CHAPTER NINE

Towards an Integration of Ethnography, History and the Cognitive Science of Religion

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Scientific explanations and interpretive accounts of human behaviour, including religious behaviour, are different kinds of enterprise. It is tempting to think that although the questions asked by both scientists and humanist scholars look similar, they are actually incommensurate. Hilary Putnam's professor, caught with his trousers down in the girls' dormitory, may serve as an instructive illustration (Putnam 1978: 42–3; see Laidlaw, this volume). As Putnam observes, the question 'why was the professor there?' could be answered in a potentially infinite variety of ways, including that the professor was there so that he could not leave before midnight at a speed faster than light, given that nobody (certainly not professors) can travel faster than light. To the ethnographer or historian[1] it may seem that the answers suggested by scientific psychology have a similarly bizarre character, quite unrelated to the questions that matter to people in everyday life. Nothing could be further from the truth.

Cognitive scientists are typically interested in fundamentally the same problems that perplex interpretive anthropologists, as well as historians and others. In the scenario Putnam presents, all would be eager to know about the professor's motivations and intentions. The ethnographer or historian might seek to contextualize the professor's own account of his intentions within a web of locally and temporally variable values (e.g. whether this event occurred

1. Although this remark does not apply to Laidlaw, who recognizes to a considerable extent the value and relevance of scientific enquiry.

on a California campus in the 1960s or in a twenty-first century theological seminary). The question of how the professor's behaviour is judged in the prevailing cultural context (e.g. one that celebrates free love or one that counsels moral censure or litigation), is unquestionably relevant to understanding his predicament. But the cognitive scientist urges us to heed an *additional* set of questions. For instance (and this is only an example), what kinds of evolved human capacities govern processes of reputation management? How are these brought to bear when a transgression occurs?

Our closest relatives, the great apes, do not have to deal with such issues. Chimpanzee transgressions do not become the object of gossip or slander that might handicap their abilities to mobilize authority and resources in the future, even among strangers. But humans have to make immensely subtle calculations about such matters, resulting in a glorious repertoire of strategies for managing their reputations. Recent studies suggest, for example, that confession is widely used as a means of damage limitation in circumstances when exposure is a serious risk, based on the intuition that punishment will be less severe if the transgressor displays remorse. The greater the risk of exposure and the more serious its consequences the stronger the urge to confess becomes (at least by the statistical measures used in these kinds of studies). Consequently, meaning and context *matter*, even for cognitive scientists—in fact, *especially* for cognitive scientists. People, even professors, tend to lie when they think they have a low risk of detection and to confess when they fear discovery. But these strategies are carefully modulated by subtle features of context: how severe the punishments for a particular transgression are likely to be in a particular cultural setting, the extent to which forgiveness might be anticipated in response to displays of remorse and contrition, and so on. And these kinds of judgements come into play irrespective of actual guilt, for sometimes even the innocent confess (even innocent professors, if that is not a contradiction in terms).

If cognitive and interpretive anthropologists are really studying the same things, as I think they are, then the crunch question is whether the kinds of answers they provide could be *integrated*. Two extreme views on this matter may be distinguished. Hardline cognitivists maintain that conscious thought is merely a surface expression of processes outside our awareness, and that the latter processes shape and constrain our consciousness whereas it seldom (if ever) happens the other way around (e.g. Bering and Shackelford *in press*). For this reason asking people about their intentions or the meanings of their experiences and observations elicits no more than cryptic clues to the real causes of their behaviour. We ignore these clues at our peril, to be sure, but they do not constitute explanations in themselves. Hardline interpretivists in-

sist that meanings and reasons are only explainable in terms of other meanings and reasons, whether those of informants (the ethnographic gambit) or of the interpreter (the hermeneutic gambit)[2]. Both forms of hardline interpretivism constitute a circular strategy (amusingly dubbed 'the hermeneutic vortex'[3]) that accomplishes ever more elaborate stories but forecloses the possibility of ever explaining anything. An alternative to both extremes is available, based on a certain amount of compromise but also a large dose of messy-world empirical enquiry.

There is now a mounting body of evidence that explicit representations, including many (if not all) the things go to make a religious tradition, are influenced by implicit cognition, about which we can only learn indirectly, through experimental research (both laboratory-based and naturalistic). Such findings have opened up the possibility of two major types of contribution to core anthropological problems. The first type seeks to contribute to an explanation for cross-culturally recurrent features of religious thinking and behaviour, regardless of the specificities of local contexts and histories. Such a strategy proceeds on the basis that, all else being equal, certain kinds of religious concepts (for instance) will be more widespread in human societies than others. Such claims pertain to statistical patterns of recurrence in the ethnographic record as a whole rather than to individual cases. The second potential contribution from this quarter, however, considers how specified environmental conditions bias the activation of different types and configurations of cognitive mechanisms in predictable ways. How does the presence of a particular institutional system trigger or inhibit implicit thinking, overt behaviour and consequent patterns of cultural transmission? The latter question (which of course could be fractionated in a wide range of narrower variants), encompasses our concerns about Putnam's unfortunate Professor, whose individual mental states and behaviour can only be fully understood in its wider context. While a generalizing approach may accurately quantify the likelihood of intended sexual transgressions on the part of half-naked men in girls' dormitories, the more detail we provide about the context in which such escapades occur the more precisely we can predict the psychological states and behavioural choices of particular would-be transgressors. Lawyers do it. So do anthropologists. But on the whole they do it by appeal to more or less im-

2. In the latter case, paradoxically, the conscious meanings attributed by the interpreter are sometimes viewed as inaccessible to the actor, a state of affairs that may attributed to a diversity of factors (e.g. collective unconscious, dynamic unconscious, false consciousness, mystification, hegemonic ideology, etc.).

3. Lawson and McCauley 1993.

plicit assumptions, stereotypes, or fashionable interpretive frameworks rather than with reference to testable theories of the way people actually think.

Implicit cognitive biases, even if situated in richly specified sociocultural contexts, may turn out to be only part of the story, however. Contrary to some cognitivist hardliners, I would argue that conscious reasoning and reflection also influence the way we behave, in turn shaping and constraining processes of cultural innovation and transmission. Experimental psychology provides just a fraction of the evidence needed to understand such processes. We must look also to the data commanded by ethnographers and historians, among others who catalogue the statements and deeds of our fellow human beings in their historically specific cultural habitats. For this reason, anthropologists must be part of the explanatory endeavour, in on the ground floor. Although we cannot (yet) measure the relative importance of implicit and explicit cognition in patterns of social behaviour and cultural efflorescence that is the direction in which I believe we need to go. Let us begin, however, by considering how far the cognitivist hardliners can take us.

Implicit Cognitive Constraints on Religious Transmission

A substantial and growing literature in the cognitive science of religion argues that religious transmission is shaped and constrained by implicit (unconscious) cognitive processes. A central feature of this approach is that it seeks to fractionate religious thinking and behaviour into myriad different components that are explainable in terms of a finite array of relatively discrete cognitive mechanisms. Sometimes construed as 'modules', or at least as 'domain-specific' systems, [4] these cognitive mechanisms are often assumed to have evolved in response to evolutionary pressures that are, at least in principle, discoverable by evolutionary psychologists, physical anthropologists, cognitive archaeologists, and other students of human evolution. But evolutionary arguments play a subsidiary role in the cognitive science of religion, since the main evidence for specialized, domain-specific cognitive systems comes from experimental research by developmental and cognitive psychologists (and to some extent also from neuroscientists and clinical psychologists). The strategy is to ask what effect these implicit mechanisms have on the transmission

4. For a cutting edge discussion of modularity theory and domain-specificity, and an account of the history of these terms, see Barrett and Kurzban (in press).

of culture, for instance in the area of religious thinking and behaviour. And what this requires, in practice, is a piecemeal approach to the phenomena of interest.

Religious behaviour is extremely complex, involving a huge diversity of cognitive systems. Nobody could study all of those things at once. So cognitive scientists have adopted the procedure of taking one cognitive mechanism (or cluster of mechanisms) at a time and asking what role it plays in the transmission of very specific kinds of religious information. Rather than asking, for instance, 'how are rituals in general transmitted?' cognitive scientists home in on some strikingly recurrent features of ritual behaviour around the world (e.g. the tendency to repeat nonsensical verbal formulae) and try to explain each component more or less in isolation, before moving on to explain other aspects of the same ritual behaviour (perhaps with reference to very different mechanisms). This way of proceeding can seem very puzzling if you are not used to it. Scholars trained in the grand theoretical traditions of Marxism, psychoanalysis, semiotics, or phenomenology may assume that theories of religion must always take the form of *general theories of religion as a whole*. Indeed, it may seem absurd to reduce religion to one puny little mechanism in the mind. But such reactions belie a basic misunderstanding. The aim is to build up a picture of the multiple causes of a huge variety of different components of, for instance, ritual behaviour *before* attempting to declare that we have something approaching a 'theory of ritual' as such.

The best way to illustrate this point is, perhaps, to look at a specific example of ritual behaviour and to reflect briefly on the range of cognitive mechanisms that would seem to shape and constrain its varied component features. Consider the following piece of ethnography deriving from my fieldwork among members of the Pomio Kivung religious movement in Papua New Guinea in the late 1980s, who daily laid out offerings to their ancestors in various kinds of temple (Whitehouse 1995: 67–68):

> The task of preparing offerings for the ancestors is supposed to be quite distinct from the task of secular food preparation. When handling offerings to the ancestors, the women should observe specified internal states. For example, the women should never think about eating the food as they prepare it for (although they may eventually eat their fill of it) the food at this stage belongs to the ancestors and must be prepared with a view to (in the local idiom) 'giving with the palm of the hand' (i.e. freely, generously, and unreservedly). If the cooks think of eating the food in the course of its preparation then it will come from 'the back of their hands' and the

ancestors will reject it. In actual fact, it is not the material substance of the food which the ancestors consume, but the respect, goodwill, generosity, deep faith, and devotion which the living supposedly put into its preparation and presentation. It follows that any breach of Kivung morality on the part of the cooks during food preparation renders the offering useless, because such breaches imply lack of devotion and respect (insofar as they 'injure' the ancestors in the sense of causing them offence) and lack of faith (insofar as a true believer would be too afraid to sin during the food preparation). A typical sin on the part of the cooks would be for two of them to gossip about the third's laziness, such gossip being seen (in the local idiom) as the 'theft' or 'killing' of the third person's good name. By cooking for the ancestors separately the women avoid squabbles or covert bad feeling about relative labour inputs. Under no circumstances should a menstruating woman work as cook (if she comes into contact with the food it will be polluted and unacceptable to the ancestors). Sickness and menstruation may reduce the labour power of the cooking group and this usually just means that less food is prepared.

At 2.30 p.m. the village bell is struck with a stick three times by anybody who knows the time … Of the men who come to take the food from the cook house to the Cemetery Temple when the bell is struck, not all necessarily have set duties to perform, some acting merely as assistants. The men do not communicate with one another except by mouthing, gesticulating, or whispering and they are supposed to observe the same morally sound internal states as the cooks. They enter the Cemetery Temple one by one through the front door and place the food and drink (e.g. bottles of water) on a sideboard.

The temple is internally divided into two rooms. The first room, accessible through the front door, is dedicated to lower ranking ancestors and contains two tables with benches (one for deceased men and boys and the other for deceased women, girls and babies) and a sideboard for storing food. A team of designated (all-male) helpers lays the tables in this room with plates, cutlery and decorative flowers or leaves in vases. Other tasks include the final cleaning of crockery and other equipment with tea towels and the display of elaborate concern with neatness and tidiness in the room. Checks are also made on the provision of additional comforts for the ancestors who will come to 'eat', for example a blanket and pillow in case one of them is 'cold' or 'tired'. Finally, food is dished into plates on the tables.

Clearly, there are great many different things going on even in this relatively simple string of ritual procedures. The cognitivist strategy is to begin by plucking out certain features that are found in rituals more generally, for instance: the fear of menstrual pollution, the overt concern with cleanliness and neatness, the emphasis on rules that have no known function (e.g. the rigid adherence to a certain division of labour by sex, the requirement that the temple be entered in single file, the observation of routines carefully marked out by the chiming of the village bell, etc.). These are only part of what cemetery temple rituals entail, in the Kivung religious tradition, but at least we have a starting point. Could there be a single underlying mechanism that produces these particular features of ritualized behaviour, whether in the Kivung or in the many thousands of other ritual traditions that ethnographers have documented around the world?

Pascal Boyer and Pierre Lienard (2006) argue that certain characteristic features of culturally standardized rituals can be explained with recourse to the implicit operations of a cognitive system geared to the handling of potentially hazardous materials in the environment. This 'hazard-precaution system', they argue, involves three major levels of functioning. The first is described (following Szechtman and Woody 2004) as the 'security motivation system', the function of which is to identify potential hazards through the stepwise engagement of three kinds of neural mechanisms. One mechanism is concerned with the appraisal of potential threats. Its activation in turn triggers a motivational system geared to evaluating the nature and seriousness of the threats. And where the threats are deemed sufficiently serious a third system is activated that selects an appropriate response to the potential hazard from a limited repertoire of motor and visceral programmes. Activation of these programmes (leading to precautionary procedures, such as cleaning or isolating and arranging potentially contaminated objects) should normally feedback inhibitory signals to the appraisal mechanism. Boyer and Lienard point out, however, that Szechtman and Woody's model is not sufficient, as it stands, to account for some of the characteristic features of the precautionary procedures that are selected. For instance, why those particular procedures and not others? Why are they performed in a certain order rather than some other? To answer these questions, they introduce a second major system that responds to the elevated arousal occasioned by the security motivation system. At an experiential level, the operations of this second system produce a nonspecific sense of threat and a tendency to focus on minutiae rather than on overall patterns. This latter process places heavy burdens on working memory leading to a high degree of conscious attention to the performance of rigidly circumscribed procedures.

Boyer and Lienard argue that this model reveals why humans respond to perceived threats of contamination in highly stereotyped ways (i.e. conforming to rigid procedural rules), entailing such features as redundant repetition and a sense of obligation or compulsion. They argue further that these mechanisms are activated in slightly modified fashion in socially sanctioned rituals, on the one hand, and in the pathological condition known as 'obsessive-compulsive disorder' (or OCD), on the other. In the case of socially sanctioned rituals, the hazard-precaution system is only partially activated—that is, rituals that have become standardized in society serve to mimic some of the input conditions of the hazard-precaution system without necessarily triggering the arousal occasioned by potential hazards. In the case of OCD, the hazard-precaution system is activated in its entirety but due to the malfunctioning of certain parts of the system (which need not detain us here) anxiety levels occasioned by the potential hazard are modulated incorrectly and the system becomes trapped in a self-feedback loop that generates obsessive repetition of particular micro-procedures. Despite important differences between the behaviours found in socially sanctioned rituals and OCD patients respectively, Boyer and Lienard argue that this model helps explain many interesting similarities between the two.

The link between OCD and religious rituals had been considered in considerable detail in previous research, some of it inspired by Sigmund Freud's early speculations on the topic. The most impressive contribution to this area of research in modern times has arguably been Fiske and Haslam's (1997) comparison between OCD symptoms and traits found in socially sanctioned rituals based on an extensive survey of the ethnographic record. What Boyer and Lienard bring to this topic, however, is a plausible account of the precise mechanisms responsible for the similarities between the behaviours of OCD sufferers and some of the actions that widely recur in cultural rituals. Moreover, they set out an elegant model of how the specific behavioural traits arising from the activation of the hazard-precaution system would have been adaptive for our hominid ancestors.

In considering the evolutionary background to the relationship between psychological mechanisms and recurrent behavioural outputs[5] it is helpful to distinguish between the *proper* and *actual* domains of the mechanisms in-

5. As noted above, this is not a necessary requirement for cognitive approaches but may be seen as enriching the theoretical breadth of the enterprise, given that evolutionary biology constitutes one of the most robust sciences available to the study of human (and animal) behaviour.

volved.[6] The proper domain of hazard-precaution mechanisms would be hazardous materials in the ancestral environment, such as rotting meat, faeces, infected wounds, and other contaminants. These constitute threats to survival (and thus to reproductive success) from which our hazard-precaution mechanisms evolved to protect us and, consequently, these are the kinds of inputs that will typically serve to activate those dedicated mechanisms. But the same mechanisms could be set off by inputs that resemble contaminants, for instance because they are linked by association to feelings of disgust or nausea (some people feel that way about soft egg yoke or butter) or because we see other people handling them in a way that suggests that they are potentially dangerous (inasmuch as many objects used in religious settings, for instance, are treated with special care and attention they too are likely to set off our hazard-precaution mechanisms). These kinds of triggers, which may vary widely among individuals and across populations, do not actually target potential sources of contamination. Consequently they belong to the *actual* but not the *proper* domains of the mechanisms at issue.

If Boyer and Lienard are right, they appear to have gone some way to explaining why the Kivung ritual incorporates such a striking concern with the avoidance of contamination of the offerings, with straightening and arranging tasks, with arbitrary rules for the performance of sequencing of actions, and suchlike. The persuasiveness of their theory lies in the fact that it draws on such a broad range of scientific evidence: developmental, neurological, clinical, biological, and so on. But it is also a very modest theory, in the sense that it does not for a moment assume that it is capable of explaining rituals in general, or the entire range of behaviours entailed in any one particular ritual. Rather, it plucks out a rather narrow strand of the behavioural repertoire entailed in ritual performances and tries to explain that, and only that. This means, of course, that we are still left with the challenge of explaining many other things going on in our Kivung ritual. For instance, why are the men unable to speak normally inside the temple? Why do people suppose the ancestors will be offended if the women think about eating the food during its preparation? Even these two questions (and there are many more we could ask, as we shall soon see) suggest that we still have a long way to go in explaining the data before us.

To begin with the whispering of the men inside the temple, this would seem to be linked to the idea that the ancestors are invisibly present and should be treated respectfully. In this regard, their behaviour differs little (if at all) from

6. Millikan 1984; see also Sperber 1996.

the way visitors to a church in England might speak only in hushed tones upon entering. One of the psychological mechanisms responsible for this behaviour might be dubbed 'agency detection'. As with the hazard-precaution system significant work has been carried out on the neural and cognitive characteristics of agency detection, as well as its evolutionary foundations.[7] We also have a body of evidence suggesting that humans are easily primed to *overdetect* agents in their environments. Stewart Guthrie argues (1993 and in this volume) that, regardless of cultural differences, people everywhere require little encouragement to see signs of agency in almost any kind of situation. We curse our computers when they crash, we scream in the dark when an object unexpectedly brushes against us, and we are easily seduced by advertisements that display a vast range of products (from household detergents to Michelan tyres) behaving like people. Being sensitive to the presence of possible agents would have conferred considerable benefits in the conditions in which our ancestors evolved. Clearly, any failure to pay attention to signs that a predator is present would have been far more costly than the experience of innumerable false alarms (Guthrie 1980, 1993; Barrett 2000). So when my friends in Papua New Guinea lowered their voices to a whisper inside the temple, perhaps it was (partly) because their agency-detection systems were delivering powerful intuitions that there were ancestors around.

Perhaps. But still there is much more going on. Consider the food preparation problem (that the women shouldn't think about eating the food themselves). This is essentially a moral issue. Food that is prepared for the ancestors with thoughts of greed or hunger is considered by Kivung members to be harmful to the ancestors. Such behaviour is described as 'killing' the ancestors. In the local idiom, 'killing' refers not only to homicide but to all harm-causing behaviour. And as such its use elicits ideas of a moral nature that have universal foundations. Since Elliott Turiel's work in the 1980s, psychologists have realized that moral rules involve intuitions that are somewhat different from rules of mere convention. For a start, moral rules are fundamentally similar the world over, while conventional rules may differ very widely. One of the core features of moral rules is the intuition that causing *harm* to others is wrong. Moral violations everywhere are considered to be more serious than conventional violations. And, crucially, moral rules are felt to hold true whether or not they are upheld by a figure of authority (that is, people intuitively judge harming behaviour to be wrong even if it is condoned or not ex-

7. For overviews of work on agency-detection systems, see Scholl and Tremoulet 2000 and Barrett 2004.

plicitly forbidden by authorities). This appears to be the case even when we are talking about divine or supernatural authority. For instance, in a study of Amish teenagers, Nucci found that all participants considered that working on Sunday would be acceptable if God had not forbidden it but agreed that hitting people would be wrong whether or not God forbade it (Nucci 1986).

From Piaget onwards many psychologists have assumed that the development of moral thinking is a consequence of empathy towards others based on being able to imagine oneself in their shoes. But Shaun Nichols (2004) has shown that individuals who have very limited perspective-taking capacities (e.g. children under the age of four and people with autism) nevertheless are quite competent at distinguishing moral from conventional rules. In response to this kind of evidence, Blair (1995) has argued, following Lorenz (1966) that social animals like dogs and humans have evolved mechanisms of limiting aggression between individuals of the same species. For instance, dogs stop attacking in response to submission cues. Blair argues that in humans the activation of a 'violence inhibition mechanism' (VIM) in response to distress cues in others sets off a search for meaning, resulting in a negatively valenced interpretation of an event (i.e. the moral evaluation that what is happening is wrong). He has shown in a series of ingenious studies that psychopathic criminals do not respond to distress cues (in photographs) in the same way as normals and further that they cannot distinguish between morality and convention in the way most people can. He concludes from this that they have a defective VIM. But as Nichols (2004) has shown, the VIM account has a number of drawbacks. First, even though small children and people with autism have problems with perspective-taking, they are aware that people experience desires and suffer pain. We cannot therefore completely rule out the possibility that moral intuitions depend upon some rudimentary perspective-taking abilities. Second, the VIM notion cannot account for the sense that something is wrong as opposed to merely being regrettable. That is, even if we do feel bad when we see distress cues it doesn't follow that we judge what we see to be wrong. Seeing people have accidents or fall prey to natural disasters should activate VIM (if such a mechanism exists) but not lead us to conclude that what we have seen is morally wrong.

Nichols builds an alternative to both the Piagetian and VIM accounts, by offering a unique synthesis of both. His starting point is that in the course of development people acquire 'normative theories' consisting of sets of rules for how to behave. In order for these stipulations of convention to become moral rules, they must be emotionally valenced such that people *feel* it is wrong to break those rules. Such feelings are triggered when we witness people harming others. On this account, moral rules are rules of convention backed by af-

fective systems. In support of this, Nichols has conducted experiments showing that affective systems concerned with themes other than causing harm produce intuitions of a moral kind that differ from those pertaining to more neutral conventional rules. For instance, he used behaviours that would be considered disgusting rather than harmful to demonstrate the point. As with harmful behaviours: 'The disgusting violations were regarded as less permissible, more serious, and less authority contingent than the neutral violations' (2004: 22). And just as Blair observed that psychopaths found it harder to distinguish harmful behaviours (moral infractions) from violations of neutral norms (infractions of conventions), so Nichols found that people with a high tolerance for disgusting behaviour found it harder to distinguish disgusting behaviours (moral) from violations of neutral norms (conventions), in terms of our key parameters of seriousness, permissibility, and authority contingency. Thus, these parameters seem to be 'mediated by affective response' (2004: 24).

Nichols considers two possible ways in which normative rules might come to be emotionally valenced and thus *moral*. One possibility is that there is a developmental stage during which certain kinds of neural mechanisms start to be activated as a response to negatively valenced (e.g. harmful) actions. Once these responses become associated with particular norms, they result in stable moral attitudes (although the responses that kick-started them may pass, having been part of a transient developmental phase). A second possibility is that the emotional valence has to be present on-line in order to generate moral responses. Various kinds of moral deficits, for instance as observed in criminal psychopaths, would thus be due either to abnormal development or due to the ongoing lack of some normal mechanism throughout life. Nichols also considers the possibility that the establishment of moral rules (or their failure to become established) may involve both developmental and on-line factors.

If the Nichols account, or something like it, turns out to be correct then the moral thinking system, like all other features of intuitive cognition, has an evolutionary history that needs to be unpacked. Although that is a task to be undertaken elsewhere, we should note that an obvious adaptive value of this system is that it serves to limit intra-species violence, a point made in some detail by Blair (see above). That function might belong to its proper domain. But moral intuitions can also be activated in relation to other species, as happens among animal rights campaigners (see Milton 1993) or even in relation to non-empirical beings, such as the Pomio Kivung ancestors.

Rudimentary perspective-taking may, as Nichols proposes, be a necessary ingredient of moral thinking. But there are also mechanisms in normal adults

that are capable of far more sophisticated forms of reflection on what other people may be thinking or feeling. Among experimental psychologists, these mechanisms are commonly referred to as 'theory of mind' (or ToM), the significance of which has also been stressed by many other contributors to this volume (most notably Astuti, Barrett, Bloch, Cohen, and Guthrie).[8]

Mature ToM mechanisms provide humans with the ability, indeed the nagging obligation, to generate inferences about intentional states that drive the behaviour of people around them. First-order ToM mechanisms deliver intuitions about the possible intentions of other actors, and they begin to emerge early in development. By around age four to five, children realize that people's behaviours are driven by intentions that may or may not be based on accurate information and that it is therefore possible to manipulate their behaviour through duplicity and deception. Second-order ToM mechanisms appear a little later, around age six or seven, allowing us to speculate not only on the intentional states of Jim and Mary but on the speculative inferences that they in turn might be making with regard to the states of mind accompanying our own behaviour. Second order ToM abilities enable us to construe behaviour as communicatively driven (Jim does x because he knows that Mary is likely to interpret x in a certain way).

In our Kivung ritual, every action that involves the agency-detection system has the potential to trigger ToM mechanisms as well. For instance, the preparation of food for the ancestors is carried out on the understanding not only that the ancestors are around (an intuition delivered by the agency-detection system) but that the ancestors can 'read' one's thoughts. These mindreading capacities attributed to the ancestors mean that even if a cook is careful never actually to eat any of the food being prepared, the ancestors will know immediately if she fantasizes about doing so. The idea that ancestors know what you are thinking carries important social consequences. Normally we predict the likely behaviours of others and calculate the risks of them finding out things we don't want them to know, on the assumption that people have an imperfect knowledge of what is going on and may not know things we do (or worse, may know things we don't). The idea that supernatural

8. Some of the most revealing studies of ToM come from developmental psychology, focusing on the emergence of mindreading capabilities in the course of childhood (Carey 1985, Gopnik and Meltzov 1997, Bloom 2000). Another important area focuses on deficits in ToM functioning among people with autism (Baron-Cohen 1995). In addition we now have an increasingly detailed picture of the neurological mechanisms involved in ToM (Baron-Cohen, Tager-Flusberg, and Cohen 2000; Williams, Whiten, Suddendorf and Perrett 2000).

agents, a group of ancestors in this case, have access to all our thoughts introduces a whole new level of complexity to these kinds of calculations. In particular if other people think that you think that the ancestors will find out and punish your wrongdoing (even when no earthly agent has any power to find out these things) then this has implications for your reputation in the eyes of others. A cook devoutly preparing offerings for the ancestors may accrue the respect and trust of others, or risk incurring censure and punishment, in ways that a cook preparing dinner for her husband may not.

Now, we could in principle go on like this for some time, picking out bits of the Kivung ritual that seem to satisfy the input conditions of various postulated domain-specific cognitive mechanisms. If we were to do that we would no doubt find that many behaviours require explanation with recourse to more than one (perhaps many) psychological mechanisms. After all, we have observed that it would be insufficient to explain the behaviour of cooks preparing offerings to the Kivung ancestors only with reference to, say, the agency-detection system. This same behaviour also involves ToM mechanisms since the ancestors are attributed special mindreading capabilities (and will know if one of the cooks even thinks about eating the food she is preparing). And we have also noted that this part of the ritual excites mechanisms dedicated to intuitive moralizing, since an offering given from the 'back of the hand' would harm the ancestors. But we need not stop there. Preparing food for the temple also involves the hazard-precaution system, since the idea of tainted offerings gives overt expression to pollution anxieties. And there are many more candidate mechanisms that could be implicated in one way or another in just this single feature of the ritual process.

It might be argued that if we were to persist in this type of exercise for long enough we would end up with an explanation for the Kivung ritual, and all other rituals that exhibit similar features. I have my doubts about that, however. Although we could certainly do a great deal more to explain our Kivung ritual (and millions of other recurrent behaviours like it, all around the world) by pursuing this strategy to its limits, we will eventually discover that there are important features of the observed behaviour that cannot be understood in that way, either because the approach is too narrow to encompass all the relevant facts (a problem of lack of comprehensiveness of the approach) or because the approach excludes more creative aspects of cognition responsible for the variability of thinking and behaviour from one cultural tradition to the next (a problem of lack of particularity of the approach). Both problems have always haunted the hardline cognitivist approach to explaining culture. But I will argue that they can also be overcome if we expand our conception of cognition to encompass processes that are often *conscious* and always *his-*

torically constituted. Herein, I believe, lie particularly fertile opportunities for the integration of cognitivist and interpretivist approaches.

Cognition and Religious Variation: Where Ethnography, History, and Science Meet

Hardline *interpretivism* envisages culture as an unstable (continuously contested, mediated, disrupted) network of meanings and inter-subjective states that hovers somewhat mysteriously above (or at least beyond) all other ontological levels of reality (e.g. the psychological or the biological) and is certainly irreducible to them. But I favour an alternative view of culture. We learn about other people's thoughts and feelings through empathetic dialogue and observation.[9] Over time, we can build up such a rich understanding of other people's construals of the world that they seem to assume a systemic quality more or less tentatively generalizable to others in their community, marking the group off from others living in different places or historical periods. The challenge for ethnographers and historians, it seems to me, is to characterize accurately such patterns among individuals and populations, present and past. Explaining how the patterns came into being certainly entails close tracking of the way they change over time or are spread through the movement of people and things across space. But in order for people to invent or spread their ways of thinking to others, within and across the generations, requires tools—not just physical artefacts, like books and buildings, but also mental tools, such as the ability to acquire new concepts and to recognize their potential applications. Such abilities certainly include the kinds of domain-specific cognitive mechanisms discussed in the last section and understanding such mechanisms takes us a long way in explaining the behaviour of most mammals, ourselves included. But the case of humans is complicated by the fact that we have an extraordinary capacity for innovation and learning and therefore for the transmission of cumulative bodies of *acquired knowledge*. Only some of our psychological mechanisms confer this advantage, as we shall see, but they do so in ways that have consequences for the operation of all the kinds of mechanisms discussed above.

9. Although, as should be clear from the discussion of so-called Theory of Mind in the last section (and in many other parts of this volume), cognitive science has contributed more than any other approach to the development of a theoretical understanding of empathy and its role in human communication and sociality.

To understand why, it is helpful to return to ethnographic case material. Our Kivung ritual does not end with the laying out of offerings. Once the tables have been carefully prepared, and various minor rites have been performed, everyone leaves the temple—except for one man, who remains inside. This man observes a vigil, listening and watching for signs that the ancestors are present (Whitehouse 1995: 70–73):

> The official who keeps a vigil in the Cemetery Temple (between approximately 1.50 p.m. and 3.45 p.m.) plays the part of a kind of observer. His Pidgin title of *kuskus* (literally 'clerk' or 'bookkeeper') associates him with Western government structure, particularly the officials who keep records on what is said at meetings. I will refer to the *kuskus* as a 'witness'… After entering the temple, the witness goes to sit in a small cubicle, built in the corner of an external wall and a wall dividing the two rooms of the house. According to Kivung ideology, he remains seated until 3.45 p.m. During the period that he sits there, the witness may hear a knocking at the door indicating the arrival of the ancestors, or he may hear a faint clattering of plates, cutlery or bottles, or the creaking of a door. Such sounds are caused by the ancestors who have come to receive the offerings. Although they create noises, the ancestors are never visible. An analogy with the wind is often made, for just as the wind moves the branches of trees yet is itself invisible so the spiritual substance of the ancestors moves objects in the Cemetery Temple thereby creating noise. These noises always cease before 3.45 p.m. and their cessation may be marked by another sound of knocking on the door. When the noises have stopped, it means that the ancestors have finished 'eating' and have departed. Sometimes the witness hears nothing in the course of his vigil.
>
> The task of the witness is to keep a mental note of any noises that occur during his vigil, representing evidence that the ancestors came to receive the offerings. All the men who act as witnesses are supposed to possess considerable courage and moral fibre since proximity to spirits, even the 'good' ancestors, is held to be dangerous to those who possess inadequate conviction and faith and who therefore have reason to fear the wrath of God and the ancestors. The danger is twofold: in the face of presumptuous behaviour on the part of the morally weak, the ancestors may confer sickness upon them and also the fear of the morally weak can itself cause sickness.
>
> At 3.45 p.m. the village 'bell' is struck three times once again, indicating that it is time for those villagers wishing to eat and to hear

the news from the witness (this could be anybody in the community) to gather outside the front door of the Cemetery Temple. The man in charge of the boss's room is the first to arrive at the cemetery. He knocks on the door of the Cemetery Temple, announces his identity, then opens the door and enters. The witness remains seated in his cubicle while this man checks the plates containing food, first in the 'lower' room and then in the boss's room. He may find that the food has not been disturbed, or he may notice that the rim of one or more of the plates has been splashed with food or that there are other signs of disturbance (e.g. a hole in a taro tuber where a morsel of food has been removed). If such signs are discovered he will show them to the witness who, until that moment, presumably does not know of their existence. Meanwhile, a team of helpers removes the food from the house and places it on leaves and tables in the open air. Then the witness and man in charge of the boss's room emerge from the Cemetery Temple into the light to find another kind of official (an 'orator') standing there with his back to them, facing a gathering of some or all of the villagers (depending on who wanted to come). The man in charge of the boss's room goes to join the throng while the witness goes to stand a little to one side and behind the orator. The hushed chatter of those gathered sinks into silence while the witness whispers into the orator's ear, informing him either that the ancestors did not come or that he heard certain noises and the food was disturbed indicating that the ancestors did come. The orator in turn conveys this information to the gathering. If the ancestors did not come, it means that the living have committed some offence, thereby contaminating the offering and rendering it unacceptable to the ancestors. In such a case, the orator urges the people to consider how they have caused offence (it may be that all, some or just one of them is/are to blame). He tells them that a monetary collection must be performed soon to wipe the slate clean and restore moral purity in the village. He probably reiterates the impossibility of being reunited with the ancestors if evil continues to flourish among them, or he may focus on the horrors of damnation. If the ancestors have come, the orator relates the evidence to his audience and urges everyone to continue along the righteous path which they have evidently found and to strengthen themselves against corruption by Satan … After brief applause, the orator, the witness and the whole gathering repeat together the Lord's Prayer, and everybody shakes hands. The Lord's Prayer has a special significance for Kivung members insofar as it seems to focus on the

themes of returning ancestors ('Thy kingdom come …), the harmony of the group ('… as we forgive those who trespass against us'), and other central principles of Kivung doctrine.

Many of the details of what happens in these additional parts of the ritual arguably involve the same psychological mechanisms we have already considered. For instance, the witness's agent-detection systems are highly primed for signs of ghostly presence, since observing these events is the ostensible purpose of his vigil. The evidence as to whether or not the ancestors came to 'eat' the offerings is taken as an indication of what the ancestors are thinking about the living and this requires the activation of ToM mechanisms. But there are also non-modular cognitive systems involved in all of this, one of which may be dubbed the 'cross-domain analogical thinking system' or 'CAT system'.

The CAT system is one of the most powerful mental tools in the human repertoire, since it enables us to borrow knowledge from one domain of experience and to use it to solve problems in completely different domains. Classic studies of analogical thinking present subjects with a problem and its solution and test the extent to which they are capable of applying this information to other kinds of problems. For instance, Gick and Holyoak (1980, 1983) would tell people a story about a military general who realized that he needed a large number of troops to storm a fortress. Unfortunately the roads leading to the fortress were all too narrow for him to deliver his troops to the target in sufficient numbers at one time. His solution was to divide his men up across the countryside so that they could all converge on the fortress at a pre-arranged time. Later, subjects in the experiment were told about the problem of a surgeon who needed to destroy a tumour but could not cut it out without damaging the surrounding organs. He had the idea of using a laser to attack the tumour in a more precise fashion but also realized that this would damage healthy tissue at the point of entry. The rationale is that subjects should use the general and fortress story to solve the surgeon's dilemma. They should propose that, just as the general attacked from several directions, the surgeon should direct the laser at the tumour from many different angles thus converging in a sufficiently powerful ray to destroy the growth but without causing any damage upon entry to the body. These kinds of studies have produced mixed results. Overall it is clear that people are more likely to produce spontaneous analogies to solve problems in real-world conditions than in artificial laboratory settings (Kokinov and Petrov 2001), a situation that has come to be known as the 'analogical paradox' (Dunbar 2001).

One possible explanation for this paradox may be summed up by the old adage that necessity is the mother of invention. Real generals and real surgeons have to find ways out of the problems they encounter whereas participants in a psychological study generally lack the motivation to draw analogies

between inconsequential stories. In the real world, analogical thinking delivers solutions to problems thick and fast. When seeking to persuade others to their way of thinking people routinely produce a rich variety of analogies, usually with strong emotional overtones (Thagard and Shelley 2001). It is a commonplace stereotype that politicians mix their metaphors but this may be because politicians' analogies are so prolific that they are hard for their producers to track in working memory.

During my field research on the Pomio Kivung, I found that the discourse of religious adherents was replete with analogies (*tok piksa* or 'talk picture' in Pidgin). Consider, for instance, the role of the witness which was construed as analogous to the role of a bookkeeper in government meetings. This analogy had immense significance for Kivung followers, because they claimed that the ancestors formed a ghostly assembly, itself modelled on earthly governments. According to my informants, this other-worldly government would soon return to 'this world' establishing a new system of administration and a powerful industrial base in the heart of their rainforest environment. People had detailed ideas about why and how this would happen and their ritual practices, including the temple rituals, were seen as part of the normal functioning of the ghostly assembly by close analogy with the House of Assembly in Port Moresby (the capital of Papua New Guinea). Moreover, when orators delivered their sermons at the end of the temple rituals, they prided themselves on their capacity for impassioned rhetoric, especially the ability to summon up new and exciting analogies. As I noted in my original ethnography (Whitehouse 1995: 81):

> The orators stir up a deep horror of the Devil and his many wives (evil female spirits), by stressing how sinners are separated from their social universe and sucked into a wilderness of hunger, fear, and loneliness and by focusing on the horrors of eternal damnation. The orators speak in elaborate and grisly metaphors which capture the imagination and instil fear into would-be sinners. They employ rhetoric and raised voices, charged with emotion. In view of the frequency of these meetings, the key speakers have highly developed oratory skills and powers of persuasion.

The CAT system figures prominently not only in the speeches of accomplished orators but in the daily discourse of ordinary Kivung followers. My fieldnotes soon became filled with colourful analogies and elaborate metaphors used to illustrate and justify the movement's doctrines. Mark Turner (1996) has argued that this predilection for parable is fundamental to all human thought. The title of his intriguing book, *The Literary Mind*,

amply makes the point. To the extent that this analogical impulse is a pervasive feature of human thought (even if somewhat muted in the laboratory) it is hard to envisage a domain of human behaviour that does not in some way provide grist for its mill.

According to archaeologist Steven Mithen (1996), the capacity to make analogical connections between domain-specific forms of intelligence was a somewhat recent evolutionary adaptation in the hominid lineage. Mithen assembles a range of evidence suggesting that Early Humans possessed advanced forms of specialized intelligence in the domains of social thinking, technology production and use, and natural history. But these specialized forms of intelligence were 'cut off' from each other, so that there was no means of using technical intelligence to solve social problems or of using knowledge of natural kinds to organize social categories and statuses. The 'joining up' of these specialized capacities in Modern Humans explains the sudden profusion, in the archaeological record, of artefacts used as social markers (e.g. worn as body decorations) and of more complex forms of social organization based on analogues with natural taxonomies. Once fully established, the CAT system was capable of linking the outputs of literally any other cognitive system. To distinguish this type of system (and we must bear in mind that there may turn out to be a number of them[10]) from those that are domain specific, I propose to refer to the latter as 'nuclear systems' and the former as 'global connection systems'.

Innovations delivered by creative thinking would be of limited value if they could not be passed on from one generation to the next. For that type of cumulative learning to take place, we require systems of information storage (including external mnemonics and technologies of the intellect) capable of encompassing at least some key features of the outputs of all the other mechanisms in our cognitive repertoire and of binding them together into relatively durable networks of information packets. One such evolved cognitive

10. The forging of creative connections between distant or previously unconnected domains of knowledge may involve cognitive systems other than analogy-formation. For instance, logical or analytic thinking is also capable of creating novel conceptual connections and appears to operate in ways that differ significantly from what is sometimes called 'insight-thinking' (which includes analogical thinking). Whereas progress towards novel connections is *gradual* in logical thinking, it appears to be more *sudden* in the Eureka moments of insight-thinking (Metcalfe 1986). And whereas verbalization can adversely affect insight-thinking, this seems not to be the case with logical thinking (Schooler and Melcher 1995). These sorts of differences suggest that logical thinking should be viewed as a separate cognitive system from analogical thinking, even though both are types of global connection systems.

system in humans is 'semantic memory'.[11] Semantic memory is typically defined in contrast with 'episodic memory'.[12] Episodic memory refers to our capacity to recall distinctive moments in our lives. All mammals and birds possess a significant capacity for episodic remembering, such that specific types of cues trigger recall for relevant information about past experience. In apes, this type of remembering is rather highly developed. Chimpanzees, for instance, can recall quite large volumes of information but only in ways that are tied to *concrete encoding experiences*. For this reason, Merlin Donald (1991) describes ape culture as 'episodic', meaning that all new information, even the sort that is acquired through creative innovation, is tied to unique situations or episodes. One of the most strikingly distinctive features of human cognition is the capacity to store *general knowledge* about the world (objects, stories, people, dates, sequences, theories, and so on) in a manner that is quite independent of episodic recall (indeed, in the case of much of our general knowledge, we are helpless to recall the circumstances in which we first acquired it). This is what we mean by 'semantic memory'. As Donald has argued in considerable detail, the evolution of semantic memory in the mental armoury of our ancestors constituted a major cognitive breakthrough of unrivalled significance for the cumulative storage of cultural information.

The extraordinary value of semantic memory is that it enables each one of us to become a walking, talking encyclopaedia—a storehouse for knowledge. The evolution of such a system means that we can stockpile many of our greatest creative inventions and discoveries and pass these on to future generations. In order to exploit that capacity, however, there are some costs. While much of the information in semantic memory would be gathered informally through everyday experience, expert knowledge must be built up through long-term study involving regular review and rehearsal of the information acquired. In modern urban environments this involves formal schooling and examinations and it also increasingly involves the use of external data storage devices (ranging from traditional libraries to advanced digital archives) to extend our limited cognitive capacities. In the ancestral environment in which semantic memory mechanisms evolved, however, the first emergence of even rather limited capacities for explicit (teachable) information storage would have been revolutionary. Instead of having to rely on the outputs of nuclear systems (such as the contamination avoidance repertoire) or even global connection systems (such as analogical thinking) to decide how to respond to new situa-

11. For an excellent overview, see Baddeley 1997: Chapter 13.
12. Following the distinction first made by Tulving 1972.

tions, our ancestors could begin to rely on the lessons learned by their forebears.[13]

This meant that the actual domains of all kinds of cognitive systems were greatly enlarged. In the case of our global connection systems—such as the CAT system—the expansion of potential inputs would have been vast. And as storage capacity became enlarged through the development of the semantic memory system, our access to creative innovations from the past would have grown accordingly. This expansion, however, would still have been structured and constrained in various ways by our nuclear systems. For instance, our capacity to store information about the natural environment would have been constrained by nuclear systems dedicated to the construction of taxo-

13. One of the most ambitious theories of the cognitive and evolutionary foundations of human culture to date is that proposed by Tomasello (1999; see also Tomasello, Kruger, and Ratner 1993). Tomasello, like me, wants to explain distinctively human capacities for cumulative cultural transmission, whereby the knowledge and skills of one generation can be passed on to the next (a process he and his colleagues have labelled the 'ratchet effect'). Tomasello argues that creativity is not the key to this, since other primates show highly innovative tendencies as well (1999: 5). Rather, it is that humans uniquely have developed ways of *preserving* the outcomes of innovation. Tomasello thinks that knowledge-preservation can be explained by a cluster of cognitive mechanisms, among which 'perspective-taking' (ToM) plays a leading role (1999: 5–12). The present argument differs from Tomasello's in two key respects. First, humans are strikingly more creative than other primates insofar as our innovative and creative ideas are activated and applied *across* domains, hence my referring to analogical thinking (and other methods of creating cross-domain connections) as 'global systems'. Second, the mechanisms Tomasello focuses on are implicated in only some aspects of the ratchet effect, and are certainly not sufficient to account for it. Perspective-taking, for instance, undoubtedly plays an important role in most (but by no means all) forms of cultural learning, enabling us to 'learn not just *from* the other but *through* the other' (Tomasello 1999: 6, original emphases). But this is not a crucial feature of all distinctively human types of learning. The malfunctioning of ToM mechanisms in people with autism does not, as Tomasello seems to imply, necessarily imply a catastrophic failure of cultural learning. On the contrary, people with autism often show above-average capacities for acquiring expert knowledge in a wide range of domains. And despite the handicaps of their condition, some autistic individuals have contributed immensely to the store of human knowledge. The most immediate and obvious cause of the ratchet effect is not our capacity to imagine the world through other people's eyes but rather our capacity to *store* the information acquired from others so that it is available to conscious inspection, evaluation, and creative modification in the future. Explicit memory and cross-domain creativity constitute the key to this revolution. To use the terminology developed in this article: perspective-taking, along with the other nuclear mechanisms discussed by Tomasello, contribute significantly only to *some* aspects of learning; our global systems, dedicated to connecting and storing information, play an essential role in *all* forms of cultural innovation and transmission.

nomic databases and our knowledge about potential contaminants would have been constrained by nuclear systems that were naturally aroused by things that look rotten or smell bad. As intuitive botanists and healers, our capacities to harness and extend natural processes and to protect ourselves from diseases were inevitably based more on trial and error than on well-founded theories. Yet trial and error, driven by intuitive nuclear systems, is still capable of producing prodigious bodies of knowledge. Informal hypotheses generated by global creative systems, and 'stored' in semantic memory, could now be passed on and developed over many generations. So successful has this process been in human history that modern theory-driven science, which seeks to transcend the constraints of our nuclear systems, nevertheless is increasingly demonstrating the efficacy of many traditional remedies.[14]

One of the areas of human striving in which the constraints of intuitive thinking are somewhat loosened is the domain of *religion*.[15] Speculations about entities that don't exist (or that we cannot prove exist) and about origins that are little understood (i.e. concerning which we have limited evidence) present us with seemingly unlimited opportunities for cosmological innovation. Armed with tools for creative reasoning, such as the CAT system, modern humans were free to develop belief systems of extraordinary diversity. Connections made between one cluster of ideas and another could now be fixed in semantic memory through regimes of teaching and rehearsal. This fixation of the implicational or analogical links between otherwise quite unconnected ideas allowed the first emergence of what might be called 'doctrinal systems'.[16]

We have to be very careful at this point in the argument, however, because we teeter on the brink of ontological error. A doctrinal system is not a unitary 'thing' out there in the world, still less a 'being' of some kind with intelligent purposes of its own, but rather a series of countless iterations and reiterations stored in semantic memory as a set of templates (commonly called 'schemas' or 'scripts' by psychologists) that inform and guide our thinking and behaviour

To return to our ethnographic example, Kivung followers all told me strikingly similar things about the origins of the world, the history of their strug-

14. For a rounded evaluation of the scientific evidence on this topic, see Fontanarosa 2000.

15. Elsewhere, I have described these aspects of religion as 'cognitively costly' (see especially Whitehouse 2004: chapter 3).

16. See Whitehouse 1992, 1995, 2000, 2004; Whitehouse and Laidlaw 2004, Whitehouse and Martin 2004, Whitehouse and McCauley 2005.

gles with neighbouring groups, their experiences of colonization by the Germans and then the Australians, about their hopes for deliverance by their ancestors, the sacrifices this entailed, the meanings of the rituals they had to perform, and so on. This amounted to a substantial body of knowledge that gradually filled up my fieldnotes, to a point where I began to realize that everything was connected to everything else either by implication or by analogy. That insight was not my own special discovery, for it was more or less explicitly illustrated by every sermon I ever heard delivered by the Kivung's orators and other officials (and I heard a lot of them). What the orators knew, long before I came to know it as well, was that the cosmology and doctrine of their religious tradition formed an integrated network of connections that could be explored in speech, often in genuinely creative ways, but only by traversing well-worn tracks between the component concepts and networks of concepts. What gave these tracks their relative fixity was, as with a real track, the fact that people went over them time and again rather than randomly deviating and criss-crossing them. In the Kivung, unauthorized innovation on matters of doctrine and narrative was socially sanctioned. And heresy could not be committed inadvertently since regular reiteration of the orthodox canon ensured that innovations would always be noticed. This is one of the great accomplishments of semantic memory—that it facilitates not just recall for individual items but for elaborate networks of connections among them. Since semantic memory capacities evolved as a means of domain-general information storage all recurrent patterns of events in the world constitute its proper domain, including all the outputs of nuclear and global connection systems. I shall refer to semantic memory as a 'global storage' system.

Thanks to the presence of global storage systems in the human cognitive repertoire, cultural innovation never starts from scratch. The case of Kivung religion shows, even when we focus only on one type of ritual performed in one of its temples, that nuclear and global connection systems shape and constrain what people say and do at every turn. But no matter how closely we focus on those systems they will never enable us to explain why the Kivung tradition embraces particular configurations of systems and outputs while another tradition elsewhere embraces another. What is it that gives religious traditions their local and historical particularity, even though their members are all equipped with the same cognitive toolkits? The answer lies in the operations of global storage systems like semantic memory that impose a degree of fixity on particular configurations of representations, resulting from cumulative past experiences.

In talking about 'a degree of fixity' I do not mean to suggest that cultural systems really are fixed—only that they are somewhat resistant to change.

Once an elaborate network of schemas has become distributed in the memories of a population, it can certainly be changed but if that process happens swiftly then people will notice and could object (and may well have more or less explicit methods of co-operatively punishing unauthorized innovators). Slower processes of change (over years or generations) would of course be less noticeable except when one deliberately reflects on the subject (as an historian, or when engaged in autobiographical rumination). There are of course many ways in which distributed semantic schemas can change but at least some gross features of historical transformation owe their existence to the dynamic interaction between nuclear systems, on the one hand, and global systems, on the other.

Every time a mental representation is activated there is a risk that it will be transformed. Insofar as rehearsal reduces the risks of memory distortion and decay, frequently-activated schemas in a population will tend to be more robust than irregularly-activated schemas. To the extent that frequency of activation is modulated by the presence of artefacts, such as texts and iconography, it makes some sense to understand semantic memory as augmented by 'extended' global storage systems.[17] And to the extent that we can rely on others to reproduce specialized knowledge on behalf of others, it makes sense also to talk about 'distributed' global storage systems (Hutchins 1995). But no matter how important external mnemonics and expert knowledge may be in the reproduction of cultural schemas, the persistence of those schemas over time depends crucially on regular rehearsal (if only among specialists). When transmissive frequency falls below a critical level, there will be a risk of distortion. Distortions, however, are never random. All else being equal, the filling of gaps in semantic memory will be influenced most directly by in-

17. Donald goes so far as to argue that extended cognition, or 'external symbolic storage', constitutes a one of three major transitions in hominid cognitive evolution that were necessary for the emergence of distinctively human culture (his other two transitions are, first, the emergence of mimetic capabilities, that is being able to re-enact events, which he argues first appears among *homo erectus* populations, and, second, the development of speech systems). Although it makes some sense to regard extended cognition as a global storage system (facilitating the accumulation of information that could not otherwise be available to recall), we should not forget that artefacts (including inscriptions and computers) have to be interpreted by internal cognition in order to 'store' anything. Moreover, for most of human history, external storage has played a comparitively modest role in cultural transmission. Even rudimentary writing systems are no more than about 6,000 years old and the massive data storage capabilities afforded by computers only began to be realized half a century ago. So we should be cautious in over-estimating the importance of external storage in cultural transmission from the viewpoints of *both* evolution *and* history.

tuitive 'nuclear' systems. This weighting of cultural innovation in favour of intuitive thinking has been dubbed the 'cognitive optimum effect'.[18] The idea is that people readily 'default' to the easiest ways of representing information, in the absence of strong inducements to engage in more cognitively challenging ways of thinking. Among American Christians, for instance, it has been shown that 'theologically correct' ideas about divine omnipresence are easily overridden by more intuitive notions that God can only respond to one prayer at a time (Barrett and Van Ormann 1996). And we have growing evidence that 'theologically incorrect' religious ideas (i.e. more intuitive versions of authoritative teachings) are much more pervasive among rank and file members of religious traditions than among religious experts (Slone 2004).

Arguably the most elaborated attempt so far to synthesize cognitivist and interpretive perspectives on religion is the theory of 'modes of religiosity', arising initially out of ethnographic observations[19] but subsequently modified and extended through extensive collaboration with anthropologists, historians, and cognitive scientists.[20] The essence of this theory is that the transmission of two very general patterns of religious thinking and behaviour depends on the exploitation of both nuclear and global cognitive systems. In order to achieve widespread credibility, for instance, religious representations must have at least some cognitively optimal features (that is, they must meet the inputs conditions of our nucleated, intuitive cognitive systems). This is in accord with the claims, summarized in the last section, that have been repeatedly made by the cognitivist camp (and that are favoured by many contributors to this volume). But the cultural and historical particularities of religious traditions arise from the creative application of global connection systems and their fixation by means of global storage systems.

The theory of modes of religiosity postulates broadly two routes to creativity and storage. One (the doctrinal mode) emphasizes frequent repetition of core concepts and the connections that bind them together in semantic memory. The other (imagistic mode) emphasizes rare, climactic religious experiences and the formation of epiphanic insights and exegetical innovations. These two modes of religiosity, often present within the same tradition, not only bring about (and reinforce) highly distinctive patterns of activation of cognitively optimal religious concepts but they also give rise to massively coun-

18. Boyer 1994 (see also Whitehouse 2004).

19. Whitehouse 1995, 2000, 2004.

20. Whitehouse and Laidlaw 2004; Whitehouse and Martin 2004; Whitehouse and McCauley 2005.

terintuitive religious knowledge, such as the 'theologically correct' concepts of doctrinal elites or the esoteric revelations of mystics and expert cosmologists.

Tensions between the 'theologically incorrect' outputs of nuclear systems and the more cognitively challenging concepts of religious experts figure prominently among the causes of religious reformations, not only in Christianity but it would seem in all doctrinal religions. Religious reform is always at least partly an attempt to rectify theological incorrectness by establishing an uncompromising vision of the one true doctrinal system subjecting adherents to an extraordinarily intensive regime of high-frequency repetition of its cardinal concepts. But heavy repetition also carries costs, not just in terms of time and labour but potentially also in terms of morale and the maintenance of authority. High-frequency repetition of religious doctrine and intolerance of competing perspectives can lead to disaffection and ultimately to the formation of religious splintering and sectarian division. In such cases, the influence of nuclear systems (e.g. concerned with coalition-formation and the punishment of defectors) may figure prominently but theological innovation is very often driven by the same kinds of global systems that animated the original movements of reform, rather than by the so-called 'cognitive optimum effect'. These different consequences of nuclear and global cognitive systems are capable in principle of being theorized systematically, ultimately holding out the possibility of a thoroughgoing synthesis of cognitivist and ethnographic/historiographical perspectives on culture in general, and religion in particular.

Conclusion

Social and cultural anthropologists who are interested in explaining religion have much to learn from cognitive approaches. The evidence that our minds are composed of numerous specialized tools for handling different types of information is supporting increasingly plausible claims about the shaping and constraining effects of cognition on the invention and spread of culture in general, and religion in particular. So far, the contributions of cognitive scientists have focused rather heavily on a small set of domain-specific cognitive specializations (what I have been calling 'nuclear systems') in generating *universal* features of religious thinking and behaviour. Children, it now seems, cannot be raised to believe just anything; nor can adults be converted to any type of ideological system. Religions must exploit certain fundamental universal human intuitive biases and predilections if they are to get a foothold. The cognitivist project has certainly been valuable in explaining why many features of religious thinking and behaviour are much the same everywhere.

But religions also *vary* significantly from one place to the next. They differ not only their myriad details but also at the level of what we might call a 'middle range' of generalization. For instance, patterns of communication and exchange with putative supernatural beings are readily grouped into loose families of similar types of acts (prayers, rites of passage, sacrificial rituals, and so on) that receive strikingly different emphasis from one religious tradition to the next. Likewise, systems of belief exhibit highly contrasting cosmological, theological, ethical, and aesthetic predilections and biases. Patterns of leadership and spread are also highly variable, based on diverse types, and combinations of types, of authority claims (e.g. messianic, prophetic, textual, revelatory, etc.). This kind of variation, which has been the traditional focus of *interpretive* approaches to the study of religion, is salient for the very obvious practical reason that apparent differences between religious traditions provide a basis for coalitional thinking and contestations of identity. But it may also be salient theoretically, insofar as we are able to devise plausible explanations for varying patterns of practice, belief, scale, and structure in the world's diverse religions.

I have argued that the most promising explanatory strategies will be those that combine cognitivist, ethnographic, and historiographical perspectives on religion. The theory of modes of religiosity is one such approach. According to this theory, any universal tendencies towards certain types of religious thinking and behaviour are heavily shaped and constrained by socially and historically constituted prior patterns of innovation and transmission. But, at the same time, those patterns of innovation and transmission depend upon the presence of cognitive systems capable of forging novel ideas (and networks of ideas) and of 'fixing' those ideas in collective memory. Such processes are clearly influenced by the extent to which knowledge can be distributed and combined among specialists and by the ways in which external mnemonics (such as inscribing practices or commemorative artefacts and *aides memoires*) are used and elaborated. The theory of modes of religiosity focuses on just some (arguably significant) variables influencing the creation and storage of religious ideas, specifically such factors as frequency of transmission and level of arousal in the area of ritualized behaviour. But we are (or should be) witnessing only the beginning, and not the end, of a new synthesis of perspectives.

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