] God” (Feierman 2009) will be called religious behavior. Similarly, the Emotive Ritual hypothesis predicts that only instances of emotional ritual “in conjunction with non-utilitarian ‘sacred’ symbols” will be called religious behavior (Candace Alcorta, personal communication, January 28, 2008). Thus, proponents of both of these hypotheses are left needing to answer the question: How are higher powers, deities, or Gods and sacred symbols identified, except by certain talk (i.e., the communicated acceptance of supernatural claims) or the memory of such talk?
What is interesting about the LSV and Emotive Ritual hypotheses is that they each received support in our tests, yet, this fact actually weakens these hypotheses. This is because some of the images submitted in support of their respective hypotheses showed behaviors that can be considered antithetical to one another (‘make-oneself-smaller’ versus ‘make-oneself-bigger’, for example). This means that while submissive postures or emotive ritual behaviors may be sufficient because of their remembered association with the communicated acceptance of supernatural claims, they are not necessary to the identification of religious behavior.

Now that I have established empirical evidence in support of the validity of the definition of religion as the communicated acceptance of supernatural claims, in the next chapter I offer an explanation, built around this definition for the evolution of religion as a traditional behavior that was directly favored by natural selection in ancestral humans.
Chapter 5: Religious Behavior as Adaptation: Natural Selection, Traditions, and Evolutionary Success

The argument for religious behavior as an adaptation can only be fully understood within the larger context of kinship and cultural tradition. First, however, it is necessary to briefly review the phenomena of learning in general, and the evolution of social learning in particular, for this is the foundation of a great many patterns of human behavior, including religious behavior. Discussion of the evolution of learning will lead into an examination of the mechanisms and evolutionary significance of transgenerational continuity of socially acquired behavior patterns, or traditions, and how traditions, like genes, are subject to the process of Darwinian selection. This is followed by a discussion of traditional religious behavior, and its effects on the evolutionary success of ancestral humans. Lastly, the concept of adaptation is revisited and a case made for viewing religion as an adaptation.

The Evolution of Learning

Learning, as currently conceptualized in the biological sciences is one aspect of phenotypic developmental plasticity, or “the ability of a single genotype to produce more than one alternative form of morphology, physiological state, and/or behavior in response to environmental conditions” (West-Eberhard 1989: 249). Although the process of learning necessarily involves changes in physiological state (electrochemical neural activity, hormonal levels, etc.), and may in some cases lead to morphological changes (growth or atrophy of brain regions, establishment or loss of neural connections, etc.), for the discussion that follows in subsequent pages to be productive, I here use the term ‘learning’ in a
restricted sense to refer only to behavioral plasticity (or flexibility) in response to the ecological environment (as opposed to the genetic and somatic environments [Williams 1966: 57-58]), which includes other conspecifics. It is widely accepted by evolution-minded researchers of behavior that learning, in its various forms and in the various species we observe it, are mechanisms for tracking specific environmental parameters and modifying behavior towards optimality given the organism’s particular environment (see Heyes & Galdef 1996; Bonner 1980; Hinde 1987). Optimality here means the achievement of a phenotypic state best suited for survival and reproduction given the available alternatives and the constraints of the environment (Foley 1985; Maynard Smith 1978).

Learning is not, as so often it is assumed, the opposite of, or even distinct from, “innateness” or “instinct”. Learned versus innate is indeed a false dichotomy. All phenotypes are the product of genetic and environmental interaction (Alcock 2001). Genetic information for the construction of a neurological system enabling behavioral flexibility depends crucially at all stages on environmental input for its development; from the translation of proteins from RNA used to build the cells making up the tissues constituting the nervous system, to the environmental stimuli detected by the senses, processed by the brain, and translated into a behavioral response. Learning, or behavioral flexibility in response to environmental stimuli is therefore part of the epigenetic system of an organism. As mentioned above, learning allows the production of many possible phenotypes from a single genotype (Symons 1979: 33). In addition to this many-to-one relationship between phenotypes and genotype, learning also affords another developmental possibility: a given phenotype might be produced by a variety of genotypes (Reeve & Sherman 1993: 9).
Epigenetic systems are selected on one basis only, the phenotypic outcomes they produce—these systems must have given rise, on average, to a reproductively successful life-history within the normal range of conditions of the organism’s developmental niche (Johnston 1982); the normal range of conditions referring to the environmental parameters in which the epigenetic system was selected for in ancestral generations. Since the parameters of the developmental niche vary widely across taxa, we do not see phenotypic plasticity universally favored, but only under rather specific conditions. The two most often given conditions favoring the evolution of learning are: a moderate amount of environmental unpredictability and fluctuation (Alcock 1975: 259; Mayr 1983: 331; Avital & Jablonka 2000: 328; Lachmann & Jablonka 1996; Richerson & Boyd 1992) and environmental complexity (see Symons 1979: 36-37; Boyd & Richerson 1985). *

Because of the high costs involved in the ontogeny of neurological systems that enable learning, only if what was learned had a positive effect on fitness, that is, if the benefits of behavioral flexibility outweighed the costs, could there have been sustained selection pressure for the maintenance and elaboration of the capacity in phylogenetic lineages (Alcock 1998: 109-110).

* Individual Learning

One need not be a biologist to know that organisms behave in quite regularly patterned ways, and at all cyclical scales (hourly, daily, weekly, monthly, yearly, etc.). Organisms exhibit stereotyped patterns of behavior because, presumably, this way of behaving has ancestrally resulted in evolutionary success. It is an axiom of psychology that

* Of course, “complexity” is not an intrinsic property of the environment, but rather depends on the organism’s niche within the environment.
behaviors that are reinforced are repeated. Evaluation of behavioral outcomes is one of the primary functions of the evolution of complex nervous systems. “An animal’s nervous system causes some environmental events to be reinforcing and others aversive. The behavioral variation that individuals exhibit is shaped by such stimuli so that reinforced…behaviors are retained, while those that result in aversive stimuli…disappear” (Richerson & Boyd 1992: 64). Indeed, this is why many of the simple behavioral ecological models have the predictive power that they do (Krebs & Davies 1987). Repetition of positively reinforced behavior, and decreased frequency of punished behavior, is a form of individual learning referred to as “operant” or “instrumental” conditioning (Terry 2003: 92), and can be regarded as one of the most primitive and taxonomically widespread forms of learning along with classical conditioning.

**Social Learning**

Organismic behavior patterns are repeated both within individuals’ lifespan, and across generations; if a behavior contributes to reproductive success, the genes involved in that behavior are successfully passed to the offspring generation. Genetic endowment, however, as stated above, is not enough for realization of behavior; environmental input is necessary to phenotypic expression, and often the required environmental input involves the behavior of other individuals. If it is in the best reproductive interest of the parent that its offspring also exhibit the behavior that was successful for the parent, then natural selection should favor any mechanism, whether in the parent or offspring or both, that increases the likelihood or efficiency with which the offspring comes to exhibit the behavior of the parent
Natural selection has fashioned numerous mechanisms contributing to behavioral transfer through social learning (or what Avital & Jablonka [2000] refer to as ‘behavioral inheritance’, or what others have termed ‘phenotypic transmission’ Thornhill & Palmer 2000) during the course of human evolutionary history: a long period of juvenile dependence (Geary 1998: 210-211) (the human juvenile period is 1.4 times longer than that of our closest living relatives, the chimpanzee [Kaplan, et al. 2000: 159]), an elaborate capacity for imitation, a high level of (bi)parental investment, verbal language, and so on.

This increased reliance on parental care and socialization and ontogenetic flexibility must have contributed to reproductive success in ancestral human environments, or else we would not witness these features of human life history.

Cultural aptitudes were selected for because they caused human ancestors to acquire information resulting in behavior (e.g. assisting kin, seeking mates, forming advantageous social alliances, communicating effectively, and accruing resources) that increased genetic representation in future generations relative to less successful alternatives (Flinn1997: 28-29).

What could be a more illuminating illustration of a mechanism facilitating the trans-generational transfer and reception of information than human language? To be a successfully behaving human adult, it is necessary to learn a huge amount of information about the ecological (including social) environment, and a large chunk of this information must be learned while an individual is young, precluding much first-hand experience (Geary & Flinn 2001: 13). This information is expected to come to the young individual through parents and other kin who have inclusive fitness interest in them, and we should expect a bias in human juveniles toward the preferential acceptance of tutelage from those identified as
parents and other close adult kin (see Flinn and Alexander 1982: 394; Wright 1994: 168; Pulliam & Dunford 1980: 55-57). Indeed, as Coe & Palmer point out, “the long period of immaturity…indicates that human offspring are designed to be influenced” (2007: 6 emphasis added). Waddington (1960) makes a similar observation on the presumed function of childhood as an era of orthodoxy absorption. Campbell remarks that, “a universal tendency for conformity to the opinions of others may be essential to an adaptive social custom cumulation” (1975: 1107). And Simon uses the term “docility” to refer to the evolved propensity of humans to accept social influence (1990: 1666).

Especially relevant empirical support for the hypothesis that young humans are designed to be influenced comes from the psychology laboratory. Experiments have shown that children readily imitate adult models that exhibit both altruistic and selfish behaviors (see Grusec et al. 1978; Presbie & Coiteux 1971). Moreover, mere exposure to adult talk about the appropriateness of, and justification for, altruistic and selfish acts have been shown to be as effective in influencing the behavior of children as providing a behaving model to imitate (Rice & Grusec 1975). Findings such as these bolster the idea that human childhood may have evolved, in part, in the service of facilitating the adoption of behaviors appropriate to the local social context, whose details were almost certainly far from monolithic throughout the history of our species. Specifically, the evidence from the studies above may point to a developmental mechanism for calibrating levels of altruism, selfishness, and cooperation to their frequencies prevalent in the extent social milieu (see MacDonald 1984). Those adaptations concerned with social behavior may be especially plastic; that is, they may be characterized by relatively wide calibration parameters (as opposed to, for example,
anatomical traits) in the ontogeny of these mechanisms, and this developmental plasticity allows for the forging of environmentally appropriate personality characteristics.

Some authors have pointed out that with an increasing amount of developmental plasticity and reliance on social learning come costs in the form of risk of failure to learn, inappropriate learning, intentional misguidance, and ‘developmental fallibility’ (Johnston 1982). The more flexible an organism’s phenotype and the more dependent on social learning it is, the greater chances there are for maladaptive developmental perturbations (Symons 1979: 307). According to Chisholm, “under these conditions selection is expected to favor the genetic basis for ontogenetic processes that buffer developing young against inappropriate learning or channel them into the locally most appropriate learning situations” (1993: 5). What Chisholm is referring to are learning biases in young organisms, as mentioned above. There does exist experimental evidence for the channeling of selective attention towards adaptively-relevant environmental stimuli in humans and other species, and many authors have argued that natural selection has favored certain contingencies of learning in organisms in ways that increase the chances of the acquisition of fitness-maximizing behaviors within the species ecological niche (Byrne 1994; Garcia & Koelling 1966; Breland & Breland 1961; Roper 1983; Mineka, et al. 1984).

Many researchers, however, have overlooked the possibility that the “ontogenetic processes” that buffer and channel learning may also occur in adult parents in the form of teaching biases. Perusse (1993) has suggested that a teaching bias mechanism that emerges in adults as they reach parenthood is both more efficient and more likely to lead to adaptive behavior in offspring than learning biases. Whereas learning biases would require the genetic encoding of a tremendous amount of information about the environment before it is
actually experienced by the organism, a teaching bias would make use of information acquired epigenetically and require only the genetic encoding of a simple rule such as “teach what is most adaptive for your children” (Perusse 1993: 281). “Such biases would represent the penultimate general-purpose mechanisms as they would have the remarkable potential to produce an unending stream of adaptive behaviors in any environment—including those never encountered before in human history” (Perusse 1993: 282). Given the complexity of human social life, and the diversity of environments and climes inhabited by humans, some sort of teaching bias in parents may have been favored by selection in augmenting any specialized learning biases. Epigenetic accumulation of information about the environment, coupled with a parental inclination to influence the behavior of offspring may actually relax selection pressure on the offspring to be able to change its behavior spontaneously (Trivers 1974: 262). “Since the parent is likely to discover the changing circumstances as a result of its own experience, one expects tendencies toward parental molding to appear, and spread, before the parallel tendencies appear in the offspring” (Trivers 1974: 262). In fact, Castro & Toro (2004) have argued that it is not the capacity for imitation, but the inclination to approve or disapprove of an offspring’s learned behavior that distinguishes primate social learning from the human cumulative cultural system. (Despite Castro & Toro’s claim of human uniqueness for such a teaching mechanism, there is evidence of active teaching of offspring by parents in some non-human primates such as vervet monkeys and chimpanzees [Caro & Hauser 1992; see also Boesch 1991]).

Thus, parents and close kin are expected to have evolved to encourage related individuals in the descending generations to adopt those behaviors that are in the interest of the genetic legacy of the ancestral generation. Stated more broadly, natural selection has
favored the trans-generational transfer of behavior from ancestors to descendants (i.e. traditions). This transfer is facilitated in two ways: Through the passage of genes, and through the replication of a specific environment; which includes such factors as social instruction, models to imitate, and other stimuli relevant to the acquisition of behavior. As argued by Thornhill, “phenotypic fidelity across generations, regardless of whether the phenotypic trait is influenced causally by social learning...or not...requires both the relevant, trait-specific genetic and environmental developmental causes repeating between generations” (2007: 204; see also West-Eberhard 1989; 2002). In this way, phenotypic transmission of behavioral traits is subject to the action of natural selection.

According to many models of cultural transmission, the environmental parameters of the model play a crucial role in determining the mode of behavioral transmission that is favored by selection (Boyd & Richerson 1985; Wakano et al. 2004; McElreath & Boyd 2007; McElreath & Strimling 2008; Box & Gibson 1999). There is a general agreement among modelers of culture that selection favors vertical transmission when the environment is relatively stable (Henrich & Boyd 1998; Laland, et al. 1996). The advantage of vertical social learning in stable environments arises because an optimal behavior set remains adaptive through multiple generations. Parents who exhibit the most adaptive behavior have the greatest reproductive success, and the best an offspring can do is to adopt the parent’s strategy.* This is how traditional patterns of behavior emerge, perpetuate, and spread through vertical transmission. But, as McElreath & Strimling argue, when environmental parameters fluctuate rapidly, “behavioral heritability is the enemy. Oblique social learning

* According to Avital & Jablonka (2000), environments that favor social learning are those that fluctuate slowly enough that conditions in which the learned information is beneficial last longer than the generation time of the animal, but do not remain constant enough such that genetic assimilation of behavioral responses is favored by selection (see also Lachmann & Jablonka 1996: 2).
learning from individuals other than parents], by increasing the rate of recombination between genes and learned behavior, reduces this heritability and allows more rapid adaptation [sic]” (2008: 313 brackets added; Henrich & McElreath 2003 brackets added). While McElreath & Strimling’s computer simulation of social learning may be correct according to the data they entered into their program, I see a shortcoming in their thinking about real-life circumstances: the authors fail to consider that vertical transmission of behaviors (i.e. traditions) plays a dual role. That is, not only can traditions constitute adaptive patterns of behaviors within a stable environment, but traditions also create a stable environment, especially when other individuals in the group are co-descendants and thus likely to have the same traditional behaviors. Traditions may effectively prevent environmental stochasticity.

According to Alexander (1987) and others (Flinn, et al. 2005; Dunbar 1988), the primary selective pressures on humans come from the social environment. Widespread traditions can render the social environment stable (but no less complex and nuanced for this stability). Traditions are favored in stable, complex environments, and thus traditions are perpetuated because of this equilibrating feedback. Traditional behavior patterns are a key aspect of human ‘niche construction’ (see Laland, et al. 2000). These traditional behaviors create a particular and predictable social environment; at one and the same time, these traditions serve as behavioral solutions to the very environment they create.

*Traditions in Evolutionary Perspective*

Anthropologists have long recognized that human cultural behavior has been, and in many cases still is, notoriously traditional (Tylor 1871; Frazer 1979: 352; Boas 1955: 156;
Kroeber 1948: 256; Hartland 1924: 138). In many societies, tradition pervades every facet of life. An excellent example demonstrating this fact is a saying of the Lugbara of Africa that “the rules of social behavior are the ‘words of our ancestors’” (Middleton 1960: 27). The Australian Aborigines conduct their lives by a code of behavior known as “Ancestral Law” (Keen 2004: 244); ancestral heroes, described in rituals are models for correct social behavior (Elkin 1964: 156). Hsu, describing the domestic education of Chinese youth, observes that children “at every turn…are encouraged to imitate and to participate in the ways of the adults, which are, in turn, ways of the ancestors…This education is built on the supposition that all the living are in the shadow of their ancestors” (Hsu 1968: 159). Of the Todas of Southern India, W. H. R. Rivers writes that they are “slaves of their traditions and the laws and regulations which have been handed down to them by their ancestors” (1906: 445). Malinowski, writing about the myths of the Trobriand islanders, notes that the functional role of a myth is that “[i]t justifies by precedent the existing order and it supplies a retrospective pattern of moral values . . .It fulfills a function sui generis closely connected with the nature of tradition . . . with the continuity of culture, with the relation between age and youth and with the attitude toward the past. The function of myth is to strengthen tradition…” (1979: 22; see also Malinowski 1984). An example closer to home comes from the Amish. Palmer states that, “the Amish place an extremely high value on preserving the patterns of behavior they have copied from their parents or other ancestors” (2008), and that this group “spurns many forms of technological innovations, and changes of any kind ‘generally are not encouraged, vocalized, or rewarded in Amish society’” (Palmer 2008, citing Hostetler 1993: 302).
The list of ethnographic examples could go on indefinitely, however, the enumeration of evidence of the importance of tradition is not the point of the current discussion. The point is that human behavior has been and still is for a large (but shrinking) percent of the world’s population, guided by tradition. Traditional behavior, like all manifested phenotypic traits, is subject to the process of Darwinian selection. Organisms succeed or fail in the game of evolution by the traits they exhibit. Behavior is that aspect of the phenotype that is closest to the interface between an organism and Darwin’s hostile forces. The only way to account for the maintenance of long-standing and widespread traditional behavior patterns is to conclude that they are, or were up until recent times, favored by selection in the ecologies in which they are (were) practiced. As stated by Steadman & Palmer, when a tradition “helps to leave descendents it will tend to increase in frequency. When it does not, it will tend to die out” (2008b: 342). “If a pattern of behavior causes people to produce more descendants who also follow that pattern, the behavior will eventually come to predominate—or be naturally selected” (Hartung 1982: 1). Those behaviors passed down through generations with a high degree of fidelity are those behaviors that have been, on average, successful at producing descendants of those ancestors who transmitted them.

Traditions can be thought of as analogous to genes. Both are replicable and inheritable. They both contribute to transgenerational phenotypic fidelity, and it is they that are transmitted (or not) through generations as a function of their phenotypic effects, and hence are the proper units of Darwinian selection. Note that traditions, in this sense, are not memes as conceptualized by Dawkins (1979; 1982), as they refer only to unidirectional transgenerational transmission as a result of their own effects on their success at being
replicated. Also unlike memes, the evolutionary success of traditions is dependent on their impact on the survival of the genes that make their inheritance possible. Just as selection acts on genes to the extent of their influence on their own frequency as a result of their effects in the development of a phenotype, so too does selection act on traditions. Traditions and genes, however, are not so inextricably linked such that they inevitably share common fates. Traditions can be abandoned when they no longer serve the interest of the gene.

In many cases, the evolutionary significance of traditional behaviors among humans may be obscure upon superficial observation, and even upon painstaking analysis. In a species as complex as *Homo sapiens*, the link between any particular pattern of behavior and its ultimate logic can be extremely subtle and circuitous. Indeed, the actors themselves may be completely unaware of the (fitness-related) reasons for perpetuating most traditional behaviors (see Irons 1979). Nevertheless, evolutionarily minded anthropologists have provided some insight into the hidden adaptive logic behind several traditional behaviors. For example, while marriage is a tradition found in all cultures with a relatively straightforward reproductive function, rules as to just who an individual is allowed to marry may often appear arbitrary. However, studies of traditions surrounding marriage such as lineage exogamy (Irons 1981), and cross-cousin and parallel cousin marriages (Flinn 1981; Alexander 1979), have been shown to be fitness-enhancing strategies within the social contexts they were observed to be practiced.

Other kinds of traditions not so directly related to reproductive behavior have also been cast in a Darwinian light that shows their evolutionary significance. The content of traditional myths and stories, handed down through generations, have been interpreted as a context for the transmission of reservoirs of strategic information (Minc 1986; Sobel &
The ability to access the accumulated knowledge of ancestors allows individuals access to solutions for problems that may not be experienced for generations, such as droughts, famines, wars, etc. (Alvard 2003: 142). Traditional food taboos, a long-standing puzzle to ethnography, have also been given a new spin within an adaptationist framework. Hill & Hawkes (1983), using prey choice models from foraging theory, argue that some food taboos among the Ache of Paraguay are the result of floral and faunal species falling out of the optimal diet. The foods that are tabooed are those foods having low return rate compared to procurement costs (Hill & Hawkes 1983). Thus, it makes sense to avoid seeking these resources, and influencing others to also avoid such costly (in terms of energy expended to energy gained) behavior. As Kaplan & Hill note, “some food taboos may have their origins in long-term information transfer about the low profitability of rarely encountered prey” (1992: 196).

Thus, we begin to see, from these few examples briefly touched on above, that the apparently arbitrary nature of culture, an assumption so firmly held by many social scientists for the better part of the twentieth century, and a view used by the cultural determinists and blank-slate psychologists to argue against the application of evolutionary biological theory to understanding human behavior, can, and is, ever-increasingly being shown to constitute a profound error in social scientific thought from which disciplines concerned with the study of humanity are only beginning to recover (see Pinker 2002). Darwinism is not a paradigm that is only selectively applicable to a few aspects of human nature; it applies to all of them. There is nothing about human or any other form of life as we know it on earth that this body of theories is not capable of addressing. As Dobzhansky so excellently put in regarding this point: “Nothing in biology makes sense except in the light of evolution” (1973: 125). Barash
elucidates the implication such a view holds for the Darwinian study of human behavior: “In an evolutionary perspective, the only concern of any and all human behavior is the production of other humans” (1977: 286), even if the anthropologist or the actor cannot immediately understand just how. It is this “how” question that must be pursued within the evolutionary paradigm if science is to reach intellectually satisfying and theoretically sound explanations of age-old riddles of human behavior. Foremost among these riddles has been religious behavior.

Religious behavior is perhaps the facet of culture that is in many cases the most traditional. A vast empirical literature attests to the largely vertical (parent to offspring) transmission of religious orientation (see Hood, et al. 1996: 72-82 and references therein). As Michael Blume states, “We shouldn’t be surprised that human evolution rewarded vertical transmission of religious imprinting, because it confers a clear advantage: if you learn from your parents, you are sure to learn from people who chose to have children and who usually have a real interest that you may continue the generation chain (2007: 25). But to really understand why religious behavior tends in most cases to be traditional, we must become familiar with the most prevalent kinds of supernatural claims, and the social effects that these supernatural claims produce when communicated among individuals.

Traditional Religious Behavior: Ancestor Worship

According to Steadman, et al. (1996), the most widespread, and perhaps universal kind of religious claims concern ancestors; more specifically, the ability of dead ancestors to influence and/or be influenced by, living descendants (see Steadman & Palmer 2008a: 14-25). In their re-examination of Swanson’s (1964) cross cultural survey, Steadman and
colleagues found that supernatural claims about dead ancestors were made not only in those societies coded by Swanson as practicing ancestor worship, but in all of those societies coded “ancestors absent” by Swanson. Indeed, even in the Western religions of Christianity we find vestiges, or at least analogies, of ancestor worship in the Catholic veneration of relics (remains of dead saints), the supernatural qualities attributed to founders of Protestant denominations, and the use of the kinship term “father” when talking about the Christian God, etc.

*The Evolutionary Significance of Ancestor Worship Traditions*

Supernatural talk about dead ancestors may very well be a human universal. Indeed, such behavior can be considered a tradition of humanity. Yet, the question remains as to why this particular tradition is so widespread. What consequences resulted from this kind of communication, such that this kind of behavior was persistently and consistently transmitted through generations of humans through history to become a tradition that is found everywhere it may be sought?

To answer this question, let us lay out a series of succinct observations: Ancestors serve as the genetic nexus between co-descendants. Ancestors are the source of both kin and traditional patterns of behavior (Steadman & Palmer 1996). In traditional societies, kinship relations structure social interaction. The transmission of traditions necessarily entails cooperation between kin; specifically, between ancestors and descendants; it is the acceptance of influence of the ancestor by the descendant. The primary mechanism of kin recognition in humans is social learning—often from parents (Alexander 1979: 108-112.) Many traditions revolve around kinship, and encourage nepotism and cooperation among
those identified as kin (see Palmer & Steadman 1997). Worship of ancestors implies recognition of kinship ties among those who worship common ancestors. The identification of an individual as kin, coupled with the observation of traditions of nepotism entails the cooperative behaviors encouraged by tradition. Reciprocal cooperation (during ritual or mundane activities) strengthens social relationships and should often result in fitness benefits for all involved parties. The fitness gains from amiable relations and beneficial cooperation between near—and distantly—related individuals that result from the inheritance of, and obedience to, the traditions that encourage these behaviors resulted in more descendants of the ancestor who provided both the genes and the traditions. Stated differently, the behavior of making and communicating acceptance of supernatural claims about ancestors is a cross-cultural universal because of its influence on leaving descendants in ancestral environments. The transmission from parents to offspring of religion and other traditions that encourage cooperation between close and distant kin would have contributed to the descendant-leaving success of those ancestors who were able to influence the behavior of their descendent kin, who would themselves become ancestors (see Palmer, et al. 2009). In this way, the linked gene-tradition combination would multiply exponentially with each passing generation.

The question may be posed as to why supernatural claims about ancestors need have anything to do with this process at all? What is the point of adding supernatural talk to veneration of ancestors? And what is more puzzling, possessing the faculties for rationality that humans do, why would anyone communicate acceptance of claims about subjects that cannot be scrutinized by the senses for truth or falsehood; in this case, claims that dead relatives can influence, and be influenced by, events in the world of the living? In pursuing an answer, consider what Fortes says of the Tallensi: “among the Tallensi the ancestors
constitute the ultimate tribunal, the final *authority* in matters of life and death” (1961: 176 emphasis added); and what Bradbury tells us of the ancestor worship of the *Edo* of Southern Nigeria: “It is the *authority* aspect of the relationship between successive generations of close kin that is projected onto the mystical plane, in such a way that the basic norms governing the behaviour of members of kin groups appear to the actors to be handed down from above, and therefore *unchallengeable*” (1966: 127 emphasis added). Note from these examples that ancestors are described as having an authoritative role in the enforcement of behavioral norms and the maintenance of tradition. Another illustrative example comes from the Ju/'hoansi of the Kalahari. According to a Ju/'hoansi informant, ancestral spirits play an active role in the life of the living, these ancestors (*//gangwasi*) “expect certain behavior of us. We must eat so, and act so. When you are quarrelsome and unpleasant to other people, and people are angry with you, the *//gangwasi* see this and come to kill you. The *//gangwasi* can judge who is right and who is wrong” (Lee 2003: 129).

It is this unchallengeable aspect of a supernatural claim (about the authority of dead ancestors or any other claim) that is the key to understanding its social significance. The validity of a supernatural claim cannot, by definition, be demonstrated. Therefore, the acceptance or rejection of the claim is based completely on the acceptance or rejection of the influence of the speaker. To reject the claim is, in a sense, to reject the person making the claim. When a supernatural claim contains reference to shared dead ancestors, the response to the claim—acceptance or rejection—can have dramatic social consequences. Steadman & Palmer argue that, “to reject, deny, or ignore a traditional claim is not only to reject the person making it, but also to reject one’s ancestors, the source not only of one’s existence, but also of one’s traditions and kinsmen” (2008: 18). Rejection of a traditional supernatural
claim can disrupt social relationships; acceptance of these claims tends to promote them.

Hsu (1968), describing Chinese ancestor worship, provides an excellent commentary on the nature of ancestor worship in general:

It is clear, then, that the attitude of the living toward the dead and that of the dead toward the living are functionally one. The relation of the living with the dead is essentially modeled upon that of the living with the living. It is, however, more than that. By glorifying the dead it both idealizes and sets the standard and pattern for kinship relationship (1968: 161).

Fortes (1961) also provides us with insight on the important function of ancestor worship in kin-based societies:

Traditionally, in a society like that of the Tallensi, one could not live in a community except as either a legitimate member of a lineage and family, or a kinless and rightless slave…There are good structural reasons, therefore, for institutional devices and cultural values that will serve to regulate the potentiality of schism between successive generations. Ancestor worship provides the medium through which this end is attained. It represents not only the apotheosis of parental authority but its immortalization by incorporation in the universal and everlasting dominion of the lineage and clan ancestors (1961: 182).

Kin Selection or Descendant-Leaving Strategy?

The reader familiar with sociobiological theory will perhaps recognize kin-selection in the scenario described for the spread of religious traditions. Mutually beneficial cooperation between close kin would result in inclusive fitness maximization for the cooperators. There is a difficulty, however, in explaining traditional religious behavior when armed only with the theory of kin-selection alone. Kin selection theory (Hamilton 1964; West-Eberhard 1975) is based on the fact that, due to recent common ancestry, related individuals share some proportion of their genetic constitution. Because related individuals share genes, they represent additional vehicles of genetic propagation of those genes that are shared, thus biologists speak not merely of individual fitness, but of inclusive fitness.
Behaviors that contribute to inclusive fitness (altruistic behavior that contributes to the survival and reproduction of related individuals) are favored by natural selection. More specifically, kin selection holds that altruistic behavior will be favored by natural selection when the cost to the altruist is less than the benefit to the relative devalued by the proportion of the altruist’s genes present in the relative (Hamilton 1964).

What proportion of new genes are shared by any two related individuals depends on how far removed the individuals are from a common ancestor. For example, in sexually reproducing diploid species, half of an organism’s genetic material comes from the male parent and half comes from the female parent. Thus, offspring share 50% of their genes with father and 50% with mother. Siblings of the same parents also have, on average, half of their genes in common. Each link (individual) in a chain or web of descent reduces the coefficient of relationship by half. The shortcoming of kin selection comes from the fact that relatedness falls dramatically at distances beyond first cousins ($r=.125$). Therefore, there would be very weak or no selection pressure for altruistic behavior beyond this sphere of relatedness.

Contrary to the predictions of classical kin selection theory, many anthropologists have noted that traditions of kinship amity often encourage the extension of nepotistic behavior to distantly related individuals, well beyond the bounds at which classical kin-selection could effectively operate (Hiatt 1965 among Australian Aborigines; LiPuma 1988 among the Maring; Lederman 1986 among the Mendi of Highland Papua; see also Fiske 1991; Price 1975). For example, Keesing, in discussing the Tiv of Africa, points out that “the whole population of some 800,000 traces descent by traditional genealogical links from a single founding ancestor” (1975: 32-33), and Fortes observes that prescriptions of altruism toward kin applies to all of the Tiv (1969: 237). Similarly, Winters (1966), writing on the
Iraqw of northern Tanganyika, a group who in 1957 numbered more than 130,000, reveals that “it is virtually impossible for two Iraqw to fail to find a kinship link within a very short time” and that this genealogical knowledge “provides a means by which individuals can erect scaffolds upon which they can build acquaintanceships and friendships” (1966: 162). Thus, kin-selection theory alone is not adequate to explain the phenomenon.

At this point it is important to recall that the mechanism of kin recognition in humans lay in social learning—learning who is kin from parents and other relatives. Kinship comes with traditional prescriptions about how to behave toward those identified as kin. Given the mechanism of kin-recognition in humans, the traditional behavior patterns involving kinship relations, and the inadequacy of classical kin-selection to explaining the persistence of such traditional behavior, it is necessary to approach traditional religious behavior from a slightly different point of view to understand how such cultural systems can emerge and be favored by natural selection. We must examine its effects from a broader vantage point than that afforded by kin-selection.

The real beneficiaries of religious and kinship traditions are the ancestors who successfully transmitted these behavioral traits. To see why, we must take into account the theory of parent-offspring conflict (Trivers 1974). Some insights gleaned from this theory will aid in demonstrating how it is that kin selection is inadequate to explain ethnographic observations of widespread altruism, as well as how the descendant-leaving model can account for such observations. The following discussion will also clarify why it is that so many traditions concern prescriptions of altruism toward individuals identified as kin.

That we should not expect a complete overlap of interest between parents and offspring comes from the fact that a parent and offspring share (on average) only half of their
genetic constitution in common, likewise with any siblings with the same parents. Following from the tenets of kin selection theory (Hamilton 1964, see above), because siblings are only genetically related by half, each sibling should see itself (i.e., behave as if it sees itself) as twice as valuable as any of its siblings; because it is one hundred percent related to itself. A parent of those siblings, however—and let us assume there are only two offspring in this scenario—should value each of the offspring equally. Hence, it is in the genetic interest of the parent that those siblings behave more altruistically toward one another than is in the genetic interest of the siblings to do so. Thus, parents should have evolved to “extract from the child more kin-directed altruism and sacrifice…than is in the child’s genetic interest” (see Wright 1994: 168).

This line of argument can be extended beyond the nuclear family. Collateral kin of the same generation are always (except in the case of siblings) more closely related to a common ancestor than each is to the other. For instance, an individual is more closely related to a parent’s sibling (ego’s aunt or uncle, r= .25) than to the offspring of the parent’s sibling (ego’s cousin, r=.125). Those relatives in the senior generation, then, are expected to encourage more altruistic behavior between their offspring and their sibling’s offspring (Trivers 1974: 259). Similarly, a grandparent of the cousins, who is related to each by one-fourth, is also expected to encourage more altruistic behavior between these co-descendants than is in their genetic interest. From this simple point, it should, upon reflection, become increasingly obvious who the evolutionary beneficiaries are when traditions of kinship amity are successfully transmitted to descendent generations. The further one goes up into the ancestral generations, the greater is the amount of co-descendants whose altruism toward one another would be to the genetic benefit of a common ancestor. To the extent that parents can
successfully influence offspring and other descendants to exhibit this increased altruism, the
genes of those ancestors would spread in the population (Palmer & Steadman 1997).

While altruism and cooperation between individuals may or may not enhance the
inclusive fitness of the actors depending on kinship distance (i.e. the proportion of shared
genes), it inevitably enhances the descendant-leaving success of an ancestor when altruism
translates into reproductive success (Palmer & Steadman 1997). And this descendant-leaving
success is exponentially multiplied with each generation of descendant kin, as evidenced in
the example of the Tiv and Iraqw above.

Note that this argument does not rely on descendant-leaving success as an explicit
conscious goal of religious behavior or the transmission of such traditions. Ultimate goals
need never be assumed to be motivation for behavior (Alexander 1990: 241, 255). Proximate
mechanisms such as encouraging offspring to follow the examples of your behavior (Castro
& Toro 2004; Perusse 1993: 281), or a bias in young individuals to preferentially copy the
behaviors of parents and other close kin (Flinn & Alexander 1982) are sufficient for the
maintenance of trans-generational transmission of behavioral phenotypes.

Religious Behavior and Evolutionary Success

Several authors have pointed out the costly, counter-productive, irrational and reality
distorting nature of religious belief and behavior and ask why natural selection, a ruthless
pragmatist, has not eliminated such behavior from the human repertoire (see Bulbulia 2004a:
19-20; Sosis 2004: 167; Kirkpatrick 2006: 169-170). Indeed, these apparent attributes of
religion is one of the arguments used to defend the position that religion is a by-product of
human evolution and not a directly favored adaptation or set of adaptations (Kirkpatrick
This descendant-leaving model for the spread and persistence of religious behavior shows that this puzzlement shown by many scholars of religion is misguided.

There seems to me to be three reasons for this misunderstanding over religion-as-adaptation. The first reason was discussed above and is based on inaccurate definitions of religion. Despite arguments such as, “[r]eligion consists of multi-layered categories of behavior” (Soler 2008: 173), I have shown that religious behavior is more accurately characterized as nothing more nor less than the communicated acceptance of supernatural claims. While the consequences of such verbal behavior can of course be costly (think of rejecting Catholic supernatural claims during the Inquisition), talking itself is not particularly costly. Rather, it is the behaviors that are often associated with supernatural claims that can be costly, such as obligatory time-consuming prayer schedules, mandatory periodical fasting, or painful and dangerous initiation rites. These behaviors, however, are not religious behaviors per se. Arguments that religion is a by-product are based on the failure to properly define religious behavior. The second reason has also already been discussed and concerns the assumption of belief in the supernatural thought to underlie and motivate costly religious behavior. Since the existence of reality-distorting beliefs in the supernatural cannot be verified, they cannot be presumed to have a causal role in the enactment of religious behavior.

The third reason is that researchers examining the apparent costs of religious behavior may be entertaining an insufficient time-depth that does not capture the evolutionary benefits that outweigh any associated proximate costs. Kirkpatrick states that, “benefits to individuals or groups hypothesized to result from a religious adaptation must be shown to translate into
adaptive benefits in this strict currency of genetic or reproductive success” (2006: 167).

Kirkpatrick’s failure to see these benefits leads him and others to the by-product conclusion. The adaptive nature of religious behavior, however, is best demonstrated longitudinally, not necessarily within any one generation. The problem of how to best measure the fitness of a trait is a heretofore-unresolved one (see Dawkins 1982:179-194). The main issue at stake is the appropriate point at which to take stock of the reproductive consequences of a trait (Alexander 1974: 374; Hamilton 1970; Dawkins 1982: 184; Palmer and Steadman 1997). It is asserted here that selection always acts most effectively on individual traits and not on groups of organisms or traits (but see Wilson 2002), but this still leaves open the question of when to measure the effects of the trait on individual reproductive success.

It may not be obvious at first that a trait that leads to sacrificial behavioral patterns can be selected and spread at the expense of traits that produce ‘every man/woman for themselves’ life histories, however, several examples of the evolution of these kinds of traits can be cited. For example, Alexander observes that in polygynous societies, polygynously mated females often have fewer offspring that monogamously mated females, but polygynous females may have many more grandchildren (1974: 374; see also Hartung 1982). Similarly, the relatively early cessation of reproductive capacity in human females (menopause) has the immediate consequence of terminating the possibility of future reproduction, but presumably has been favored by natural selection because of its effects on maximizing the reproductive success of extant offspring leading to a greater number of grandchildren (Hawkes et al. 1997; Hawkes et al. 2000). Infanticide, abortion, and other birth control measures can also be interpreted as behavioral traits that although representing a decrement to immediate reproductive success, can increase long-term overall reproductive
success. Those strategies of reproduction referred to as K-strategies (Barash 1977: 179-186) are based on a trade-off of maximum fertility potential realization for maximum number of future descendants (see Chisholm 1993: 3).

Thus, a trait that confers descendent-leaving success can be naturally selected and spread through a population, because the immediate costs are compensated for by large future benefits, but it’s adaptive effects may not be apparent from an isolated analysis of the trait in a single or a few generations. As pointed out by Williams, “[i]t would be rash to assume that any brief and local biological study can yield reliable data on long-term directions and intensities of natural selection” (Williams, 1992, p. 40). The bottom line is that if religious behavior was directly favored by natural selection it must have been evolutionarily successful for those ancestral individuals who exhibited the trait, although a perspective that takes into account the immense vertical dimension of evolutionary progression is necessary to capture these effects (Palmer & Steadman 1997).

Is Religious Behavior an Adaptation?

The preceding paragraph raises the issue of the contemporary effects on the reproductive success of those who engage in religious behavior. Should we expect religious behavior to have positive effects on the genetic success of practitioners in today’s modern environments? This issue becomes especially poignant upon consideration of the demographics of ‘world’ religions such as Judaism, Islam, and Christianity, wherein individuals are often unrelated—and explicitly known to be unrelated—to a large proportion of fellow practitioners. Reaching an answer to this question requires a revisiting of the concept of adaptation.

*Benefits in the form of maximum genetic representation in descendent generations.
Remember that adaptation is a *historical* concept, concerned with past selection pressures and past differentials in reproductive success (Gangestad 2008; Mayr 1983; Thornhill 1997; Williams 1966; Buss 2004). Recall also that adaptations are intimately connected to the ancestral environmental context in which they selected (Dobzhansky 1956: 347; Tooby & Cosmides 1990; 1992; Symons 1990), and that a trait that was naturally selected in the past for its phenotypic effects need not produce those same effects in environments that differ in some important way from its environment of evolutionary adaptedness.

One of the principal criteria used in biology for the identification of an adaptation is evidence of *design*; the trait must convincingly be shown to be *designed* to serve some function contributing to survival or reproduction (Williams 1966; Thornhill 1990). An observation on the fitness effects—the adaptiveness—of a trait is important only insofar as it may assist in revealing functional design (Symons 1990). As Symons argues, “[t]o conclude that the measurement of differential reproduction illuminates adaptations from the premise that adaptations were produced in the past by differential reproduction is simply a *non sequitur*” (1990: 430 emphasis in original). “[M]easuring reproductive success focuses attention on the rather trivial problem of the degree to which an organism actually achieves reproductive survival” (Williams 1966: 159).

It does not follow from the fact that a trait has been identified as an adaptation that we should expect to see current adaptiveness. This is because proximate mechanisms can become disconnected from the selection pressures that led to their evolution, and thereby cease to function adaptively in novel environmental contexts (that is, in environments that differ in some significant way from the environments in which the trait was selected).
Organisms, including humans, have been designed by natural selection acting on the genetic proliferation of ancestral generations. For this reason, then, organisms are *adaptation executors*, and not *fitness maximizers* (Tooby & Cosmides 1992: 54; 1990). Natural selection is not teleological and cannot, therefore, anticipate future adaptive problems individuals will face. “The best that natural selection can do is give us adaptations…that play the odds” (Wright 1994: 106). As Tooby and Cosmides argue, “[n]atural selection cannot directly ‘see’ an individual organism in a specific situation and cause behavior to be adaptively tailored” (1992: 54).

Thus, from the discussion above and of that from chapter 2, it should by now be clear that adaptation, according to modern evolutionary biological theory, is a term that refers to a trait that exists because it itself was favored by natural selection in ancestral generations.

The statement that a particular form of behavior is an *adaptation* to a particular environment does not imply the current existence of beneficial effects on survival and reproduction; it implies that during the course of evolutionary history selection produced that particular form of behavior because that form served a specific function more efficiently than available alternative forms did (Symons 1992: 148 emphasis in original; see also Symons 1986: 208; Irons 1986: 197; Daly & Wilson1983: 310; Dawkins 1982: 36).

So the answer to the question of whether we should expect adaptive consequences to follow from religious behavior (or any other behavior, whether or not it is claimed to be an adaptation) practiced today is: No, not necessarily.

Some authors have examined the possibility that some aspects of modern religion may manipulate our proximate mechanisms in a way that is not necessarily in the reproductive interest of the manipulated individual. For instance, Batson has suggests that “certain kinds of religious imagery may serve to extend the range of application of the narrowly kin-specific innate altruistic impulse…the religious imagery that I have in mind is
kinship imagery” (1983: 1383). The strength, and even the existence, of Batson’s “kin-specific innate altruistic impulse”, is up for debate, but the idea of religious imagery-as-manipulation is an intriguing one. Following a similar line of thought, Qirko (2004) hypothesizes that religious institutions demanding extreme forms of altruism such as celibacy from members take advantage of “human predispositions to favor genetic relatives in order to maintain and reinforce these desired behaviors in non-kin settings…This is accomplished through the institutionalization of practices to manipulate cues through which such relatives are regularly identified” (2004: 681). The cues Qirko refers to are association, phenotypic similarity through standardized dress, and most importantly, the use of kin-terms. In the scenarios that Batson and Qirko have in mind, individuals may indeed be manipulated by religious imagery to non-adaptive or maladaptive ends.*

The tendency toward kin-terms in religious contexts is a markedly widespread phenomenon. For a familiar example, a catholic priest is called “father”; nuns are addressed as “mother” or “sister”, depending on seniority; co-congregants are called “brothers” and “sisters”; we are all the “children of God”. Whether or not the use of kin-terms actually manipulates some evolved disposition towards kin-directed altruism, the use of kinship terms in non-kin based religions does seem to create a metaphorical “family” of co-religionists (i.e. a group of individuals who communicate acceptance of the same supernatural claims) who tend to act “as if” they were real kin, preferentially cooperating with, and sacrificing for, their metaphorical relatives.

* However, in the case of celibacy, several authors have mustered evidence that it may actually be an inclusive fitness maximizing strategy (see Deady et al. 2006 for Irish Catholic priesthood; Childs 2001; Crook & Crook 1988 for Tibetan monkhood; Livi-Bacci 1971; Boone 1988 for Portuguese Catholic priesthood; and Hill 1999 for celibacy among medieval religious women).
But is there not some degree of manipulation involved in all religious behavior? I would answer in the affirmative, but I would also argue that the word ‘manipulation’ be stripped of the negative connotations in this context. Manipulation can be in the reproductive interest of not only the manipulator, but also the manipulated. A peahen is ‘manipulated’ by the spectacle of the dominant male peacock’s tail fan, and she mates with him. The consequences of being manipulated thusly are genes in her male offspring for attributes of the reproductively successful father, and preference for high-fitness males in the female offspring (see Andersson 1994: 24-25; Fisher 1930).

Returning to religious behavior, recall the definition: the communicated acceptance of supernatural claims. To communicate acceptance of a supernatural claim requires the suspension of skeptical evaluation of the truth-value of the claim. After all, a supernatural claim, by definition, is one whose subject matter cannot be verified. As mentioned above, to accept such a statement is literally to accept the influence of the speaker. The acceptance of another’s influence is the necessary precondition for a cooperative interaction with another individual. Irons (2008) points out that religious statements are irrational messages that cannot be subjected to logical and empirical scrutiny. It is the irrationality of religious messages, he argues, that contributes to their effectiveness as expressions of in-group commitment; “irrational messages are preferable because they are not subject to rational evaluation; they are true commitments” (Irons 2008: 54). The special qualities of making, and communicating acceptance of supernatural claims is argued to be what leads to the high levels of cooperation between co-religionists. The unquestioning acceptance of influence implied in the acceptance of supernatural claims as true is what creates the family-like relationships found in groups of unrelated individuals united by religion (Steadman & Palmer
2008a: 44). The acceptance of influence is the manipulation involved in religious behavior. Whether or not this manipulation is to the reproductive advantage of the manipulator, the manipulated, neither, or both, is not a question that can be given a generalized answer.

Religious Behavior is an Adaptation

The topic of manipulation brings this section full circle to the argument of the opening statement: Religious behavior is an adaptation. In addressing the issue of identifying adaptation, recall that, “[t]he demonstration of a benefit is neither necessary nor sufficient in the demonstration of function…It is both necessary and sufficient to show that the process is designed to serve a function” (Williams 1966: 209 emphasis added). If a trait was shaped by the direct action of natural selection, that trait, then, is functionally designed for the solution of the ecological problem that constituted the selective pressure in ancestral generations. The functional design of an adaptation is evidence of the selective force that led to its evolution (see Thornhill 1997: 5). To apply this idea to religious behavior, it is quite clear that supernatural claims are not designed to serve the function of conveying accurate information about the world to other individuals. For the subject matter of such statements cannot be verified by the senses of either the speaker or the hearer. Indeed, it may be argued that no instance of human (and animal) communication is in the service of conveying accurate information, but rather directed at influencing or manipulating the behavior of others (see Dawkins & Krebs 1978). What supernatural claims seem designed for is influencing the hearer to accept the speaker’s authority unskeptically. What the communicated acceptance of a supernatural claim seems designed for is signaling the acceptance of the claim-maker’s influence. The function this process seems designed for is, the promotion of cooperative
relationships between individuals. In ancestral human groups the supernatural claims involved dead ancestors, and the cooperative relationships would have been between co-descendants of ancestors who transmitted this pattern of behavior. The increased cooperation resulting from this behavior led to greater descendant-leaving success, and hence the trait spread relative to alternative traits.

The descendant-leaving effects of religious behavior in contemporary times hinges on the environmental context in which this behavior is exhibited. Alexander has pointed out that in the analysis of adaptation, “one may infer that any human attribute that gives evidence of being highly evolved, or is too elaborate to be accidental, is likely to have had reproductive significance—to be adaptive in some context. The problem lies not in deciding whether or not complex evolved phenomena are adaptive but in identifying the context [in which the trait is, or would have been adaptive]” (1990: 249 emphasis and brackets added).

Irons (1998) has coined the term “adaptively relevant environments (ARE)” to address the issue of the effects of adaptations within changing ecological contexts. According to the ARE concept, each adaptation is fitted to some particular aspect of the environment, and “[a]s a rule, an adaptation needs to interact with only a few selected elements out of the organism’s total environment in order to confer its reproductive advantage” (Irons 1998: 198).

What is the ARE for religious behavior? I would argue that the adaptively relevant environment for religious behavior is kin-based social contexts wherein religious behavior takes the form of ancestor worship and is intimately linked to other cultural traditions such as those concerning conduct toward individuals identified as kin. This is the socio-ecological context in which humans have lived for the majority of our ancestral existence, and the one
in which religious behavior presumably emerged and was shaped (designed) by natural selection. As W. Robertson Smith put it long ago: “it is not with a vague fear of unknown powers, but with a loving reverence for known gods who are knit to their worshippers by strong bonds of kinship that religion begins” (1938: 54).

Thus, when the proximate mechanisms of religious behavior operate outside of this specified context, we have no reason for assuming a priori that this trait will lead to a reproductive advantage. Therefore, in stating that religious behavior is an adaptation, its current effects on the fitness of individuals exhibiting the trait, as well as data on whether or not the trait is currently inherited by offspring from parents are completely and totally irrelevant, and do not directly bear on a hypothesis about adaptation. All that one may conclude upon consideration of the ubiquity of religious behavior among all known cultures is that it must have been evolutionarily successful in the past for the majority of those individuals who adopted and successfully transmitted the trait.*

To reiterate and clarify the argument developed above for religious behavior as an adaptation, I will now attempt to put all the pieces of the puzzle together. According to Coe and Palmer (2007), “traditions can be expected to show evidence of adaptation only to the extent that both the genetic and the environmental influences on that behavior have been replicated across generations for the long periods of time needed for effective selection” (2007: 39; see also Thornhill & Palmer 2000).** This is as true for behavioral traditions as it

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* It is important to understand that a trait need only be adaptive on average to be favored by selection. What this means is that religious behavior is not expected to have been evolutionarily successful for all individuals in the ancestral past, only a larger portion than for those who did not reap such consequences of engagement in this behavior.

** Although some coevolutionary theorists have attempted to make a distinction between “cultural” and “genetic” adaptation (see Cavalli-Sforza & Feldman 1983), this is a false dichotomy. Every trait is a product of gene-environment interaction during development. When authors speak of “cultural” adaptations, all that this essentially means is that a specific environmental input has been identified that is necessary to the ontogeny of the trait; in this case, the observation of other humans exhibiting the trait.
is for any other phenotypic trait that would properly be regarded as an adaptation. An adaptation is tied to a particular environmental context (its ARE), which is necessary for the ontogenetic emergence of the trait in such a way that it confers an adaptive advantage on the bearers of that trait. Therefore, only as long as a trait’s ARE persists can we expect a trait identified as an adaptation to function in the manner for which it was selected. Thus, the trait of making and communicating acceptance of supernatural claims is only expected to function adaptively (i.e. contribute to descendant-leaving success) within the environmental context in which it was selected.

As suggested above, this context was small, kin-based social groups where behaviors were transmitted vertically from ancestors to descendants. This is the ancestral lifestyle of our species for the past 99% of our existence, and the only context that has persisted long enough for natural selection to act on the consequences of this trans-generationally transmitted behavior pattern. The traditions that we observe among those populations that still practice an ancestral way of life are behavioral traits that have survived the selection process because of the descendant-leaving consequences they conferred on their bearers. One tradition that we observe ubiquitously among these societies is ancestor worship. The universality of ancestor worship is testament to its evolutionary success.

Some, perhaps, may be tempted to extend this argument and state that the universality of religious behavior is testament to its continued adaptiveness. However, we have no basis for such a claim. Religious behavior that takes a form other than ancestor worship, such as Christianity and other world religions have simply not been around long enough for natural selection to have effectively acted on them. Furthermore, these religions are practiced largely in non-kin social contexts in environments radically different from the human
ancestral condition. It is a distinct possibility that the persistence of religious behavior today is not a consequence of its continued adaptive consequences in modern socio-ecological contexts (that is, modern religious behavior not involving ancestor worship may be a by-product of traditional ancestor-based religious behavior). As Avital and Jablonka warn us, “[b]ehaviour can sometimes be transmitted even when the environmental conditions that induced the behavioural change in the parents [or ancestors] are no longer present, and even if the behaviour is somewhat deleterious to the offspring. This may sometimes be the price of this type of transmission: the price of tradition is conservatism” (1996: 1196 brackets added).
Chapter 6: Conclusion

In this work, many issues pertaining to the evolutionary study of religion have been addressed. Chapter 1 provided an introduction to a selection of the major contemporary approaches to the study of religion from the fields of evolutionary cognitive psychology and behavioral ecology. It was seen that researchers from evolutionary cognitive psychology have as one primary interest the characterization of religious concepts and the identification of the cognitive domains and mechanisms responsible for the formulation and processing of these concepts. Evolutionary cognitive psychological researchers argue that the fundamental characteristics of religious concepts include counterintuitiveness, agency, and varying degrees of psychological and physical anthropomorphization of these counterintuitive agents. Behavioral ecologically oriented researchers have devoted more attention to the social effects associated with these concepts, and the role of ritual and other patterns of behavior in the promotion of altruism and cooperation. Researchers from this perspective have analyzed religious behavior in the framework of signaling theory, and argue that many behaviors associated with religion, as well as beliefs in the supernatural serve as costly and honest signals of group commitment.

In chapter 2, the debate over whether religion represents an adaptation directly favored by natural selection or a by-product of other evolved traits was introduced, and it was shown that those authors supporting the by-product argument come largely from the evolutionary cognitive psychological schools, while the adaptationists, for the most part, identify with the behavioral ecology paradigm. Additionally, this chapter contained discussion of what a good hypothesis for religion as an adaptation would need to include.
Criteria include the need to clearly distinguish the concepts of adaptiveness and adaptation, and the need to posit a function of religion and show how religion is well designed to perform that function, as well as a demonstration of how that function would have contributed to the evolutionary success of ancestral individuals who engaged in religious behavior. Also in chapter 2, it was argued that how religion is defined has important implications for how it is viewed from an evolutionary perspective.

Chapter 3 explored several problematic issues regarding existing definitions of religion. Principal among these issues is the notion of “belief”. It was argued that defining religion in terms of belief in the supernatural renders any theory or hypothesis of religion untestable, and hence unscientific. This is because beliefs are non-empirical, and thus unidentifiable. As such, they cannot be used to explain behaviors thought to be motivated by, or associated with, these beliefs. A definition of religion, if it is to be scientific, must reference something empirical: namely, behavior. When religion is defined behaviorally, hypotheses about the social consequences of religious behavior can be tested for validity. In addition, important questions about the ontogenetic and evolutionary history, and proximate and ultimate causes of religious behavior can be posed and answered. Another issue regarding a useful definition of religion is the inclusion of criteria that are both necessary and sufficient to the identification of religious behavior cross-culturally. The definition must include all of the elements that are sufficient for identifying behavior as religious across societies. However, at the same time, the definition must be restricted to only those elements that are necessary for identifying religious behavior.

Chapter 3 concluded with the proposition of a definition of religion as the \textit{communicated acceptance of supernatural claims}. It was argued that this definition of
religion contained the necessary and sufficient elements for accurately identifying religion in all societies and cultures. Use of the term *supernatural* was argued to be more appropriate for characterizing religious concepts than the term *counterintuitive*. This is because while counterintuitive phenomena can be used to describe many aspects of the observable world, such as insect metamorphosis, the behavior of light, and quantum physics, the term supernatural refers only to those concepts that do not exist in nature, and hence are not identifiable with the senses or subject to explanation according to natural laws. It is the quality of being supernatural that universally characterizes religious concepts.

Chapter 4 presented the results of two survey studies formulated to test the accuracy of this definition of religion. Survey #1 did this by adding text to images that indicated that the behaviors depicted were associated with the communicated acceptance of supernatural claims. This significantly raised the religious rating of every image compared to the ratings of the image alone, and the ratings of the image accompanied by natural claims. Survey #2 compared the communicated acceptance of supernatural claims hypothesis against two other hypotheses regarding criteria useful in identifying religious behavior.

In chapter 5, an explanation of the evolution of religious behavior as an adaptation was laid out step-by-step. It was shown that, through the mechanism of social learning, transgenerational transmission of behavior—traditions—are subject to the action of natural selection. Traditions that contribute to the descendant-leaving success of individuals are selected for and increase in frequency in descendent generations compared to less successful alternative behaviors. The tradition of making and communicating acceptance of supernatural claims about dead ancestors is a traditional behavior found in all small scale societies studied, and vestiges or analogues of ancestor worship, in the use of fictive kin-
terms, is found throughout modern world religions. It was suggested that the ubiquity of ancestor worship traditions among societies that best represent the social environments of ancestral humans is evidence that such behavior is the primordial form of religion, and was naturally selected for its effects on the evolutionary success of human ancestors. The function of traditional religious behavior is the promotion of cooperation and altruism between near and distant kin. Cooperation between related individuals increased the descendant-leaving success of ancestors, and thus traditions of religious behavior were maintained as a human phenotype through human history to eventually, as a result of increased cross-cultural contact, give rise to our major world religions such as Islam, Judaism, Buddhism, Hinduism, Christianity, etc. Because of the relatively recent emergence of these religions, their horizontal transmission, and largely non-kin context, these forms of religious behavior may or not be currently adaptive; that is, they may not contribute to the descendant-leaving success of their practitioners.

The future of the evolutionary study of religion looks promising. Each year the volume of literature dedicated to Darwinian approaches grows, and many scholars from the younger generations of academia are being increasingly attracted to this aspect of human life. While the evolutionary approaches to religion are still in their infancy, integration of the various perspectives seems imminent. However, many problematic issues still remain to be worked out, and chief among these is the achievement of agreement on a useful operational definition of the behavior studies of religion should be concentrated on. In this work, I hope to have contributed something towards achieving this end, as well as inspired some critical thinking about current views, definitions, and theories, and the natural history of the human relationship with the supernatural.
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Despite comments to the contrary (e.g., Zuckerman 2007), the existence of atheism (defined here as the explicit non-acceptance of supernatural claims that others communicate acceptance of) poses no special challenge—indeed, no problem whatsoever—to the thesis of religious behavior as an adaptation. Some authors, especially those associated with the cognitive sciences (e.g. Barrett 2004; Boyer 1994; Atran 2002; Kirkpatrick 2005), have asserted that theism, or religion, is natural; that is, religious thought and behavior arise naturally from the normal workings of evolved human psychology, and that atheism is
unnatural and a result of novel environmental influences on evolved cognitive processes (see Barrett 2004: 113-122). To the contrary, if religion really is necessarily and sufficiently defined as the communicated acceptance of supernatural claims, it amounts to the identifiable phenomena of certain acts of communication, as does atheistic behavior. Because one act of communication is no more nor less “natural” than another, the distinction is not even a logical one. If an organism is capable of performing a behavior, that behavior is “natural”; meaning simply that it verifiably exists in the physical world.

Another, and perhaps more relevant reason why atheism is unproblematic to an adaptationist explanation of religious behavior emerges from a few basic corollaries of evolutionary theory: an adaptation need not be exhibited by all members of a species (for example, sex-linked and facultative traits), an adaptation is not expected to be exhibited in the absence of environmental input necessary to its manifestation, nor need an adaptation even be exhibited in instances where the necessary environmental input that served as the selective pressure leading to the evolution of the adaptation is present. For example, consider male sexual jealousy, an adaptation related to paternity certainty (Wilson & Daly 1992). In an environment lacking females and other relevant cues, the adaptation will not be manifested because the adaptive challenge the trait was naturally selected to solve does not present itself. Consider also a male who is confident in the fidelity of his mate. Such an individual may not exhibit sexual jealousy in instances where his mate interacts with other males. Another example is tool usage by chimpanzees such as using a hammer and anvil to crack the shells of nuts, as practiced by Tai forest populations. In the absence of the material necessary to utilize and/or a model to copy, the adaptation will not be exhibited. Further, even where the tool material and models to copy are present, adult male chimps usually do not exhibit this nut cracking behavior.

Another obvious and more closely related example is language. For the adaptation of language to emerge as a phenotype requires exposure to language during a certain critical period of ontogeny. In another case, an individual may be exposed to more than one language while growing up, yet never speak one of those languages. To apply these ideas to the current topic of this paper, for religious behavior to emerge as phenotype requires that the environmental input of others making and communicating acceptance of supernatural claims is present such that the individual acquires this trait from the social environment. However, even in an environment containing others exhibiting religious behavior an individual may not, for any number of reasons, copy such behavior, especially in environments containing non-religious (or anti-religious) behavioral options. Nothing in evolutionary theory mandates that adaptations be exhibited by all members of a species, or be exhibited by any member of a species in a given environment, and this pertains especially to evolutionarily novel environments.