INTERDISCIPLINARY SCIENCE REVIEWS, Vol. 35 No. 3–4, September–December, 2010, 377–87

Why Evolved Cognition Matters to Understanding Cultural Cognitive Variations

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There is great intellectual substance in Geoffrey Lloyd's musings on the nuances of cognitive styles (Lloyd 2007) and a great many mischievous challenges to our entrenched assumptions too, as we have come to expect from such an impeccable yet unconventional scholar. Rather than discuss Lloyd's latest contributions to our appreciation of Greek and Chinese world-views, it may be relevant here to focus on the general issue, of the possible contribution of recent scientific findings, in psychology or neuroscience or biology, to an understanding of the role of cognition in culture.

Lloyd's piece in this issue contains precious elements towards this understanding. But it also seems to perpetuate a misleading description of the state of the art. As a correction to that picture, it may be important to stress that evolution does not usually result in innate cognitive structures, that more learning requires more, not less, genetically specific structure, that most cognitive processes are not accessible to conscious inspection and therefore also to ethnographic investigation. It may also be of help to emphasize differences between two kinds of mental events, intuitive and reflective, that are sometimes confused in anthropological discussions of cognition and culture. I suggest that a more accurate description may help dispel various misunderstandings, about the connections between evolution and cognition, between evolved cognition and cultural representations, and about the need or value of certain kinds of anthropological relativism.

Intuitive and reflective understandings

A crucial distinction that needs to be emphasized here is that between *intuitions* or intuitive understandings, with their underlying cognitive machinery, on the one hand, and *reflective* information and beliefs, on the other.

An intuition or intuitive understanding, for the sake of this argument, is simply the occurrence of some information that is potentially consciously accessible and directs the agent's expectations and behaviours, although the pathways that led to holding that information are not accessible to conscious inspection. Consider for instance the following situations:

DOI 10.1179/03080181 0X12772143410449

[a] an infant expects a solid object on a collision course with a solid surface to bounce against it, not to fuse into it (Spelke *et al.* 1995)
[b] after dissecting a crocodile and observing its innards, a person asked what is inside another crocodile spontaneously assumes that it must be the same stuff — but she is less confident if the second animal is a snake (Gelman *et al.* 1994)
[c] people primed with quick exposure to faces of minority men tend to misidentify pictures of tools as weapons, while they make the opposite mistake when primed with male faces from their own ethnic group (Payne 2001).

Reflective information, on the other hand, is consciously held information that has the effect of extending, making sense of, explaining, justifying, or communicating the contents of intuitive information. For instance, in the cases described so far, we can have the following reflective processes engaged:

[a] people asked about the trajectories of tennis balls explain them in terms of 'impetus' or 'force' and 'bouncing'
[b] informants tell us that there is some unique quality, in each animal, that makes it a member of a species, and that it must be inherited — it cannot be acquired
[c] people say that members of a particular ethnic group are lazy, aggressive, irresponsible, etc.

In each domain considered here — and the distinction holds across many other domains — intuitive understandings may or may not be conscious mental events, but their origin is not accessible. They just pop up, so to speak, as a largely automatic and fast result of being presented with the relevant stimuli. In contrast, reflective mental events take more time, are largely accessible and generally under cognitive control.

Although we use the terms intuitive and reflective, we are not in any way engaging debates in the philosophy of mind about the status of these different kinds of representations. These are just convenient labels for the empirically observed difference between two kinds of information. Also, by way of pre-empting confusion, note that the distinction between 'intuitive' and 'reflective' is *not* supposed to map other familiar distinctions, between, e.g. 'psychology' and 'culture' or 'natural' and 'cultural'. Indeed, as we will see presently, a number of misunderstandings in this domain stem from confounding all these oppositions.

Now the best way to describe the cognitive machinery involved in creating intuitions and their reflective after-effects is in terms of highly specialized, domain-specific cognitive systems. This domain-specific view of cognition informed by different principles was first popularized by developmental psychologists (Hirschfeld and Gelman 1994) and it has received considerable support from both developmental psychology and the study of highly specific cognitive impairment (Caramazza and Shelton 1998). Neuroimaging and cognitive neuroscience are now adding to the picture of a federation of evolved competencies that has grown out of laboratory work with children and adults. This view is supported by a wealth of findings from experimental

and developmental psychology, linguistics, neuropsychology, and the neurosciences (Gazzaniga 1998).

In this view, evolution by natural selection favours the evolution of systems that handle recurrent fitness challenges. This is why we have evolved capacities to handle such issues as evaluating the fitness value of a potential mate, assessing the number and identities of people who would form a coalition with us, detecting who is taking advantage of us in social exchange, avoiding probable sources of pathogens and toxins, reading mental states from facial expressions, measuring the predation danger of different landscapes, forming hypotheses about non-physically present agents, and a myriad other such domains (Boyer and Barrett 2005). The point of these systems is *not* to provide us with a philosophically coherent or empirically valid map of social and natural environments, but to nudge us towards behaviours that on average increased fitness over long periods.

It may be of help at this point to emphasize a number of characteristics of evolved intuitive systems:

Intuitive understandings are not necessarily 'innate', if this term means that they are present at birth and carry the same contents at different stages of development. That is, no-one needs to assume that infants' minds include, e.g. an 'animal' concept that is identical to the intuitive understanding of animals in adults. All that is implied here is the capacity to form such understandings, given normal environments. It would be very surprising if cognition emerged fully-formed, when so many other evolved capacities take a long time to unfold. Humans are not born equipped with teeth or a working system of sexual drives. Throughout an organism's lifetime, many genes are tuned on or off during development at appropriate stages.

Intuitive systems are learning systems. Each domain-specific system is specialized in picking up particular kinds of information in the organism's environment. So, contrary to a widespread assumption in popular understandings of genetic evolution, acquired information and genetically specified information are not a zero-sum system (Barrett 2005b). On the contrary, organisms (e.g. primates) that can acquire vast amounts of information from their environments need vastly more specified initial dispositions than organisms (e.g. invertebrates) that acquire less. Between species, more learning invariably means more instinct, so to speak. This is particularly relevant to humans, whose capacity to store information in the social environment, i.e. in other people's heads, is without parallels in the rest of the animal world (Richerson and Boyd 2006; Tomasello 2000). Humans can be said to live in the 'cognitive niche', in the sense that their ecological milieu consists in information, often provided by conspecifics (Tooby and DeVore 1987).

Evolved cognitive systems result in contextually appropriate intuitions. This is because intuitive understandings are there to allow organisms to acquire information that is contextually appropriate, and to calibrate behaviour according to that behaviour. For instance, it is not really plausible that humans in general have a certain impulse towards aggression, which finds its outlet in such behaviours as pub fights, warfare and office politics. It would make little sense to have an aggressive drive, since belligerence enhances one's fitness only in some specific contexts and is highly detrimental in others

(Daly and Wilson 2001). In terms of evolutionary design, it would make more sense to expect that aggression, together with conciliation or coalition-building, is part of a suite of available behaviours triggered by relevant cues in the social environment (Sell *et al.* 2009). This in turn predicts that people will intuitively adopt different strategies in different environments. Consider for instance the fact that, in some places, one tends to react aggressively even to minor insults, while in others people shrug off even major attacks (Nisbett and Cohen 1996). Such cultural differences are to be expected. An evolved computational system can evaluate the relative costs of violence and non-violence in the particular social environment (Daly and Wilson 1988; 2001). The whole point of evolved systems is that they are learning systems, which pick up specific appropriate information in the environments, and one should expect these to produce appropriate, that is, *different* results in different places.

That is why it is certainly wrong to expect intuitive understandings to produce cultural universals. Conversely, it would be equally misguided to assume that reflective understandings are invariably culturally specific. Consider for instance people's understandings of morality, which develop from an early age in highly similar forms in different places (Turiel 1998). People form moral judgments on the basis of intuitions about the intrinsically right or wrong nature of a behaviour. These intuitions are then, sometimes, explicated in terms of general moral principle. There is ample psychological evidence to suggest that the reflectively represented principles do not actually direct people's judgements, but constitute an attempt to justify them (Greene 2005; Haidt 2007). But these explicit principles are not indefinitely flexible. They make use of notions of harm, intention, relative welfare and equity that are common to different cultural environments, even if the specific moral rules (e.g. whether killing ~~an aggressor~~ to kill) are different (Haidt *et al.* 2008; Miller and Bersoff 1994; Yau and Smetana 2003).

Evidence from ethnography and history

The distinction between intuitions and reflective beliefs is crucial, if anything because in many cases, people's reflective understandings are not entirely compatible with their own intuitions. This is often true of morality, and is particularly clear in the case of religious concepts. People maintain an explicit representation of superhuman agents (ancestors, gods, ghosts, etc.) that is largely in agreement with locally accepted doctrine (Barrett and Keil 1996). But implicit tests show that their spontaneous, everyday judgments are based not on such local cultural models but on common expectations about agents and intuitive psychology, regardless of differences in religious traditions (Barrett 1998; Slone 2004).

So it is always important to be clear about the evidence we have, and to determine whether it stems from people's intuitions or their reflective understandings. As mentioned above, most cognitive systems are not accessible to conscious inspection, although the outcomes of their computational operation may be conscious, in the form of intuitions or emotions. As a result, it generally takes experimental techniques to uncover the tacit principles

underpinning our common intuitions. In contrast, in many cases, reflective understandings can be elicited from informants.

It follows that most of the evidence gathered by anthropologists through common fieldwork (i.e. mostly through conversations), or by historians from archives, or by social scientists through questionnaires, are about people's reflective notions. These may or may not align with these people's intuitive understandings — whether they do is an empirical question that experimental work alone could answer.

This is the framework in which we should evaluate the import of the cross-cultural evidence that Lloyd, among others, brings to bear on the question of intuitive ontologies. For instance, Lloyd notes that:

> on such key topics as agency, causation, change, the emotions, and even the analysis of colour, there were fundamental disagreements between the Presocratics, the atomists, Aristotle, the Stoics and other Hellenistic philosophers, Epicureans and Sceptics. (Lloyd 2007)

1

Quite true, but that is orthogonal to the question, whether Greek people of that period actually had *intuitive* understandings of agency, causation, etc., that were different from ours or different from each other's. We do not know and we probably never will. Intuitive understandings of agency, for instance, are not tested by analyzing what people say about it, but by measuring, e.g. the way their reaction times differ, when focusing their attention on changes of location between animal-looking and artefact-looking things, respectively (New *et al.* 2007). The same can be said of Lloyd's next statement, that:

> very different ontologies were proposed by authors who spoke the same language and who lived under more or less the same type of political regime (that of the ancient Greek city-state).

Which is valid only if we take the term 'ontology' to denote a reflective, explicit understanding of the kinds of things the world is made of. This may be a very crude set of distinctions, as when an informant tells us that animals and people have 'breath', which plants and artefacts do not possess, or that humans are different from spirits in that the latter feed on the smoke of tobacco. The distinctions may be far more elaborate, as is the case when Greek or Chinese or other intellectuals ponder what the basic building blocks of the universe may be. In either case, we are dealing with explicit understandings of categories. These cultural or historical differences are orthogonal to what some people have chosen to call 'intuitive ontologies' (Boyer and Barrett 2005), perhaps not the most felicitous coinage as it may be rather misleading.

We cannot infer from reflective understandings to intuitions. Indeed, our own cultural environment provides a very nice illustration of this. Consider the proliferation of books, films, cartoon-strips and artefacts designed for children in modern industrialized nations. A large number of these cultural products are about animate artefacts or anthropomorphized animals, about helicopters that have children, tug-boats with emotional states and locomotives with a social life, not to mention the innumerable examples of talking animals and self-propelling artefacts. To an anthropologist from another

culture, all this would perhaps suggest that these Western folks must be the most confused people, in terms of their intuitions about the categories of animals, persons, plants and artefacts. But... that is precisely the population where the early development of strong ontological expectations was first observed, before being studied in other populations. This example also shows that familiarity is not the same as intuition. Many Western children are more familiar with talking crocodiles than with the real article, yet their intuitive understanding of crocodile behaviour is in terms of intuitive biological understandings that remain unaffected by this cultural trend. So a good rule in handling evidence from distant places is that we should not assume that exotic myths say more about exotic people's intuitions than *Thomas the tank-engine* says about Western ontology.

Do we need relativism (of any kind)?

Some authors cited by Lloyd have embraced some form of relativism about people's intuitive ontologies. They are not relativists in the usual anthropological or philosophical sense, but they do emphasize what they see as crucial differences in world-views, which in their view would challenge evolutionary psychological perspectives. It seems to me that this stance is unnecessary or unjustified, and that it stems mostly from the various misunderstandings mentioned above, namely, a confusion between intuitive and reflective understandings; the assumption that evolution results in innate, fixed and universal cognitions; and the assumption that learning a lot requires having less prior structure.

A persistent problem in using ethnographic examples for theoretical purposes is that the situations themselves are often described in vague or misleading terms, and therefore do not unambiguously support any specific theoretical point. This is the case, it seems, for the general framework of 'perspectivism' proposed on the basis of specific ethnographic examples (Descola 2009; Viveiros de Castro 1998), and briefly discussed by Lloyd. Consider for instance Viveiros de Castro's statement that Arawete humans do not see spirits and animals the same way as spirits see animals and humans, or the same way as animals see spirits and humans. This is difficult to interpret as the statement is couched in the typical anthropological idiom of reported beliefs (we are told what the Arawete world-view is, but not who said what when, how this information is extracted, etc.), including the use of reported speech as factual statements ('the gods think that...'). At the risk of being pedestrian, I must stress that the only perspective that the anthropologist knows is of course the Arawete or Shuar views. The anthropologist does not literally describe the spirits' perspective, as these agents, if they exist at all, are not among his informants. As for the animals, who do exist, the anthropologist has not done any observational or experimental work to evaluate their perspective. So, once rephrased in a literal, perhaps less flamboyant but more carefully empirical style, the claim is, among other things, that [a] the Arawete or Shuar see all animals as different from humans and [b] *people say that* the spirits see humans and animals as the same. In other words, the people who say these things are imagining that other (real

or imagined) agents' views may be different from their own. I would not labour the point, but whoever says these things among the Arawete or Shuar is *not* challenging any of their own intuitions, but reflectively considering that others may have different ones.

This is hardly a change of ontological commitment, especially if the main point is that spirits (are said to) see people as prey while people see them as predators. Predator and prey are relational terms, orthogonal to biological taxonomies. We have intuitive understandings of what typical predators are like, and what the interaction between predator and prey is like. These understandings seem to develop early, in similar ways in very different natural and cultural environments, including the Shuar (Barrett 2005a). But these understandings in no way entail that predators or prey be natural categories of organisms. Given appropriate cues, any animal can be intuitively perceived as a prey, or predator, or can turn from one into the other, as any hunter faced with a disgruntled wild boar will have noticed. In such situations, hunters can rely on fast automatic responses, showing that their intuitive systems can flexibly switch from predator to prey inferences.

The same can be said of Philippe Descola's classification of various cultural representations in terms of 'physicality' and 'interiority'. This is a particularly insightful way of sorting out commonalities and differences between the world-views and principles that seem to organize, among other things, myths and stories and local views on the meanings of dreams (Descola 2009). This is in other words a tool for classifying reflective understandings put forward in various places — which should not be confused with the operation of intuitive systems in these different places. As mentioned before, that plants have minds like people is something people can explicitly represent, say, discuss, justify or deny. Their intuitions about the features to be expected from plants can be tested in terms of attention focus, reaction-times, priming or other experimental techniques which are not part of the usual anthropological tools, although they certainly should be.

In what way disciplines (really) need each other

Now that misunderstandings or unnecessary hypotheses are out of the way, how should we approach these issues? There is little hope of putting forward plausible claims about human social and cultural natures that are not directly fed by encounters with local and historical specificity. Conversely, cultural anthropology, history and other disciplines interested in precise understandings of particular places and times have a great deal to gain from being more closely acquainted with the results of evolutionary biology and psychology (Slingerland 2008). That much should be agreed, but how does it work?

It may be of help to have a better description of the actual differences between the relevant traditions. Ever since C.P. Snow, it has been traditional to comment on, and lament the divide between natural sciences and the humanities (Snow 1959). But this is a rather imprecise, and actually misleading way of understanding the points of contact and differences between scholarship traditions. A more appropriate description would focus on what I called elsewhere different *modes of scholarship* (Boyer 20XX). These

are different ways in which particular scholarly contributions are organized, such that they are recognized as valid contributions to a field, and their authors as *bona fide* members of the 'guild'. These are rather striking and perhaps superficial differences a social scientist of scholarship would notice, before they dug deeper into the contents of that scholarship.

One can make a rough distinction of this sort between two ideal types of traditions, or legitimation strategies, that I would call the 'science mode' and 'erudition mode'. The science mode, without doing any philosophy of science, can be identified as what people do when they publish very short contributions, in a field where methods and most findings are agreed on, where people also agree on what the relevant issues are, and where the ideal model of a contribution is to test a model or set of hypotheses against some evidence, using statistics and other mathematical methods to evaluate the fit of the model. The erudition mode is recognizable at distinct traits. People publish either very short monographs or long compendiums, the point of which is to add to our accurate knowledge of a domain of reality. The ambition here is not to provide causal explanations for why the world is the way it is, but a catalogue of the way it really is in a particular corner, so to speak. The differences between these modes also have social consequences. For instance, people make contributions to science-like projects early in their careers, while advanced erudition often requires long experience of a domain.

Note that I am talking here about *modes of scholarship*, not about disciplines. It is possible, indeed it is actually the case, that these two modes are present in a single discipline, and often inside a single scholar's mind. The difference is between the epistemic goals, not the people or the academic departments. I am not claiming either, that these two modes exhaust the varieties of scholarly projects — only that the difference is of interest.

Most importantly, this is emphatically *not* a contrast between 'natural sciences' and the 'humanities', because the distinction proposed here cuts across these common categories. For instance, within the same discipline, one may work on models of plate tectonics (science mode) as well as document the physical history of a region (erudition mode). One may build price theories (science mode) as well as chronicle historical money systems (erudition). One may want to explain the role of symmetry perception in visual art (science mode) as well as catalogue the works of the Wu school (erudition). One may test hypotheses about ergative syntax (science mode) as well as classify Tibeto-Burman languages (erudition).

So how does this distinction play out in the social sciences? The two modes are usually combined in healthy disciplines, with intense intellectual traffic going in both directions, as for instance in linguistics, economics, archaeology or biology, but not at all in socio-cultural anthropology. It also used to be the case of anthropology. Science-like hypothesizing about, e.g. social structure or primitive mind, were tested against a growing corpus of erudite knowledge about various cultural environments.

Such exchange was for a while largely absent from anthropological debates. Indeed, some cultural anthropologists seemed to evince distaste, if not moral revulsion, at the idea of practicing science-like research. But this is only part of the story, for two reasons. First, anti-scientific movements were only

temporary fads. Second, that a particular, and particularly desirable research programme is not carried out in one official place, in this case the anthropology school or department, does not mean that it will not be carried out elsewhere.

Which is indeed happening. A great deal of anthropological-psychological research is in fact re-introducing the science mode to anthropology, in particular, through the introduction of evolutionary, neuro-cognitive or economic models to the study of traditional anthropological issues such as kinship (Jones 2003a,b), morality (Greene and Haidt 2002), parenting (Quinlan 2003), coalitions and ethnicity (Kurzban *et al.* 2001; Navarrete *et al.* 2004), ritual (Lienard and Boyer 2006), religious concepts (Barrett 2000) or the enjoyment of fiction (Zunshine 2006).

The science mode is back — but that should not be interpreted as devaluating the role of erudite anthropology and history, quite the opposite. These two modes of scholarship feed on each other, as I hope the examples of biology or economics, or indeed of a lot of classical anthropology, should amply demonstrate. Dialogue, however, is a rather dialogical affair, so to speak — it does not require a fusion nor a dissolution of identities. When people are engaged in erudition projects, they are not doing science and when they do science they do not usually contribute to erudition, and there is no reason to think that it should be otherwise. Genuine progress in understanding different cultures and traditions, of the kind Lloyd actively promotes and to which he has contributed so much, may require more than dialogues between disciplines — an effective combination of erudite and scientific projects within the mind of each specialist.

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