

# The Evolution of Religion: Three Anthropological Approaches

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## Abstract

This article examines three anthropological theories explaining how religion has evolved and continues to evolve. They are: *commitment theory*, which postulates that religion is a system of costly signaling that reduces deception and creates cooperation within groups; *cognitive theory*, which postulates that religion is the manifestation of mental modules that have evolved for other purposes; and *ecological regulation theory*, which postulates that religion is a master control system regulating the interaction of human groups with their environments. An assessment of the success of the theories is offered. The idea that the biological evolution of the capacity for religion is based on the group selection rather than individual selection is rejected as unnecessary. The relationship between adaptive systems and culturally transmitted sacred values is examined cross-culturally, and the three theories are integrated into an overall gene-culture view of religion that includes both the biological evolution and the cultural evolution of behavioral systems.

## Introduction

In recent years, evolutionary psychology and cultural anthropology have been incorporating neo-Darwinist evolutionary models of human behavior into their

thinking. This has produced some interesting new theories about the evolution of religion, which was one of the earliest concerns of cultural anthropology and which was the focus of considerable thought in the 19th century.

In the 19th century, anthropological ideas about the evolution of religion were more about the evolution of a cultural form than about behavior driven by the underlying capacities of the evolving human brain. Within these purely cultural ideas, a lower-to-higher, savagery-to-civilization sequence emerged as the primary framework for describing the evolution of religion. In this 19th century work, the religious beliefs of other cultures, which were published by anthropologists such as Frazer (1911), offended the sensibilities of many Europeans, and they acquired a low position in the hypothetical sequence of cultural evolution. An important issue within this framework was the search for the “origins” of religion, a state of religion in its more pristine form out of which the more “enlightened” religions of the 19th century evolved. Thus, when “primitive” beliefs such as magic or divination cropped up in 19th century European society, they were regarded as “survivals” carried over from earlier evolutionary forms in a manner akin to vestigial organs in animal physiology (Tylor 1958[1871]:112–159).

At the beginning to the 20th century, Durkheim moved British and American social anthropology away from evolutionary perspectives (Harris 1968:479-480). Durkheim (1961:20-21) redefined “origins” as the “ever-present causes upon which the most essential forms of religious thought and practice depend.” “Ever-present” implied that the temporal sequence had become a side issue. Yet, the idea of a hierarchy remained. Durkheim felt that “origins” were more clearly revealed in “lower” cultures that had not been “complicated” by contact with civilized ones. Gradually, through ethnography and cultural contact, the religious beliefs of other cultures acquired more reason in the European mind, and the prejudicial idea of their being lower in an evolutionary sequence faded. Still, religion was thought of as a cultural thing by itself, and no one thought of it as a behavioral capacity that had previously come into existence because of some success it had for survival and reproduction.

The change of course toward evolutionary biology was very slow in coming. The big issue addressed by David Bidney (1950) in an article in the *American Anthropologist* was whether or not the myths of modern natives represented primitive thinking or were just imaginative thinking based on different data than the data available to modern scientists. He concluded that mythology was universal and differed only in the spread of its domain in preliterate and modern cultures. He suggested that, in the preliterate cultures, myth enjoyed a wider domain of application; however, he did not mention the neurophysiology of the brain. In

1972, Alexander Gallus (1972) proposed that religion evolved because it aided survival and reproduction. He located religion in the evolved brain. Lacking an understanding of neuroanatomy, an understanding that has developed greatly since then, Gallus peppered his theory with Jungian, Freudian, and existential speculative notions of how the brain worked and still used a lower-to-higher model in which the higher reasoning, culture-producing areas were superimposed on lower emotional areas of the brain. Because it had an emotional appeal, myth was seen as an earlier form of adaptive cognition, as an emotional sort of cognitive map that was being replaced by a more logical one, science. In the 1980s, the psychiatrist Eugene d'Aquili (1985) suggested that the brain was involved in religion and that it had evolved in such a way as to promote group solidarity through rhythmic auditory, visual, or tactile stimuli. He and others began to move anthropological theorizing about religion toward paradigms that included biology. Anthropologists and other evolutionists are presently examining the hypothesis that religion is a genetically evolved behavioral trait that is subjected to the laws of natural selection (Steadman and Palmer 1995; Boyer 2001; Atran 2002; Wilson 2002; Roes and Raymond 2003; Sosis 2003b; Sosis and Alcorta 2003; Sosis 2004).

The difference between early and recent evolutionary theories of religion is that the early theories were blank-slate theories in which the biology of the brain was not involved (Pinker 2002). They assumed that culture was progressing, at least in technological terms, from a state of savagery to one of civilization, and it was believed, or at least hoped, that science would replace religion as culture progressed; however, the facts do not support this optimistic belief. Human beings are replacing non-empirical religious beliefs with new non-empirical religious beliefs as fast as the old ones are discarded. Religion is not disappearing.

## **The Evolutionary Process**

For the purposes of this discussion I would like to put forth a tentative set of definitions and a rough model of how the evolutionary process works in regards to religion. I define religion in an existential sense, as an object that we perceive in others. This object consists of human behavior that people in Western cultures generally put together in the category of "religion." In other cultures there are similar but not identical categories (Csordas 2004:163), but what is important to this discussion is that there is a generally perceived object that we can call religion. It can be observed. It can be summarized as a world view, a system of belief, a concept of reality, that other people communicate collectively.

The central nervous system evolved, at least in mammals, to facilitate survival and reproduction by relating input from sensory organs to an output of behavior. This is clearly seen in its anatomy. It has evolved to make this neural data processing adaptive in the sense of promoting survival and reproduction. One of the ways that it does this is to create internal models of external realities. In fact there is no absolute external reality. There are only models of it that are created by the central nervous system and used to process information coming from the senses. Somewhere before 60 thousand years ago humans added a capacity for complex symbolic communication (Mithen 1996 ; Henshilwood and Marean 2003).<sup>1</sup> This allowed them to share through syntactic communication their internal models with each other.<sup>2</sup> The ability to share information increased the ability of humans to survive in groups, and a process of cultural transmission ensued (Boyd and Richerson 1985). A cultural storehouse of valuable, symbolically shared knowledge developed. One can assume that many different models with adaptive possibilities appeared. They were syntactically encoded and communicated to groups. The most popular of these shared models of an external reality seem to have become what we perceive as religion; however shared models of reality and other forms of collective consciousness do go beyond what most people would think of as religion. I am concerned with those very popular models that are clearly defined as religion.

## **Commitment theory**

A recent evolutionary theory is commitment theory. This was sketched out by the economist Robert Frank (1988) and has been developed by the anthropologists William Irons (2001) and Richard Sosis (2004). Commitment theory starts with the paradox that religion is simultaneously rational and irrational. It is rational in that it leads people to successful cooperation within a group, but it is irrational in that it requires a belief in unverifiable superhuman entities and forces. Commitment theory proposes that religion's rationality is hidden from the individual.

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<sup>1</sup>Pinning down the point at which language appeared is difficult given the state of modern evidence and scientific technique (McBrearty and Brooks 2000:486). It is fairly certain that archaic *H. sapiens* developed it and that *H. erectus* did not have it. The FOXP2 gene research points to the area where genetic mutations can affect the development of language ability (Dunbar 2003:176; Enard et al. 2002)

<sup>2</sup>From an information processing point of view, syntax is an extra layer of encoding that connects a sequence of symbols with a sense of meaning (Chomsky 1957, 1965).

It postulates that people signal each other by making irrational commitments to unverifiable truths. This tends to create trust within the group. Trust is always a problem in human groups, because the syntactic symbolic communication that creates human culture also creates a potential for deception and autopredation. Irons (2001) proposes that a costly signal that can't be faked shows that the signaler can be trusted. Thus, when an individual abandons all self-interested logic and commits himself or herself to an irrational belief, other persons are inclined to trust him or her. This can be compared to costly signaling in the animal world, but the selection process is different. In the animal world it is often an advertisement of reproductive fitness, and the advantage is being chosen as a mate. Among humans the advertisement is for trustworthiness, and the advantage is better cooperation with others. The theory receives strong empirical support in observations that religiously organized groups have better internal cooperation and better success competing with non-religiously organized groups (Sosis and Bressler 2003).

Commitment theory sees religion evolving to maintain the advantages of group cooperation by means of an unselfish attachment to an empirically arbitrary system of belief. The commitment leads to behavior that optimizes group cooperation. From an evolutionary perspective, the individual is protected from autopredation that makes use of complex symbolic deception, at least in the context of a simple paleolithic society. Whether or not individual fitness is also enhanced in a modern culture with mass communication and with sophisticated methods of symbolic deception is not clear. A number of studies show that religiosity in modern industrial cultures is still associated with longevity and health (Levin 1994). Much of this association is linked to social participation (Hummer, Rogers, Nam, and Ellison 1999). More empirical data is needed to show when and where there is a real benefit to the individual while responding to costly signals in complex cultures. With the advent of mass communication, the benefits may sometimes go to the signalers who are activating a defense mechanism against autopredation that is no longer useful to the responders.

A parallel to commitment theory has been outlined by the economic sociologist Lawrence Iannaccone (1992), who is working within general sociological concepts of rational religious behavior (Stark and Finke 2000). He looks at it from the point of view of economic utility and sees a type of rationality in religious behavior (Iannaccone 1995). Since the main psychological benefits of belonging to a religious group come from being in a close-knit enveloping society, religious groups will try rationally to maintain that closeness. Small cult-like religious groups in which the closeness rewards are the greatest will often keep their members dedicated by imposing taboos that prevent their involvement with

the larger society. A religious group will reject casually committed members because they dilute the intensity of the feeling of group solidarity, the fundamental store of utility that the group holds. Thus, religious groups will exact irrational acts of commitment in order to keep free riders out and to prevent the dilution of the ideological intensity that they offer their members. Iannaccone points out that the demands for irrational acts of commitment are really rational when seen as the protection of group benefits. One has to judge rationality in this case from the point of view of the believers, who value their support system, and not from the point of view of outsiders (Stark and Finke 2000). One advantage of the economic rationality theory is that it offers a prediction of religious change, whereas commitment theory does not. An individual changes his or her religion, drops out, or backslides when the utility of membership changes. Calculations of utility can be affected by changing costs of membership and by market competition for the same religious services.

## **Cognitive theory**

The cognitive theorists in anthropology, and related cognitive fields, are asking what makes religious models so popular and widely accepted? Instinctive non-rational popularity implies that there has been a selective process in the past that selected this behavior because it increased survival and reproduction. They are searching for the fitness advantages of religious behavior and have concluded that most of these advantages lie outside of religion itself. They feel that the behavior has survival and reproductive value in other contexts. Atran (2002) has noted a number of these emotionally attractive things in religion: the search for agents that cause things to happen; easily remembered stories for learning important cultural ideas; the evocation of therapeutic states in the brain; pleasant rhythms and sounds, etc. The attractive features of religion point to evolved capacities in the brain that are called modules (Barkow, Cosmides, and Tooby 1992). Whether or not these modules evolved in the context of an adaptive religious system is the issue. Most anthropologists immersed in the comparative study of religion tend to see religion as evolving biologically and culturally as a special integrated complex. However, cognitive anthropologists such as Atran (2002) and Boyer (2001), who look at cognitive structures in general, tend to see religion as composed of modules that evolved to solve different non-religious problems, for example the awareness of predators or the detection of cheaters.

One of the most concrete mental modules that Atran has pointed out is the

module of agency. It is related to Guthrie's (1993) ideas of animism and anthropomorphism. Humans from an early age manufacture theories at a tremendous rate and very rarely test them with rigorous logic and careful observation. One of the most common and universal tendencies is to theorize that something happens because some agent made it happen. The agent need not be another human being. It may be any imagined natural or supernatural force or creature. Religions, not just the animistic ones, are loaded with beliefs in unseen agents, gods, spirits, and the like, who cause things to happen. Possibly this belief in agents is a pre-human module that animals developed to detect predators. A rabbit that sees a rustle in the bushes and imagines a fox has a better chance of survival than one that does not imagine a fox. Does a person who imagines a god have a better chance of survival? The success of religion in promoting individual health indicates that possibly he or she does.

This position, that religion evolved as separate modules, finds commitment theory inadequate. Atran and Norenzayan write as follows

Religion is not an evolutionary adaptation, but a recurring by-product of the complex evolutionary landscape that sets cognitive, emotional and material conditions for ordinary human interactions. The conceptual foundations of religion are intuitively given by task-specific panhuman cognitive domains, including folkmechanics, folkbiology, folkpsychology . . . This enables people to imagine minimally impossible supernatural worlds that solve existential problems, including death and deception. Because religious beliefs cannot be deductively or inductively validated, validation occurs only by ritually addressing the very emotions motivating religion. [Atran and Norenzayan 2004]

Cognitive theory is an evolutionary by-product theory. By-product theories pop up in other areas of evolutionary theory. For example, killing one's sexual partner hardly is a good way to increase one's reproduction, but it occurs from time to time with great passion (Daly and Wilson 1988). It can be seen as a byproduct of mate-guarding that, by and large, increases the reproduction of aggressive genes when it occurs at a less violent level. It only appears irrational when it goes overboard. Cognitive theory propose that religion is an overboard manifestation of other behavior the adaptive rationality of which should be seen apart from religion. Religion is a culturally constructed complex of behavior that captures a number of adaptively unrelated behavioral modules.

One problem in utilizing cognitive theory is that some of the modules are pre-human, so we need data from animal as well as human studies. Most scholars

of religion have avoided looking at non-human psychology. Only a few anthropologists of religion have been willing to consider animal cognition and behavior. For example, Anthony Wallace (1966), whose theories of religion were quite advanced for the time, proposed that ritual evolved among animals and that humans simply added symbolically communicated belief to make it into religion. Let us speculate for a moment. If we take the human-to-human species-specific communication out of religion, then how do we know that other mammals do not have convictions of the existence of an unseen world of beings and forces? Perhaps they have something like religious convictions developed by their central nervous system from their experience. Humans communicate this reality with their capacity for symbolic communication, but animals may have it without communicating it in symbols.

Atran's idea of religious cognition is that it formulates counterfactual counterintuitive models. What does it mean to say that a model is counterintuitive or counterfactual? Atran and Norenzayan write:

The meanings and inferences associated with the subject (omnipotence = physical power) of a counterintuitive expression contradict those associated with the predicate (insubstantial = lack of physical substance), as in the expressions "the bachelor is married" or "the deceased is alive." [Atran and Norenzayan 2004]

But this test depends on semantic logic. The semantic structure of language varies from one culture to another, so something can be counterintuitive in one culture and intuitive in another. If a theory of religion is to be universal, then it must apply to all cultures. The counterfactual/counterintuitive characteristics are not recognized by everyone. Geertz (1966) and Boyer (1994) believe religion is inherently factual. Whether or not a religious belief is factual, counterfactual, intuitive, or counterintuitive depends on who is looking at it. Counterfactuality cannot be measured absolutely but only in the context of other beliefs. A belief is counterfactual only if we have another model of reality that is more "factual," and, of course, we have to be able to measure factuality in both domains of discourse with the same tools of measurement. Atran and Norenzayan (2004) adduce evidence from psychological tests of children that shows that the acceptance of "counterfactual" beliefs increases with age, but this could be interpreted as the result of learning culturally supplied cognitive structures.

## Ecological Regulation Theory

Ecological regulation theory has been around longer than commitment or cognitive theory. It proposes that religion evolved because it sends control signals to a group telling it about the state of its interaction with the natural environment. There are several critical assumptions in this theory: (1) that religion alone has the emotional power to alter group behavior, whereas other symbolic signals lack the authority and emotional impact to get the job done, (2) that religion responds to changes in the group's relationship to the natural environment, and (3) that the group is the unit of natural selection by which religion evolves. Marvin Harris (1974) proposed a version of this theory consistent with his materialistic view of culture. He looked at various rituals that seemed to defy logic, cow protection in India for example, and found within them a reasonable logic, the need for draft animals in this case. Harris's position was that there was a material foundation to culture that was obscured from common view by ideology. However, he was not concerned with how things got that way, that is with evolution.

Rappaport added two important ideas: (1) that rituals were signals to a group, and (2) that religion was part of an ongoing adaptive mechanism embedded in culture. He saw social behavior as regulated by a system of values that were arranged in a hierarchy with instrumental values at the bottom and sacred values at the top (Rappaport 1999:425-427). Therefore, the highest level of values, the sacred ones, controlled the widest range of behavior and integrated the total adaptive system of the culture. Delineating such a system is difficult. Rappaport's (1974) masterful analysis of Maring ritual, in which pig-feasts control warfare and the exploitation of the environment stands above all others. However, many smaller connections between the material environment and religion have been found, and it has even been postulated that Christianity led to profligate environmental destruction (White 1967), a controversial idea that has now received some empirical support (Eckberg and Blocker 1989).

In Rappaport's overall scheme, religion provides a master cybernetic feedback control for the whole adaptive system of a culture. Primary sacred values provide a conceptual encoding system that people use to communicate their experience to each other. They permit some types of messages to be sent and limit others. They function as minders of cultural adaptation somewhat like individual values function as minders of individual adaptation. They create certain types of group action and limit other types.

Ecological regulation theory is a step beyond Durkheim's social theory of religion. Durkheim emphasized the power of religion to create social action, but

he did not give religion the power to respond to the environment. Religion was society. Religion held society together, but an adaptive mechanism was left out. Durkheim ignored the powerful ecological symbolism expressed by the Australian Aborigines, the people he used to illustrate his social theory (Peterson 1972). It seems incredible that after writing:

Out of more than 500 totemic names collected by Howitt among the tribes of south-eastern Australia, there are scarcely forty which are not the names of plants or animals; these are the clouds, rain, hail, frost, the moon, the sun, the wind, the autumn, the summer, the winter, certain stars, thunder, fire, smoke, water, or the sea. [Durkheim 1961[1915]:124]

he rejected the idea that religion was responding to the natural environment. According to Durkheim, religion interpreted nature incorrectly. Science made the correct interpretation.

Whatever we may do, if religion has as its principal object the expression of the forces of nature, it is impossible to see in it anything more than a system of lying fictions whose survival is incomprehensible. [Durkheim 1961[1915]:100]

However, it will be said that in whatever manner religions may be explained, it is certain that they are mistaken in regard to the real nature of things: science has proved it. The modes of action which they counsel or prescribe to men can therefore rarely have useful effects: it is not by lustrations that the sick are cured nor by sacrifices and chants that the crops are made to grow. [Durkheim 1961[1915]:102]

Durkheim theorized correctly that religion organized people into social groups, but he completely missed the idea that this could have been done as part of an adaptive response to the environment.

Harris and Rappaport brought the natural environment back into the evolutionary theory of religion. Yet, they did not see the evolution of religion as occurring in the individual. They proposed instead that selection operated on groups, not on individuals. Rappaport suggested that groups in better alignment with their natural environments would out-compete other groups. The behavior would be passed on culturally, and there would be no impact on the evolution of the brain.

Rappaport's contribution to the theory of religion is tremendous. He moved the anthropological understanding of religion forward by decades. He discussed

ritual, evolution, ecology, symbolism, language in one complete integrated theory. He once mentioned to me in a personal conversation that he was playing a very difficult and odd role in anthropology because on one hand he was an ecologist dealing with the material world and on the other he was a philosopher dealing with the symbolic world. The groups of anthropologist to whom he was talking were usually divided into these two camps, the materialist and the symbolist, and they seldom communicated with each other. He was clearly moving in the direction of consilience, the unification of the sciences, that E. O. Wilson (1998) has suggested as the salvation of the social sciences.

Rappaport defines adaptation as:

the processes through which living systems of all sorts — organisms, populations, societies, possibly ecosystems or even the biosphere as a whole — maintain themselves in the face of perturbations continuously threatening them with disruption, death or extinction. [Rappaport 1999:6]

He sees adaptive dynamics as a product of evolution:

Adaptive responses are seldom, if ever, isolated but seem, rather, to be organized into sequences possessing certain temporal and logical characteristics (Bateson 1972h, Rappaport 1971a, 1979a, Slobodkin and Rapoport 1974) commencing with quickly mobilized easily reversible changes in state (if perturbation continues), proceeding through less easily reversible state changes to, in some cases, the irreversible changes not in state but in structure that are called “evolutionary.” [1999:6]

This is a way of saying that evolution produces adaptive dynamics in systems subject to selection. Adaptation is a characteristic of living systems produced by evolution, not just of evolution itself. The quick mobilizer of human adaptation is the central nervous system. Evolution has made it adaptive; yet cultural learning does much, some would say practically all of the programming of brain mobilized behavior. Thus, symbolic communication has an effect on the organization of human adaptive systems.

Although one can see genes and culture working together to evolve adaptive systems, Rappaport (1999) saw the superorganic evolution of cultural behavior evolving as an adaptive system without biological involvement. He was concerned only with adaptation produced by cultural evolution. In order to do this he resorted to a evolutionary model based on group selection:

First, whatever the case may be for explanations of behavior and organization of other species, and of their evolution, the extent to which concepts like “inclusive fitness” and “kin selection” can account for cultural phenomena is very limited. Secondly and related, whatever the case may be among other species, group selection (selection for the perpetuation of traits tending to contribute positively to the survival of the groups in which they occur but negatively to the survival of the particular individuals in possession of them) is not only possible among humans but of great importance in humanity’s evolution. All that is needed to make group selection possible is a device that leads individuals to separate their conceptions of well-being or advantage from biological survival. Notions such as God, Heaven, Hell, heroism, honor, shame, fatherland and democracy encoded in procedures of enculturation that represent them as factual, natural, public, or sacred (and, therefore, compelling) have dominated every culture for which we possess ethnographic or historical knowledge. [Rappaport 1999:10]

## **The Problem of Group Selection in Ecological Regulation Theory**

I find this to be a very profound statement, but we must ask how the device that leads individuals to “separate their conceptions of well-being or advantage from their biological survival” is going to evolve. If it is a basic behavior given to humans by their species heritage then it must be in the brain and have evolved biologically. If it varies widely from culture to culture and is completely absent in some, then it could have evolved culturally. However, religion is practically universal in human groups and there are many pan-cultural features of which people have taken note (Wallace 1966; Turner 1969). Rappaport (1999) notes that this is the case too and essentially contradicts his proposition that group selection is the only mechanism for the evolution of adaptive system. The confusion, I believe, comes from the hierarchical nature of the religious control mechanism. Religion is higher because it controls group behavior rather than individual behavior, but it is a mistake to assume that because it is a group control mechanism it must have evolved by group selection. In the animal world group cooperation, deception, and signaling have all evolved biologically. Why must humans be the only

species to defy what seem to be a general pattern in biological evolution?

The idea of people working together to promote group welfare is a common theme in cultural ideology. People everywhere promote group cooperation. But what drives them to do this? Many evolutionists have suggested that group cooperation has evolved biologically through kin altruism or reciprocal altruism and that sacrifice for the benefit of the group really benefits the individual and his or her kin more than it benefits the group. However there is much human cooperation between unrelated individuals and much unselfish altruistic behavior. We don't have to go as far as postulating kin selection to explain this as a product of biological evolution.

A group, in competition with other units gains or loses reproductive advantage in relation to the other units. In the case of cultural group selection, the behavior is culturally acquired. The behavior must stick to the group so that the whole group is selected as a unit in the evolutionary process. Rappaport was probably thinking of this because he saw groups as firmly committed to an unchanging set of sacred values under which the day-to-day practical instrumental values would shift as necessary to maintain the adaptive equilibrium. If the behavior does not stick to the group and becomes acquired on an individual basis then cultural group selection dissolves and cultural meme selection takes over. Obviously this happens often. Real human groups contain contending religious systems and people move back and forth from one religious point of view to another. Only through commitment can religious groups be defined.

Punishing or policing behavior can evolve by individual selection and maintain group cooperation. Behavior that punishes individuals for deviating from group goals can explain the evolution of group cooperation in the absence of relatedness. Steven Frank (1995) has produced a generalized mathematical model that shows that "policing" can evolve biologically to maintain cooperation as the degree of relatedness between members of a group goes down. This kind of policing would manifest itself in humans primarily as shame, guilt, and anger at freeloaders. Making use of human group experiments, Fehr and Gächter (2002) show that altruistic punishment will actually develop in human groups in order to maintain cooperation. Boyd and Richerson also see punishment as process that can maintain cooperation (Boyd and Richerson 1992). Thus, group selection is not necessary for group cooperation of a religious type to evolve, or for a complex system of communication via sacred symbols to develop.

I do not deny the possibility of group selection, but it is really not necessary for a religiously mediated cooperative system to evolve. Sosis (2003a) points out that religious defenses against freeloaders indicate that individual selection is

actively at work and can threaten cooperation if it is not policed. Policing can develop through individual selection if there are benefits to be had from group cooperation. Iannaccone (1992) points out that the suppression of free-loaders is an important feature of all religions. If religion evolved through group selection, then it is hard to explain the numerous new and quasi religious ideologies that keep cropping up in human society. Why do they keep occurring? They occur because the capacity for religious behavior has been developed in individuals not groups, although we often see its manifestation in the context of groups. Cognitive theorists would have no problem with this and neither would commitment theorists who recognize that the impulse to commit one's self to a religious belief is an individual impulse. After commitment, people often become more intolerant of non-believers, a behavior that is consistent with the policing hypothesis. Commitment and intolerance usually go hand in hand because of the way that religious behavior has been selected in individuals.<sup>3</sup>

The hypothesis that group selection is responsible for the evolution of religion is probably due to the way that people instinctively see the social world. The evolved brain leads people to think that well ordered social groups with few defectors are more successful. This is absolutely true, but individual selection is the mechanism that has made it true. What evolution has realized, and created, is not the the same thing as the mechanism by which evolution works. There is no reason to postulate benefits to a group as a whole when one can postulate benefits to individuals living in a group whose self-sacrificing members are well policed. Individual selection is a simpler, clearer, well-proven, basic Darwinian mechanism of natural selection.

## **A Cross-Cultural Test of Ecological Regulation Theory**

There is a long history of anthropological interest in the adaptive value of religion, which in earlier times was phrased in terms of functions (Wallace 1966; Malinowski 1948[1921]). Rappaport (1974) illustrated a religiously controlled adaptive system among the Tsembaga. Proving in general that religion is a criti-

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<sup>3</sup>One can love the unconverted and still be intolerant of their misguided beliefs. The argument that Liberal Christianity is a tolerant religious movement needs to be tempered with the reality that it sometimes manifests an intolerance of intolerance that is often not recognized as a type of intolerance.

cal component in culture's adaptation to natural environments requires more than simple observations of how behaviors are interrelated within particular cultures, particularly, because cognitive theorists may see religion as by-product of other adaptations and some evolutionists even see it as a parasite of cultural behavior (Dawkins 1993). If religion is adaptive in the sense that Rappaport defined it, one should find a correlation between types of adaptation to the natural environment and sacred values. Cultures with similar systems of adaptation should have developed similar sacred values. In fact, this is true and can be shown by cross-cultural analysis as follows.

Unfortunately, cross-cultural codes for religious beliefs have typically been made to measure variables suggested by pre-existing hypotheses. For example, Guy Swanson (1960), who was influenced by Durkheim's meta-theory, classified sacred values according to their social implications and not according to their relationship to the environment. Swanson wanted to test Durkheim's belief that society was the primary force establishing religion. Swanson's work was an important effort at placing religion in the context of other features of culture, and his cross-cultural codes might have revealed a relationship between sacred values and adaptive systems. The study has been reexamined by Peregrine (1996) and clearly indicates that a belief in a high god is more likely in a society with large communities, multiple levels of political hierarchy, and social differentiation (Peregrine 1995:59). However the relationship between religion and environmental adaptation is not examined. Swanson's cultural variables are so biased toward measuring political organization that they can't show the relationship of religion to the environment. Only one variable, *Principle Source of Food*, out of 39 has anything to do with the environment.

Because Swanson and others have not answered the question about a possible general linkage between adaptive systems and sacred values, I examined this possibility with cross-cultural data coded for the Standardized Cross-Cultural Sample (SCCS) (Murdock and White 1969), a selection of 186 geographically dispersed cultures. The electronic journal, *World Cultures* (Gray 2003), has currently collected 1,849 variables coded for the SCCS by various researchers.

Cultures can develop different ways of adapting to the same environment. These depend on the culture core (Steward 1963), the basic subsistence or energy-extraction pattern that a culture uses to support its populations. Therefore in classifying adaptive systems it is better to classify them by their culture cores rather than by their environments, because the culture cores more accurately reflect the adaptive systems than the environments alone.

SCCS variables representing subsistence systems, a good measure of the cul-

ture core, are easy to find, because many cross-cultural researchers have been interested in the effect of ecological adaptation on other aspects of culture. I chose variables from a study by Whyte (1978) primarily because they were rank ordered and contained more detail than others. They are shown in Table 1.<sup>4</sup>

It was difficult to find variables measuring sacred values, because few cross-cultural researchers have looked at the symbolic aspects of culture without tying them to a particular theory of social or material influences. I was unable to find any overall, detailed, geographically balanced, hologeistic study of sacred values connected to the Standard Cross Cultural Sample. In deciding what to take from other existing codes, I looked for variables that measured beliefs in non-empirical or supernatural objects, beings, or forces, in other words, variables that had no direct connection with the material world and consisted entirely of abstract beliefs to which people were seriously committed. I was able to find five useful sacred value variables from a cross-cultural study by Murdock, Wilson, and Frederick (1978) who were looking at beliefs in the supernatural causation of illness. They are shown in Table 2.

The five sacred value variables were correlated with the 6 adaptive system variables. The details are given in the Appendix. Twelve of the 30 possible correlations were significant. The number of significant correlations and the effort made by the creators of the Standardized Cross Cultural Sample to eliminate correlations due to diffusion and historical geographic links gives a strong indication that religion is playing a role in maintaining adaptive systems. The existence of intermediate variables, if any, that might explain these correlations does not invalidate the possibility of Rappaport's theory, because the intermediate variables could just be another part of the system. These results do not prove that Rappaport's postulate is correct for all cultures; yet, if the theory is correct one of the consequences would be correlations like this. More measures of sacred values need to be developed, more correlations need to be studied.

## Summary

Commitment theory proposes that religion increases group cooperation by sending costly signals to members of the group. These signals overcome mistrust, lower defection, and allow the benefits of cooperation to be realized. Religion

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<sup>4</sup>Note that the variables have been recoded so that 1 represents the lowest level of importance and 5, the highest. This allows positive correlations to represent positive effects. In Whyte's original codes 1 represented the highest and 5 the lowest importance.

can be seen as an autopredatory defense mechanism that works in the context of groups. One does not have to deal with postulations of group selection because successful group cooperation can evolved by natural selection at the individual level if individuals consistently live in groups.

Cognitive theory proposes that the underlying modules of the brain create religion. This implies that religion emerges from the unconscious without any particular function as an entity itself; however there is empirical evidence that there are psychological and ecological adaptations that are associated with the whole entity. Cognitive theory simply states that the mental modules that make up religion have evolved because they created well being in other ways for individuals in the past. Each module has to be studied on its own. Cognitive theory tends to ignore the adaptive properties of whole religious complexes.

Ecological regulation theory proposes that religion is part of a cybernetic system that controls the exploitation of the environment in a productive way. It helps to maintain the food supply and produce well being. Religion helps to make a cultural system adaptive. Cross-cultural evidence indicates that this is probably true in a wide sample of cultures.

A critical question to be answered is how does the brain link well being to the acceptance of an internal model of reality? The common human way of thinking about survival is to apply rational logic to solving problems, but religion clearly works at other levels of consciousness. The psychological mechanisms that link stress and discomfort to religions change need to be examined more carefully.

A major question in these three theoretical orientations is whether religion is a byproduct of mental modules or whether it is evolving as a complex of its own. Actually it could be both. Religion could be evolving as a complex and still be using mental modules that evolved in other contexts. There are numerous examples in biological evolution where an organ originally developed in one adaptive context is also utilized in another. The central nervous system would not have evolved at all if there were not great efficiencies to be gained by using the same organ in a variety of different contexts.

Certainly the evolution of religion is a gene-culture co-evolutionary process. The human brain is evolving biologically, and the symbols of religion are changing culturally. Figure 1 diagrams this co-evolution. The vertical dimension expresses the time at which different religious behaviors developed. The horizontal dimension expresses the speed at which adaptation is taking place. In the left column we see the different biological evolutionary developments implied by the above theories. At the earliest level, there is the evolution of the mammalian brain (which needs more investigation from a religious point of view). Later in time,

comes the hominid development of syntactic communication, and, finally, there is the evolution of costly-signaling during evolutionary games in the context of groups held together by symbolic communication. Each of these biological developments impacts the human brain seen in the middle column. The brain enables patterns of cultural adaptation that exhibit the features that are observed as religion shown in the right column.

The idea of the sacred probably appeared at the time that syntactic communication developed. The communication of meaning in abstract belief is not possible without the development of syntax. Thus, articulated beliefs in sacred things could be a byproduct of the evolution of the capacity for syntactic communication. Rappaport refers to this as freeing signs from their significata (1999:416). The low information content but great meaningfulness of ritual symbols gives them an important function in the adaptive mechanism of a culture (Rappaport 1999:285-287). Wallace (1966) also notes that ritual is meaningful communication without information.

The evolution of syntactic communication also created a new potential for group coordination and the possibility of deception by group leaders. Costly signaling probably evolved as a defense against deception. Costly-signaling avoids the deceptive potential of syntactic communication by dealing only with unverifiable realities. These realities have no direct utilitarian value, but strengthen social bonds and trust. Religion may have utilized pre-existing behavioral modules for costly signaling developed in mating rituals in order to overcome the potential for deception created by syntactic communication. Because costly mating displays are more prevalent among males rather than among females in a polygynous species like the human one, an empirical investigation of the relative involvement of males vs. females in costly religious ritual signaling might produce interesting results.

The three evolutionary theories discussed in this paper are part of an effort in religious research that recognizes the role of biological evolution in creating religious behavior.<sup>5</sup>

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## Appendix: A Cross-cultural Analysis of Adaptive Systems and Sacred Values

I was able to glean five useful religious variables from a cross-cultural study by Murdock, Wilson, and Frederick (1978) who were looking at beliefs in the supernatural causation of illness. They are shown in Table 2. Two other useful religious variables, *Origin of First Creator or Ancestor* (V674), and *Mode of First-Mentioned Creation* (V675), coded by Sanday (1985), were in the SCCS data, but they had too many missing cases to give meaningful correlations with other variables.

The codes for adaptive systems were taken from Whyte (1978). They are shown in Table 1. These variables were also ordinal, so their association with sacred values could be measured by rank correlation. In the the codes 1 represents the lowest level of importance and 5, the highest. This allows positive correlations to represent positive effects. The variables were recoded from Whyte's codes in which 1 represented the highest and 5 the lowest level of importance. In this scheme positive correlations would have represented negative effects and would have confused the discussion of the results.

All the six adaptive-system variables were correlated with the five sacred-value variables using Kendall's measure of rank correlation  $\tau$ -b. Some of the correlations were highly significant and others were insignificant. Significance was determined by a two tailed test of the hypothesis that  $\tau$ -b was zero. Any  $P$  value above 0.05 was considered non-significant. The statistical package used was R 1.9.1, which has a more sensitive test than SPSS. In general, the larger the value of  $\tau$ -b, the more significant it is. The results are shown in Table 3.

Most of the correlations are congruent with what one would expect from the ethnographic literature. An this intermediate level of analysis, data is aggregated. One has to recognize that adaptive systems in the same category may have different environmental parameters to contend with. Thus, correlations may not be strong. Agriculture in the Andes and gardening in Tikopia have different requirements although they may be classified as agricultural/horticultural systems. The purpose of this analysis was not to ferret out the actual role that religion plays in an adaptive mechanism, but to show that there is empirical support for the

conjecture that religion is involved in maintaining adaptive systems and that there are some universal adaptive patterns arising from a common behavioral base for religion in the brain.

The two biggest, and most significant, correlations were a positive one (+.471) between *Importance of Agriculture* and *Theories of Fate* and a negative one (-.427) between *Importance of Hunting and Gathering* and *Theories of Fate*. This makes some sense because agriculture is an uncertain enterprise. Groups may recognize that their agricultural efforts are sometimes subjected to forces beyond their control and express this in religious terms. Why hunter gatherers would not have a concern over fate is an interesting question. Murdock, Wilson, and Frederick (1978), who coded the beliefs, offer some insight into this relationship. They define fate as “the ascription of illness to astrological influences, predestination, or personified ill luck” (178:453). They note that theories of fate tend to be concentrated in societies with considerable complexity. Therefore ideas about fate seem to support the more complex cultures rather than the less complex ones such as hunter-gatherer cultures. Complexity has several dimensions such as a greater social division of labor, a greater energy capture per unit area inhabited, and a more efficient energy using technology. The maintenance of such complexity in its various dimensions may be aided by religious values. Fate seems to say that if something goes wrong you just keep on doing what you are doing. This is a good sacred value to follow when survival is dependent on keeping a complex social-technological system running.

## References Cited

- Atran, Scott.. (2002). In *Gods We Trust: The Evolutionary Landscape of Religion*. New York: Oxford University Press.
- Atran, Scott and Ara Norenzayan.. (In Press N.d.). Religion’s Evolutionary Landscape: Counterintuition, Commitment, Compassion, Communion. To be published in *Behavioral and Brain Sciences*.
- Barkow, Jerome, Leda Cosmides, and John Tooby.. (1992). *The Adapted Mind: Evolutionary Psychology and the Generation of Culture*. NY: Oxford University Press.
- Bateson, Gregory. (1972). *The Role of Semantic Change in Evolution* In *Steps to an Ecology of Mind*. New York: Ballantine.

- Bidney, David.. (1950). The Concept of Myth and the Problem of Psychocultural Evolution. *American Anthropologist* 52(1):16–26.
- Boyd, Robert and Peter J. Richerson.. (1985). *Culture and the Evolutionary Process*. Chicago: University of Chicago Press.
- \_\_\_\_\_ (1992). Punishment Allows the Evolution of Cooperation (or Anything Else) in Sizable Groups. *Ethology and Sociobiology* 13:171-195.
- Boyer, Pascal.. (1994). *The Naturalness of Religious Ideas: A Cognitive Theory of Religion*. Berkeley: University of California Press.
- \_\_\_\_\_ (2001). *Religion Explained: The Evolutionary Origins of Religious Thought*. New York: Basic Books.
- Chomsky, Noam. (1965). *Aspects of the Theory of Syntax*. Cambridge, M.I.T. Press.
- \_\_\_\_\_ (2002[1957]). *Syntactic Structures*. New York: Mouton de Gruyter.
- Cronk, Lee. (1994). Evolutionary Theories of Morality and the Manipulative Use of Signals. *Zygon* 29(1):81–101.
- Csordas, Thomas J.. (2004). Asymptote of the Ineffable: Embodiment, Alterity, and the Theory of Religion. *Current Anthropology* 45(2):163–185.
- Daly, Martin and Margo Wilson.. (1988). *Homicide*. New York: Aldine de Gruyter.
- Dawkins, Richard. (1993). Viruses of the Mind. *Free Inquiry* (Summer 1993):34-41.
- D’Aquili, Eugene G.. (1985). Human Ceremonial Ritual and the Modulation of Aggression. *Zygon* 20(1):21–30.
- Dunbar, Robin M.. (2003). The Social Brain: Mind, Language, and Society in Evolutionary Perspective. *Annual Review of Anthropology* 32:163-181.
- Durkheim, Emile.. (1961[1915]). *The Elementary Forms of the Religious Life*. Joseph Ward Swain, trans. New York: Collier Books.
- Eckberg, Douglas Lee and T. Jean Blocker.. (1989). Varieties of Religious Involvement and Environmental Concerns: Testing the Lynn White Thesis. *Journal for the Scientific Study of Religion* 28(4):509–517.

- Enard, W., M. Przeworski, S. Fisher, C. Lai, V. Wiebe, T. Kitano, A. Monaco, and S. Pääbo.. (2002). Molecular evolution of FOXP2, a Gene Involved in Speech and Language. *Nature* 418:869–872.
- Fehr, Ernst and Simon Gächter.. (2002). Altruistic Punishment in Humans. *Nature* 415:137–140.
- Frank, Robert H.. (1988). *Passions Within Reason: The Strategic Role of the Emotions*. New York: Norton.
- Frank, Steven A.. (1995). Mutual Policing and Repression of Competition in the Evolution of Cooperation Groups. *Nature* 377:520–522.
- Frazer, James G.. (1911). *The Golden Bough: A Study in Magic and Religion*. 12 vols. Third Edition, revised and enlarged. London: Macmillan.
- Gallus, Alexander.. (1972). A Biofunctional Theory of Religion. *Current Anthropology* 13(5):543–568.
- Geertz, Clifford.. (1966). Religion as a Cultural System. *In Anthropological Approaches to the Study of Religion*. Michael Banton, ed. London: Tavistock Press.
- Gray, J. Patrick, ed.. (2003). *World Cultures, A Journal of Comparative and Cross-Cultural Research*, Vol. 14. Jamaica, NY: World Cultures and York College, City University of New York.
- Guthrie Stewart.. (1993). *Faces in the Clouds: a New Theory of Religion*. New York: Oxford University Press.
- Harris, Marvin.. (1968). *The Rise of Anthropological Theory*. New York: Crowell.
- \_\_\_\_\_ (1974). *Cows, Pigs, Wars and Witches: the Riddles of Culture*. New York: Random House.
- Henshilwood, Christopher S. and Curtis W. Marean.. (2003). The Origin of Modern Human Behaviour: Critique of the Models and Their Test Implications. *Current Anthropology* 44 (5): 627-651.
- Hummer, Robert A., Rich G. Rogers, Charles B. Nam, and Christopher G. Ellison.. (1999). Religious Involvement and U.S. Adult Mortality. *Demography* 36(2):273–285.

- Iannaccone, Laurence R.. (1992). Sacrifice and Stigma: Reducing Free Riding in Cults, Communes, and Other Collectives. *Journal of Political Economy* 100(2):271–291.
- \_\_\_\_\_ (1995). Voodoo Economics? Defending the Rational Approach to Religion. *Journal for the Scientific Study of Religion* 34 (1):76–88.
- Irons W.. (2001). Religion as a Hard-to-fake Sign of Commitment. In *Evolution and the Capacity for Commitment*. Randolph Nesse, ed. Pp.292-309. New York: Russell Sage Foundation.
- Levin J.. (1994). Religion and Health: Is There an Association, Is It Valid, Is It Causal? *Social Science and Medicine* 38(11, June):1475–1482.
- Malinowski, Bronislaw.. (1948[1921]). *Magic, Science, and Religion*. Garden City, N. Y: Doubleday.
- McBrearty, Sally and Alison S. Brooks.. (2002). The Revolution That Wasn't: A New Interpretation of the Origin of Modern Human Behavior. *Journal of Human Evolution* 39(5):453-563.
- Mithen Steven J.. (1996). *The Prehistory of the Mind*. London: Thames and Hudson.
- Murdock, George Peter and Douglas R. White.. (1969). The Standard Cross-Cultural Sample. *Ethnology* 8(4):329–369.
- Murdock, George P. and Suzanne Wilson and Violetta Frederick.. (1978). World Distribution of Theories of Illness. *Ethnology* 17(4):449–470.
- Peregrine, Peter.. (1995). The Birth of the Gods and Replications: Background to the Data and Codes. *World Cultures* 9(2):56-61.
- \_\_\_\_\_ (1996). The Birth of the Gods Revisited: A Partial Replication of Guy Swanson's (1960) Cross-Cultural Study of Religion. *Cross-Cultural Research*30(2):84–112.
- Peterson, Nicholas.. (1972). Totemism Yesterday: Sentiment and Local Organization among the Australian Aborigines. *Man* 7(1):12-32.
- Pinker, Stephen.. (2002). *The Blank Slate: The Modern Denial of Human Nature*. Viking Press.

- Rappaport, Roy A.. (1971). Nature, Culture, and Ecological Anthropology. In *Man, Culture, and Society*. 2nd ed. H. Shapiro, ed. New York: Oxford University Press.
- \_\_\_\_\_ (1974). *Pigs for the Ancestors: Ritual in the Ecology of a New Guinea People*, 2nd ed. New Haven: Yale University Press.
- \_\_\_\_\_ (1979). *On Cognized Models*. In *Ecology, Meaning, and Religion*. Richmond, CA: North Atlantic Books.
- \_\_\_\_\_ (1999). *Ritual and Religion in the Making of Humanity*. New York: Cambridge University Press.
- Roes, Frans and Michel Raymond.. (2003). Belief in Moralizing Gods. *Evolution and Human Behavior* 24:126–135.
- Sanday, Peggy.. (1985). Female Power and Male Dominance. *Codes. World Cultures* 1(4).
- Slobodkin L. and A. Rapoport.. (1974). An Optimal Strategy of Evolution. *Quarterly Review of Biology* 49:181-200.
- Sosis, Richard.. (2003a). Review of “Darwin’s Cathedral: Evolution, Religion, and the Nature of Society: By David Sloan Wilson.” *Evolution and Human Behavior* 24(2):137-143.
- \_\_\_\_\_ (2003b). Why aren’t we all Hutterites? Costly signaling theory and religious behavior. *Humann Nature* 14:91-127.
- \_\_\_\_\_ (2004). The Adaptive Value of Religious Ritual. *American Scientist* 92(2):166–172.
- Sosis, Richard and Candace Alcorta.. (2003). Signaling, Solidarity, and the Sacred: The Evolution of Religious Behavior. *Evolutionary Anthropology* 12(6):264-274.
- Sosis, Richard, and Eric Bressler.. (2003). Cooperation and Commune Longevity: A Test of the Costly Signaling Theory of Religion. *Cross-Cultural Research* 37(2):211–239.
- Stark, Rodney and Roger Finke.. (2000). *Acts of Faith: Explaining the Human Side of Religion*. Berkeley: University of California Press.

- Steadman, Lyle B. and Craig T. Palmer.. (1995). Religion as an Identifiable Traditional Behavior Subject to Natural Selection. *Journal of Social and Evolutionary Systems* 18(2):149–164.
- Steward, Julian Haynes. (1963). *Theory of Culture Change: The Methodology of Multilinear Evolution* (Urbana, IL: University of Illinois Press).
- Swanson, Guy.. (1960). *The Birth of The Gods: The Origin of Primitive Beliefs*. Ann Arbor: University of Michigan Press.
- Turner, Victor W.. (1969). *The Ritual Process: Structure and Anti-Structure*. Chicago: Aldine.
- Tylor, Edward Burnett.. (1958[1871]). *The Origins of Culture*. New York: Harper and Row.
- (1966). *Religion: An Anthropological View*. New York: Random House.
- White, Lynn, Jr.. (1967). The Historical Roots of Our Ecological Crisis. *Science* 155(3767):1203–1207.
- Whyte, Martin K.. (1978). *The Status of Women in Preindustrial Societies*. Princeton University Press. Codes published in *World cultures* 1(4).
- Wilson, David Sloan.. (2002). *Darwin’s Cathedral: Evolution, Religion, and the Nature of Society*. University of Chicago Press.
- Wilson, Edward O.. (1998). *Consilience: The Unity of Knowledge*. New York: Alfred A. Knopf.

## Tables and Figures

**Table 1: *Variables Representing Adaptive Systems***

**Source: Whyte (1978)**

- V727** Importance of Agriculture in Subsistence, including gardening
- V728** Importance of Animal Husbandry in Subsistence
- V729** Importance of Fishing, Shellfishing and Marine Hunting

**V730** Importance of Hunting and Gathering in Subsistence

**V731** Importance of Handicrafts, Manufacturing

**V732** Importance of Trade in Subsistence

### Levels and Frequencies

Code	Value	Frequencies for Variable					
		V727	V728	V729	V730	V731	V732
1	Insignificant, sporadic, or absent	22	29	31	15	6	13
2	Present, but relatively unimportant as a subsistence activity	2	14	19	24	44	44
3	Important, but not a major subsistence activity	6	32	26	28	42	33
4	Co-dominant, sharing position of principal subsistence activity with one or more other categories	20	12	13	14	1	3
5	Dominant, the principal subsistence activity	43	6	4	12	0	0

**Table 2: Variables Measuring Sacred Values**

**Source: Murdock, Wilson and Frederick (1978)**

**V649** Theories of Fate

**V652** Theories of Mystical Retribution

**V654** Theories of Spirit Aggression

**V655** Theories of Sorcery

**V656** Theories of Witchcraft

### Levels and Frequencies

Code	Value	Frequencies for Variable				
		V649	V652	V654	V655	V656
1	Absence of such a cause	99	26	2	16	81
2	Minor or relatively unimportant cause	27	68	18	45	24
3	An important auxiliary cause	1	32	37	45	17
4	Predominant cause recognized by the society	0	5	74	24	9

**Table 3: Kendal  $\tau$ -b Significant Rank Correlations of Adaptive Systems with Sacred Values**

Adaptive System	Sacred Value Theory				
	Fate V649	Retribution V652	Aggression V654	Sorcery V655	Witchcraft V656
V727 Agriculture	+.471				
V728 Animal Husb.		-.193	+.203	-.167	+.366
V729 Fishing...	-.253			+.218	-.356
V730 Hunting...	-.427	+.245			-.264
V731 Handicrafts...					
V732 Trade	+.265	-.228			+.183

**Figure 1: *The Gene-Culture Coevolution of Religion***

