Commentary

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The Coexistence Problem in Psychology, Anthropology, and Evolutionary Theory

Commentary on Evans & Lane, Harris, Legare & Visala, and Subbotsky

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The coexistence of natural and supernatural explanation in social discourse has long been puzzled over by anthropologists. The arguments advanced in this special issue of *Human Development* augment earlier anthropological discussions with sharpened hypotheses and rigorous forms of experimental support. But they also overlook some of the most compelling findings of the anthropological literature, which collectively suggest that natural and supernatural explanations are the outcomes of quite distinct cognitive orientations: one concerned with understanding and managing *physical-causal relations* in a mechanistic fashion, and the other concerned with understanding and managing *social relations* in a normative and deferential fashion. Natural and supernatural explanations deploy these orientations in markedly different ways with different but complementary consequences.

Psychological and Intellectualist Perspectives on the Coexistence Problem

In the Trobriand Islands of the Western Pacific, where Bronislaw Malinowski pioneered the ethnographic method, seafaring activities more readily made appeal to magical rituals than horticultural pursuits. According to Malinowski [1935, 1945] and Homans [1941], the explanation lay in perceived risk and uncertainty. On the whole, Trobrianders could be fairly confident that if they planted a sufficient volume of root vegetables and other crops in their fertile soils, they would generally be assured of adequate harvests. But efforts to exploit marine resources and to engage in trade with more distant islands were fraught with dangers and presented highly un-

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predictable outcomes. Lives were often lost at sea in unforeseen tempests; the locations of shoals of fish were hard to predict; the cooperativeness of exchange partners in foreign lands was difficult to ensure. In the absence of more pragmatic methods of reducing risk, Trobrianders turned to magic. Much subsequent experimental research has lent credence to the view that magical thinking may be triggered by perceived risk [Case, Fitness, Cairns, & Stevenson, 2004; Felson & Gmelch, 1979; Rudski & Edwards, 2007; Womack, 1992; Wright & Erdal, 2008], whether this takes the form of lucky charms and mascots used by athletes and their fans [Bleak & Frederick, 1998; Burger & Lynn, 2005; Gmelch, 1971, 1992], the superstitions of gamblers [Bersabe & Martínez Arias, 2000], or prayers and incantations in the shadow of warfare and terrorism [Sosis, 2007].

While this line of research has helped us recognize the triggers for supernatural wish fulfillment, it fails to explain why such an avenue for explanation and control presents itself in the first place. The contributors to this special issue have conducted important research on this topic, by investigating the role of early-developing intuitive beliefs in the formation of supernatural explanations. Whether we are talking about magical thinking in general [Legare & Visala, this issue; Subbotsky, this issue] or a more circumscribed set of concepts concerning the origins of the natural world [Evans & Lane, this issue], there is growing evidence that supernatural explanations often have intuitive foundations that cannot be entirely 'educated out' of us and in some environments are, on the contrary, heavily reinforced by salient cultural content [Barrett, 2011; McCauley, 2011]. Interestingly, Harris's [this issue] contribution has bucked this trend, at least with respect to the development of afterlife beliefs. It has been argued that young children are prone to assume that beliefs, memories, and desires persist after the physical body expires [Bering, 2006; Bering & Bjorklund, 2004]. This natural tendency is thought to be muted by a secular education and exacerbated in cultures where spirits of the dead (ghosts, ancestors, etc.) figure prominently in everyday discourse and ritual [Barrett, 2004; Boyer, 2001]. Harris and his colleagues have produced evidence to the contrary [Astuti, 2007; Astuti & Harris, 2008; Harris & Giménez, 2005], and it will be interesting to see how the debate unfolds. Nevertheless, at least some aspects of supernatural explanation would seem to be supported by implicit reasoning, whether this is best understood following Subbotsky [this issue] as a kind of subconscious 'psychological energy' or as a set of fast, intuitive, nonreflective beliefs generated by specialized, domain-specific cognitive architecture, as Evans and Lane [this issue] would argue.

In the anthropology of religion, another line of thinking, commonly labeled the 'intellectualist' perspective, views supernatural explanation as an effort to make sense of the world, and in this respect comparable to, or at least capable of complementing and augmenting, various forms of natural explanation. For instance, Evans-Pritchard argued that supernatural explanations commonly address questions that more rational or scientific frameworks do not and so are not competing for the same explanatory turf. To illustrate his point, Evans-Pritchard [1937] described a tragic but all too common event among the Azande of Southern Sudan, whereby the supports of a granary gave way killing the people sitting in its shade. The Azande typically attributed all misfortunes to witchcraft and the deaths on this occasion were no exception. When Evans-Prichard pointed out that the supports of the granary had been eaten away by termites, severely weakening the structure, the Azande heartily agreed. But this, they argued, was only the physical cause of the tragedy. The gra-

nary could have collapsed at any time but to explain why this happened at the precise moment those particular people were sitting there required a further explanation: witchcraft. For the Azande, Evans-Pritchard maintained, natural and supernatural accounts coexisted without contradiction.

In anthropology, then, psychological and intellectualist perspectives on the coexistence of natural and supernatural explanations have a long pedigree, and they accord closely with the theoretical approaches adopted in this special issue. But there is a third perspective that has been much more influential still in anthropological thinking, a perspective that is largely lacking in the papers assembled here. This missing element concerns the *social* causes and consequences of explanatory strategies.

For the contributors to this special issue, it would seem that the coexistence of natural and supernatural explanation is puzzling because it seems irrational – a problem that needs to be resolved, for instance, by positing different levels of processing or reasoning. But what if supernatural explanation were not so much a failure of natural explanation as an altogether different *kind* of discourse? What if it were a kind of discourse that dispensed with the very notion of ordinary causation – a kind of explanation that is not just causally opaque but irretrievably so?

Natural and Supernatural Explanations as Outcomes of Distinct Learning Systems

Much of the cultural knowledge we acquire in the course of socialization is causally opaque. Some of the things we learn, such as how to drive a car, entail forms of opacity that are in principle resolvable. We know that the clutch must be engaged before we can safely shift gear without necessarily knowing precisely how the clutch plates and gearbox contribute to the process. But we assume that we could learn how it works if we had to. At the very least, we assume that mechanics know how the car works and will rationally apply their expert understanding of the car's components and their functions so that they can fix them when they break. But other things we learn are causally opaque in a more decisive sense, such that it would not be sensible or appropriate to expect there to be a physical-causal rationale for the procedures adopted [Humphrey & Laidlaw, 1994; Sorensen, 2007; Staal, 1989; Whitehouse, 1992, 1995, 2000, 2004]. Much of culture including social etiquette, religious dogma, clothing fashions, and even the rules of childhood games are causally opaque in this much stronger sense. This kind of opacity is crucial to understanding supernatural explanation and so warrants a little further consideration here.

When we copy other people without fully understanding why they are acting in a particular way, we have to decide, if only implicitly, whether to adopt a mechanistic perspective (i.e., this behavior is intended to bring about some end goal in a rational fashion) or a normative/social perspective (i.e., this is the proper way to do it, but for social rather than instrumental reasons). Psychologists studying imitation like to tell a quaint but instructive story about 'Sylvia's recipe' that conveys this point admirably [Gergely & Csibra, 2006].

Sylvia, an accomplished scientist, had a distinctive way of roasting ham. She cut off both ends of the joint before placing it in the oven. She had learned this technique at her mother's knee, never questioning it. Many years later, Sylvia prepared this dish

while her elderly mother was visiting. Observing Sylvia's technique in astonishment, the mother asked her what she was doing. It turned out that when Sylvia was a child the family roasting tin was too small to accommodate an average joint of ham and that is why her mother cut off the ends. The young Sylvia observing her mother may have assumed that the removal of the ends of the joint had some physical-causal rationale (e.g., to allow the juices of the meat to flow out) even if that instrumental purpose was known only to more experienced cooks. But it is equally possible that Sylvia adopted a normative, noninstrumental understanding of the procedure, prioritizing *social* meanings and functions inadmissible from a teleological perspective. Perhaps this method of preparing meat was the 'posh' way of doing it, displaying the sophistication and discernment of the cook. Perhaps it was a clue to Sylvia's ethnic origins, via traditions passed down by her mother. One could equally imagine a cultural milieu in which Sylvia's recipe was accorded a supernatural function, for instance to release the spirit of the animal that has given its flesh. But whenever a normative perspective is activated, there is also a further, if rather baffling, possibility: that nobody knows why meat should be prepared in this peculiar fashion – it simply *should*.

Recent psychological research suggests that 'overimitation' (the copying of causally opaque behavior), if not unique to our species, plays a far greater role in human learning as compared with other primates [Horner & Whiten, 2005]. Yet very little is known about the processes by which children come to recognize that in some cases actions are best understood in terms of mechanistic reasoning whereas other times they are not, being simply a matter of stipulation. Historically, developmental psychologists have tended to regard children as little scientists, exploring the affordances of their environments by testing more or less explicit hypotheses [Gopnik, 2000; Piaget, 1928]. Even the imitation of causally opaque behavior tends to be interpreted within this general framework. If children copy superfluous or irrelevant actions in attempting to reproduce a demonstrated end goal, psychologists typically infer that this is because children overattribute causal efficacy to the redundant elements [Lyons, Young, & Keil, 2007], perhaps assuming that the model must have a good reason for behaving in this strange way (however opaque to the observer) and can be trusted not to transmit useless information [Tomasello, 2009]. Maybe this is how Sylvia came to adopt her mother's method of roasting ham. But there is another possibility, more in accordance with the view from social anthropology, namely that humans are especially predisposed to copy behavior that is *in principle* inexplicable by means of teleological reasoning in the expectation that it serves social rather than technical goals [Legare & Whitehouse, in preparation]. This brings us back to the coexistence problem.

According to the social anthropologist Robin Horton [1993], African divination, like biomedical science, sets out to explain the causes of various diseases. But whereas scientists seek to discover the physical-causal effects of microscopic entities, such as viruses, parasites, and proteins, diviners understand the causes of illness in terms of a few types of human failing, such as jealousy, adultery, or the breach of taboos. According to Horton, the theories of scientists and diviners are cast in qualitatively different explanatory frameworks: the framework of the scientist is mechanistic, concerned with theoretical entities (like viruses) that cannot think or feel; the framework of the diviner is social, concerned with theoretical entities (like gods, ancestors, and other spirits) that act more like people.

Natural and supernatural explanations seem to result from quite distinct strategies for understanding causally opaque behavior. Insofar as we are ready to learn technically efficacious procedures even when their causal structure is unclear, we may adopt a 'copy all, correct later' strategy of learning, producing overimitation that is rapidly supplanted by goal emulation as trial and error reveals what is really necessary to accomplish desired outcomes and what is merely superfluous [Whiten, McGuigan, Marshall-Pescinil, & Hopper, 2009]. And yet we must *also* be ready to acquire technically unnecessary but socially salient information, such as the random signifiers of a language, the arbitrary identity markers of a group, and the norms of politeness towards social superiors. Arbitrary conventions of this kind once learned tend to stick, but not because their causal rationale has been discovered. Indeed, for the learner to interpret this kind of behavior in terms of physical-causal reasoning would be quite the wrong way to think about it, even ridiculous or subversive.

The notion of supernatural causation is arguably little more than a post hoc rationalization of irretrievably opaque processes *as if* they were somehow equivalent to events with an intelligible causal structure. On this view, we treat magic as 'like' medicine but know that it is not really the same thing. What crucially distinguishes the two is that magic is premised on an unknowable causal rationale and medicine on a knowable one. When we invoke supernatural causation we are making claims primarily about the normative rather than the mechanical structure of the world, claims that can really only be 'right' in a moral rather than an epistemological sense. These two forms of explanation have distinct functions – and this may provide the key to a fuller understanding of their coexistence.

The Coexistence Problem in an Evolutionary Frame

Supernatural thinking does not arise and persist in cultural systems simply because it helps us feel better, or more in control, or even because it is anchored in maturationally natural intuitions. Nor can it be understood purely as an expression of our curious engagement with the world or thirst for comprehension. These psychological and intellectualist considerations at best only partially account for supernatural reasoning. They cannot explain why some populations, like the Azande, routinely invoke supernatural causation whereas educated nontheists in the studies reported by Subbotsky [this issue] are loath to entertain supernatural explanations of any kind. Anthropologists have tried to explain this kind of variability in functionalist terms: armed with a sufficiently detailed understanding of the complex sociocultural systems in which supernatural explanations are invoked, we can show how such explanations contribute to the stable reproduction of those systems.

In addition to his interest in psychological explanations for magical thinking, Malinowski was greatly intrigued by the role played by seemingly outlandish supernatural beliefs in the reproduction of social institutions. To take one example, the Trobriand islanders adamantly insisted that human pregnancies were not caused by insemination via sexual intercourse but by the entry of 'spirit babies' into women's wombs when they bathed in the sea. Penetrative sex might 'open the way' to this more mystical process of impregnation (much as termites prepared the Zande granary for

collapse) but the physical and spiritual substance of the fetus owed nothing to paternal semen. Malinowski [1929] explained the presence of this belief in terms of its role in maintaining the integrity of corporate groups. Membership of land-owning corporations in the Trobriands was based on descent through the female line (the principle of *matriliny*) and marriages were not permitted within the group (the principle of *exogamy*). Consequently, brothers and sisters belonged to the same group; husbands and wives did not. A man's natural heirs were his sisters' children and not his own. The temptation for men to favor their own children over nephews was counteracted by the magical theory of conception, according to which a man's children are not really his own at all. The supernatural explanation for pregnancy was not well supported by observation or indeed by emotion and intuition – quite the contrary. Yet it served a social function of great importance and from the perspective of ultimate causation that is why it became culturally embedded. Functionalist anthropology accounted for a vast array of supernatural beliefs in this fashion, based on evidence from countless societies. To give just one further example, people like the Azande who blamed everything on witchcraft were shown preferentially to accuse certain categories of adversary: persons too closely related to prosecute formally and yet too distantly related to kiss and make up. Thus, the alleged function of witchcraft beliefs was to regulate conflict in ways that would otherwise have led to the dissolution of cooperation, destroying the very fabric of Zande society [Evans-Pritchard, 1937].

Most social anthropologists nowadays have abandoned the functionalist approach on the grounds that some social institutions (e.g., culturally distributed supernatural beliefs) appear to be dysfunctional and functionalism can convey the false impression that traditional societies are incapable of changing unless disrupted by some external force, such as colonization or invasion [Goldschmidt, 1996]. These objections throw the baby out with the bathwater, however. The evidence gathered in support of functionalism was very substantial and the fact that it does not explain everything all the time is hardly a good reason for abandoning it. A more serious criticism, perhaps, is that functionalists did not have an adequate theory of how and why certain institutions acquired their functional properties. But the problem rapidly evaporates when we reconsider the above arguments in an evolutionary framework.

Cultural evolution is governed by many of the same fundamental principles as biological evolution [Mesoudi, 2007], except that inheritance is by learning (rather than by genes), selection by consequences for cultural traits tends to be rapid, adaptive cultural mutations arise frequently (often as a result of deliberate innovation), and prior cultural forms are only loosely constraining (cultural revolutions do sometimes happen). Nevertheless, the study of how strategies of supernatural explanation affect the survival of cultural groups can be understood in the same basic terms that any evolutionary biologist would recognize [Wilson, 2002]. Specifically, we need to understand how changing features of a given group's ecology and resourcing needs might make the adoption of particular beliefs *adaptive* (by contributing to group survival and reproduction over time), allowing also for the possibility of drift (random factors contributing to the belief's persistence), and phylogeny (the constraints imposed by preexisting cultural beliefs).

Over the past decade particularly, there has been much debate about the adaptiveness of particular forms of supernatural explanation both from a 'gene's eye'

point of view in cognitive evolution and (more importantly for our present purposes) in the evolution of cultural groups. To take one example, the postulation of omniscient moralizing gods with the power to mete out punishments and rewards is much more common in large-scale societies than in smaller ones [Johnson, 2005]. God concepts of this kind might serve a particularly important policing function in dense populations where temptations to cheat, defect, and free ride under the cloak of anonymity are particularly acute. Moreover, the presence of costly and hard-to-fake displays of devotion to powerful moralizing gods could give groups possessing this trait an edge in competition with other groups lacking such markers, for instance where groups jostle for a privileged share of a commercial market and its trading networks. Although a comprehensive account of the evolution of supernatural explanations in cultural systems is a long way off, the general approach is now well established [Bulbulia et al., 2008]. As this work gathers momentum, it should be possible to address the 'coexistence puzzle' in a way that combines proximate and ultimate levels of causation, just as a synthesis of explanatory levels is increasingly proving to be possible in evolutionary biology [Pigliucci & Muller, 2010].

Conclusions

In addressing the coexistence problem the contributors to this special issue of *Human Development* echoed many of the concerns raised by psychological and intellectualist perspectives in the anthropology of religion. Neglected, however, is a more dominant strand of anthropological thinking pointing to the different *functions* of natural and supernatural explanation in social discourse.

In the course of our species' evolution, cognitive specializations have arisen to support technological and social learning in rather different ways. The unique – or at least uniquely exaggerated – human propensity for overimitation can be prompted by quite different orientations to the behavior being transmitted: the one instrumental and collaborative, the other deferential and affiliative. Supernatural explanation might best be understood as a byproduct of these cognitive adaptations, combining as it does the goal-orientedness of an instrumental stance with the irretrievable opacity of a normative stance. It seems likely that other proximate mechanisms narrow the field of possibilities for candidate supernatural explanations: those chiming well with our implicit intuitive beliefs (e.g., in ways suggested by several contributors to this special issue) enjoying a selective advantage in cultural transmission [Barrett, 2004; Boyer, 2001; Whitehouse, 2004]. In the course of cultural evolution, however, the social functions of supernatural explanation have themselves become subject to selection by consequences, giving rise to a great diversity of manifestations of the coexistence problem. A fuller understanding of this topic requires attention to both ultimate and proximate causes operating at the level of cultural groups as well as individuals' minds. This will be accomplished most effectively by *combining* the theories, methods, and findings of psychological, anthropological, and evolutionary sciences.

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