This article was downloaded by: [KU Leuven University Library]
On: 15 December 2012, At: 02:12
Publisher: Routledge
Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK

International Journal for the Psychology of Religion

Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/hjpr20

Religious Concepts as Structured Imagination

Helen De Cruz [a]

[a] Faculty of Philosophy, University of Oxford, United Kingdom

[b] Centre for Logic and Analytic Philosophy, Catholic University of Leuven, Belgium

Accepted author version posted online: 23 Oct 2012.Version of record first published: 14 Dec 2012.

To cite this article: Helen De Cruz (2013): Religious Concepts as Structured Imagination, International Journal for the Psychology of Religion, 23:1, 63-74

To link to this article: http://dx.doi.org/10.1080/10508619.2013.735495

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: http://www.tandfonline.com/page/terms-and-conditions

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae, and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand, or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

The International Journal for the Psychology of Religion, 23:63–74, 2013
Copyright © Taylor & Francis Group, LLC
ISSN: 1050-8619 print/1532-7582 online
DOI: 10.1080/10508619.2013.735495

Routledge
Taylor & Francis Group

Downloaded by [KU Leuven University Library] at 02:12 15 December 2012

Religious Concepts as Structured Imagination

Helen De Cruz
Faculty of Philosophy
University of Oxford, United Kingdom
Centre for Logic and Analytic Philosophy
Catholic University of Leuven, Belgium

What cognitive processes underlie the generation of religious concepts? This study investigates the creative processes involved in religious concept formation from the perspective of structured imagination. It examines whether the generation of novel religious entities is structured by universal features of human cognition that are hypothesized in the cognitive science of religion literature, in particular regarding the degree to which religious beings are anthropomorphic, their level of counterintuitiveness, and their moral character. In this study, participants freely imagined and described aliens and alien religious beings. Results suggest that spontaneously imagined religious beings are perceived as less anthropomorphic than aliens, that aliens are conveyed in more counterintuitive terms than religious beings, and that religious beings are described more frequently in terms of moral properties than aliens.

IMAGINING RELIGIOUS BEINGS

Theories about the nature of religious imagination have an ancient history. The Greek pre-Socratic philosopher Xenophanes (6th century BC) famously speculated that religious imagination is structured by the way we conceptualize human beings:

> If cattle or lions had hands, so as to paint with their hands and produce works of art as men do, they would paint their gods and give them bodies in form like their own—horses like horses, cattle like cattle.

To date, the question of religious creativity remains largely unexplored in the cognitive science of religion (CSR). Most research on religious concepts has focused on the *transmission* of

Correspondence should be sent to Helen De Cruz, Faculty of Philosophy, University of Oxford, Woodstock Road, OX2 6GG Oxford, United Kingdom. E-mail: helen.decruz@hiw.kuleuven.be

religious ideas (e.g., Boyer & Ramble, 2001) rather than on their *generation*; Guthrie's (1993) theoretical work on the role of anthropomorphism in religion is a notable exception. Such studies explore why religious concepts are culturally successful in terms of their memorability. However, cultural transmission is constrained not only by the recall of ideas but also by their emergence. A better understanding of the cognitive constraints that underlie religious imagination may promote new insights into religious cognition. This article aims to examine cognitive processes that underlie the imagination of novel religious concepts.

Because "imagination" is a term with a wide range of common and scientific meanings, I use this term in the restrictive sense of Ward (1994), namely as "the *deliberate* mental generation of some *novel* entity" (p. 2). The experimental design and theoretical background of this study is inspired by Ward's theoretical and experimental work on *structured imagination* (e.g., Ward, 1994; Ward, Patterson, Sifonis, Dodds, & Saunders, 2002; Ward & Sifonis, 1997). These studies indicate that when participants create a new member of a known category, their imagination is structured by properties that are characteristic for this category. In a series of experiments, Ward (1994) showed that when people have to imagine alien creatures, they draw beings that resemble vertebrate animals on Earth, with bilateral symmetry, sense organs such as eyes and ears, and animal-like body parts such as arms or legs. This was even the case when they were explicitly instructed to invent creatures that were widely different from Earth animals (Ward & Sifonis, 1997). Structured imagination was also found in other categories of objects, such as tools or fruits (Ward et al., 2002). These experiments indicate that human creativity is constrained by prior conceptual knowledge.

The present study examines whether structured imagination is also at work in religious concept formation, through a comparison of imagined aliens and alien religious beings. Because this is as yet a poorly researched domain, the study is exploratory in nature. To make informed predictions on how structured imagination influences the generation of religious concepts, I draw on theoretical and empirical work in CSR.

HOW IS RELIGIOUS IMAGINATION STRUCTURED?

CSR examines religious beliefs and behaviors in terms of ordinary thoughts about natural entities. According to scholars working in CSR (e.g., Barrett, 2004), the generation and transmission of religious beliefs is not solely a product of cultural factors but is also influenced by cognitive biases that are cross-culturally present. If this is the case, we can expect the imagination of religious entities to be constrained by these cognitive biases. Indeed, although the diversity of religious concepts across cultures is considerable, some religious ideas are more widespread than others. For example, Boyer (2001) remarked that zombies are less culturally prevalent than ghosts and that no one has come up with gods that exist only on Wednesdays. In what follows, I briefly review CSR theories on the formation of religious concepts to derive testable predictions on the role of stable human cognitive biases in the imagination of religious concepts.

Features of Religious Beings

What do religious entities look like? According to Guthrie (1993), religious beliefs are a by-product of our ability to detect agents, an ability we share with other animals. Because our

Downloaded by [KU Leuven University Library] at 02:12 15 December 2012

agency detection may be hypersensitive, we sometimes may erroneously infer the presence of agents, giving rise to supernatural concepts like ghosts. Guthrie specified that the most important agents in our evolutionary history are other humans. Consequently, he thinks that mental constructions of religious beings are to some extent likely to be anthropomorphic. By contrast, Bloom (2004) argued that humans are intuitive dualists. He contended that humans, from infancy onward, make a distinction between minds and bodies: We reason about other people's actions not in terms of their bodily properties but in terms of invisible mental states, such as beliefs, desires, and intentions. As a result, we can easily imagine disembodied minds. Bloom regards the belief in spirits, gods, and other religious beings as by-products of this intuitive dualism. Hodge (2012) outlined a third position. He claimed that we do not spontaneously imagine religious beings as entirely disembodied or entirely embodied. Rather, because we are more interested in another agent's intentions, desires, and goals than we are in their mundane biological functions, we tend to focus on only those body parts that are relevant for social interactions, such as the face. These three models lead to differing predictions of the features that would be present in spontaneously imagined religious beings. They could be to some extent anthropomorphic (Guthrie), be disembodied minds (Bloom), or have anthropomorphic features that are relevant for social interaction (Hodge). To assess these competing claims, I examine whether imagined religious beings have body parts and sense organs similar to humans, and I compare this with the features of imagined space aliens.

Downloaded by [KU Leuven University Library] at 02:12 15 December 2012

Counterintuitiveness

An influential theory in CSR (e.g., Barrett, 2004; Boyer, 2001) proposes that religious ideas are minimally counterintuitive (MCI). "Counterintuitive" is used in the restrictive sense of "violation of ontological expectations." According to Boyer (2001), humans have cognitive mechanisms that allow them to make inferences about broad categories of objects in the world (ontological categories), such as inanimate objects, plants, animals, and persons. MCI concepts violate these ontological expectations, for example, a chair that walks violates our expectations about inanimate objects. Boyer (2001) argued that such concepts enjoy a high cultural success because they balance on a cognitive optimum: they arouse our attention but still mostly adhere to our category-based expectations. Is MCIness also specific to religious concepts? This seems doubtful, because not all MCI concepts are religious. For example, several studies indicate that the most successful (secular) stories and folktales have MCI elements, such as talking animals or pumpkins turning into carriages (Barrett, Burdett, & Porter, 2009; Norenzayan, Atran, Faulkner, & Schaller, 2006).

Still, MCIness is regarded as a central property of religious concepts. Pyysiäinen, Lindeman, and Honkela (2003) presented Finnish participants with imaginary beliefs with varying levels of counterintuitiveness. They showed that counterintuitive representations in general, and counterintuitive representations involving conscious agents in particular, are more likely to be considered religious. Thus, counterintuitiveness may be an important—if only tacit—part of our folk concept of religion. However, it remains unclear whether religious concepts are MCI when they are first imagined, or whether MCIness is perhaps a result of memory distortion during cultural transmission. Barrett and Nyhof (2001), using a design that simulated cultural transmission, found that people frequently distorted concepts to the effect that they became MCI (e.g., a significant number of participants remembered a bright pink newspaper blown by

the wind as walking or running). This article examines to what extent religious beings exhibit MCIness when they are spontaneously imagined. I also test whether there is a difference in MCIness between spontaneously imagined religious beings and aliens.

Moral Properties

Several theories in CSR (see Schloss & Murray, 2011, for an overview) have argued that religious beings with moral properties are widespread across cultures, because such entities—who can punish or reward behavior—successfully enhance cooperation and altruism within human groups. Adaptationist accounts of religion regard its policing role as psychologically central (e.g., Shariff & Norenzayan, 2007). If religious imagination is indeed structured by stable human intuitions regarding moral, supernatural agents, one can predict that imagining religious beings elicits a higher percentage of moral terms compared to nonreligious entities. I examine whether imagining religious beings elicits more descriptions involving moral properties, such as ethical good and evil, norm violations, and punishments and rewards, than imagining aliens.

To summarize, the present study sought to explore three questions. First, are spontaneously imagined religious beings best characterized as anthropomorphic (Guthrie, 1993), disembodied (Bloom, 2004) or in between, with an emphasis on social interaction (Hodge, 2012)? Second, how counterintuitive are imagined novel "gods"? Finally, is some connection to moral or normative concerns a common feature of imagined supernatural beings?

METHOD

Participants

Undergraduate philosophy students at a Belgian university ($N = 88$, M age $= 22.6$ years, percentage of women $= 45.9\%$) were recruited from several introductory classes in philosophy and participated on a voluntary basis.

Materials and Procedure

Each participant received a questionnaire in Dutch, with two questions, each printed on a separate page. They completed the questionnaire individually in a lecture room. The procedure followed Ward's experiments on structured imagination (e.g., Ward, 1994; Ward et al., 2002) but required written responses instead of drawings. Participants were asked to imagine (a) an alien being that is very different from life-forms on Earth, and (b) a religious, supernatural being in which aliens that are very different from life-forms on Earth believe. The participants were encouraged to be creative but were not informed that the study probed *religious* concept formation. The order of the tasks was reversed in half of the questionnaires to control for possible order effects.

The term "being" (in Dutch *wezen*, literally, "something that is") was used rather than "agent" or "life-form" because the former is neutral with respect to category membership. As the task aimed to probe religious imagination in an unconstrained manner, no limits on word

Downloaded by [KU Leuven University Library] at 02:12 15 December 2012

count were imposed—participants were asked to use as much space as they needed to provide a detailed description of their imagined entities.

Coding

Two independent coders with no prior knowledge of theories in structured imagination or CSR coded the responses for the following items: (a) body parts and sense organs, (b) resemblance between space aliens and religious beings, (c) counterintuitiveness, and (d) presence of terms denoting ethical norms. The coders were instructed not to code the descriptions if they thought the information was insufficient or ambiguous. Disagreements were resolved during intercoder discussion. Where disagreements remained, the items were excluded from the analysis.

1. *Body parts and sense organs*. This coding followed the procedure in Ward (1994). The coders rated each written response for presence of standard Earth animal senses (eyes, ears, nose, and mouth) and appendages (head, hands, arms, feet, legs, tail, wings, fins). Only body parts that were explicitly mentioned were included.
2. *Resemblance between aliens and religious beings.* Coders were asked to check whether a description of an alien religious being *explicitly mentioned* that the religious beings were similar to the aliens; they categorically coded this as either "yes" or "no."
3. *Counterintuitiveness.* Barrett's (2008) coding scheme was used to assess counterintuitiveness of religious and nonreligious imagined items. Briefly stated, the first step of the coding scheme is to assign the item to a basic category (e.g., CHAIR, CLOUD, DOG). On the basis of this, it is placed in one of five high-level ontological categories: *spatial entity* (entities that are not solid with a particular location in space, such as clouds, gasses, light sources), *solid object* (artifacts such as chairs, and natural objects such as stones), *living thing that is not self-propelled* (e.g., plants, lichen, fungi), *self-propelled living thing* (animals), and *person* (entities with intelligence, complex mental states, a personality). Each of these ontological categories is associated with a set of ontological expectations. For example, a *person* has internal mental states, desires, and intentions, but a *living thing that is not self-propelled* or a *solid object* lack these. Next, violations or transfers of ontological expectations are recorded. An example of a transfer is a HAPPY CHAIR, which is a solid object with mentality transferred. An example of a violation is an INVISIBLE CHAIR, a solid object that has a violation in expectations about physicality (we expect solid objects to be visible). Adding the total number of violations and transfers gives a counterintuitiveness score. In the case of a HAPPY, INVISIBLE CHAIR, the counterintuitiveness score is 2. Objects with a counterintuitiveness score of 1 are regarded as cognitively optimal for recollection and transmission (Barrett et al., 2009).
4. *Moral properties.* Both coders examined the descriptions for terms indicating moral properties (e.g., "evil," "good," "wrong," "sinful," "virtuous") and punishment or reward (e.g., "penance," "retribution," "reward"). They were instructed to code the descriptions categorically as either "absent" or "present." Given that the moral character of some words (e.g., "good") depends on the context, coders were encouraged to carefully look at the context to decide whether the description contained moral terms.

Downloaded by [KU Leuven University Library] at 02:12 15 December 2012

RESULTS

Participants produced written descriptions of aliens and alien religious beings in Dutch. The order of tasks (i.e., religious being first or alien first) did not significantly influence the dependent variables being tested. Because of the openness of the design, the descriptions were of variable length. For the aliens, the mean word count was 82.4 (range = 3–445, SD = 67.3); for the religious beings, the count was 65.7 (range = 12–354, SD = 51.9).

Presence of Body Parts

Kendall's Tau-b was used to calculate consistency among coders; concordance between the two coders was high ($\tau = 0.914$). To compare the number of body parts and sense organs, a Wilcoxon signed rank test for related measures was conducted. Participants mentioned significantly more senses and appendages for the aliens ($M = 1.52$, range = 0–17, SD = 2.73) than for the alien religious beings ($M = 0.35$, range = 0–8, $SD = 1.22$), $n = 73$, $z = -4.139$, $p < .001$. Type of being significantly predicted the number of appendages and sense organs controlling for narrative length ($\beta = -.208$), $t(157) = -2.889$, $p = .004$. Example 1 (see the appendix) shows the description of an alien and a religious being by the same participant.

Although body parts and sense organs were not entirely absent from descriptions of the religious beings (Table 1), they were fewer in number than those of the aliens. There was a significantly smaller percentage of descriptions of religious beings (12.9%) that mentioned body parts compared to the aliens (54.3%), $\chi^2(1, 160) = 2.02$, $p < .001$. A post hoc test was conducted to examine to what extent descriptions of beings were explicitly anthropomorphic (i.e., where participants either explicitly mentioned that the beings looked like humans or gave a description of an upright being with a head and eyes at the top). This percentage was relatively low: 11% of the alien religious beings and 19% of the aliens were described as anthropomorphic; this difference was not significant.

TABLE 1
Frequencies of Common Appendages and Sense Organs for the Two Types of Imagined Beings

Appendages and Sense Organs	*Aliens*	*Alien Religious Beings*
Arms	3	0
Legs	9	0
Hands	5	0
Feet	3	0
Eyes	14	7
Ears	2	3
Nose	5	1
Head	17	5
Mouth	9	1
Hair, feathers, fur, scales	7	2

Downloaded by [KU Leuven University Library] at 02:12 15 December 2012

Downloaded by [KU Leuven University Library] at 02:12 15 December 2012

Resemblance Between Aliens and Religious Beings

Coders looked for explicit reference to a resemblance between the aliens and their religious beings. Intercoder agreement was high at $\kappa = 0.905$. Of the 88 descriptions of religious beings, 21 (i.e., 23.9%) explicitly mentioned that the religious beings resembled the aliens (see Example 2, appendix).

Counterintuitiveness

Coders first assigned each item to a basic category (e.g., INSECT) and subsequently to a higher level ontological category (e.g., animal). Intercoder agreement about ontological categories was good ($\kappa = 0.865$). There was a significant difference in category membership between the aliens and the alien religious beings, $\chi^2(4, 140) = 2.81$, $p < .001$. Post hoc tests revealed which differences were driving these effects: Religious beings were significantly more often categorized as spatial entities (50%), such as clouds, flames, and shadows compared to aliens (21.1%), $\chi^2(1, 140) = 11.67$, $p = .001$. Aliens, on the other hand, were more categorized as self-propelled living things (26.3%) compared to the religious beings (6.2%), $\chi^2(1, 140) = 8.4$, $p = .004$ (see Figure 1).

Coders registered violations and transfers of ontological expectations. Intercoder agreement was satisfactory at 74.2% (Kendall tau-b $\tau = 0.715$). Cases in which there was disagreement about ontological category membership were excluded from the analysis; the remaining cases were solved by discussion. In this way, 58 valid pairs of aliens and alien religious beings remained for the analysis. As an illustration of the kinds of items that were generated and their coding, see Examples 3 to 5 (appendix) for beings with differing levels of counterintuitiveness.

None of the participants came up with items that had a counterintuitiveness score higher than 3. The aliens had a significantly higher level of counterintuitiveness ($M = 1.1$, range =

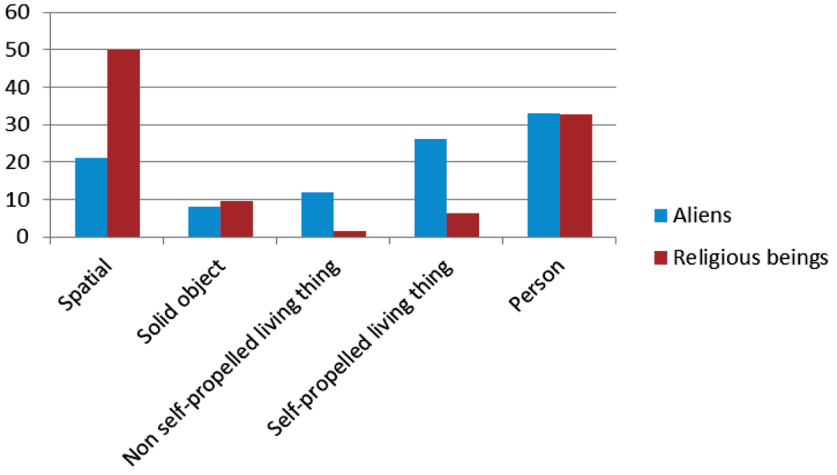

FIGURE 1 Percentages of ontological category use for aliens and alien religious beings (Color figure available online).

0–3, $SD = 0.99$) compared to the alien religious beings ($M = 0.6$, range = 0–3, $SD = 0.89$), Wilcoxon signed rank test for related measures, two-tailed ($n = 59$, $z = -2.593$, $p = .01$). This difference remained significant when controlling for narrative length. Type of being significantly predicted counterintuitiveness when controlling for narrative length ($\beta = -.199$), $t(137) = -2.422$, $p = .017$. Although religious beings had a lower MCI score, this result was still significantly above a test score of 0 (one-sample Wilcoxon signed rank test, $p < .01$).

Moral Properties

Coders examined the descriptions for terms indicating moral properties. Intercoder agreement was excellent at $\kappa = 0.960$. A significantly higher number of descriptions of religious entities (11, 12.5%) mentioned ethical terms compared to those of alien beings (2, 2.27%), $p = .047$, Fisher's exact test, two-tailed. Example 6 (see appendix) provides a description with moral properties.

DISCUSSION

The aim of this study was to gain new insights into religious imagination. The first question focused on the spontaneously imagined religious beings. Were their depictions anthropomorphic (Guthrie, 1993), disembodied (Bloom, 2004), or in between (i.e., with an emphasis on social interaction; Hodge, 2012)? The results do not fall clearly in line with either Guthrie's or Bloom's position: Alien religious beings had fewer body parts than the aliens, but body parts were not entirely absent in the religious beings. Similar to earlier studies (e.g., Ward, 1994), aliens were conceptualized in terms of the properties commonly attributed to Earth creatures, having Earth-like senses and appendages. Aliens were significantly more likely to be conceptualized as animals than the religious beings. On the other hand, the alien "gods" had fewer body parts, and they were more frequently conceptualized as spatial entities such as clouds or flames compared to the aliens (50% of participants saw the alien religious beings as spatial entities, and 32.8% described them as persons, see Figure 1). As Table 1 indicates, eyes were the most commonly mentioned body parts for religious beings and the second most common characteristic for aliens. Guthrie (2002) argued that sensitivity to the presence of eyes, which is present in a wide variety of vertebrates, is central to our recognition of living things. The presence of eyes also corresponds with Boyer's (2001) proposal that the most culturally successful supernatural agents are not just MCI but also have strategic information (i.e., special access to information relevant to social relationships). The following excerpt from a long description (354 words, written by a 20-year-old male student) of an alien religious being provides an illustration of this: "This God would be big and sovereign. He would possess some sort of all-seeing, all-hearing, etc. senses in order to follow everything that goes on." The relatively high degree of abstractness of the imagined religious beings, combined with the overwhelming predominance of facial features (head, eyes) in the religious beings lends tentative support for a more qualified position (as outlined by Hodge, 2012), where the body parts of religious beings are mainly imagined to the extent to which they are relevant to social interactions (the exceptions are two cases where hair is mentioned; in both the hair is a long, gray beard, in line with some popular conceptions of the Christian God). Some participants (23.9%) explicitly wrote that

Downloaded by [KU Leuven University Library] at 02:12 15 December 2012

the alien religious being resembles the alien, indicating that high-level expectations about the resemblance between aliens and religious beings played a role.

The second research question concerned the counterintuitiveness of religious concepts. In agreement with theories in CSR (e.g., Boyer, 2001), religious beings were MCI. However, surprisingly, they were less counterintuitive than the aliens. The latter were in fact closer to the cognitive optimum of 1 (Barrett et al., 2009) than the former. The greater counterintuitiveness of aliens may be due to the fact that in popular culture (e.g., movies, comics) aliens are conceived of as outlandish and remote. Due to their prior exposure to various media, participants may have been more at home with aliens than with alien religious beings, which may have prompted them to make move vivid, counterintuitive descriptions.

The finding that the generated items had a low counterintuitiveness score is an interesting one. It suggests that high levels of counterintuitiveness may not only be demanding when subjects recall MCI concepts but also when they generate them. The descriptions were in principle long enough to allow for highly counterintuitive items. The description of "A cat that can never die, has wings, is made of steel, experiences time backwards, lives underwater, and speaks Russian" (from Barrett & Nyhof, 2001, p. 93) requires 20 words, only about one fourth of the average word count for the alien descriptions, yet has a total counterintuitiveness score of 6. As Barrett and Nyhof (2001) rightly observed, high counterintuitiveness undermines conceptual structure—the creature they mention is hardly a cat. Thus, human conceptual cognition may pose intrinsic limitations on the level of counterintuitiveness of spontaneously generated items. Nevertheless, the results indicate that participants could spontaneously imagine MCI concepts and that they took relatively little time in doing so: Most participants completed this task in about 20 min. Therefore, it would seem that MCI concepts, despite their violations of ontological expectations, are not particularly difficult to generate.

Finally, this study indicates that a significantly higher percentage of descriptions of religious beings mention moral terms. This suggests that people are more likely to spontaneously come up with moral properties when inventing religious beings than when they invent aliens. Although this finding is in line with adaptationist theories in CSR that propose that morality is an important feature of religious concepts, the percentage was still not very high (12.5%), and much lower than one would expect if the primary adaptive (biological or cultural) function of belief in supernatural beings was social regulation. Boyer (2001) argued that being morally interested (an agent who has access to "strategic information" on our morally relevant actions) is not a central property of supernatural beings, but rather an additional selection factor that may further the cultural success of particular agent concepts. The results are thus more in line with Boyer's by-product account than with adaptationist explanations.

Downloaded by [KU Leuven University Library] at 02:12 15 December 2012

CONCLUSION

Religious imagination is largely unchartered territory in CSR and the rest of the psychology of religion. This study has explored to what extent religious imagination is structured according to features predicted by some of the CSR literature. In a sample of western participants, religious beings are imagined as abstract (but not entirely disembodied) entities. Religious beings are MCI, but they are less counterintuitive than imagined aliens. Also, religious beings are more often described in moral terms compared to aliens. The results indicate that features

that are commonly associated with religious beings in the CSR literature, such as minimal counterintuitiveness and moral properties, are not just the result of modifications during cultural transmission but are already present in spontaneously imagined religious beings. An interesting future extension of this research would be to replicate it with participants from different religious traditions to control for the effects of preexisting religious concepts on imagination. For example, one could predict that participants who have more anthropomorphic god concepts, such as Hindus, would mention more body parts when generating novel religious concepts.

The design of this study involved an off-line creative task, in which participants had to explicitly imagine religious concepts. How far can the conclusions drawn from this task be extrapolated to the online reasoning that is characteristic of actual religious concept formation? Quasi-experimental investigations in the domain of engineering (e.g., Jansson, Condoor, & Brock, 1993) and historical case studies of scientific creativity (De Cruz & De Smedt, 2010) show that structured imagination is a pervasive force in creativity under natural conditions as well as in experimental conditions. This study has provided tentative support for the role of structured imagination in religious concept formation.

Downloaded by [KU Leuven University Library] at 02:12 15 December 2012

ACKNOWLEDGMENTS

This study was supported by a grant provided by the Cognition, Religion and Theology Project at the University of Oxford, funded by the John Templeton Foundation. The views expressed here are not necessarily those of the funding institution or the University of Oxford. I gratefully acknowledge support from the organizers of the CRT project in help with designing the study, especially Justin Barrett, Miguel Farias, Tenelle Porter, Emily Burdett, and Emma Cohen. Thanks to Stewart Guthrie and Johan De Smedt for their suggestions on an earlier draft and to three anonymous referees for their helpful suggestions.

REFERENCES

Barrett, J. L. (2004). *Why would anyone believe in God?* Walnut Creek, CA: AltaMira Press.

Barrett, J. L. (2008). Coding and quantifying counterintuitiveness in religious concepts: Theoretical and methodological reflections. *Method and Theory in the Study of Religion*, *20*, 308–338.

Barrett, J. L., Burdett, E. R., & Porter, T. J. (2009). Counterintuitiveness in folktales: Finding the cognitive optimum. *Journal of Cognition and Culture, 9*, 271–287.

Barrett, J. L., & Nyhof, M. A. (2001). Spreading non-natural concepts: The role of intuitive conceptual structures in memory and transmission of cultural materials. *Journal of Cognition and Culture, 1*, 69–100.

Bloom, P. (2004). *Descartes' baby: How the science of child development explains what makes us human.* New York, NY: Basic Books.

Boyer, P. (2001). *Religion explained. The evolutionary origins of religious thought*. New York: Basic Books.

Boyer, P., & Ramble, C. (2001). Cognitive templates for religious concepts: Cross-cultural evidence for recall of counter-intuitive representations. *Cognitive Science, 25*, 535–564.

De Cruz, H., & De Smedt, J. (2010). Science as structured imagination. *Journal of Creative Behavior, 44*, 29–44.

Guthrie, S. E. (1993). *Faces in the clouds. A new theory of religion.* New York, NY: Oxford University Press.

Guthrie, S. E. (2002). Animal animism: Evolutionary roots of religious cognition. In I. Pyysiäinen & V. Anttonen (Eds.), *Current approaches in the cognitive science of religion* (pp. 38–67). London, UK: Continuum.

Hodge, K. M. (2012). Context sensitivity and the folk psychology of souls: Why Bering et al. got the findings they did. In D. Evers, M. Fuller, A. Jackelén & T. Smedes (Eds.), *Is religion natural?* (pp. 49–63). New York, NY: T & T Clark International.

Jansson, D. G., Condoor, S. S., & Brock, H. R. (1993). Cognition in design: Viewing the hidden side of the design process. *Environment and Planning B, 20*, 257–271.

Norenzayan, A., Atran, S., Faulkner, J., & Schaller, M. (2006). Memory and mystery: The cultural selection of minimally counterintuitive narratives. *Cognitive Science, 30*, 531–553.

Pyysiäinen, I., Lindeman, M., & Honkela, T. (2003). Counterintuitiveness as the hallmark of religiosity. *Religion, 33*, 341–355.

Schloss, J. P., & Murray, M. J. (2011). Evolutionary accounts of belief in supernatural punishment: A critical review. *Religion, Brain & Behavior, 1*, 46–66.

Shariff, A. F., & Norenzayan, A. (2007). God is watching you. Priming God concepts increases prosocial behavior in an anonymous economic game. *Psychological Science, 18*, 803–809.

Ward, T. B. (1994). Structured imagination: The role of category structure in exemplar generation. *Cognitive Psychology, 27*, 1–40.

Ward, T. B., Patterson, M. J., Sifonis, C. M., Dodds, R. A., & Saunders, K. N. (2002). The role of graded category structure in imaginative thought. *Memory and Cognition, 30*, 199–216.

Ward, T. B., & Sifonis, C. M. (1997). Task demands and generative thinking: What changes and what remains the same? *Journal of Creative Behavior, 31*, 245–259.

Downloaded by [KU Leuven University Library] at 02:12 15 December 2012

APPENDIX
Example Descriptions

Example 1, written by a 24-year-old male student:

Alien: *torso + head and four legs with duck feet. Body with scales and cold-blooded. Very intelligent. Writes by means of protrusions on its head.*

Alien religious being: *The "upper spirit" elicits visions through shrieks it emits. The aliens write down these visions in clay tablets using the protrusions on their heads.*

Example 2, written by an 18-year-old female student:

Alien religious being: *Often one imagines a supernatural being as a reflection of oneself, so the way the supernatural being looks like is an image of he/she/it.*

Example 3, written by an 18-year-old female student:

Alien religious being: *The aliens worship a kind of stone with a special shape and made out of a very special sort of material. This material is deep red in colour and has sparkles.*

The coders interpreted this as a STONE (corresponding to the ontological category of solid object) with no counterintuitiveness, so its counterintuitiveness score was 0.

Example 4, written by an 18-year-old male student:

Alien: *The being consists entirely of water. It gets its energy through the sun. It needs the energy to harden and not to be blown away by the strong winds. Because it is made of water, it can take on several shapes. But this requires a lot of energy so it only takes on the shapes for a short while. It is neither hungry nor thirsty. It doesn't die either since water evaporates. It is a peaceable people, since fighting and murder are pointless. Usually they live by themselves, but sometimes also in groups.*

The coders interpreted this as a spatial entity with a transfer of animacy (a), because it seems to be able to move by itself (take on different shapes, live in groups). So it was coded ^{a}WATER, with a counterintuitiveness score of 1.

Example 5, written by a 39-year-old male student:

Alien religious being: *The supernatural beings can take the form of mist or fluid. They can time-travel and take on any shape they want, but preferably they remain in their natural state (fluid or mist). They can also be at two places at the same time and only interfere with other beings when their existence is at stake. Although they have been repeatedly observed, their appearance has been misinterpreted as a natural phenomenon.*

The coders interpreted this as a spatial entity with a transfer of animacy (a), and two violations: a violation of spatiality (s) in the ability to be at two places at once, and a violation of universality (u) in the ability for time travel, so it was coded ^{a}MIST^{s+u}, with a counterintuitiveness score of 3.

Example 6, written by an 18-year-old female student:

Alien religious being: *the source of all wisdom and knowledge. Goodness where there is no place for evil.*

Note. All examples are translated from Dutch by the author.

Downloaded by [KU Leuven University Library] at 02:12 15 December 2012