

## Waiting, Tolerating, and Cooperating

### *Did Religion Evolve to Prop Up Humans' Self-Control Abilities?*

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The Natufians lived 15,000–11,500 years ago on the eastern side of the Mediterranean in what is modern-day Syria, Israel, Palestine, and Jordan, and they were social pioneers in many respects. They were among the first people to make the transition to a sedentary lifestyle in which people lived in groups, including substantial numbers of nonkin. They were one of the first societies to begin the transition from foraging to agriculture—harvesting wild cereals such as wheat and barley using sickles with stone blades and wooden handles. Their society provides some of the first physical evidence for dog domestication—a marked break from the Paleolithic world, in which the world of humans was clearly separated from the world of animals. They were the first society to bury their dead in large, concentrated numbers near their own settlements (Bar-Yosef, 1998). And most important for our purposes here, the remnants of Natufian culture include the first known burial site of a shaman in the Near East.

Several years ago, anthropologists discovered a 12,000-year-old gravesite in a cave called Hilazon Tachtit, halfway between the Mediterranean and the Sea of Galilee in northern Israel. The grave contained the body of a 45-year-old woman whose pelvic and spinal deformities would have caused her to drag a leg or limp when she walked (Grosman, Munro, & Belfer-Cohen, 2008). The gravesite was prepared with care; the body was positioned deliberately and held in position by a series of large stones. The grave goods included the types of artifacts that characterize shamans' toolkits worldwide: an ox's tail, the forearm of a wild boar, the wing of an eagle, fragments from a basalt bowl, the horn core from a gazelle in association with the bowl fragments, the pelvis of a leopard, the skulls of two stone martens, 50 tortoise shells, and a fully articulated human foot

(someone else's, not the shaman's). The burial—a 10-kilometer walk and a 150-meter climb up a steep escarpment from the nearest Natufian settlement—would have been time-consuming and effortful for the community. Clearly, this shaman woman was a person of great importance to her group.

Shamans were the world's first religious professionals, and they are still found almost universally in the world's extant hunter-gatherer societies (Winkelman, 1990). The Natufian shaman's grave is by no means the world's only prehistoric shaman grave, or even the oldest one (Porr & Alt, 2006), but it is tempting to view the care with which this particular shaman was treated (and the fact that she was found in association with *this* Near Eastern society, and neither an earlier Near Eastern society nor a later one) as related to the unique characteristics of Natufian society in which she lived, and the dramatic social and economic changes it was experiencing. In part due to climactic improvements, populations were growing, and their old lifestyle of seminomadic foraging, with seasonal moves in pursuit of more plentiful food, was giving way to a lifestyle characterized by permanent settlements in which wild cereals could be exploited.

To gain benefits from their new semipermanent lifestyle and to cope with their growing population base, the Natufians would have had to develop new ways of regulating group life, as is often the case when politically autonomous band-level societies are superseded by larger, more complex societies. Specifically, there would have been novel problems related to *cooperating* (i.e., engagement in personally costly actions with non-relatives to create new public and private assets such as kilns for producing lime, fences to pen livestock, or the simple gains of trade); novel problems related to *tolerating* (the emotional effects of inevitable conflicts of interest are less easily salved when the psychological affordances shaped by selection pressures for kin altruism are not activated by cues of genetic relatedness; Lieberman, Tooby, & Cosmides, 2007); and, for their descendants, who would specialize almost exclusively in animal domestication and plant cultivation (Bar-Yosef, 1998), novel problems associated with *waiting* (in agricultural societies, the problem of waiting is particularly intense because cereal cultivation requires several months between initial preparation and planting to harvest, unlike economies based on hunting and gathering, in which the time between the onset of acquisition and consumption is measured in seconds to days). And it seems that problems like these would only get more intense as societies got larger, and food economies came to involve more and more waiting. Mithen (2007) puts some of the novel problems that agriculture and sedentism introduce this way:

The mobile hunter-gatherer lifestyle always looks far more attractive than sedentism, which creates problems of refuse disposal, hygiene and social conflict within [*sic*] one's neighbours—hunter-gatherers solve these problems by simply moving away, whether from their rubbish or other people. *That is no longer an option after one has invested in field clearance, irrigation ditches, stock fences and so forth.* (p. 710, emphasis added)

We suspect that the waiting, tolerating, and cooperating that sedentary lifestyles and agrarian economic activity necessitate draw upon specific cognitive abilities that go together under the label *self-control*. We note that Reyes-García and colleagues (2007) made a similar argument for how self-control (which they call *patience*) facilitates the accumulation of the forms of human capital (e.g., formal schooling) that enable people to transition from the economic activities that characterize life in self-sufficient societies

(e.g., hunting, foraging, small-scale agriculture) to those that characterize life in market-based economies (e.g., wage earning).

Consider the following facts about how self-control influences the sorts of behavioral challenges we are outlining here. The link between animals' levels of self-control and the specific food ecologies can be viewed as something like an iron law of behavioral ecology: Animals simply cannot exploit food sources that require more waiting than they are capable of enduring, so the ability to exploit food sources that require self-control can exert selection pressure on organisms to attain higher and higher levels of self-control (Stevens, Hallinan, & Hauser, 2005). Moreover, tolerating unfair behavior from others (which is inevitable in a world in which people's interests never align perfectly) without lashing out against them draws on cortical areas associated with the top-down suppression of anger and other negative emotions (Jensen-Campbell, Knack, Waldrip, & Campbell, 2007; Tabibnia, Satpute, & Lieberman, 2008). Finally, biologists and psychologists have recently argued that self-control is a cognitive prerequisite both for the evolution of reciprocal altruism (Stevens, Cushman, & Hauser, 2005), and its proximal production (Curry, Price, & Price, 2008; Rachlin, 2000; Yi, Buchhalter, Gatchalian, & Bickel, 2007).

Our thesis here is that intensifications in human religiosity (particularly, an increasing focus on supernatural entities that (1) monitor human behavior for moral probity and moral lapses, (2) possess well-formed preferences about desirable modes of human conduct [even in the nonmoral realm], and (3) administer temporal or afterlife punishments and rewards) over the past 10,000 years reflect the efficacy of belief in these sorts of supernatural agents to increase self-control among group members, so that modern problems related to waiting, tolerating, and cooperating could be resolved without exclusive reliance on social monitoring and policing, or even expensive institutional monitoring and policing. Johnson (2005) documented how the world's distribution of "high Gods"—that is, gods with moral preferences that monitor and punish human behavior—correlates positively with a variety of indices of societal complexity, including community size, the use of money and credit, the presence of police forces, jurisdictional hierarchies above the level of the local community, taxation, and—importantly—the level of individual compliance with community norms, which suggests that the advent of moralizing gods is coincident with increasing societal concerns about adjusting to the socioemotional challenges that arise when people begin to live in large groups. Our thesis is very consistent with Johnson's—and with that of Norenzayan and Shariff, who argue that religious cognition is particularly good at facilitating prosocial behavior that is costly in the short term (Norenzayan & Shariff, 2008; Shariff & Norenzayan, 2007). We think our proposal is also congenial to Robert Wright's (2009) recent description of the connections between the social evolution of economies and the social evolution of religion.

But here is where our thesis differs from previous ideas: We want to describe the interaction between the human psychology for self-regulation and beliefs in moralizing gods because it is at this nexus of evolved cognitive hardware for self-regulation and religious innovation that people's capacities for waiting, tolerating, and cooperating might be modified by particular forms of religion. Put simply, we believe that religious cognition has been refined through cultural selection (Richerson & Boyd, 2005) because of its ability to promote self-control, which is at a premium in the large, complex, sedentary,

agriculturally based societies in which most humans have increasingly lived for the past 8,000 years (Carneiro, 1978).

Human capacities for self- control were put in place by natural selection acting on neural tissue over many generations in ancestral human populations, but the parameter settings on those evolved mechanisms can be influenced by cultural inputs, such as religious parental influences (Bartkowski, Xu, & Levin, 2008) or personal involvement in religious institutions (Kenrick, McCreath, Govern, King, & Bordin, 1990) and practices (Wenger, 2007). This particular aspect of our thesis—that cultural inputs can influence the parameter settings on evolved mental mechanisms—is not particularly controversial (Tooby & Cosmides, 1992, see especially pp. 114–116).

Empirical research on the links between religion and self- control is in its infancy (McCullough & Willoughby, 2009), so we limit ourselves here to describing what is currently known about those links, even though much of that research is correlational and therefore unable to shed definitive light on religion's ability to foster self- control or self- regulation more broadly. Nevertheless, we think this research shows generally that there are reasons to believe that religion, as experienced and practiced by many people on the planet today, is indeed associated with higher levels of self- control and specific aspects of self- regulation more generally.

### **DEFINING RELIGION, SELF-CONTROL, AND SELF-REGULATION**

Following James (1958), Pratt (1934), and Atran and Norenzayan (2004), we conceive of *religion* as a broad cultural syndrome characterized by deeply held beliefs that arise from awareness of, or perceived interaction with, supernatural agents such as gods and spirits that are presumed to play an important role in human affairs, along with the emotions and behaviors (including ritualized and socially shared practices) that arise from and support these beliefs. In research, religion is often operationalized with measures of people's self- reported religious commitment, frequency of religiously related activities (prayer, service attendance, etc.), and belief in the existence of gods or spirits (Hill & Hood, 1999).

We define *self- regulation* similarly to many other scientists (Baumeister & Vohs, 2004; Carver & Scheier, 1998) as the process by which a system uses information about its present state to change that state toward greater conformity with a desired end state or goal. Self- regulation need not be a deliberative, effortful process: Much of self- regulation occurs in a relatively effortless and automatic fashion (Fitzsimons & Bargh, 2004), and for that reason, we also wish to understand how religion might be related to automatic or implicit self- regulation (Koole, McCullough, Kuhl, & Roelofsma, 2010). We reserve the term *self- control* for situations in which people work to override a prepotent response (e.g., a behavioral tendency, an emotion, or a motivation), such as a craving for alcohol, a desire to pull one's hand out of near- freezing water, or the temptation to chase a hare instead of remaining with the group to stalk a stag (Baumeister, Vohs, & Tice, 2007). In other words, when people exert self- control, they modify their response tendencies by suppressing one goal so as to pursue another one that is more highly valued— especially when one is not actively within the thrall of that prepotent motivation to action (e.g., when we are setting an alarm clock in the evening for the next day, we value getting up early the next morning to a greater extent than we value

staying in bed, but our preferences can shift when that alarm goes off at 5:30 the next morning. Self-control at 5:30 A.M. helps us to stay true to what we valued most when we set the alarm in the first place). Self-control is therefore a more specific concept than self-regulation. Not all psychological states that are self-regulated involve *self-control* as we use the term here; however, self-control may rely on a generic self-regulatory strength (Baumeister et al., 2007).

### EXAMINING AND EXPLAINING THE CONNECTIONS OF RELIGION TO SELF-CONTROL AND SELF-REGULATION

We recently reviewed the extant literature on the links between religion and self-control and self-regulation (McCullough & Willoughby, 2009), and little has changed since the publication of that article. Nevertheless, we summarize some of those highlights below and emphasize how the literature has developed (and how our thinking has changed) since its publication, beginning with efforts to describe the apparent nature of the relationship of religiosity and a generic dispositional proneness toward self-control.

#### *The General Connection of Religiosity and Self-Control*

Evidence from personality research suggests that religious people tend to score higher on measures of self-control and measures of personality that subsume self-control, such as conscientiousness and agreeableness, than do their less religious counterparts (Lodi-Smith & Roberts, 2007; Saroglou, 2002). In Eysenck's model of personality, psychoticism, which can be thought of as the opposite of Big Five agreeableness and conscientiousness (Costa & McCrae, 1995) is consistently, and negatively, related to a variety of measures of religiosity for samples from a range of ages, religious denominations, and cultures (Francis, 1997; Francis & Katz, 1992; Hills, Francis, Argyle, & Jackson, 2004; Lodi-Smith & Roberts, 2007; Wilde & Joseph, 1997). With respect to Cattell's personality system, McCullough and Willoughby (2009) cited studies revealing that scale "G," also known variously as "Conformity," "Superego," and "Expedient versus Conscientious," is positively associated with church attendance, attitudes toward Christianity, and traditional Christian religious belief.

McCullough and Willoughby (2009) also summarized 12 studies that reported associations of measures of religiosity with measures of general self-control (e.g., Bouchard, McGue, Lykken, & Tellegen, 1999; Desmond, Ulmer, & Bader, 2009; French, Eisenberg, Vaughan, Purwono, & Suryanti, 2008; Walker, Anette, Wills, & Mendoza, 2007). Of these 12 studies, 11 reported positive associations between self-report measures of religiosity and self-control, with effect sizes ranging from 0.21 to 0.38. It is worthwhile to note that in two of these studies (Bergin, Masters, & Richards, 1987; Bouchard et al., 1999), researchers found *extrinsic religious motivation*, which is a religious orientation characterized by treating religion as a means (as opposed to *intrinsic religiosity*, in which it is treated as an end; Allport & Ross, 1967) to be negatively associated with self-control. The distinction between intrinsic and extrinsic religion may be an important one to keep in mind as this research area develops.

In the United States, religious families also tend to have children with more self-control (Bartkowski et al., 2008; Brody & Flor, 1998; Brody, Stoneman, & Flor, 1996;

Lindner- Gunnoe, Hetherington, & Reiss, 1999). Parental religiosity, variously measured as church attendance, reports of the extent to which religion is discussed in the home, and self-rated importance of religion, is positively associated with parent and teacher ratings of children's self- control and lack of impulsivity. These associations do not appear to result from the confounding effects of gender, age, race, socioeconomic status, education, or religious denomination.

Confidence that the links between religion and self- control are *causally* related must be limited, in part, by the lack of appropriate longitudinal data and the limited support for the hypothesis that the (rather weak) available longitudinal data provide. McCullough and Willoughby (2009) found six longitudinal studies that reported evidence bearing on the causal nature of this relationship between religion and self- control or self-control-related personality traits, and in only one of them (Wink, Ciciolla, Dillon, & Tracy, 2007) was religiousness associated with increases in a personality trait related to self- control—agreeableness—over the life course. Moreover, this finding held only for women, and no connection between religiosity and later increases in conscientiousness was found. In contrast, five studies found that measures of self- control and relevant personality traits predicted religiosity later in life. In one study, conscientious children reliably became more religious adults, even after researchers controlled for confounds such as gender and religious upbringing (McCullough, Tsang, & Brion, 2003). In another, children who scored low in agreeableness tended to become less religious adults (McCullough, Enders, Brion, & Jain, 2005). In a third, conscientious adolescents and agreeable female adolescents experienced increases in religiousness through late adulthood, measured nearly 50 years later (Wink et al., 2007). In a fourth, religious youths who reported making decisions deliberately and avoiding risk taking remained more religious a year later than their less religious and less controlled counterparts (Regnerus & Smith, 2005). In a fifth, high school boys whose psychoticism declined over two time points, and high school girls with increasing conscientiousness at the same two time points, reported more religiosity at a third time point (Heaven & Ciarrochi, 2007). Taken together, therefore, this body of research suggests that religion and self- control are indeed related at the level of personality. However, the longitudinal evidence that religion can *cause* increases or reductions in self- control is currently quite limited, and the evidence that changes in conscientiousness and similar constructs leads to increases in religiosity over time enjoys quite a bit more empirical support. For this reason, experimental data demonstrating that religion can create transient (or long-term) increases in self- control would be highly desirable from a scientific point of view.

### ***Religion and the Cybernetic Model of Self- Regulation***

Aside from religion's general connections to personality-level measurements of self- control, it is instructive to consider how religion might influence self-regulation via basic conceptual processes that are necessary for systems (biological systems included) to self-regulate effectively. Carver and Scheier (1998; Chapter 1, this volume) conceptualized *self- regulation* as a dynamical process by which people bring their behavior into conformity with standards, despite environmental changes that disturb equilibrium, through the operation of integrated negative feedback loops. These negative feedback loops consist of several integrated functions. The *input* function detects the system's state. In human terms, this is equivalent to one's perceptions of the self and the environment. The *com-*

*parator* function compares the system's state to a *reference value*. Reference values can be conceptualized as goals or standards. When a comparator indicates that the system's state matches its reference value, nothing changes, and the existing state is maintained. When the comparator notes a discrepancy between the system's state and its reference value, an *output* function is activated to reduce the discrepancy. Self-regulating systems continuously self-monitor for goal-behavior discrepancies; when discrepancies are noticed, they respond by trying to minimize them via outputs.

In other words, effective human self-regulation, as Carver and Scheier (1998) conceptualized it, requires four processes. First, it requires clear *goals* that are organized so as to permit effective management of conflict among them (Fitzsimons & Bargh, 2004). Second, it requires sufficient *self-monitoring* and/or self-directed attention, so that one can detect discrepancies between one's goals and one's actual behavior. Third, it requires sufficient motivation, or *self-regulatory strength* to change one's behavior when discrepancies are detected. Fourth, it requires effective mechanisms, or *outputs*, for effecting behavioral change (Schmeichel & Baumeister, 2004). Presently, we consider how religion might influence these four processes and describe some of the research that is relevant to these concepts.

### *Religion and Goals*

Religious belief encourages people to acquire specific goals and values that differ from those of nonreligious people (Roberts & Robins, 2000; Saroglou, Delpierre, & Dernelle, 2004). For instance, in meta-analytic data from 12 studies conducted in primarily Christian, primarily Muslim, and primarily Jewish nations (e.g., the United States, Turkey, and Israel), religiosity was reliably and positively correlated with the values from the Schwartz Value Survey called Tradition (described as including traits such as "responsible" and "helpful";  $r = .45$ ) and Conformity (including traits such as "self-discipline" and "politeness";  $r = .23$ ). Conversely, religiosity was negatively correlated with the values measured on scales known as Hedonism ("self-indulgent," "pleasure";  $r = -.30$ ), Stimulation ("exciting life";  $r = -.26$ ), and Self-Direction ("freedom," "independent";  $r = -.24$ ). These results were obtained in all three types of religious nations, suggesting that Jewish, Christian, and Muslim religious beliefs promote goals related to respect and concern for the welfare of others, while discouraging goals related to personal gratification and individuality. It seems to us no accident that religiosity is particularly good at increasing people's valuation of tradition and conformity-related values, if what religion has evolved culturally to do is increase people's ability to wait, tolerate, and cooperate.

One way in which religious thought may encourage religiously related goals at the expense of secular goals is by *sanctifying* them, or defining the source of religious goals as sacred, thereby making them more important (Emmons, 1999). For example, Mahoney et al. (1999) found that husbands and wives who characterized their marriages as "sacred" and as "manifestations of God" reported healthier marriages (better adjustment, better conflict resolution). Mahoney and colleagues (2005) also showed that college students who sanctified their bodies, believing them to be gifts from God, tended to get more sleep, wear their seat belts, and disapprove of illicit drug use. It seems that religion can be used to sanctify almost *any goal*, from getting enough exercise to killing civilians, but we anticipate that many, if not most, of the goals that people commonly sanctify through religion will be relevant (in the practitioner's eyes, at least) to waiting (e.g., being a more

patient person), tolerating (e.g., being a more forgiving person), and cooperating (e.g., helping members of one's group or honoring one's debts).

### *Religiosity and Self- Monitoring*

Awareness of an evaluative audience increases people's self- awareness. When made self- aware, they then compare their behavior to relevant behavioral standards (Carver & Scheier, 1998). Many religious belief systems posit gods or spirits that observe humans' behavior, pass judgment, then administer rewards or sanctions (Bering & Johnson, 2005), and in many of these religions, these beings can also read thoughts and are not fooled by people's attempts to deceive them. Several studies suggest that priming religious concepts produces behavioral effects on measures such as cooperation, generosity, and honesty that can be construed as prosocial in nature (Pichon, Boccato, & Saroglou, 2007; Randolph-Seng & Nielsen, 2007; Shariff & Norenzayan, 2007), and such effects could conceivably be mediated by religious cognition's effects on self- monitoring (though this remains an open question). Such speculation is also consistent with work showing that exposure to images of eyes (i.e., stimuli indicative of the fact that one is being monitored) increases generosity and honesty (Haley & Fessler, 2005). Religion could also promote self- monitoring through introspective religious rituals (e.g., prayer, meditation, reflecting on scripture) that encourage people to monitor for discrepancies between their goal states and their actual behavior (Wenger, 2007). Correlational evidence that religious people engage in more self- monitoring than do less religious people is limited, and mixed, and direct experimental work on the topic is virtually nonexistent, so we think this particular question is ripe for research (McCullough & Willoughby, 2009).

### *Religiosity and Self- Regulatory Strength*

Once a discrepancy between a goal and one's behavior has been detected, it has been posited, people must have adequate self- regulatory strength to adjust their behavior (Schmeichel & Baumeister, 2004). Religious communities are high- constraint settings (Kenrick et al., 1990) in part because involvement in these communities exposes members to social incentives and sanctions that encourage self- regulated behavior. The presence of such incentives and sanctions may then lead people to self- regulate on a more chronic level, which, according to the muscle model of self- control (Muraven & Baumeister, 2000), should increase religious people's self- regulatory strength. Religious rituals also often involve self- control behaviors (e.g., fasting, long periods of prayer and meditation), so regular engagement in such rituals might function as a type of self- control exercise, in time increasing self- regulatory strength (McCullough & Willoughby, 2009) that can be applied toward other self- regulatory tasks.

Although we know of no experimental evidence backing this proposition, research on fasting during the month of Ramadan is a compelling case study. During Ramadan, observant fasters become more irritable and anxious (Kadri et al., 2000), experience reduced blood glucose levels (Fazel, 1998) and suffer decrements in performance on perceptual tasks (Ali & Amir, 1989), and even end up in traffic accidents and the emergency room more frequently (Fazel, 1998). These findings suggest that Ramadan observance draws on limited self- control resources (Banfield, Wyland, Macrae, Münte, & Heather-ton, 2004). For this reason, Ramadan fasting may be, among other things, a month-long



workout for self-regulatory strength. If that is the case, then we should also expect that people leave the month of Ramadan with more self-regulatory strength than when they entered it (although, as we noted earlier, this idea is highly speculative).

### *Religiosity and Outputs for Self-Change*

A final requirement for effective self-regulation is the possession of a suite of effective psychological and behavioral tools for self-change. As mentioned earlier, such tools for self-change are called *outputs* (Carver & Scheier, 1998). Religious belief systems may encourage effective outputs that are not specifically religious, such as simply avoiding contact with tempting stimuli (e.g., someone to whom one is highly sexually attracted but with whom a sexual relationship would be morally off limits) (Worthington, et al., 2001), but they offer something uniquely religious as well.

For example, prayer and meditation may serve important regulatory functions (Galton, 1872; McNamara, 2002). In one study, Brefczynski-Lewis, Lutz, Schaefer, Levinson, and Davidson (2007) discovered more activation in regions of the brain associated with attention and response inhibition in experienced meditators. Also, Chan and Woollacott (2007) found that experienced meditators had less interference during a Stroop task, suggesting that they had more effective regulation of attentional processes. In addition, Koole (2007) conducted five experiments revealing that people (particularly religious people) exposed to a person in need and then instructed to pray for that person experienced more reductions in negative affect than did people instructed (1) simply to think about the person or (2) to reappraise the person's plight positively.

Other religious behaviors that may be effective outputs for self-change (especially for religious people) include religious imagery (Weisbuch-Remington, Mendes, Seery, & Blascovich, 2005; Wiech et al., 2008), and consulting religious scriptures (Wenger, 2007). Rachlin (2000) proposed that behavioral guidance gleaned from religious scripture might be a particularly effective tool for change due to its sacred nature. Wenger's (2007) experiment provides some support for this claim. Participants who were led to focus on religious shortcomings spent longer reading a passage called "How can I know when it is God who is speaking to me?" It is not a stretch to see this finding as an illustration of a self-regulating system, noting a discrepancy in behavior relative to a goal state (not following religious tenets when a goal is to be a good follower of a religious system), then reducing the discrepancy using a religiously prescribed output function (reading religious material).

### *Religion and Implicit Self-Regulation*

As noted earlier, self-control can occur through both automatic mechanisms and deliberative ones (Fitzsimons & Bargh, 2004), so Koole, McCullough, Kuhl, and Roelofsma (2010) recently advanced a parallel view of religion's connection to self-regulation that relies on implicit or automatic routes for cognitive processing rather than conscious ones. Implicit self-regulation, as they conceptualized it, functions in three ways that might be influenced by religious cognition. First, religion might help people to form appropriate intentions that can then be translated into effective action (also known as *volitional efficiency*). Second, religion might facilitate *emotion regulation*. Third, religion might help

people reconcile new experiences with what has come previously, thereby helping to create and preserve *meaning in life*.

Many studies in which religious cognition has been primed outside of conscious awareness do indeed suggest that religious cognition can foster self-regulation through implicit processes. For example, in one experiment, subliminally presented religious mental content suppressed goals related to temptation (Fishbach, Friedman, & Kruglanski, 2003). College students were subliminally primed for 50 msec with a temptation/sin-related concept (e.g., drugs, temptation, premarital sex), a religion-related concept (e.g., prayer, bible, religion, and God), or a neutral word. After each prime, participants were instructed to identify religion-related words or temptation/sin-related words as either words or nonwords as quickly as possible. Fishbach et al. found that the subliminal presentation of temptation/sin-related primes led to faster recognition of religion-relevant words than did the subliminal presentation of neutral primes. Conversely, subliminally presented religion-relevant primes slowed recognition of sin/temptation-relevant words in comparison to the neutral primes. These results suggest that people recruit religious concepts to facilitate self-control in the face of temptation and, conversely, that activating religious mental content can suppress temptation/sin-relevant content. Interestingly, these regulatory processes took place automatically, implying that the regulation was based on implicit goals that had been internalized through a religious belief system.

One important effect of implicit regulation is to stabilize people's moment-to-moment responses to emotion-inducing stimuli (Koole, 2009; Kuhl, 2000). As described previously, Koole (2007) reported the results of five experiments supporting the hypothesis that prayer can reduce negative affect. Weisbuch-Remington and colleagues (2005) found similar effects in two experiments that evaluated whether religious imagery facilitates emotion regulation. These studies revealed that subliminally exposing Christian participants to positive religious imagery (images of Christ ascending to heaven, Jesus as an infant, etc.) before they completed a stressful task caused physiological responses characterized by greater cardiac output (a so-called "challenge response"; Blascovich, Mendes, Tomaka, Salomon, & Seery, 2003). In contrast, Christians exposed to negative religious imagery (demons, satanic symbols, etc.) evinced greater total peripheral resistance (a so-called "threat" response). A threat response is thought to occur when resources are evaluated as not meeting situational demands, whereas a challenge response indicates that situational demands have been evaluated as surmountable (Blascovich et al., 2003). Taken together, these results remind us that even though self-control has traditionally been considered a conscious, effortful process, we know better now. Therefore, we should expect that many of religion's potential self-regulatory effects will occur through automatic rather than conscious cognitive processes, and research in the future should examine religion's effects on self-regulation through both of these possible routes.

## CONCLUSION

Evolutionary theories of religion can be divided roughly into those that view religious belief as a by-product of more basic cognitive adaptations—for example, cognitive mechanisms for inferring both causality in the physical world and other people's mental states (Boyer, 2001), or for maintaining attachments to caregivers (Kirkpatrick, 2005)—and

those positing that the capacity for religious belief results from selection for religious mental representations of reality that might facilitate within-group conformity, cooperation, or generosity (Johnson, 2005; Norenzayan & Shariff, 2008; Sosis & Ruffle, 2003; Wilson, 2002). Although these theoretical approaches differ, one can concede that the human capacity for religious belief is indeed a by-product of more basic cognitive adaptations and still hold that the effects of such a cognitive by-product (i.e., the capacity for religious belief) might have been subject to more recent regimens of cultural (if not genetic) selection (Richerson & Boyd, 2005) that have led to the diversity religious beliefs seen throughout the world from prehistory to the present day.

Within such a hybrid theoretical account, the capacity for religious belief could be conceptualized as a secondary adaptation (Andrews, Gangestad, & Matthews, 2002) that has been selected for its ability to encourage people (1) to exercise patience, or delay of gratification—that is, *to wait*; (2) to refrain from aggression or other forms of anti-social behavior when others misbehave—that is, *to tolerate*; and (3) to engage in costly prosocial behaviors that enable them to collaborate with others in generating public goods—that is, *to cooperate*.

Space does not permit a full treatment of this idea here, but we hope one illustration will suffice. Many of the mathematically plausible models of natural selection for cooperation—most notably, reciprocal altruism (Axelrod, 1984; Axelrod & Hamilton, 1981; Trivers, 1971)—imply that for cooperation to evolve, certain cognitive foundations must be in place, for example, a willingness to start transactions in a cooperative (or “nice”) frame of mind, a capacity to forgive occasional defections (i.e., transform one’s vindictive motivations toward a cooperation partner back into prosocial ones), and an ability to delay gratification, that is, not to discount too steeply rewards that can be obtained after a time delay (Rachlin, 2000; Stevens, Cushman, et al., 2005). Most animals lack some or most of these cognitive foundations, but humans possess them all.

We wonder whether religious cognition—activated either chronically or acutely by situational cues such as religious artifacts, linguistic symbols, or even internally generated religious cognitive material (prayers, contemplation of valued religious role models, etc.)—might be particularly good at activating or strengthening these cognitive foundations for cooperation either explicitly or implicitly. As we have described, implicit religious priming increases generosity (Pichon et al., 2007; Shariff & Norenzayan, 2007), and honesty (Randolph-Seng & Nielsen, 2007), facilitates emotion regulation (Koole, 2007; Weisbuch-Remington et al., 2005; Wiech et al., 2008), and may even reduce temporal discounting (Roelofsma, Koole, & McCullough, 2009)—the very cognitive abilities required for the evolution of reciprocal altruism. If so, then perhaps religious belief has been conserved or modified further by selection for its ability to foster self-control and self-regulation in precisely the cognitive domains upon which humans and their ultracooperative ways of life have come to depend.

Seemingly overnight, the study of religion within psychology—indeed, within many of the social, behavioral, biological sciences—has become theoretically vigorous and empirically exciting. In the foreseeable future, the effects of religion on people’s individual and social lives will likely remain the subject of considerable scientific research. We think it will be fruitful for researchers interested in those effects to inquire into the extent to which religion’s effects might be built on its ability to encourage self-control and self-regulation.

### ACKNOWLEDGMENTS

Preparation of this chapter was supported in part by the Center for the Study of Law and Religion at Emory University and a by grant from the John Templeton Foundation.

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