

Part Four

EVOLUTION'S IMPRINT

PSYCHOLOGY AND THE ROOTS OF TERRORISM

MILITANTS AND MARTYRS

Evolutionary Perspectives on Religion and Terrorism

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The main argument of this chapter is that evolutionary studies of religion are vital for understanding the proliferation, patterns, and logic of current trends in terrorist activity. The importance of this message is becoming increasingly evident. As Simon and Benjamin (2000, 59) prophetically warned before 9/11, the threat of terrorism will “intensify, because the old paradigm of predominantly state-sponsored terrorism has been joined by a new, religiously motivated terrorism.” Indeed, in recent years there has been a rise in the proportion of terrorists motivated by religious concerns, and there is a significant correlation between religious motivation and lethality (Hoffman 1998). Simon and Benjamin argue that state-sponsored terrorism is somewhat constrained since states do not want to undercut their claims of legitimacy and alienate potential supporters who would revile indiscriminate violence against civilians. In contrast, the new religiously motivated terrorists “want a lot of people watching and a lot of people dead” (Simon and Benjamin 2000, 71). Why is religiously motivated terrorism becoming more common? And why is it more deadly? What governmental policies can stem religiously motivated violence? We believe evolutionary research on religion can provide novel insights and timely answers to these pressing questions.

In this chapter we first examine the relationship between religion and terrorist activity and clarify religion’s role in causing, motivating, and facilitating terror. Next we present recent work on the evolution of religion and show how this research can help us understand current patterns of terrorism. The chapter concludes with future research questions and policy implications derived from our evolutionary approach.

What Is the Relationship between Religion and Terrorism?

While the literature on terrorism offers widely divergent opinions on almost every topic, one matter is clear: not all terrorists are religious fanatics, or

even religious. Nonetheless, it is also apparent that religiously motivated terrorism is on the rise and it is alarmingly more lethal than other forms of terrorism. One possible explanation for the lethality of religious terrorism is that it is more closely linked to suicide terrorism, which accounts for only 3% of all terrorist activity from 1980 through 2003, but 48% of the fatalities (Pape 2005, 6). Some researchers have indeed argued that religious motivations are more commonly associated with suicide terrorism (Hoffman 2003; Berman and Laitin 2005), although others have rejected this connection (Bloom 2005; Pape 2005). In support of the latter position, it has been widely observed that the Liberation Tigers of Tamil Eelam (LTTE), a Marxist-Leninist group demanding independence from Sri Lanka, were the world leaders in suicide terrorism prior to the current insurgency in Iraq. Furthermore, Pape's (2005, 210) analysis of data on suicide terrorism from 1980 to 2003 found that less than half of the suicide bombings documented during this period were religiously motivated. However, even if religiously motivated suicide bombers are not more common than their secular counterparts, they may be more successful in causing fatalities, as Berman and Laitin's (2005) data suggest. Below we argue that religion can institutionally and individually facilitate suicide attacks and other forms of terrorism, and that specific evolved elements of religion differentially contribute to these effects. We also contend that these evolved elements of religion are employed by both secular and religious terrorists alike in order to achieve their goals and create a committed and cohesive following.

The media may be responsible for the popular belief that religion and terror are strongly associated. Terrorists, especially suicide terrorists, are often depicted in the media as delusional religious fundamentalists, hopelessly brainwashed and out of touch with reality. The picture that is emerging from recent research, however, is far different. For example, Berrebi (2003) has shown that Palestinian suicide bombers have above average education and are economically better off than the general population. Krueger and Maleckova (2002) also demonstrate that poverty is not a predictor of participation in political violence or support for terrorism. Moreover, Sageman (2004) found no evidence of psychopathology in an international sample of Muslim terrorists. Leaders of terrorist organizations are clear that recruits may not be depressed or suicidal. As one spokesman for the Palestinian Islamic Jihad explains, "to be a martyr bomber you have to want to live" (Richardson 2006, 117). Terrorists themselves point out that even suicide bombers have plenty of hope, otherwise there would be no point in killing themselves (Atran 2003).

If terrorists in general, and suicide bombers in particular, are not crazed religious zealots, what then is the relationship between religion and terrorism? Various researchers have argued that terrorists have political, not

religious goals (Juergensmeyer 2003; Bloom 2005; Pape 2005). Religion is not the root cause of conflicts but is rather a tool used by terrorists to achieve their goals. Recast in evolutionary terms, religious beliefs, rituals, and institutions are proximate mechanisms that facilitate otherwise improbable behavioral outcomes. Here we review four main reasons why religion serves as an effective mechanism for terrorists.

Framing the Conflict

Juergensmeyer (2003) argues that while religion is not the cause of most conflicts involving terror, religion is the means by which terrorists translate a local political struggle into a cosmic war. In other words, terrorists often frame their disputes in religious rather than political terms. This has various advantages, most significantly in motivating others to sacrifice themselves for the cause. This transformation from political to religious struggle encourages actors to perceive that they are participating in something of divine significance that transcends individual self-interest. Among Sikh militants in the Punjab, Juergensmeyer describes joining the struggle as “motivated by the heady sense of spiritual fulfillment and the passion of holy war” (2004a, 2). It is remarkable how successful contemporary terrorists have been in shaping world views so that they are consistent with their own views. Bin Laden, for instance, has been particularly successful in transforming his local grievance (getting U.S. troops off “Muslim” soil) into a cosmic clash between civilizations. The use of religion to transform local power struggles into cosmic conflicts benefits terrorist groups who may otherwise be viewed as economically and politically self-serving. In an age of instantaneous electronic communications, such religious framing of essentially local conflicts serves to broaden both the ideological and geographic base of terrorism. A second consequence of the religious framing of political conflicts is the extension of the horizon for victory. Terrorists perceive that they are fighting a cosmic war in divine time, thus eliminating incentives to “win” within one’s own lifetime. Commenting on an interview with Hamas leader Abdul Aziz Rantisi, Juergensmeyer observes that “[i]n his calculation, the struggles of God can endure for eons” (2004b, 35).

Moral Justification

Religion also facilitates terrorists’ goals by providing moral legitimacy to their cause (Juergensmeyer 2004c). All contemporary world religions impose a moral framework upon their adherents, thereby enabling terrorists to present their conflicts in morally absolute dichotomies, such as good versus bad or righteous versus evil. While legitimizing ones’ own cause, religions are particularly effective at demonizing those with opposing views.

The history of religion is replete with examples in which in-group passions are aroused and out-group hatreds are dangerously ignited. Indeed, one consistent predictor of suicide terrorism is a religious difference between the perpetrator and victim (Pape 2005). This occurs even when the terrorist group appears to have secular motivations, such as the LTTE, who are Hindus fighting a Buddhist majority. In Berman and Laitin's (2005) extensive sample of suicide terrorism, almost 90% of the attacks were aimed at victims of a different religion.

Spiritual and Eternal Rewards

Religion not only provides a divine dimension and moral legitimacy to terrorist activity, it also defines the rewards that combatants can attain. After considering the benefits that Sikh militants attain, Juergensmeyer concluded that "[t]he reward for these young men was the religious experience in the struggle itself: the sense that they were participating in something greater than themselves" (2004a, 2). In addition to such spiritual rewards of transcendence, religion may also explicitly offer benefits in the afterlife that can rarely be matched in this world. The 9/11 hijackers all believed that they "would meet in the highest heaven" (Lincoln 2003, 98), which we can assume helped them rationalize their actions.

Religious Symbols, Myths, and Rituals

Religion's most significant role in terrorism may be its incorporation of emotionally evocative and highly memorable symbols, myths, and rituals that serve to individually motivate and collectively unify diverse individuals under a common banner. All terrorist groups face the challenge of creating group commitment and individual devotion to a common cause. Anthropologists have long noted that fundamental "faith-based" elements of religion—symbols, myths, and rituals—foster this in-group commitment better than any other social institution. Not surprisingly, secular and religious terrorists alike maintain communal rituals and initiation rites that communicate an individual's level of commitment to the group (Atran 2003). For religious terrorists, cohesiveness is further fostered through powerful religious symbols, which "often become focal points in occupations involving a religious difference" (Pape 2005, 89). And of course, martyrdom itself means to sacrifice one's life for one's faith. Religion provides the rituals and symbols to both motivate and memorialize these local heroes, thereby affording them an otherwise unattainable status that is also eternal. Pape observes that "[s]uicide terrorist organizations commonly cultivate 'sacrificial myths' that include elaborate sets of symbols and rituals to mark an individual attacker's death as a contribution to the nation" (2005, 29).

Terrorism and Evolutionary Research on Religion

Evolutionary studies of religion further our understanding of these elements of terrorism and provide important insights that can benefit the development of antiterrorist policies. There is unfortunately great misunderstanding among many social scientists concerning the merit of evolutionary analyses of religion. For example, Zuckerman claims that recent data on the high rates of atheism in many parts of the world “delivers a heavy blow” (2006, 13) to evolutionary theories of religion. Zuckerman mistakenly equates evolutionary theory with genetic determinism and falsely assumes that recent evolutionary research, which reveals psychological biases toward supernatural belief (e.g., Bering 2006), must be inaccurate since plenty of people appear to not exhibit these biases. Evolutionary theory does not endorse genetic determinism. On the contrary, evolutionary theory assumes that environmental input during ontogeny is critical for the expression and adaptive functioning of many traits, including religious belief (Wilson 2002; Alcorta and Sosis 2005). In the absence of such input, genetic predispositions remain latent. Such environmentally cued gene expression permits broad adaptive lability while ensuring optimal allocation of limited resources. The development of religious beliefs and behaviors is likely to reflect such interactive, ontogenetic processes.

While we obviously cannot review all of the burgeoning evolutionary literature on religion, we encourage interested readers to see books by Atran (2002), Boyer (2001), and Wilson (2002), review articles by Bulbulia (2004a) and Sosis and Alcorta (2003), and the wide literature cited therein. Here we focus on recent theoretical developments that synthesize much of the existing literature. Alcorta and Sosis (2005) propose that religion may best be understood as an evolved complex of traits incorporating cognitive, affective, behavioral, and developmental elements. Central to this complex are four cross-culturally recurrent features of religion:

- Communal participation in costly ritual
- Belief in supernatural agents and counterintuitive concepts
- Separation of the sacred and the profane
- Adolescence as the critical life phase for the transmission of religious beliefs and values

Alcorta and Sosis (2005) argue that these traits derive from prehuman ritual systems and were selected for in early hominid populations because they contributed to the ability of individuals to overcome ever-present ecological challenges. By fostering cooperation and extending the communication and coordination of social relations across time and space, these traits served to maximize the potential resource base for early human populations, thereby benefiting individual fitness. In contemporary societies,

these four elements continue to provide adaptive benefits and generally co-occur within “religion,” but not always. Consequently, Western distinctions between the “secular” and the “religious” are often difficult to discern. For example, the adoption of communal rituals and initiation rites by nominally secular terrorist groups, such as the LTTE, and their quasi-deification of Marxist-Leninist ideals, blurs the line between what is secular and what is religious. These groups engage important elements of the above described religious adaptive complex and reap many of the adaptive benefits achieved by religion.

Communal Participation in Costly Ritual

Among the most significant challenges terrorists face is ensuring that fellow insurgents are trustworthy and will not defect from the cause (Berman 2003). How can a prospective terrorist guarantee that he will not reveal the locations of hidden conspirators or the secret codes of communication, and that he will not turn aside when asked to carry out a risky or suicidal attack? At first glance, evolutionary theories of religion would appear to hold little promise for answering these questions, or understanding terrorism at all. Natural selection favors genes that get themselves into the next generation, yet terrorists often take great risks with their lives and some of course intentionally sacrifice themselves for their ideological beliefs. Such actions seem to contradict evolutionary expectations. The solution to this puzzle lies in understanding religion as an evolved system of communication, which offers mechanisms that can promote in-group trust and overcome commitment problems (Rappaport 1999; Irons 2001; Atran 2002; Sosis 2003; Atran and Norenzayan 2004; Bulbulia 2004b; Alcorta and Sosis 2005). Irons (2001), for example, posits that the primary adaptive benefit of religion is its ability to foster cooperation and overcome problems of collective action that humans have faced throughout their evolutionary history. The costliness of religious activities, or specifically what Sosis (2006) refers to as the four “Bs”—religious belief, behavior (rituals), badges (such as religious attire), and bans (taboos)—enables them to serve as reliable and honest signals of group commitment. Only those who are committed to the group will be willing to incur the time, energetic, and opportunity costs of religious belief and performance. In other words, adherents pay the costs of religious adherence, but by doing so they demonstrate their commitment and loyalty to the group and can thus achieve a net benefit from successful collective action and other status benefits available to trusted signalers (see Sosis 2003; Sosis and Alcorta 2003; Bulbulia 2004b).

Surprising to many observers, costly religious demands are today increasing in many communities throughout the world. Indeed, the global

rise in religious terrorism has been paralleled by a worldwide growth in religious fundamentalism. Fundamentalism typically refers to a religious ideology that embraces scriptural literalism and traditional religious values. Current fundamentalist trends, however, have placed *higher* demands on their practitioners than the traditional practices that they claim to emulate. For example, the standards of *kashrut* (laws pertaining to edible food) among ultraorthodox Jews are more stringent now than at any time in Jewish history (Sosis, in press). Signaling theory suggests three factors that may be motivating the fundamentalist trend toward increasing ritual requirements. First, the rising costs of membership may be a direct response to increases in perceived risk of apostasy faced by religious groups, a risk generated by the rapid improvement in mass media technologies, which expose wide audiences to Western secular values and culture. Second, and somewhat paradoxically, the multicultural openness of Western societies may also contribute to fundamentalist trends. While the celebration of multiculturalism has yet to embrace aggressive fundamentalism, in societies where group differences are tolerated and even encouraged, maintenance of in-group cohesion requires that groups increase their distinctiveness in order to preserve the relative costliness of the group's previous bans and badges. Thus, multiculturalism may actually initiate movements toward fundamentalism, even while vehemently rejecting fundamentalism's message of possessing life's only true path. Notably, Juergensmeyer (2002) observes that one of the universal features of religious terrorists is a strong rejection of Western multiculturalism. Third, signaling theory predicts an increase in signal costs as resource competition escalates. In highly competitive modern multicultural nation-states, the higher costs incurred by religious fundamentalism are likely to be offset by the economic and political gains achievable through religious consolidation and organization of group membership.

The evolutionary signaling theory of religion assumes an inverted-U-shaped relationship between the costliness of religious activity and in-group cooperation. Since imposing costly requirements upon group members is challenging, and greater than optimum costs are expected to negatively impact group cohesion, most groups are predicted to impose less than their optimal level of costly requirements, and thus be observed on the increasing side of the U-shaped distribution. Experimental, cross-cultural, and ethnohistorical research evaluating this prediction has been largely supportive (Sosis 2000; Sosis and Bressler 2003; Sosis and Ruffle 2003, 2004; Ruffle and Sosis 2007; Sosis et al. 2007). Religious terrorists of course employ religiously defined costly requirements to signal commitment, resulting in high levels of in-group cohesiveness and trust that are essential for carrying out their clandestine activities (e.g., Hassan 2001). As Pape describes, terrorists have "a close bond of loyalty to comrades and devotion to leaders; and they have a system of initiation and rituals signifying an individual's

level of commitment to the community” (2005, 8). Interestingly, among many terrorist cells these rituals also include the recording of a video testament prior to an attack (Atran 2003). Such video testaments not only serve to immortalize the suicide terrorist and his cause among followers; they also create undeniable contracts, as well. Defecting on a mission after declaring and documenting one’s intentions would result in severe psychological, social, and presumably spiritual costs.

Evolutionary signaling theory assumes that the short-term costs of displaying a signal are repaid through individual gains. This creates a particular challenge for understanding suicide terrorism from a signaling theory perspective, since individuals are obviously not around to reap any benefits from their actions. How can suicide terrorism possibly constitute an individually adaptive response? There would appear to be three noncompeting alternative explanations. First, while the individual faces the ultimate sacrifice, suicide terrorism is likely to benefit the group, and Pape’s (2003, 2005) analysis showing that groups deploying suicide terrorists tend to achieve their goals would support this interpretation. Suicide terrorism may offer the most promising example of strong selective pressures operating at the group level (Villarreal, this volume). Second, it is possible that suicide bombers recoup their losses through benefits to their kin. For example, the families of Palestinian suicide terrorists receive financial payments (up to \$10,000) for their martyred sons and daughters. However, Israel’s policy of destroying suicide bomber’s homes would appear to counterbalance these indirect fitness gains and be a strong negative incentive to sacrifice oneself for one’s family. Noting Krueger and Maleckova’s (2002) finding that Hezbollah suicide bombers attained above average education, Azam (2005) argues that suicide bombers may be investing in future kin generations (their higher educations makes them appreciate the importance of investing in the future). However, this poses a significant collective action problem, and it would appear that under most conditions one would be better off letting someone else make the investment (i.e., sacrifice one’s life for future generations). A third possibility is that the payoffs motivating suicide bombers are not material but rather otherworldly. Indeed, when applying evolutionary signaling theory to religious activity, both Sosis (2003) and Bulbulia (2004b) incorporate *perceived* gains into their models, which include payoffs attained in the afterlife. They independently found that afterlife payoffs can dramatically alter the dynamic of the game and favor costly religious activity. Moreover, we suspect that not only do martyrs expect to reap their heavenly rewards, but that they also include the reputational benefits they expect to receive as a martyr into their calculations (e.g., Richardson 2006, 124), even though they will of course not be around to enjoy their newly attained status. If afterlife rewards and concerns of postmortem reputation are motivating suicide bombers, such

beliefs are likely to be maladaptive, unless kin significantly benefit from being related to a martyr.

Belief in Supernatural Agents and Counterintuitive Concepts

The second feature of the adaptive religious complex that Alcorta and Sosis (2005) describe concerns supernatural agents and counterintuitive concepts. Evolutionary cognitive scientists have shown that the supernatural agents of religious belief systems are “full access strategic agents” (Boyer 2001). They are “envisioned as possessing knowledge of socially strategic information, having unlimited perceptual access to socially maligned behaviors that occur in private and therefore outside the perceptual boundaries of everyday human agents” (Bering 2005, 418). Furthermore, accumulating research indicates that humans exhibit a developmental predisposition to believe in such socially omniscient supernatural agents, appearing in early childhood and diminishing in adulthood. Cross-cultural studies conducted with children between the ages of 3 and 12 indicate that young children possess an “intuitive theism” that differentiates the social omniscience of supernatural agents from the fallible knowledge of natural social agents, such as parents (Kelemen 2004). By late childhood supernatural agents are not only socially omniscient; they are regarded as agents capable of using such knowledge to reward and punish deeds that are now viewed within a moral framework. Several evolutionary researchers have emphasized the role that supernatural punishment plays in promoting community-defined moral behavior, and specifically in-group cooperation (Johnson et al. 2003; Bulbulia 2004b; Johnson and Kruger 2004; Johnson 2005; Sosis 2005). Recent experimental evidence indicates that “even subtle unconscious exposure to religious ideas can dramatically encourage prosocial over selfish behavior” in theists and atheists alike (Shariff and Norenzayan, 2007).

Evolutionary cognitive scientists have further noted that the counterintuitive concepts that characterize religious beliefs, such as bleeding statues and virgin births, are both attention arresting and memorable (Boyer 2001; Atran 2002). These features make them particularly effective for both vertical (across generations) and horizontal (within generations) transmission and can help explain why religious ideologies, including those of terrorists, often spread quickly through populations. In addition to their mnemonic efficacy, they comprise almost unbreakable “codes” for the uninitiated. Counterintuitive concepts are not readily generated on the basis of intuitive concepts, thus the chances of spontaneously recreating a preexistent counterintuitive concept are exceedingly low. By incorporating counterintuitive concepts within belief systems, religion creates reliable costly signals that are difficult to “fake.” Sosis (2003) has argued that repeated ritual performance fosters and internalizes these counterintuitive

beliefs, which typically include a nonmaterial system of reward and punishment, including expectations about afterlife activities.

The promise that 72 virgins await a *shahid* is often joked about, but afterlife rewards are a critical feature of successful ideologies that enable terrorist organizations to motivate recruits to carry out their missions. As a Hamas member describes, "We focus his attention on Paradise, on being in the presence of Allah, on meeting the Prophet Muhammad, on interceding for his loved ones so that they, too, can be saved from the agonies of Hell, on the houris [virgins], and on fighting the Israeli occupation and removing it from the Islamic trust that is Palestine" (Hassan 2001, 39). Female martyrs are promised to be the chief of the virgins and exceed their beauty (Richardson 2006, 122). Even kamikaze pilots were assured that they would be "transcending life and death" (Atran 2003, 1535). Detailed experiments by Bering (2006) demonstrate that humans have a natural inclination to believe that some element, typically a soul, survives death. Indeed, most of us, including atheists, have difficulty conceiving of a complete cessation of mental and social activity following death. Nobody knows what it is like to be dead so people attribute to dead agents the mental traits that they cannot imagine being without. Religious and other cultural beliefs serve to enrich or degrade beliefs in the afterlife, but Bering's work suggests that appeals to rational arguments about the irrationality of afterlife beliefs are likely to face strong resistance. As we discuss below, if it is strategically important to alter terrorists' beliefs about the afterlife, the greatest success can be achieved by exposing children and adolescents to alternative belief schemas *before* they are exposed to the afterlife rewards promised by terrorists.

Separation of the Sacred and the Profane

The separation of the sacred and profane and the emotional power of sanctified symbols are critical for understanding how terrorists utilize religion for their benefit. Religious ritual is universally used to define the sacred and to separate it from the profane (Eliade 1959; Durkheim 1995). As noted by Rappaport (1999), ritual does not merely identify that which is sacred; it *creates* the sacred. Holy water is not simply water that has been discovered to be holy, or water that has been rationally demonstrated to have special qualities. It is, rather, water that has been *transformed* through ritual. For adherents who have participated in sanctifying rituals, the cognitive schema associated with that which has been sanctified differs from that of the profane. Of greater importance from a behavioral perspective, the emotional significance of holy and profane water is quite distinct. Not only is it inappropriate to treat holy water as one treats profane water; it is emotionally repugnant. While sacred and profane things are cognitively distinguished by adherents, the critical distinction between the sacred and

the profane is the emotional charging associated with sacred things (Alcorta and Sosis 2005).

It is the emotional significance of the sacred that underlies “faith,” and it is ritual participation that invests the sacred with emotional meaning. Extensive research indicates that emotions constitute evolved adaptations that weight decisions and influence actions (Damasio 1994). The ability of religious ritual to elicit both positive and negative emotional responses in participants provides the substrate for the creation of motivational communal symbols. Through processes of incentive learning, as well as classical and contextual conditioning, the objects, places, and beliefs of religious ritual are invested with emotional significance. The use of communal ritual to invest previously neutral stimuli with deep emotional significance creates a shared symbolic system that subsequently weights individual choices and motivates behavior.

It is noteworthy that the sacred may most commonly be encountered as physical space (Eliade 1959). Pape (2005) argues that at the root of each suicide terror campaign is a dispute over land; an occupying power that must be removed from the homeland. Such conditions are ripe for religious symbolism, and indeed, homelands in these conflicts are always publicly perceived as sacred. Pape (2005, 85) comments that “[a]lthough boundaries may be ambiguous and history may be contested, the homeland is imbued with memories, meanings, and emotions.” Religious rituals sustain memories, shape meanings, and foster these emotions. Religion’s reliance on such emotionally evocative symbols also explains why religious terrorist groups are more successful than secular ones in mobilizing their forces (Bloom 2005). Religious terrorists do not appeal to rational political arguments to win public approval; they rely on sacred symbols imbued with emotional power to enlist followers in their cause.

Once recruits are secured, group solidarity can be further enhanced through negative affect rituals. Neuropsychological research has shown that negatively valenced stimuli are both more memorable and have greater motivational power than positive stimuli (Cacioppo et al. 2002). As a result of this negativity bias, negatively valenced elements of religion provide a more reliable emotionally anchored mechanism for the subordination of immediate individual interests to cooperative group goals (Alcorta and Sosis 2005). Research on the rituals that terrorist cells employ is scant, but apparently deprivation, such as lengthy fasts, is not uncommon (Friedland 1992; Hassan 2001).

Adolescence as the Critical Life Phase for the Transmission of Religious Beliefs and Values

Adolescent rites of passage comprise one of the most consistent features of religions across cultures. Through rites of passage initiates learn what things

constitute the sacred. Rites of passage purposefully engage unconscious emotional processes, as well as conscious cognitive mechanisms. The conditioned association of such emotions as fear and awe with symbolic cognitive schema achieved through these rites results in the sanctification of those symbols, whether places, artifacts, or beliefs. Because such symbols are deeply associated with emotions engendered through ritual, they take on motivational force. When such rites are simultaneously experienced by groups of individuals, the conditioned association of evoked emotions with specific cognitive schema creates a cultural community bound in motivation, as well as belief.

The human brain demonstrates great plasticity during development. Infancy, childhood, adolescence, and adulthood are marked by differentiated growth patterns in various brain cortices and nuclei (Alcorta 2006). The differential patterns of brain growth across the life course create sensitive periods for particular types of learning. The unique changes occurring in the adolescent brain render this a particularly sensitive developmental period in relation to social, emotional, and symbolic stimuli, precisely the types of stimuli of greatest importance in adolescent rites of passage. Adolescence is also marked by heightened emotional response, and a shifting of the brain's reward circuitry. Adolescence thus comprises a critical period for the learning of emotionally valenced symbolic systems and for integrating these systems into the brain's reward circuitry. Increased risk taking during adolescence affords additional inputs into this system (Alcorta and Sosis 2005). It is therefore not surprising that most terrorists begin their militant life during adolescence. Victoroff (2005, 28) suggests that the "typical development of terrorist sympathies perhaps follows an arc: young adolescents are plastic in their political orientation and open to indoctrination. Positions harden later in adolescence, . . . [and] many retired 'terrorists' reveal a mellowing of attitude." Of course, by the time those raised in a culture of martyrdom reach adolescence they are already prepared to sacrifice themselves without further indoctrination (Brooks 2002; Atran 2003). Bloom observes that by age six Palestinian boys and girls report that they wish to grow up and become *isit-shhadis* (martyrs). "By the age of 12, they are fully committed and appreciate what becoming a martyr entails" (2005, 88). As a senior member of the Palestinian group al-Qassam declares, "it is easy to sweep the streets for boys who want to do a martyrdom operation" (Hassan 2001, 39). Nonetheless, the profile of those who actually carry out suicide attacks may be somewhat older (Hassan [2001] reports a range of 18 to 38 among Palestinians), suggesting that the enthusiasm of youth must be balanced with training and the development of trust to carry out such a mission.

Secular Terrorism and the Evolution of Religion

One advantage of the evolutionary approach we offer here is that by delineating the core adaptive features of religion that facilitate cooperation we

can avoid definitional quagmires concerning what constitutes religion. This is important because we suspect that similar to their religious counterparts, successful secular terrorists employ some of these core features, such as emotionally evocative symbols, rituals, and myths. For example, although the Tamil Tigers are not religious, they in fact use “Hindu symbols for purposes of recruitment . . . and rely on the language of religious martyrdom to justify and reward the sacrifice” (Berman and Laitin 2005, 28). And similar to the function of video testaments, prior to suicide missions Tamil Tigers partake in a ritual dinner with their leader, obviously sealing their commitment to carry out the attack (Gambetta 2005). Furthermore, thousands attend the yearly Heroes’ Day ritual celebration held on July 5, commemorating the LTTE martyrs, whose shrines are adorned with flowers and trees (Pape 2005, 193). Therefore, the secular-religious distinction made by Western societies with institutionalized religious systems may not be a useful paradigm for examining the determinants of terrorist activity. Rather, analyses would be better served by concentrating on how terrorist organizations use the particular characteristics of the human religious adaptive complex we have outlined here to inspire group commitment and individual action.

Future Areas of Research

Our brief review of the emerging evolutionary literature on religion and its relation to terrorism leaves many questions unanswered and points to the need for considerable research. We consider a few areas that we believe deserve particular attention.

1. Various researchers note the vital role that charismatic leaders play in shaping recruits’ opinions and motivations. For example, Atran (2003, 1537) argues that terrorist leaders manipulate “emotionally driven commitments” of their recruits for the “benefit of the organization rather than the individual.” Evolutionary theories of religion have yet to fully address the role of leadership in coordinating behavior within religious groups, but recent evolutionary work on the dynamics of leaders and followers should provide valuable insights (Van Vugt 2006).
2. Argo (2003) contends that in martyrdom cultures individual risk is positively correlated with status benefits. We suggested that martyrs include in their cost-benefit assessments the status benefits they expect to receive following their death, even though they will of course not be around to enjoy their newly attained status. This needs to be studied, as it is likely to be important for understanding some of the benefits that martyrs believe their actions will produce, and offer clues into how those perceived payoffs can be altered.
3. Ritual is a vital mechanism that terrorists employ to secure commitment, but detailed studies on the ritual lives of terrorists are limited. Further-

more, our analyses suggest that adolescence is the critical development phase during which terrorists are created, and thus adolescents should be the focus of considerable terror-related research.

4. Selectionist logic suggests that high-risk behaviors, such as terrorism, are more common in high-fertility populations (e.g., Daly and Wilson 1988). We are not aware of any research that links terrorism, religiosity, and fertility decisions, but this would be a worthwhile pursuit. If there is a positive relationship between terror and fertility, encouraging demographic transitions through such means as expanded female educational and economic opportunities may be one means of reducing terror activity.
5. While adherents generally view religious dogma as unchanging and even eternal, religions are in fact flexible and they do adapt to socioecological circumstances (Rappaport 1999). Rigorous studies that examine the determinants of religious change, especially among extremist forms of religion, are urgently needed.

Policy Implications

A number of policy implications previously recommended by other researchers are consistent with our evolutionary analysis.

1. As noted above, terrorists have been successful in bringing the world to view their conflicts through a cosmic lens. While it is tempting for governments to rely on absolute moral dichotomies in order to rally their own public in support of whatever military actions they must take, this serves to endorse the terrorists' position and facilitates terrorist recruitment efforts. As Juergensmeyer recommends (2004c), and we concur, governments should avoid depicting conflicts as a cosmic clash between civilizations. Because of the emotional strength of religious symbols, religion is a potent mobilizer of public support, but it is not a vital tool for Western societies and may, conversely, be detrimental given the multicultural constituency of Western societies. Framing conflicts as cosmic clashes is far more valuable for terrorist organizations. Any gains that Western governments achieve by casting the conflict in religious terms will be offset by gains terrorists receive from framing the conflict in this way.
2. Berman and Iannacone (2005) argue that fostering an open market of religious expression will reduce religious violence. We agree. Trying to eliminate religion, as some recent authors have proposed, is pointless. Evolutionary work not only affirms the empirical resilience of religion, it offers an explanation for why religion endures even in the face of persecution and indicates that the components of religion are highly effective human adaptations. Terrorists are ideologically motivated, which

means that to effectively fight terrorism, it is necessary to compete ideologically as well as militarily. Our analysis highlights the features that make some ideologies more successful than others. While a diversity of ideas can undermine extremist positions, it is critical that new ideas not be perceived as foreign, and that the symbols used to convey these ideas be consistent with existent symbolic systems. As we note, religious fundamentalists believe they are returning to *their* tradition and will reject anything they perceive as not stemming from their past. Moreover, liberal religious ideologies are not compelling substitutes for those seeking an all-encompassing religious life. The goal is not to eradicate fundamentalism, which will not succeed; rather, the policy strategy should be to encourage an open market of religious expression in which nonviolent forms of religious fundamentalism can successfully compete, as can be observed throughout North America.

3. While we agree with much of Atran's (2003) critique of rational choice explanations of suicide terrorism, there is actually considerable overlap between evolutionary and rational choice approaches. The club goods model offered by Berman (2003), Berman and Laitin (2005), and Berman and Iannaccone (2005) is similar to the evolutionary signaling model of religion (relying on rational choice rather than evolutionary assumptions) and is in fact more fully developed and more rigorously tested. Here we concur with Berman and colleagues that it is critical to recognize religious requirements as commitment signals, since governmental policies can unintentionally undermine these signals, forcing fundamentalist groups to generate even costlier signals (e.g., Berman 2000). The primary difference between the rational choice and evolutionary approach is that evolutionists, such as Atran and ourselves, maintain that emotions are vital for making sense of terrorism. Recent neuropsychological research underscores the critical, though frequently unconscious, role of emotions in individual decision making (Cardinal et al. 2002). We view the ability of terrorist groups to shape the emotions of their supporters and recruits as a critical element in their success. As Victoroff notes, "passion often trumps rationality" (2005, 17).

Evolutionary research on religion also suggests several policy recommendations we have not previously seen in the literature.

1. Our analysis indicates that religious emotions run deep. Therefore, once conflicts have been framed in religious terms, religious groups must be represented in negotiations. We echo Bloom's warning that religious groups "are more complicated and dangerous negotiating partners" (2005, 98). However, without their participation and endorsement of a solution, negotiated peace between secular groups will not satisfy aggrieved parties and will not endure.

2. Signaling theory suggests that in-group members who live in communities that demand costly badges of identity will be best able to detect terrorists posing as group members. For example, Hoffman (2003) describes Palestinian suicide bombers who dress as ultraorthodox Jews in order to penetrate deep into civilian areas. We recommend training ultraorthodox security guards to assist Israeli soldiers already posted at strategic locations (bus stations, market entrances, etc.).
3. We agree with Atran's (2003) conclusion that the best defense against terrorism is to prevent potential recruits from joining terrorist organizations. Our analysis further points to the importance of adolescence as the critical time in which individuals will be receptive to such groups. To prevent adolescents from joining terrorist organizations, alternative adolescent youth activities must be developed, funded, and encouraged. We view this as essential.
4. The ideological battle cannot be waged only among adults. Our analysis emphasizes the importance of childhood exposure to religious ideas and concepts and the importance of early ritual activity in fostering long-term belief. Alternative forms of religious expression that are publicly perceived as traditional must be fostered and made available to children and adolescents. This will mean developing youth activities as suggested above, and also funding attractive schools that can draw students away from terrorist funded schools and provide them with both ideologies and opportunities for a nonterrorist future.
5. From an evolutionary perspective, religion can be seen as an adaptive proximate mechanism for creating cohesive, cooperative groups. Modern nation-states with educational, economic, and political policies that equitably integrate their multicultural constituencies and effectively sanction policy transgressions reduce the competitive need for religious fundamentalism and increase the opportunity costs such fundamentalism incurs. Building the economic resource base of developing nations, and creating equitable and effective political structures to insure equal access to that base are fundamental steps in eradicating religious terrorism throughout the world.

Conclusion

Evolutionary studies of religion are critical for understanding the current world of terror. The novel insights offered by evolutionary theories of religion are not limited to religiously motivated terrorism, but they do explain why religiously motivated terrorism is on the rise and is particularly lethal. While there is considerable overlap between evolutionary and rational choice approaches to terror, we believe that evolutionary approaches may fill in significant gaps that have remained unexplained by the dominant

rational choice paradigm. The reach of evolutionary logic has extended to studies in history, literature, art, and recently religion; the time is ripe to apply the insights of evolutionary theory to terrorism as well.

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