We perceive other people's experiences not piecemeal but through mental models, and we construct models of gods in the same way that we construct models of each other. These models reflect our take on what others are going through, modified by projection, transference, and other distortions. Ordinarily we "believe in" other people (as opposed to how we experience fictional characters) only when we can test our models against observations of them. However, when the models are especially evocative, we may lower our threshold for belief and experience a dead relative, or Elvis, or a god as present. Such extra occasions for emotion are valuable in their own right – as valuable as the emotions are – but insofar as they can remain robust without confirmatory evidence from actual people, they may also improve our self-control.

Selfishness that gets too much in the way of vicarious reward is an impulse that needs to be controlled, as are not only "emotionally eruptive existential anxieties" and other corrosive emotions but also the self-destructive urges that get called sins. Most of these cannot be subsumed under selfishness. Of the seven deadly sins of Christianity, for instance (gluttony, lust, wrath, pride, envy, avarice, and sloth), only wrath and avarice could be argued to be as harmful to others as they are to the sinners themselves. Self-control is a broad task, and it is central to religion.

Self-control is usually regarded as the function of willpower; but I have argued elsewhere that willpower is nothing more than the fruit of recognizing a limited-warfare relationship among successive selves – another product of hyperbolic discounting – and that it suffers from the same limitations as other solutions to limited warfare (Ainslie 2001, pp. 90–104, 143–60). Specifically, willpower is the technique of regarding choices as test cases for how you will decide in similar future cases; great reliance on this technique leads to rigidity and the risk of permanent damage to willpower in cases where the will fails. That is, autonomous self-control can lead to the kind of lawyerliness that psychologists call compulsiveness and theologians call scrupulosity. But the obvious alternative commitment method, openness to the influence of actual other people, is fallible – this influence is itself impulsive at times, evadable, and sometimes self-serving.

Here is where a felt relationship with a god or even a sentient ancestor (e.g., "I can just hear Mother") could be a solution. Your sense of being on good terms with this entity forms the stake that you bet against impulses; but the entity is not rigid as a resolution is. It is, rather, a mental model like your model of other people, and made of human expectations. The information that shapes this model into a felt presence comes indirectly, from the forms of communing and divination to which the authors refer, and is not normally controlled by any one individual. Furthermore, there can be ways that you can overcome your expectation that the entity is angry or disappointed ("atonement") – not surefire ways, which would undermine your experience that the entity is genuinely another agent, but ways that might be more effective than efforts to repair an autonomous but failed will.

In sum, the mundane transactions from which the supernatural is formed need to be more motivationally important than just hair-trigger attributions, mnemonic advantages, and a rich imagination, although all of these may have their role. What I have sketched is just one possibility, but it illustrates the potential for functional modeling when a mechanism for motivational conflict is added to the mixture.

NOTE

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Counterfactuality in counterintuitive religious concepts

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Abstract: In sketching a preliminary scientific theory of religion, Atran & Norenzayan (A&N) generally agree with cognitive scientists of religion in the factors that coalesce to form religion. At times they misrepresent, however, the notion of "counterintuitive" concepts as they apply to religious concepts, confusing counterintuitive with counterfactual, category mistakes, and logical contradiction.

Presenting again the theoretic core of Atran's recent book on the subject (Atran 2002a), Atran & Norenzayan (A&N) rightly highlight the central factors currently occupying comprehensive theories in the cognitive science of religion. As Boyer foreshadowed throughout the past decade (e.g., Boyer 1994; 1995; 1996; 1998b) and detailed more recently (Boyer 2001; 2003), a thorough-going theory of religion should account for the convergence of a number of recurrent features of religions: counterintuitive concepts centering on intentional agents, collective practices that result in enhanced group cohesion, and the connection of these concepts and practices to morality and existential concerns such as death. Similar to how Boyer (2001; 2003) and I have written about the convergence of these mutually reinforcing features, A&N see a "canalization" of factors due to evolutionary forces. For the sake of clarification, I will amplify the notion of "counterintuitive" concepts as characteristic of religious cognition.

A&N rightly note the recurrence of counterintuitive concepts as central components of religious traditions. Following Boyer (1994; 2001; Boyer & Ramble 2001), *counterintuitive* has acquired a peculiar meaning in the cognitive science of religion. A counterintuitive concept is one that violates intuitive assumptions about the properties of a particular thing. These intuitive properties derive from culturally independent implicit reasoning systems. To illustrate, as has been demonstrated by developmental psychologists, the understanding that physical objects will fall unless supported arises in infancy and thus becomes an intuitive assumption for physical objects. A solid, physical object that does not require support, but may remain hovering in mid-air would be counterintuitive in this technical sense.

A&N frequently use the terms *counterintuitive* and *counterfactual* together. Note, however, that counterintuitive and counterfactual are not the same thing. Though we typically trust our intuitions to give us truthful assumptions about the world, they only serve as best guesses and may be false. Likewise, counterintuitive but factual conditions and properties abound. For instance, Venus flytraps violate our intuitive assumptions regarding the nonpredatory and inanimate character of plants; that invisible microorganisms can kill large mammals is counterintuitive; and that the earth revolves around the sun violates our intuitive evaluation of visual information. Indeed, one of the striking (and valuable) features of science is its ability to demonstrate that the physical world sometimes does *not* match our intuitive assumptions. Science is frequently counterintuitive (McCauley 2000).

Apart from increasing precision, distinguishing concepts' factuality from concepts' intuitiveness pays critical theoretical dividends for a *scientific* treatment of religion. Most importantly, it liberates the scientist from having to play philosopher, theologian, or anti-theologian and having to decide whether particular metaphysical claims are true or false before being able to consider concepts as religious or not. Such evaluations lie outside the tools of science.

Counterintuitive concepts also must be distinguished from "category mistakes" and contradictions. A category mistake involves modifying a thing with a predicate that does not and may not meaningfully apply to its ontology. For example, a "god that happened yesterday" would be a category mistake but is not counterintuitive (in the technical sense Boyer has coined). Such a no-

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tion generates no inferences and does not seem to garner any special attention or enjoy any mnemonic advantages. A "mountain that hears your prayers," on the other hand, may violate what we typically think of as a mountain, but manages to generate inferences nonetheless. Rather than utterly destroying the meaning of a concept, it opens the concept up to new interpretations. If the mountain hears prayers, perhaps it thinks as well. Maybe it understands different languages. Maybe it has beliefs, desires, and memories.

This conflation of Boyer's notion of *counterintuitive* with category mistakes makes an interpretation of A&N's memory experiment difficult. In addition to questions of ecological validity – that memory for lists of modified nouns approximates conditions of cultural transmission – the stimuli used do not clearly fall into the groups of counterintuitive versus intuitive concepts. Rather, many pairs that the authors allege to be counterintuitive may be category-based modification mistakes that provide insufficient information to illicit any concept formation (e.g., "Solidifying Lady"), or may read as obtuse metaphors (e.g., "Cursing Horse," "Sobbing Oak"). That these tests fail to show a mnemonic advantage for those items called "counterintuitive" is not surprising or clearly inconsistent with previous research (Barrett & Nyhof 2001; Boyer & Ramble 2001). Although A&N admirably attempt to answer the question of why counterintuitive concepts are the minority of cultural concepts, given reputed mnemonic advantages, simpler answers are at hand. Intuitive concepts will always remain in the vast majority as long as (1) the things that people typically experience (like rocks and daisies) fit intuitive assumptions (which they seem to do); (2) intuitive assumptions serve as defaults for unknown properties, thereby producing intuitive concepts; and (3) conceptual load problems of reasoning with multiple counterintuitive concepts in any given contexts lead to those concepts degrading into simpler, intuitive ones (Barrett 1999; Barrett & Keil 1996).

A&N suggest that religious concepts' counterintuitiveness is on par with contradiction, but to think so would be a mistake. Though many religious ideas may prove to be contradictory, contradiction is not a distinctive or defining feature of religious thought. "A mountain that hears prayer" may be counterintuitive, but it is not clearly contradictory in the way that "the bachelor is married" is contradictory. Even more esoteric notions, such as "God is omnipotent and immaterial," do not obviously run into contradiction; additional premises concerning the nature of omnipotence and immateriality are required for contradiction to arise. God being able to manipulate material objects without contacting them may be counterintuitive, however. Such a claim does not lead to the nonsensical meaning vacuum that surface-level contradiction leads to.

This persistent mislabeling of religious cognition as illogical, inscrutable, and obviously false might give the unwarranted impression that religious thought is qualitatively different from ordinary beliefs. And yet, the strength of A&N's thesis is precisely the notion that religious thought is not particularly special. Rather, universally available properties of human minds and human environments (at least historically) converge to promote the spread of counterintuitive agent concepts that may be invoked to address existential concerns and solidify moral and social arrangements.

Supernatural agents may have provided adaptive social information

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Abstract: Atran & Norenzayan's (A&N's) target article effectively combines the insights of evolutionary biology and interdisciplinary cognitive science, neither of which alone yields sufficient explanatory power to help us fully understand the complexities of supernatural belief. Although the authors' ideas echo those of other researchers, they are perhaps the most squarely grounded in neo-Darwinian terms to date. Nevertheless, A&N overlook the possibility that the tendency to infer supernatural agents' communicative intent behind natural events served an ancestrally adaptive function.

Although Atran & Norenzayan's (A&N's) ideas recapitulate those of other theorists in the cognitive study of religion, most notably Boyer (2001), they are perhaps the most squarely grounded in neo-Darwinian terms to date. A&N rightly point out that recent cognitive approaches to religion are too concentrated in the counterintuitive systems of supernatural memes and have not duly broached "the emotional involvement that leads people to sacrifice to others what is dear to themselves, including labor, limb, and life" (target article, sect. 1, para. 6). Thus, the authors' most significant contribution is their discussion of the emotional factors motivating "minimally counterintuitive" (MCI) religious concept acquisition, transmission, and representation – inherently social processes that are loaded with affect (see also McCauley & Lawson 2002; Whitehouse 2000).

Despite their laudable intentions to remove the insufferable weight of religion from the shoulders of theologians, philosophers, and cognitive anthropologists, the authors appear frequently to stumble under this weight, leaving us with a sense of theoretical inchoateness that we find unsatisfying. Our primary concern is that, like most others before them, including Gould (1991), A&N may be prematurely asserting that "religion has no evolutionary function per se" (sect. 7, last para.). The analysis provided in the target article does not establish this, nor are there sufficient data available that attend specifically to the question of whether behaviors that are limited, perforce, to the domain of religion are driven by ancestrally adaptive psychological mechanisms.

The root of the problem can be found in A&N's conclusion that "supernatural agents are readily conjured up because natural selection has trip-wired cognitive schema for agency detection in the face of uncertainty" (sect. 2, last para.). The authors thus share their interpretation of supernatural attribution with scholars such as Guthrie (1993) and Barrett (2000), both of whom have argued that supernatural attributions are functionless spillover from an evolved hyperactive agency detector. But we believe that there may be more to it than this; we also believe it is possible that explanations deviating from naturalistic causes might have solved key adaptive problems for ancestral humans.

This is because supernatural attribution does more than disambiguate poor and fragmentary agency-relevant information, for example, seeing the face of the Virgin Mary on the condensate windows of an office building, but, more important, it superimposes intentionality on natural events such that ancestrally adaptive behaviors are often promoted once the "sign" is translated for referential meaning. *"What is the Virgin Mary trying to tell me? Is this about what I did last night?"* Also, if supernatural attributions occur because environmental stimuli "achieve the minimal threshold for triggering hyperactive facial-recognition and body-movement recognition schemata that humans possess" (sect. 2, para. 7), then this cannot account for people's tendency to attribute abstract categories of life events to supernatural agents (Bering 2002). How can being diagnosed with cancer or losing a loved one

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