

The cognitive science of religion

Justin L. Barrett and Emily Reed Burdett look at the psychology behind religious experience and belief

The cognitive science of religion (CSR) is a scientific approach to the study of religion that combines methods and theory from cognitive, developmental and evolutionary psychology with the sorts of questions that animate anthropologists and historians of religion. Specifically, CSR explores causal explanations of religious phenomena (thoughts, ideas, practices and experiences) across peoples and populations. It asks 'How does ordinary human psychology inform and constrain religious expression?' Four current prominent topics in CSR are introduced here: teleological reasoning about the natural world; children's acquisition of God concepts; 'minimal counterintuitiveness theory'; and religion and prosociality.

question

What are the current key areas of research in the field of cognitive science of religion?

resources

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Why is religion so common around the world? Why do some religious ideas and practices out-compete others? Why do religious practices take on common characteristics across cultures, and how deeply imbedded in human history and nature is religion? The cognitive science of religion (CSR) tackles questions such as these, attempting to understand the reasons for initial acquisition, recurrence, and continued transmission of religious concepts and behaviour.

Psychologists – particularly scientific psychologists – have the training and tools to address such issues, providing an empirically solid bridge to connect socio-cultural theorising on one side with biological and evolutionary theorising on the other (see Barrett, 2007b; Gibson & Barrett, 2007). In recent years a number of empirical reports relevant to theories in CSR have appeared, providing a welcome move away from the area's increasingly tenuous and speculative theorising. In this brief article, we review this research with an emphasis on experimental studies and an eye toward what is needed next.

Teleological reasoning about the natural world

In a series of experiments, Deborah Kelemen and her collaborators have demonstrated that from the pre-school years children – American and British at least – have propensities to see things in the natural world as purposefully designed. Because of this 'teleological bias', Kelemen suggests that children may

be particularly receptive to the idea of a creator deity (Kelemen, 2004). In addition to continuing research with children, Kelemen has begun exploring whether this teleological bias persists into adulthood.

Casler and Kelemen (2007) carried out a study with American and Romanian Roma adults and American schoolchildren participants. They presented the children with realistic drawings of scenes that included unfamiliar animals, and then asked them about both the animals and the surrounding natural features. For instance, the drawing might show an animal surrounded by pointed rocks. The children would be asked why the animal had smooth skin or long necks, but also 'Why do you think the rocks were pointy?' There were two response options and the children were asked to select the one that 'made the most sense'. One option was always a mechanistic/physical explanation (e.g. 'They were pointy because little bits of stuff got piled up on top of one another for a long time') and one was a purposeful/functional explanation (e.g. 'They were pointy so that animals wouldn't sit on them and smash them'). Romanian Roma adults with little formal schooling (less than six years on average) were more than twice as likely to endorse purposeful answers than highly educated Roma adults (averaging approximately 12 years of schooling). They also more closely resembled American schoolchildren (first through fourth grades) than either highly educated Romanian adults or American adults. These results suggest that the tendency toward extending teleological reasoning from living to non-living natural things may recur across cultures, and that it is not merely outgrown but must be out-educated for it to go away.

More recently, Kelemen and Rosset (2009) provided experimental evidence that, under conditions of high cognitive demand, even science-educated adults show signs of scientifically inappropriate teleological reasoning. They presented American university science students with explanations for various natural

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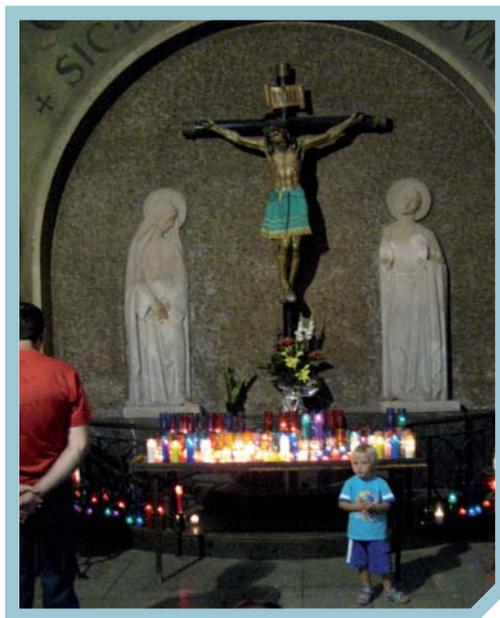
phenomena under one of three conditions: unsped, moderate (5000ms of presentation), and fast (3200ms of presentation). Participants in the speeded conditions – particularly the fast condition – endorsed markedly more purposeful explanations than those in the unsped condition. It appears that cognitive resources are needed to override a bias toward explaining the natural world in a teleological manner.

These intriguing findings would certainly be strengthened by replications with additional stimuli sets, alternative methods, and with different cultural populations. As they stand, they suggest one possible cognitive reason for the culturally widespread existence of religious beliefs in deities that either order or create the natural world: such ideas resonate with an early developing and persistent intuition that the natural world looks purposefully designed. Positing a designer (or designers) fits with our intuitions.

Children's acquisition of god concepts

Piaget (1929) proposed that, until around age eight, children reason from an anthropomorphic viewpoint, and see God as the 'man in the sky'. This view was largely accepted until a series of studies suggested that not only can children reason about God non-anthropomorphically, but they may do so from as early three years old (Barrett et al., 2001, 2003; Knight et al., 2004). These studies used 'false belief tasks' and other methods derived from cognitive developmental research on theory of mind – how we reason about others' mental states. For instance, children who had been shown that a biscuit packet actually contained stones were asked whether adult human beings and God

would know what was in the packet or be fooled by appearances. Three-year-olds easily attributed super-knowing to both God and human beings. Sometime



Children can reason about God non-anthropomorphically from as early as three years old

between ages four and five children appear to stop attributing super-knowing abilities to humans; children of this age realised and enjoyed the fact that 'Mommy can be fooled' but persisted in the belief that God knows the true contents. They distinguished God-cognition from human-cognition.

Using a similar false-belief task, Knight (2008) showed Yukatek Maya children, aged four to eight years, a *ho'ma* (a dried-out gourd conventionally used to hold tortillas). Instead of the assumed tortillas, underpants were revealed to be inside the gourd. Children were asked if various

native animals, a human puppet and various supernatural agents (e.g. the Catholic God, the Sun God, the forest spirits, and the ChiiChi – spirits often invoked by parents to children who misbehave) would know what was found in the *ho'ma*. Similar to past studies, (Barrett et al., 2001; Knight et al., 2004) children did not use an anthropomorphic approach to reason about God, but said that God would know what was in the *ho'ma*. Children who did not pass the test (i.e. did not understand that humans could not know the true contents), tended to attribute super-knowledge to all agents, including natural and super-natural ones. Children who passed the false belief task, however, differentiated the various supernatural entities. Though only four to seven years old, they approximated adult perspectives of the various agents, reasoning that the Catholic God would know what was in the *ho'ma*, the Sun God and the forest spirits were next most likely to know, and all three of these knew better than the fallible ChiiChi, humans, and animals. These children could differentiate various agents in this task as soon as they understood false beliefs, but before this threshold, treated all agents like God.

Other research has called some of these conclusions into question. Recent studies suggest that instead of being biased to attribute super-knowledge, very young children – at least at certain points in development – instead simply adopt an egocentric approach: whatever the child knows she assumes all other agents know as well (Makris & Pneumatikos, 2007). At this point it is unclear whether the differences in findings between studies are due to differences in study design or differences in the population studied. More careful examination of different populations and religious traditions –

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perhaps especially Islam, Judaism and other traditions that lack an anthropomorphic incarnation – would be especially welcome.

Minimal counterintuitiveness theory

At stake in these child development studies is just how ‘intuitive’ religious thought is. ‘Intuitive’ here relates to how readily ordinary cognitive systems can represent these ideas. If an idea is readily represented, it is more likely to be generated and more likely to be communicated, accounting for the prevalence of that idea.

The research reported above represents a growing body of work suggesting that many religious ideas are largely intuitive. One prominent contributor to CSR, Pascal Boyer, has argued that ideas that are mostly intuitive but have just a little tweak or two are the best candidates for transmission (Boyer, 1994, 2001). An example would be a carpet that behaves in all respects like a normal carpet, except that it can fly. Such ideas combine the processing ease and efficiency of intuitive ideas with just enough novelty to command attention, and hence receive deeper processing. This has come to be known as the ‘minimal counterintuitiveness’ (MCI) theory, and has received a fair amount of empirical attention since 2001 (Barrett & Nyhof, 2001; Boyer & Ramble, 2001).

Though initial studies appeared to demonstrate that slightly counterintuitive ideas are remembered more readily than both wholly intuitive ones and more radically counterintuitive ones, subsequent studies provided more mixed results. One of us has suggested that these alleged ‘failures to replicate’ were the result of ambiguities in how to operationalise counterintuitiveness (Barrett, 2008). To address this problem, Barrett developed a formal scheme for coding and quantifying counterintuitive concepts, and then demonstrated the utility of this scheme in analysing folktales from around the world (Barrett et al., 2009). True to Boyer’s

predictions, when these tales – the products of oral traditions – had counterintuitive objects in them, they were always minimally counterintuitive.

The first published experimental study using Barrett’s coding scheme did not yield simple confirming or disconfirming evidence (Gregory & Barrett, 2009): in a recall task using decontextualised MCI items (e.g. ‘a fly that is immortal’) and control items, participants under 25 years old did remember MCI items significantly better than intuitive items. But those over 25 years remembered MCI items significantly worse than intuitive items. Taken with previous research, these results point to at least three possible explanations:

- I It may be that once extracted from a narrative context, MCI concepts are not readily remembered because they require more elaboration than ordinary concepts.
- I The early findings that MCI ideas are more easily remembered may be entirely dependent upon their ready ability to generate meaningful thoughts, explanations, and predictions – their ‘inferential potential’ (Boyer, 2001).
- I It may be that Boyer’s hypothesised transmission advantage for MCI concepts interacts with age.

Religion and prosociality

Some cognitive scientists of religion suggest that once religious ideas and practices emerged in human groups, they endowed these religious folk with survival and reproductive advantages over non-religious competitors. That is, religious practices are thought to be adaptive, and this adaptiveness would have encouraged their persistence (either through genetic selection, cultural selection, or gene–culture co-evolution dynamics). A common thread of these arguments is that religious ideas and practices somehow yield communities of people that are more cooperative or prosocial than they would be otherwise.

Correlational evidence of various sorts has been produced in support of this thesis, but recently experimental evidence has appeared that offers some support for these accounts.

Using a sample of Belgian psychology students, Pichon et al. (2007) found that an act of prosocial intention was increased by subliminal priming with positive-valence religion-related words. Participants completed a lexical decision task – they had to decide whether a briefly presented string of letters was a word or not. Just before each string of words, participants were presented with one of a number of words from one of four categories: religion-related with positive valence (e.g. *heaven, praise*); religion-related with neutral valence (e.g. *mitre, altar*); not religion-related with positive valence (e.g. *freedom, smile*); and not religion-related with neutral valence (e.g. *shirt, banana*). Subsequent to the lexical decision task, as the participants were leaving the laboratory, they were told that they could take some publicity pamphlets for a charity organisation to ‘increase sensitivity’ to the organisation’s mission. Participants who had been primed with positive religion-related words took the most pamphlets, and significantly more than those who had been exposed to the other three classes of words (who did not differ among themselves). In this context, priming of positive religion-related ideas was sufficient to produce prosocial behavioural change. With a similar sample and priming procedure, Saroglou et al. (2009) documented a connection between religion-related primes and a forgiving attitude to an unseen harsh critic.

Taking charity pamphlets or adopting a



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forgiving attitude reflect goodwill to others but arguably, neither bears any direct cost to the self. Shariff and Norenzayan (2007), however, presented Canadian participants with the opportunity to decide how much money (out of \$10 Canadian) to share with an anonymous other and how much to keep. Participants' attention to religious ideas was activated by an explicit priming task. The task involved being presented with groups of five words in scrambled order and being asked to rearrange the order of the words and drop one to form a new sentence. In the religion-prime condition, half of the word groups

religiosity bear these prosocial marks. It may also be that forgiveness, generosity, and so on, apply only to members of one's own social group and not outgroup members.

Conclusion

Findings and theory from CSR are sometimes used as part of an argument against the truth or justification of religious belief (Dawkins, 2006; Dennett, 2006). We find no reason to draw such eliminativist conclusions (Barrett, 2007a; Schloss & Murray, 2009). Perhaps such evidence could even be used as part of an argument affirming a divinely implanted receptivity to the transcendent. Whether any given religious beliefs are true or false, helpful or harmful, to be realised and successfully transmitted they must enjoy some support by human cognitive systems. Here, we are only concerned with the latest published evidence relevant to just how well

ideas are supported by cognition key religious ideas are.

The literature reviewed in this article does not represent the only recently published or ongoing research relevant to CSR, but it does illustrate the growth of empirical activity in this area. Further, this research adds to our understanding of the state-of-the art in diverse ways. Research concerning teleological reasoning about the natural world affirms and extends Kelemen's earlier argument. Not only might such a teleological bias occur across cultures, it also appears to extend into adulthood. If so, these early developing biases may continue to anchor reasoning about the world and lend support to theologies that include gods that bring about natural states of affairs. Research on children's acquisition of god concepts complicates rather than affirms previous research. Though young children clearly do reason about gods and people differently, the claim that children are

biased to over-ascribe super-knowledge is in need of more disambiguation. It may be that god concepts are not wholly intuitive but only 'minimally counterintuitive'. If so, they would still be predicted to have a transmission advantage over radically counterintuitive ideas and wholly intuitive ones – or would they? More research is needed. Finally, experimental evidence is beginning to demonstrate that even subliminal priming of religion-related ideas may tilt people toward prosocial action.

Several important areas of theoretical development in CSR have received little or no new psychological empirical treatment in recent years. For instance, Stewart Guthrie's argument that an evolved system for detecting human-like intentional agency in our environments may encourage belief in gods (Guthrie, 1993), has been under-studied. Certainly humans do possess some kind of functional system that readily detects intentional agents given scant or ambiguous inputs under some conditions (Scholl & Tremoulet, 2000). This Hypersensitive Agency Detection Device (HADD), as one of us has dubbed it (Barrett, 2004), appears to emerge already in infancy (Rochat et al., 1997). Whether it plays an important role in generating or encouraging the belief in superhuman or supernatural beings, however, has not been satisfactorily demonstrated, let alone whether HADD plays a meaningful part in encouraging belief in the sort of cosmic deities central to many world religions.

The challenge set (Barrett, 2007b) for psychologists to contribute to CSR through empirically testing the reputed mechanisms at play has not gone unmet. Empirical research in this area is beginning to fill the gap between theory and evidence. Nevertheless, the same need persists to solve some old and some new questions: Psychologists, CSR needs you.



included a word related to religion (e.g. spirit, sacred). Across two controlled experiments (one with a student sample and one with a general public sample), religious participants gave significantly more money when they had been primed with religious words, as if being subtly (and perhaps unconsciously) reminded of their religiosity was sufficient to make them more generous.

These three experimental studies represent a new wave in research supporting a causal connection between religious ideas and prosocial behaviour. Naturally, numerous follow-up studies are needed to substantiate the validity of these studies and to address related questions. What aspects of religion (e.g. beliefs, social identification, existential security, moral teachings, ritual participation) encourage prosocial attitudes and actions? What are the limits of this prosociality? For instance, it may be that only particular types of religiosity or particular levels of



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