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Cognitive Aspects of Religious Ontologies:

How Brain Processes Constrain Religious Concepts

A cognitive study of religion shares some of its concerns with traditional approaches in cultural anthropology or the history of religion. It aims to explain why and how humans in most cultural groups develop religious ideas and practices, and why these have recurrent and enduring features. By contrast with other approaches, however, a cognitive approach centres on one particular set of factors that influence the emergence and development of religion. The human mind is a complex set of functional capacities that were shaped by natural selection and evolved, not necessarily to build a coherent or true picture of the world and certainly not to answer metaphysical questions, but to solve a series of specific problems to do with survival and reproduction. A crucial aspect of this natural mental make-up is that humans, more than any other species, can acquire vast amounts of information through communication with other members of the species. A cognitive study takes religion as a set of cultural representations, which are acquired by individual minds, stored and communicated to others. It is quite natural to wonder to what extent what humans acquire and transmit is influenced by evolved properties of the mind. Obviously, many other factors influence the spread of cultural representations: economics, ecology, political forces and so on. The point of a cognitive approach is not to deny that there are such factors, but simply to show that, all else being equal, properties of the human mind too have an important influence on some aspects of human cultures.

In this paper I will present some general features of the cognitive study of religious concepts, and then present in detail a framework that emphasizes the role of universal cognitive constraints on the acquisition and representation of religious ontologies. I will then present anthropological and cognitive data that supports the model.

I will conclude with some general methodological consequences of a cognitive approach to religion.

1. Cognitive diversity in religious representations

That we take a cognitive route, influenced by developments in psychology, linguistics, artificial intelligence and neuro-physiology, has some general consequences that must be emphasized at the outset:

[1] It means that we study processes that underlie people's conscious thoughts, yet are usually inaccessible to consciousness. For instance, research in psycho-linguistics shows how natural language understanding requires automatic processes that are completely inaccessible to introspection.

[2] It implies that claims about cultural representations should be based on independent experimental evidence. For instance, if we say that religious representations answer certain needs of the human mind or are constrained by particular features of the mind, we need independent evidence for the existence of these needs or properties.

[3] It may result in re-drawing what seem to us obvious boundaries and categories. For instance, it seems to us that there is such a thing as "religion", that we can find in diverse cultures. It may be the case that religion is in fact a cognitive motley, each part of which is transmitted in a specific way, so that the unified conceptual package of "a religion" is largely an illusion.

The last point is particularly important to cognitive studies. If we consider the mental representations involved in what we usually call religion, we observe that they belong to several different types or "repertoires", which may well have very different properties. "Religion" in the ordinary sense combines (among other things) at least five different domains of representations, to do with (i) the existence and specific powers of supernatural entities, (ii) a particular set of moral rules, (iii) notions of group identity ("our" religion is not "theirs"), (iv) types of actions (rituals but also daily routines or taboos) and sometimes (v) particular types of experience and associated emotional states (the main focus of W. James's psychology of religion). Now there is no reason to think that all these repertoires are represented or acquired in the same way. To take a distant analogy, consider natural language again: acquiring our mother tongue requires that we acquire a particular phonology and a particular syntax. Now these are represented in very different ways in the mind, they involve different specialized areas of the brain, and the acquisition process is very different for these two aspects. So, in

the same way, it may be the case that we acquire and transmit a religious ontology in a way that is unrelated to the way we acquire and represent a religious morality, and so on. Obviously, connections are then established between these types of representations, but we should not take for granted that "religion" is a unitary cognitive phenomenon.

I have another reason for insisting on this point. If we examine each of these different "repertoires" of religious representations, it is quite obvious that all of them also appear in non-religious representations. A religious ontology stipulates that there are specific agents with special causal powers; but we have a host of ontological assumptions about the existence and causal powers of various types of objects and agents in the world, as well as all sorts of concepts for fictional agents and objects with particular properties. There are specific moralities transmitted in a religious context, but morality extends beyond that and many moral rules and conventions are outside the scope of religion. There are religion-based concepts of ethnicity, but also many types of ethnic identities not founded on other criteria. There are religious rituals, but also non-religious ones. Religious experience, if it is specific at all, could be compared to other types of private experience, not all of which have religious content.

It may be the case, then, that in each of these "repertoires", the cognitive processes underlying religious representations have more to do with non-religious concepts in the same "repertoire", than they have with religious ones in other repertoires. To take a central question, the way we acquire and transmit a religious morality may have more to do, from a cognitive viewpoint, with the way we acquire and transmit morality in general than with other aspects of religion. This may seem odd, since religious morality is presented to us as a direct consequence of the existence of particular supernatural agents and of their wishes. However, remember point [1] above: the actual cognitive processes involved in acquisition and representation may be quite different from what they seem to conscious reflection.

In this paper, I will pursue these questions in the limited domain of *religious ontologies*, that is, mental representations concerning the existence (and causal powers) of various supernatural entities. I will try to show, in accordance with the points above, [1] that religious ontologies are not exhausted by what people can consciously report as their "religious beliefs", [2] that there is experimental evidence to show how they are actually acquired and represented, and [3] that religious ontologies are parasitic on non-religious ontological

assumptions, so that it makes no sense to study people's religious concepts in this domain unless we have a good description of their non-religious concepts for everyday beings and objects.

2. Religious ontologies: a concept-based approach

There is undeniable cultural diversity in religious representations. This is why we will start from the assumption that cross-cultural diversity should be a starting-point for the systematic study of religious representations rather than an afterthought. The variety of religious representations to be found in the world is an advantage as well as a challenge for cognitive studies. Consider supernatural agents for instance. In many societies there are several gods, in others there are no gods at all, or both gods and spirits, or ghosts only, etc.

This cross-cultural diversity does not entail that religious concepts are the product of an unconstrained form of imagination. Cultural representations in general are widespread because, all else being equal, they are more easily acquired, stored or transmitted than others (Durham: 1991; Sperber: 1985; Sperber: 1996), and an account of religious representations requires an explanation of their cognitive salience (Bloch: 1985; Whitehouse: 1992). If we focus on the recurrent patterns underlying the apparent diversity of religious representations, it appears that they are constrained by a small number of principles, which are part and parcel of normal, everyday cognition and not specifically religious in nature (Boyer 1994b; Lawson and McCauley: 1990).

The ontological assumptions found in most religious systems, in otherwise diverse environments, generally constitute direct violations of intuitive expectations that inform everyday cognition (Boyer 1994a). Consider some widespread forms of religious ontology. Spirits and ghosts are commonly represented as intentional agents whose physical properties go against the ordinary physical qualities of embodied agents. They go through physical obstacles, move instantaneously, etc. Gods, too, have such counter-intuitive physical qualities, as well as non-standard biological features; they are immortal, they feed on the smell of sacrificed foods, etc. Also, religious systems the world over include assumptions about particular artifacts, statues for instance, which are counter-intuitive in that they are endowed with intentional psychological processes. They can perceive states of affairs, form beliefs, have intentions, etc.

Anthropologists are sometimes tempted to say that these religious assumptions are perfectly "intuitive" to the people who hold them, but this is not based on any experimental evidence, is directly contradicted by everyday life in the cultures concerned, and in any case would make it very mysterious, that the people concerned find their religious notions so fascinating. In the precise sense used here, the term "counter-intuitive" means that religious concepts include some assumptions that violate ordinary intuitive expectations of the kind that is routinely described in cognitive (and developmental) accounts of "naive physics" or "naive biology" or "theory of mind". An important result of experimental studies of early conceptual development that a number of broad ontological categories correspond to specific principles, which (i) orient the child's attention to particular perceptual cues for each ontological domain, (ii) constrain the child's inferences derived from those cues and (iii) develop in relatively autonomous developmental trajectories. As Gelman puts it, "the initial principles of a domain establish the boundary conditions for the stimuli that are candidates for feeding coherent development in that domain" (R. Gelman 1990: 83). This is observed at the level of categories such as PERSON, ANIMAL, PLANT or ARTEFACT. Clearly, categorical discriminations along ontological lines are present from infancy, as concerns PERSON as opposed to the rest (Morton and Johnson 1991; Meltzoff: 1994), ARTEFACTS v. NON-ARTEFACTS (Mandler and Bauer 1989; Mandler, Bauer and McDonough 1991). At 18 months "children do not differentiate dogs from horses or rabbits in the same way that they differentiate dogs from sea or air animals" (Mandler, Bauer and McDonough 1991: 290). The identification of objects as belonging to such categories as PERSON, ANIMAL, PLANT or ARTEFACT triggers specific forms of inference which focus on particular aspects of the objects considered and only handle information pertinent to that aspect. This is clearly visible in such domains as the representation of number (Gallistel and Gelman 1992; Antell & Keating 1983; Starkey, Spelke and Gelman 1990), the understanding of the physical properties of solid objects (Baillargeon: 1987; Baillargeon and Hanks-Summers 1990; Spelke: 1990), biological inferences (Gelman 1986; Becker and Ward, 1991), and the representation of mental states (Baron-Cohen: 1995). Some of these categories and principles appear very early: intuitive physical expectations about the behaviour of solid objects can be observed from the first months of life. Other domains take more time to develop, like the various systems that govern our inferences about other people's cognitive processes, which become gradually more complex between

1 and 5. Intuitive biology emerges rather slowly, perhaps as a result of development in other domains.

The main conclusion from these studies is that, by the age of 6, the various domain-specific principles are in place and govern people's expectations about physical, biological and cognitive aspects of their natural and social environment. These expectations are automatic, they are produced by principles that are largely inaccessible to consciousness, and they do not seem to be much changed by subsequent development and experience. Religious concepts seem to include representations that go against the expectations delivered by this universal "intuitive ontology".

One should not confuse what is intuitively counter-intuitive from a cognitive viewpoint, with what is perceived as unfamiliar. Some religious assumptions can become part of a cultural "routine"; this is orthogonal, to the question whether they violate tacit, intuitive ontological principles. Most important, when I say that some religious assumptions are counter-intuitive, I do not mean to suggest that they are not taken as *real* by most people who hold them. On the contrary, it is precisely insofar as a certain situation violates intuitive principles *and* is taken as real that it may become particularly salient. It is the conjunction of these two assumptions that gives such representations their *attention-grabbing* potential.

Religious concepts, then, are constrained by their connection to what could be called an "intuitive ontology": a set of broad categories about the types of things to be found in the world, together with quasi-theoretical assumptions about their causal powers. This provides a first approximation for the range of religious representations likely to be "successful" in cultural transmission. Cultural representations need cognitive salience to be acquired at all, and a violation of intuitive principles provides just that. The idea of spirits being in several places at once would *not* be counter-intuitive, if there was not a stable expectation that agents are solid objects and that solid objects occupy a unique point in space. In the same way, the notion of statues that listen to one's prayers is attention-grabbing only against a background of expectations about artifacts, including the assumption that they do *not* have mental capacities.

Beyond this, religious representations are further constrained by intuitive ontology. Counter-intuitive elements do not exhaust the representation of religious entities and agencies. For instance, ghosts are construed as physically counter-intuitive. At the same time, however, people routinely produce a large number of inferences about what the ghosts or spirits *know* or *want*, which are based on a straightforward extension of "theory of mind"-

expectations to the spirits. Indeed, most inferences people produce about religious agencies are straightforward consequences of activating those intuitive principles that are *not* violated in the representation of those supernatural entities. These background assumptions are generally tacit and provide the inferential potential without which cultural representations are very unlikely to be transmitted.

This framework makes certain predictions about the cognitive processes involved in the acquisition and representation of religious concepts, as well as about the cultural consequences of these processes. In particular, I will centre on the following consequences of the model:

[1] The cultural recurrence of religious concepts should mirror their counter-intuitive nature. That is, all else being equal, we should expect recurrent religious concepts to include combinations of counter-intuitive assumptions and intuitive background as described above.

[2] If counter-intuitive assumptions are found in widespread religious concepts, there must be some cognitive mechanism that makes them easier to acquire, store or transmit than other assumptions.

[3] The counter-intuitive part of religious concepts is only the overt, accessible part of these representations. In order to acquire those concepts and draw inferences about religious agents or entities, people in fact activate a background of intuitive assumptions which are in accordance with their usual expectations.

In the following sections, I briefly discuss anthropological evidence for [1] and direct cognitive evidence for [2] and [3].

3. Evidence for cultural spread of counter-intuitive concepts

This model implies that the variety of recurrent religious ontological assumptions should be very limited. Intuitive ontologies produce specific expectations that apply to a limited number of broad ontological categories, so that the number of assumptions that directly violate them should be limited too. Moreover, not all violations are compatible with maintaining an intuitive background that supports inferences about the agencies postulated.

Indeed, despite their apparent diversity, religious beliefs are in fact based on a very limited set of ontological assumptions, combining a few ontological categories: PERSON, ANIMAL, ARTEFACT, NATURAL OBJECT and PLANT as well as a few domain-specific infer-

ence engines, to do with intentional states, biological processes and physical reality. This would produce such recurrent combinations as PERSON with counter-intuitive physical properties (e.g. spirits, etc.), PERSON with counter-intuitive biological properties (e.g. immortal, or with particular reproduction, etc.), PERSON with counter-intuitive psychological properties (e.g. zombies or possessed people), ANIMAL with counter-intuitive biological properties (e.g. metamorphosed into other animals) and ARTEFACT with intentional properties (e.g. thinking statues). I showed elsewhere that these constraints from intuitive ontology result in a very limited "catalogue" of possible religious assumptions which, even including rather rare combinations, does not amount to more than fifteen combinations of ontological category and violation (or counter-intuitive transfer) of domain specific assumptions (Boyer 1998). The generative principles that produce this catalogue are entirely derived from the main ontological categories and domain specific inference modules generally identified in the psychological literature. Yet these categories generate a list that is fairly representative of the most common forms of religious ontological assumptions. This, obviously, applies to the ontological assumptions underlying religious representations, not to the specific set of "surface" features that accompany them. For instance, the principle of intentional agents with counter-intuitive physical properties is widespread the world over; but in each cultural environment it is accompanied with detailed, and highly variable explicit notions about the characteristics and behaviour of those agents.

In the absence of precise and reliable statistical data, it would be difficult to go further as regards the relative spread or distribution of religious ontologies. However, it seems clear that:

[1] some of these combinations (the SPIRIT and ARTEFACT WITH COGNITIVE POWERS types in particular) are so widespread that it would be difficult to find human groups that do not have them;

[2] these and other types of religious ontologies always require some background input from intuitive ontology;

[3] one does not find culturally widespread ontologies that do not combine such categories as PERSON, ANIMAL, ARTEFACT, PLANT with violation or transfer of intuitive psychology, intuitive biology or intuitive physics;

[4] when scholarly elites put forth a version of religious ontology that deviate from these combinations, these are generally "normalized" by popular representations towards one of the cases described here. This is a familiar phenomenon. A scholarly elite can devise representations that go far beyond the violation-transfer sys-

tem described here, and for instance postulate an ontology that contradicts intuitions of identity (in the case of the Holy Trinity) or assumptions about agency (in the case of the non-anthropomorphic universe of literate Buddhism). Such constructions are transmitted in their own right through scholarly transmission, and routinely ignored (in Christianity) or supplemented (in the case of Buddhism) by popular culture.

To sum up, the distribution of cultural representations seems to confirm the prediction that, all else being equal, representations that combine counter-intuitive principles and intuitive background in the way described here are more likely than others to be acquired, stored and transmitted, thereby giving rise to those roughly stable sets commonly described as "cultural". This is where we must give an account of the process that would lead to such differences in transmission. In the rest of this paper, I will show that this model is supported by experimental psychological evidence.

4. Recall for counter-intuitive concepts

The present model of religious concepts predicts that counter-intuitive elements are better recalled or recognized than representations that conform to intuitive expectations. However, one of the few direct studies of recall for such material, Bartlett's famous study of transmission chains for mythical stories, seemed to suggest precisely the opposite. For Bartlett, subjects tend to normalize stories to familiar "schemata" and discard their strange or exotic elements (Bartlett: 1932). So one could think that whatever conflicts with "schemata" or intuitive ontology would be discarded too. However, Bartlett's studies were very limited and could confound two causes for poor recall and distortion. The subjects might have discarded particular items from exotic stories either because they were culturally alien or because they were counter-intuitive, and Bartlett's conclusions about "schemata" do not distinguish between these two aspects. More systematic studies by Barrett (1996) and Boyer (1994b) show that, once effects of cultural familiarity are controlled for, counter-intuitive items do produce better recall. Both studies used quasi-stories in which a variety of items (PERSONS, ARTEFACTS, ANIMALS) were described as exhibits in an inter-galactic museum. Barrett studied transmission of items on three "generations" of subjects. Recalled items from each generation subjects were used as stimulus material for the next generation. The stimuli came in three "levels" of oddity: [1] conforming to intuitive expectations, [2] non-

standard but not counter-intuitive and [3] counter-intuitive (in the precise sense given above). In all categories, Barrett found a significant transmission advantage for counter-intuitive items [3] over standard ones [1], and in the PERSON category there was an advantage of counter-intuitive over both standard [1] and non-standard [2].

With slightly different stimuli in a similar format, Boyer chose to measure immediate recall after a distraction task, without further transmission to other generations of subjects (This is mainly because recall and transmission results are not really different. The transmission over n generations only amplifies effects of recall that can be seen in each generation's recall performance). The goal of Boyer's study was to measure the differences between various types of counter-intuitive properties for different categories. A first study included standard items [standard assumptions or SAs], as well as *violations* of intuitive expectations [assumption violations or AVs] (e.g. artefacts that have no shadow or suddenly disappear, people with extraordinary cognitive powers). In both types of items the properties were applied to the appropriate category of objects: the artefacts had physical properties, the persons had psychological properties. The study shows a significant advantage of AVs over SAs, with an interaction with category type, the counter-intuitive physical properties of ARTEFACTS being slightly better recalled than counter-intuitive psychological properties for PERSONS. A second study tested standard items against *transfers* of intuitive expectations [assumption transfers or ATs]. Here all properties were in conformity with intuitive expectations, except that they were either applied to the appropriate category (a person with a psychological property) or to the inappropriate one (an artefact with a psychological property). This, too, showed a significant advantage of ATs over SAs, again with a category effect for ARTEFACTS. In both studies, then, counter-intuitive items seemed to carry a significant advantage in terms of recall over control items.

These controlled studies did not use material presented as "religious" and post-study questionnaires showed that subjects did not assimilate them to religious concepts. The questionnaires also showed that cultural familiarity had little effect on recall. For each item used, subjects were asked whether they had ever encountered such notions in films, stories, dreams, etc. There was no correlation between this and recall performance. On the other hand, there was a strong, not really surprising correlation between recall and explicit judgments of "oddity" about the items.

There is evidence, then, that counter-intuitive assumptions of the type found in religious ontologies may have a higher cultural survival potential than other representations simply because of a better recall potential. This would provide the causal mechanism for the fact that concepts that include these assumptions are found as recurrent features of religious ontologies, as they are less likely than other concepts to be discarded in the course of cultural transmission. Obviously, one should want to go further and explain this significant advantage for recall. There are two possible explanations here. One is that counter-intuitive items are recalled better simply because they are surprising and differ from everyday experience, and therefore require more processing than standard items. This would seem the simplest and most economical explanation. But it has problematic consequences for our model of religious concepts. If counter-intuitive items are recalled (and transmitted) simply because they are odd or unfamiliar, one would expect all sorts of variations in cultural representations based on such assumptions. This is because there are indefinitely many ways in which a representation can diverge from everyday experience. As a result, we should find indefinitely many varieties of salient religious ontologies. But this is not the case, and we find recurrent features in religious concepts. Also, as I said above, people in most groups over-learn the religious ontology that is common in their cultural environment; they do not find it surprising, yet that is no obstacle to its transmission. An alternative explanation, in the line of the present model, is that *particular* combinations of counter-intuitive and intuitive assumptions are better because of the combination of salience and inferential potential described above.

This is rather difficult to test, but a first step is to show that "surprise" or oddity effects can be excluded as an explanation. Barrett's first study (see above) indicated that oddity is probably not the main factor, since it showed differences in recall between counter-intuitive items and non-standard but not counter-intuitive ones. To show that mere oddity is really not the main factor here, Boyer designed another study, in which standard and counter-intuitive items were compared to items that are even stranger than the counter-intuitive ones. This was done by using four types of items: [a] standard, [b] violations, [c] transfers, [d] combinations of violations and transfers [AVTs]. For instance, one could have [a] artefacts with a single location in space, [b] artefacts that disappear every now and then, [c] artefacts that have offspring, and [d] artefacts that have offspring of a different 'species'. The [d] type combines activation of the wrong inference domain (biology in this case) for the category

(ARTEFACT) and the wrong inference within that domain (things that have a biology normally have offspring of the same species). The point of this design was that, if mere strangeness or distance from experience was the factor driving recall, then the subjects' performance would be best for [d] items [AVTs], which were twice removed, as it were, from intuitive ontology. On the other hand, if certain particular types of combinations were particularly salient, this two-fold oddity should give those items no special advantage in terms of recall. This is what the results indicate. AVT items showed no recall advantage, quite the opposite; recall for such items was significantly lower than for either assumption violations [b] or assumption transfers [c], although it remained higher than for standard items [a].

5. The intuitive background: "Theological Correctness"

Let me now turn to another prediction from the model. As I said above, recurrent religious concepts comprise a salient, accessible counter-intuitive part, but also an intuitive background which consists of all relevant expectations from intuitive ontology that are *not* explicitly violated by the overt religious concept. We have lots of anecdotal evidence that this is the case, and my summary of anthropological data above used that. We rarely observe religious ontologies that do not include this tacit background: imagine for instance spirits that are located nowhere, or an omnipotent God who can perceive nothing at all, or the idea that ghosts become inanimate blades of grass or kitchen knives, etc. To take less extreme examples, this requirement of inferential potential also explains the *relative* spread of religious assumptions. The notion of a spirit (an agent with (i) strange physics and (ii) standard psychological properties) is symmetrical to that of a zombie (an agent with standard physics and counter-intuitive intentional properties). Although both notions are counter-intuitive, the former is much more widespread than the latter, probably because ascribing standard psychological properties to a religious agent affords much more inferential potential than construing it as a solid object. In all cultural environments where one finds notions of "zombies", these non-intentional agents are invariably construed as "remote-controlled" by other agents, which invariably turn out to have all the usual features of intentional agents as construed by intuitive "theory of mind".

However, since this intuitive part of the religious concept is not accessible, we cannot really be sure that it plays the role described in this model, namely driving inferences, unless we have precise

experimental evidence to that effect. What we want to show is that, unbeknown to the subjects, their inferences (e.g. that a given feature of the religious agent entails another feature, or that the agent does this because of that reason, etc.) and their predictions are in fact driven by background assumptions which are not accessible or culturally transmitted.

A dramatic illustration of this phenomenon is a study by J. Barrett and F. Keil of concepts of "God" and other counter-intuitive agents in both believers and non-believers (Barrett & Keil, 1996). Barrett & Keil first elicited explicit descriptions of God. These generally centre on counter-intuitive claims for extraordinary cognitive powers. Most subjects describe God as an agent who can perceive everything at once, focus his attention on multiple events simultaneously, and so on. The subjects were then tested on their recall of simple stories involving God in various scenarios where these capacities are relevant. On the whole, subjects tended to distort the stories in ways that were directly influenced by their tacit, intuitive principles of psychology. For instance, they recalled (wrongly) that in the story God attended to some problem *and then* turned his attention to another, or that God *could not perceive* some state of affairs because of an obstacle, although such information was not in the original stories. This is particularly impressive in that intuitive principles that specify limitations on cognitive powers (e.g. perceptions are hindered by obstacles between the object and the perceiving subject) are diametrical to the subjects' explicit beliefs about God. The framework summarized above would explain how such contradictions are possible. The two types of representations are distinct and contribute to different aspects of the representation of religious categories: attention-grabbing salience for counter-intuitive assumptions and inferential potential for tacit intuitive assumptions. Incidentally, it is striking that neither the explicit concept nor the inferences produced by subjects show any difference correlated with the subjects' particular faith, denomination or even general attitude towards religion. Atheists, Hindus and Christians of various denominations have similar performance. The study was replicated by Barrett in India with Hindu participants, using a combination of Hindu deities and novel counter-intuitive agents, with similar results.

Barrett & Keil use the term "theological correctness" to denote this tendency for subjects explicitly to entertain a description of supernatural agents that is not actually used in representing or predicting their behaviour. This limiting-case shows that spontaneous assumptions from intuitive ontology are constantly produced to support inferences about religious entities. This applies, *a fortiori*, to

cases in which there is no direct conflict between the explicit and the tacit part of the religious concept, such as the more general case of spirit-concepts or artefacts with cognitive powers.

6. Is “religion” an integrated cognitive domain?

To sum up, there is evidence, both anthropological and psychological, for a description of religious ontologies as based on a limited, salient, counter-intuitive violation or transfer of expectations. As I said above, recall is only one aspect of cultural survival, albeit a crucial one. I do not want to suggest that cultural representations are simply a function of memorability. The point here is more modest; differences in recall can cause differences of cultural survival in a way that accounts for *some* recurrent cultural representations. There are many other aspects of transmission beyond recall, and we have anecdotal evidence that some aspects can even override memory factors. Jokes for instance are notoriously difficult to recall, yet seem extremely stable as a set of cultural representations. They can be construed as the analog of germs that have few physiological effects yet are extremely contagious. In this case it is fast transmission (and motivation) rather than recall that results in a transmission advantage.

Beyond these simple effects, one must remember that particular modes of transmission can impose strong constraints on the concepts transmitted. Consider for instance the contrast between religious concepts acquired through salient, rich sensory experiences such as initiation rituals, and those acquired through rote-learning and systematic teaching. These are not simply different routes towards the same conceptual structures. They seem to have a direct influence on the representations acquired and their organization, because different kinds of experience activate different memory processes (•ref Whitehouse). So the salience and inference constraints described here are only one dimension in the complex dynamics of acquisition. Still, there is definite evidence that, all else being equal, religious concepts tend to display particular combinations of salient assumptions and background inferences in a way that constrains religious ontologies.

The conclusions and conjectures summed up above are all centered on the domain of religious ontology: claims about the existence and causal powers of various supernatural entities. I tried to show that religious concepts are parasitic on intuitive ontology. They are given in the cultural input but (i) their salience depends on their

counter-intuitive nature, relative to prior expectations and (ii) they are always complemented by default assumptions imported from intuitive ontology. So it would make little sense to describe (or study) the development of religious ontologies whilst ignoring the development of intuitive ontology. The particular way in which religious ontology develops depends on the wider development of ontological categories.

Now "religion" does not reduce to religious ontologies. Other conceptual "repertoires", as it were, are involved in religious representations. As I said at the beginning, religious concepts also activate representations of moral rules, of group-identity and of private experience. I would contend that: (i) in each of these repertoires we may well find a similar "parasitic" structure, where religious concepts can only be explained against a broader background, and (ii) there is no overwhelming evidence than the various repertoires are strongly integrated into a unified religious domain. Morality is a domain where specific cultural input seems to activate general principles to do for example with a distinction between habit and convention and between convention and moral obligation (see e.g. (Turiel, 1983)). Religious morality does not develop differently; it only differs from the non-religious kind in making explicit claims about the connections between morality and supernatural agents, or about the origin of moral imperatives. To turn to group-identity, concepts of social categories and ethnic differences are informed by specific principles with a specific developmental path (Hirschfeld, 1996). Group-identity founded on religious criteria, as opposed to kinship or locality, does not seem to have specific features in that respect. A similar point could be made for the acquisition of cultural routines and rituals, or for the representation of private experience. In each of these "repertoires", then, it seems that the relevant explanation for conceptual structure and development involves the repertoire as a whole, not just its "religious" sub-part.

Further, as I said above, there is no evidence that all these repertoires are strongly integrated, even though they are often presented, especially in literate traditions, as part of a unified package. That is to say, a "religion" is presented as a coherent system in which morality for instance is supported by belief in sanction from supernatural agents, as well as connections with group identity, specific practices and specific experiences. There is good anthropological and historical evidence that these connections between repertoires are *ex post facto* rationalizations rather than the expression of actual inferential links. The historical record shows that ontology may change without disrupting either morality or group-identity, or con-

versely a new morality can be established whilst preserving ontology, and so on.

7. Conclusions: Methodology in the cognitive study of religion

All this points to the conclusion that there is no domain-specialization in “religious thinking”. That is to say, we have no good reason to think that there is a distinct domain of “religious cognition” with particular functional characteristics. Obviously, we do not mean to suggest that there is no such thing as “religion”. The notion does denote a real social and cultural phenomenon, but this does not entail that religion is cognitively integrated into a domain. To take a distant analogy, “trees” are a distinct kind of reality for all sorts of economic or ecological or aesthetic purposes; yet “tree” is not a sound biological category.

This question of “domains” and integration is not just a technical issue for cognitive psychologists. It is of great importance for the study of religious concepts, and highlights some important differences between a cognitive study of religious transmission as a cultural phenomenon on the one hand, and traditional “psychology of religion” on the other. First, as Watts & Williams put it (Watts & Williams, 1988): 1), psychologists “have often chosen to study the *externals* of religion”, such as explicit claims to belief, “religiosity scales”, connections between personality types and religious commitment or between religious belief and social relations, and so on. Most of these studies transfer to religion general concerns and methods of social and personality psychology, and therefore leave aside the general cognitive processes involved in religious concepts. However, even when this research considers cognitive phenomena as such, it seems to me that the psychology of religion may perpetuate misleading notions of religious concepts. A good illustration is Watts and Williams’ own general essay on “religious knowing” (Watts & Williams, 1988), that makes a strong case for the fact that religious representations should not be considered as *a priori* different from other conceptual domains, and aims to highlight “essential similarities between religious knowing and other everyday forms of knowing” (Watts & Williams, 1988) 38). Watts & Williams for instance evaluate the relevance of different cognitive frameworks (prototype theory and metaphor) to an understanding of the (mental) concept of God (Watts & Williams, 1988): 128ff.). They start from the assumption that “religious knowledge is the knowledge of

God” and conclude that “religious knowing involves, not so much coming to know a separate religious world, as coming to know the religious dimensions of the everyday world” (Watts & Williams, 1988): 151).

Despite suggestive descriptions and explanations, this type of work illustrates a general problem in the field of “psychology of religion”, namely that the authors only consider one particular tradition; more disturbingly, they seem to take for granted certain aspects of religious thought which are in fact particular to that tradition. The variety of religious representations to be found in the world is an advantage as well as a challenge for cognitive studies. Consider supernatural agents for instance. In many societies there are several gods, in others there are no gods at all, or both gods and spirits, or ghosts only, etc. One could argue that Western Christian data can be subsequently compared to other cultural contexts. However, this particular focus may conceal some aspects of religious concepts that are crucial to their acquisition and transmission (see Pyysianen, this volume, for consequences of this point for a comparative study of religion). This is why my first methodological conclusion is that a psychology of religion should be prescribed a heavy dose of cultural anthropological material:

[1] Cross-cultural diversity should be a starting-point for the study of religious representations rather than an afterthought.

The main reason for that prescription is that an exclusive focus on Western notions, because of the particular features of the traditions concerned, suggests that there is an autonomous domain of religious cognition, and that its features are generally accessible to consciousness. These two premises are less than altogether plausible, as I tried to show here. Consider the comparative study of ontological assumptions in various religious systems, a traditional concern of cultural anthropology as well as the history of religion. If, as cognitive evidence seems to show, religious concepts are really parasitic upon a universal system of intuitive expectations, it follows that we cannot either describe or explain religious ontologies in isolation. For instance, it makes little sense to describe some people as believing in ghosts who monitor the behaviour of the living, if we do not evaluate to what extent those ghosts are in fact represented in accordance to everyday expectations about intentional agents. An isolated study of religious ontologies would provide a catalogue of oddities and leave out the background that makes it possible to acquire these oddities and find them quite natural. The same point applies to the study of religious morality, as I suggested above. So

we cannot really explain the acquisition and transmission of religious morality without importing most of our explanation from the acquisition and transmission of morality in general. As a second general methodological principle, then, I would submit that:

[2] All repertoires of religious representations should be studied in the context of the wider, non-religious domain that supports their acquisition.

Moreover, I suggested above that the different religious repertoires are not causally integrated. The argument here is that ontology and morality and group-identity and ritual are all transmitted along specific "tracks" of cultural transmission, which are more or less independent. This leaves us with the question, How are those different repertoires integrated in the individual mind of a participant in a religion? After all, people do not keep these different repertoires entirely separate. On the contrary, they seem to establish connections between these different aspects, and to use such connections when trying to persuade others of the validity of their religious assumptions. Elsewhere I suggested that these connections typically take the form of abductive explanations, providing connections between assumptions that are already there rather than deducing some of them from the others (Boyer 1994b). That is, once people have a certain ontology and a certain morality for instance, they are likely to produce individual, conjectural explanations that account for one in the context of the other. There is some anthropological evidence that this is the case, but evidence is scarce, leading to my third methodological point:

[3] The integration of religious representations should be studied as a matter of individual cognitive possibility, rather than as a "culturally given" or "theologically given" fact.

In other words, that (i) people represent various pieces of a religious system and that (ii) these pieces are integrated in an official theology, does not entail that people actually integrate the pieces in accordance with that theology.

This last point leads to the idea that explanations for the transmission of religious concepts must use independent evidence. In other words,

[4] All claims about the "religious mind" are claims about the mind, and therefore should be reducible to empirically supported (or at least experimentally testable) claims about neural function.

As I tried to show in this paper, some aspects of religious ontologies are already studied in this way, allowing us to make definite predictions about the spread of certain religious concepts. This may seem a reductionistic strategy, and indeed it is, as are most explanations in the empirical sciences.

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