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

in an accident, both textbook examples of the conditions under which individuals make supernatural attributions, be offset by facial-recognition and body-movement recognition schemata? Rather, these are event types that bear no direct perceptual features capable of breaking the "hair trigger" of the authors' proposed sensory driven hyperactive agency detector. A&N thus overlook *the* most critical "c" in their account of religion – *communication.*

Specifically, we hypothesize an evolved psychological mechanism that may have motivated ancestral humans to believe that certain categories of natural events were *about* some abstract intentional agency's desire to purposefully share information with them. This does not involve simply detecting agency in the environment, but more important, it has to do with unraveling a supernatural agent's intentions or reasons for causing events. More often than not, the interpretation of natural events as "messages" or "signs" engenders a change in the epistemic content of believers such that these new beliefs are responsible for behavioral change. If such behavioral change tended over long periods of time to increase individual's genetic fitness, then the psychological processes enabling humans to interpret certain natural events, under certain conditions, as symbolic of supernatural agents' intentions may have been subjected to selective pressures (see Bering in press; Bering & Johnson, in press).

In a recent series of experiments, one of us (Bering) has begun to explore the developmental emergence of the capacity to find *meaning* in natural events in response to supernatural agent priming. Supernatural agent concepts may only be endorsed if there is empirical evidence of their *behaviors* in the natural environment. The ability to translate this information into communicative messages is likely dependent on advances in cognitive development. In one experiment, 3- to 7-year-olds were asked to play a guessing game by placing their hand on one of two boxes that contained a hidden ball (Bering 2003). After an initial training trial, the children were then told a story about an invisible agent ("Princess Alice") in the room with them who would "tell them, somehow, when they pick the wrong box." Following this, on two of four counterbalanced trials, a random event was simulated in the room (i.e., a light flashing on and off, a picture falling) at the moment a child's hand first made contact with a box. Only the 7-year-olds reliably moved their hands to the opposite box after these "random" events and gave verbal judgments indicating their belief that Princess Alice was trying to share with them information about the hidden object.

Findings from an ongoing study, however, suggest that even preschoolers interpret seemingly random events as admonitions when they are caught in an act of cheating (Bering 2003). When left alone in a room with a so-called forbidden box that they are told contains something very special, many children will attempt to open the box. However, when told that Princess Alice is in the room with them, and when a light flashes on and off at the moment of their indiscretion, even 3-year-olds will inhibit their cheating response and cease looking inside. Supernatural agent concepts may have led to adaptive decision making under conditions where the self underestimated the likelihood of "real" social detection by other group members. Although clearly much work remains to be done in this area, we feel it is empirically premature to claim that religious beliefs served no independent evolutionary function.

Future research in cognitive science and religion

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Abstract: From a religious studies perspective, Atran & Norenzayan (A&N) succeed in arguing for the influence of evolved cognitive functions in religious phenomena. To develop their argument further, four suggestions are offered: (1) Look beyond the ordinary to the extraordinary; (2) culture matters more than ever; (3) theists need not despair, atheists ought not celebrate; and (4) dreaming is a primal wellspring of religion.

Atran & Norenzayan's (A&N's) application of cognitive science to the study of religion is commendable for its measured tone and thought-provoking claims. Without pushing their argument farther than the evidence allows, A&N make a compelling case for the involvement of basic cognitive operations in human religiosity. As a religious studies scholar who is trying to persuade my colleagues to pay greater attention to the findings of contemporary brain–mind science, I welcome such efforts. With an eye toward the future expansion of this area of research, I offer the following four prospective suggestions.

Look beyond the ordinary to the extraordinary. The research program of A&N concentrates on identifying the psychological roots of religious behavior in the ordinary operation of our evolved cognitive capacities (e.g., folkpsychology, folkbiology, folkmechanics). This approach echoes that of Sigmund Freud in *Civilization and its Discontents* when he uses psychoanalysis to investigate "the common man and his religion – the only religion which ought to bear that name"(Freud 1930/1961). Aiming at the average and the common, Freud dismisses the possibility that studying the idiosyncratic experiences of the "*un*common man" (or woman) might reveal new dimensions of religious phenomenology, with unfortunate results for his theory of religion. To avoid a similar fate I suggest Atran, Norenzayan, and other like-minded researchers consider expanding their focus and examining more carefully the rare, unusual, and extraordinary dimensions of religious experience – *not* as the best or only way to study religion (as William James proposes in *The Varieties of Religious Experience;* James 1958), but rather as a necessary complement to current research on so-called ordinary religion.

Culture matters more than ever. Although A&N's primary goal is to abstract the "pancultural foundations of religion," they acknowledge that *actual* human cultures work to stimulate and manipulate our species' innate psychological dispositions in a huge variety of different ways. Nothing more is said about this in the article, but I hope the cognitive science of religion will in the future move more boldly into the study of cultural variability. More than anything (and as an extension of my first suggestion), I encourage researchers to consider not only the lowest common denominators found in all cultures everywhere, but also to investigate the ways in which each particular culture has developed its own creative synthesis and novel elaboration of those evolved cognitive capacities. Identifying the psychological building blocks of religion and culture is a fine achievement. An even greater achievement would be shedding new light on what humans have created with those building blocks.

Theists need not despair, atheists ought not celebrate. A&N's article is commendably free of either pro- or anti-religious polemics. Still, their work is a contribution to an ongoing and often rancorous social conversation about the relationship between religion and science, and researchers in this area can benefit from a greater historical familiarity with this conversation (which reaches back at least as far as Darwin, who agonized over the religious implications of his evolutionary theory). To my mind, James's approach in *The Varieties* remains the most reasonable one to adopt. He says that while scientific psychology can tell us