

Contributions to the Study of Culture and Cognition

by

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Dedication

Ai miei genitori, Fabrizio e Barbara Knight, con amore e profonda gratitudine.

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Abstract

Contributions to the Study of Culture and Cognition

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The five papers that comprise this dissertation illustrate the complexity of interdisciplinary work as well as the advantages of the culture and cognition approach.

Chapters II to IV use cross-cultural evidence to argue that the understanding of psychological processes such as the ontogenesis of belief attribution and categorization can be enriched by adopting this perspective. The two papers on belief attribution among Yukatek children show that this capacity emerges around age 6 (only slightly later than in other cultures); that children differentiate between the minds of humans and God from early on; and that children who perform well on human false-belief tests are able use their knowledge of differences between kinds of agents – human, animal, and non-natural – to make inferences about what they can know.

Chapter IV argues that historical processes can shape the structure of familial and extra-familial social relations, which, in turn, are thought to affect the performance of

northern and southern Italians on a simple categorization task. Southern Italians as a group paired more items thematically than did northern Italians; among Southerners, low-SES participants also showed a preference for thematic over taxonomic grouping.

Chapters V and VI complement the previous ones by showing that anthropologists have sometimes made mistaken or incomplete claims about the psychological processes that they inferred from their observations. Chapter V revisits the topic of the attribution of knowledge, this time from the perspective of the professional anthropologist, and is meant as a warning against the unreflective application of our innate tendency to attribute knowledge to others when thinking scientifically.

Chapter VI argues that three organizational features of culture observed by anthropologists – its systematicity; the recurrence of distinctions across semantic, conceptual, and practical boundaries; and the ‘bleeding’ of properties between associated concepts – may find their origin in fundamental operating principles of the mind – respectively, the cognitive principle of relevance, the decompositionality of cognitive processing, and the network structure of semantic memory. This reframing of some features of culture in cognitive terms opens up some ethnographic observations to new avenues for theory and relevant data from other disciplines.

Chapter I

Introduction: The Study of Culture and Cognition

We are currently seeing an increase in collaborative work involving psychologists and anthropologists. While this is undoubtedly resulting in an increase in knowledge, it is worth thinking about the costs involved. The challenges of interdisciplinary research are rarely the same for each of the disciplines involved; in this case, I believe that psychologists are somewhat at an advantage over their anthropological colleagues. The reasons for this are found in the history of the two disciplines.

A broadly-conceived interest in matters of psychology was once very much a part of the anthropological mainstream. From the very earliest anthropological reports, a great deal of discussion has focused on the positing and illustration of cross-cultural variability of mental processes and products. The work of E. B. Tylor and James G. Frazer is an early example of this interest, and that of such eminent anthropologists as Ruth Benedict, Margaret Mead, Bronisław Malinowski, Lucien Lévy-Bruhl, and Claude Lévi-Strauss can be said to deal at least partially with matters of psychology. Of course, these anthropologists were not for the most part acquainted with modern psychological theory, nor could they be. Thus contemporary psychologists may not recognize their methods

and theoretical orientations as psychological. Nonetheless, it is clear that these authors were writing about the mind.¹

In comparison to the history of anthropology, that of psychology appears more linear. Having grown out of philosophy, it soon embraced a naturalistic epistemological orientation, thereby differentiating itself from other branches of the study of the mind, such as psychoanalysis. Most psychologists eagerly adopted the methodological tools being developed by statisticians. Today, the field of psychology is broad enough to accommodate such disparate topics as psychophysics and social biases. It can do so, and still appear unified from the outside, because the great majority of psychologists share a number of beliefs; that the mind is a processor, that it is a natural object, and therefore that it should be studied with naturalistic tools; that this study should be guided by the broadly Popperian principles of falsification and accumulation of confirming evidence; that psychological phenomena can be broken down into their constituent parts, and that these parts are legitimate candidates for investigation; and that the most appropriate way to offer evidence for one's hypotheses is, in many cases, to gather quantitative data.

It was not always thus, however; before the so-called 'cognitive revolution' of the 1950s most psychologists would have described themselves as behaviourists, and would have disputed the first point of the above list (though they would have likely agreed with the rest). By the 1950s, the development of the computer, a fertile source of analogies and ideas, helped to establish cognitive processes as the standard focus of psychological study.

¹ The importance of psychological concerns to anthropology should not be over-estimated, however; many past and contemporary anthropologists have shown little interest in the mind and instead chosen to focus on social processes (e.g., kinship, alliance, warfare, etc.).

Stimulated by these advances, many anthropologists became interested in the possibilities of the cognitive model (D'Andrade, 1995). They adopted the cognitivists' epistemological principles and produced very important and innovative work in the areas of componential analysis of kinship terminologies (Goodenough, 1956; Lounsbury, 1956), ethnobotany (Berlin, Breedlove, & Raven, 1974; Conklin, 1954; Frake, 1980), colour naming (Berlin & Kay, 1969), etc.

Although contemporary cognitive anthropologists² differ from the ethnoscientists in significant respects that will be discussed later, their epistemological orientations are undeniably similar. They share a belief that the best way to answer a question is to provide evidence that supports a hypothesis and allows one to reject others; that quantification, repeated observation, and the manipulation of variables are useful tools in answering questions about cognition and culture; and that the desire to accurately portray other societies in their full complexity sometimes has to be subordinated to the limitations of hypothesis-driven experimentation.

The similarities between ethnoscientists and contemporary cognitive anthropologists are more starkly thrown into relief when are contrasted with the theoretical orientation of contemporary mainstream³ anthropology, strongly influenced by the work of Clifford Geertz (1973b) and that of a group of scholars who further

² I see modern cognitive anthropology as a category subordinate to 'culture and cognition.' The latter also includes cross-cultural psychology.

³ While I do believe that modern mainstream anthropology is largely interpretive and non-cognitive, not all non-cognitive anthropologists are interpretive. Many anthropologists use methods derived from the humanities – in particular history – and owe relatively little to the contributions of Geertz, Marcus, Clifford, Fischer, and colleagues.

developed ideas in the interpretive tradition (Clifford, 1988; Clifford & Marcus, 1986; Marcus & Fischer, 1986).

An alternative view of how anthropological knowledge should advance is rather neatly expressed by Geertz (1973c): “A study is an advance if it is more incisive – whatever that may mean – than those that preceded it; but it less stands on their shoulders than, challenged and challenging, runs by their side” (p. 25). Leaving aside the problems that derive from not specifying – perhaps not knowing – what is meant by incisiveness in this context, it is clear that the broadly Popperian principles that I earlier noted to be shared by the ethnoscientists and the modern cognitive anthropologists are not seen by Geertz as being essential, or even necessary, to the anthropological enterprise. Theory, in this formulation, is not dissociable from its culture-specific application (ibid.), and is not predictive in the standard scientific sense (p. 26). In his essay on Balinese cockfighting (1973a), Geertz illustrates this approach by describing this practice as so deeply embedded in Balinese culture that it could not be compared to cockfighting in another society. This holistic view contrast sharply with that of Roy D’Andrade (1995), who sees the organization and limitations of the mind as making possible “a *particulate* theory of culture” (p. 247).

Yet in spite of their similarities, the old and new cognitive anthropology are not the same. One of the most incisive critiques coming from the interpretive camp focused on the ethnoscientists’ lack of attention to people’s behaviour and the social context (for a similar critique from a cognitivist viewpoint, see Shore, 1996). In retrospect, it does appear that a love for order made some of their semantic taxonomies look more like ideal

models than accurate descriptions of mental processes and cultural products. In addition to being psychologically sound, current work in cognitive anthropology appears to be more refined anthropologically.

Examples of this approach are the work of Rita Astuti on Vezo conceptions of mind/body dualism (2001; Astuti, Solomon, & Carey, 2004) and death (Astuti & Harris, forthcoming); Scott Atran on Maya folk-biology (1998; 1999); Maurice Bloch and Dan Sperber on the mother's brother controversy (Bloch & Sperber, 2002); Pascal Boyer on traditional discourse (1990); Lawrence Hirschfeld on the development of concepts of race (1996); and of Harvey Whitehouse on religion in Melanesia (1995; 1996). There are of course many more examples, but these works share what I consider the essential characteristics of modern cognitive anthropology: a simultaneous commitment to engaging psychology as accurately as our current knowledge allows, and to portraying culture, action, and behaviour with as much richness and depth as possible.

I see this collection of papers as illustrating the complexity of interdisciplinary work as well as the advantages of the culture and cognition approach. Chapters II to IV use evidence from Yucatán and Italy to argue that our understanding of basic psychological processes such as the ontogenesis of belief attribution and categorization can be enriched by adopting a cross-cultural perspective. The impact of culture and class on these processes is illustrated and discussed. Chapters V and VI complement the previous ones by showing that anthropologists have sometimes made mistaken or incomplete claims about the psychological processes that they inferred from their

observation of cultures. I argue that an awareness of psychological methods and findings can greatly benefit the study of culture.

Bibliography

- Astuti, R. (2001). Are we all natural dualists? A cognitive developmental approach. *The Journal of the Royal Anthropological Institute*, 7(3), 429-447.
- Astuti, R., & Harris, P. (forthcoming). Understanding mortality and the life of the ancestors in rural Madagascar.
- Astuti, R., Solomon, G. E. A., & Carey, S. (2004). *Constraints on conceptual development: a case study of the acquisition of folkbiological and folksociological knowledge in Madagascar*. Oxford: Blackwell.
- Atran, S. (1998). Folkbiology and the anthropology of science: cognitive universals and cultural particulars. *Behavioral and Brain Sciences*, 21, 547-609.
- Atran, S. (1999). Folk biology. In R. Wilson & F. Keil (Eds.), *The MIT encyclopedia of the cognitive sciences* (pp. 316-317). Cambridge, MA: MIT Press.
- Berlin, B. O., Breedlove, D., & Raven, P. (1974). *Principles of Tzeltal plant classification*. New York: Academic Press.
- Berlin, B. O., & Kay, P. D. (1969). *Basic color terms*. Berkeley: University of California Press.
- Bloch, M., & Sperber, D. (2002). Kinship and evolved psychological dispositions: the mother's brother controversy reconsidered. *Current Anthropology*, 43(5), 723-748.
- Boyer, P. (1990). *Tradition as truth and communication: a cognitive description of traditional discourse*. Cambridge: Cambridge University Press.
- Clifford, J. (1988). *The predicament of culture: twentieth-century ethnography, literature and art*. Cambridge, MA: Harvard University Press.
- Clifford, J., & Marcus, G. E. (1986). *Writing culture: the poetics and politics of ethnography*. Berkeley: University of California Press.
- Conklin, H. (1954). *The relation of Hanunóo culture to the plant world*. Unpublished PhD Dissertation, Yale University.
- D'Andrade, R. G. (1995). *The development of cognitive anthropology*. Cambridge: Cambridge University Press.
- Frake, C. O. (1980). *Language and cultural description*. Stanford: Stanford University Press.
- Geertz, C. (1973a). Deep play: notes on the Balinese cockfight. In *The interpretation of cultures: selected essays*. New York: Basic Books.
- Geertz, C. (1973b). *The interpretation of cultures: selected essays*. New York: Basic Books.
- Geertz, C. (1973c). Thick description: toward an interpretive theory of culture. In *The interpretation of cultures*. New York: Basic Books.
- Goodenough, W. (1956). Componential analysis and the study of meaning. *Language*, 32, 195-216.
- Hirschfeld, L. A. (1996). *Race in the making: cognition, culture, and the child's construction of human kinds*. Cambridge, MA: MIT Press.
- Lounsbury, F. (1956). A semantic analysis of Pawnee kinship usage. *Language*, 32(158-194).

- Marcus, G. E., & Fischer, M. M. J. (1986). *Anthropology as cultural critique: an experimental moment in the human sciences*. Chicago: University of Chicago Press.
- Shore, B. (1996). *Culture in mind: cognition, culture, and the problem of meaning*. Oxford: Oxford University Press.
- Whitehouse, H. (1995). *Inside the cult: religious innovation and transmission in Papua New Guinea*. Oxford: Oxford University Press.
- Whitehouse, H. (1996). Rites of terror: emotion, metaphor and memory in Melanesian initiation cults. *The Journal of the Royal Anthropological Institute*, 2(4), 703-715.

Chapter II

Children's Attributions of Beliefs to Humans and God: Cross-Cultural Evidence

Introduction

Humans routinely attribute intentions, beliefs, and desires in order to interpret the behaviour of others. Other humans are seen as agents, that is, as entities that pursue goals in accordance with their beliefs and desires. Attributions of agency are so ubiquitous that they are typically taken for granted in everyday life. These attributions are not always correct in identifying the beliefs and desires that underlie a specific action of an agent; yet, if people did not see others as agents, the capacity to understand their behaviour would be severely impaired (for example, people would be surprised when others got up and moved).

Abundant research documents children's acquisition of human agent concepts over the first several years of life (Astington, Harris, & Olson, 1988; Perner, 1993; Wellman, 1990), but there is little work available on the development of non-human agent concepts. Yet, people often attribute intentions, beliefs, and desires to animals as well as to ghosts, gods, demons, and monsters. Scholars have long assumed that children first acquire concepts of human agency and then use them as templates to understand all

nonhuman agents. One exception in this regard is found in the work of Barrett and collaborators (Barrett, Richert, & Driesenga, 2001; Richert & Barrett, 1999).

In this article, we offer further support for Barrett's point of view, showing that Yukatek children do not reason in the same way about the agency of humans and God since early on in development. In the first part, we discuss the development of human agent concepts, specifically with regard to the false-belief task. Then, we outline the predictions implied by several theoretical positions concerning the development of children's understanding of humans' and God's beliefs. After that, we present experimental evidence from a Yukatek Maya sample that supports the hypothesis that young children do not reason about God's beliefs in human terms. Finally, we discuss the theoretical positions and their predictions in light of the results and place the evidence in the larger context of theory of mind research.

The Development of Human Agent Concepts

The cognitive literature on child development usually distinguishes three phases in the development of understanding of agency (see for example Csibra, Gergely, Bíró, Koos, & Brockbank, 1999; Gergely, Nádasdy, Csibra, & Bíró, 1995; Gopnik & Meltzoff, 1997; Wellman & Wooley, 1990). During the first year or so, children are believed to apply a principle of rational action – that is, they begin to appreciate that humans do not merely propel themselves, but do so in purposeful and rational ways. By the second or third year, children incorporate simple mentalistic attributions into this rational principle: the purposeful and rational action is understood to be driven by desires. Finally, during the

fourth or fifth year, the principle of rational action is coupled with representational attributions: agents are seen as pursuing goals in accordance to their *beliefs*.

The emergence of this representational stage, which is a necessary condition for the possession of a full-fledged conception of the mind, is the most relevant to the arguments and experimental results presented in this article. Exactly when this transition takes place has been a matter of considerable debate generating an abundance of research (e.g., Astington, Harris, & Olson, 1988; Carruthers & Smith, 1996; Whiten, 1991).

Although some evidence has emerged for the presence of representational reasoning in 3-year-olds (Chandler, Fritz, & Hala, 1989; Hala, Chandler, & Fritz, 1991; Lewis & Osbourne, 1990; Siegal & Beattie, 1991), the bulk of the data available suggests that this ability is neither stable nor robust until children are five or older (Flavell, Flavell, Green, & Moses, 1990; Perner, Leekam, & Wimmer, 1987; Wellman & Bartsch, 1988; Wellman & Wooley, 1990; Wimmer & Perner, 1983).

Since Premack and Woodruff (1978) started experimenting with non-human primates in order to establish the possibility that they had a ‘theory of mind,’ different ways of testing for this have been designed and tried out. As Dennett (1978) pointed out, you can credit an entity with a conception of belief only if there is evidence that it is able to understand that others may entertain *false* beliefs. Therefore, to probe children’s representational understanding of agency – whether they have a conception of belief – it is necessary to ascertain that they figure out that people can have false beliefs and that these beliefs can motivate behaviour.

A variety of false-belief tasks have been developed in the last twenty years to test children’s understanding of beliefs. One such experiment is known as the ‘Sally-Ann’

test (Wimmer & Perner, 1983). In this test, the child is made to look at a scene in which two dolls are animated by experimenters. The dolls are used to represent human beings – Wellman, Cross, and Watson (2001) have shown in a meta-analysis of false-belief studies that using a doll as a proxy for an actual human being does not affect the outcome of the experiment. The two dolls enter the stage; one of them (Sally) places an object in one of two containers and leaves the room. While Sally is out, the second doll (Ann) moves the object into the second container. Sally re-enters the stage; at that point, children are asked where Sally, who is unaware that the switch took place, will look for the object. Children, therefore, are asked to infer whether Sally will act according to her false belief (that the object is still in the original container) or not.

Another false belief task, the one used in the experiments that will be presented later, is known as the ‘surprising contents’ task. In it, children are shown a closed container (usually a cracker box with a conspicuous picture of its contents on the outside) and asked what they believe is in it. The experimenter then opens the box to reveal that the crackers have been removed, and that small rocks (or a similarly unexpected item) have been put in their place. After closing the box again, the experimenter checks that the children still understand and remember what the box contains. The experimenter then introduces a doll who has not seen the inside of the box, and asks what the doll would think is in the container. Again, the point of the experiment is to establish whether children are capable of figuring out that other agents may have false beliefs and act accordingly.

The Development of God Concepts

By and large the research pertaining to children's understanding of agent concepts deals exclusively with *human* agent concepts: how children's concepts of *human* agency become increasingly specialized. In false-belief tasks, as well as in most other studies of children's understanding of agency, experimenters have asked children to reason about human actions, beliefs, desires, and emotions. Very little available research addresses the generalizability of children's understanding of agency to non-human agents in general, and to God in particular. However, by looking at the assumptions of several theoretical positions, we can envisage their predictions concerning the understanding of God in comparison to humans in a false-belief task.

In Figure 2.1 we offer a tree diagram to show how these positions are related to each other. The graphs outline predictions of false-belief task performance in relation to humans and God. To illustrate the graphs, consider a surprising contents task: suppose children are presented with a closed cracker box, shown that the box contains small rocks, and then asked what a human and God, who did not have a chance to look inside the box, would think is inside.

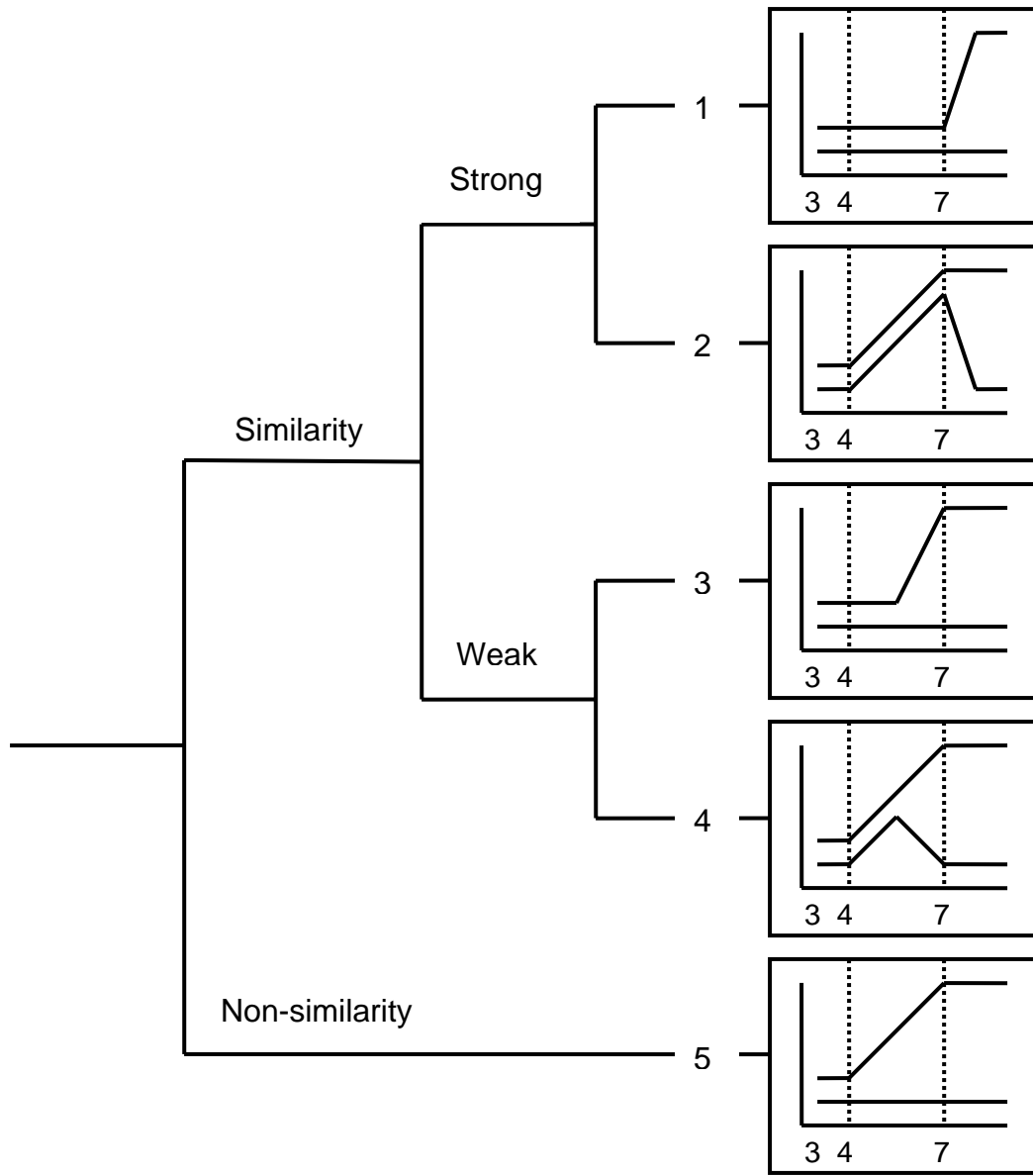


Figure 2.1: Predictions of false-belief task performance

In all graphs, the top line represents attribution of beliefs to humans, and the bottom line represents attribution of belief to God. On the Y axis, performance is mapped; the higher the line, the more likely it is that a child would attribute false beliefs to the agent in question – to say that a human or God would think that the box contains crackers. The X axis shows the developmental time frame. As indicated by the dotted lines, the age range

of 4 to 7 is the most relevant to our discussion, since it is then that children, according to the current literature, come to attribute false beliefs to human agents (see discussion in the previous section).

At the highest level of the tree, the opposition is between similarity and non-similarity perspectives with regard to the way beliefs are attributed to God and humans. From a non-similarity perspective, children would start to differentiate humans and God (attributing more false beliefs to humans than to God) from the very beginning of the developmental stage of our concern. From a similarity perspective, children would attribute either true beliefs or false beliefs to both humans and God *in equal measure, initially, and for at least some part* of this developmental time frame.

Similarity positions (graphs 1 through 4) postulate that children initially use humans (or some humans) as an analogical basis to understand God's beliefs. At the very least, we can distinguish two stances: a strong and a weak one. The strong stance is perhaps best represented in Piaget's work (1960). There are two possible interpretations of Piaget's understanding of the development of God concepts. In graph 1, an infallible parent (who is capable of knowing what is inside the box without having to see it) is used as the basis to understand God until quite late in development. At some point, children start to recognize that parents can entertain false beliefs but they do not transfer this characteristic to God, since at this point they also start to learn that God has special qualities such as omniscience. For example, children would initially say that both agents believe that rocks are inside the box, then, only by age 7, they would start to say that humans believe that crackers are inside the box, and God believe that rocks are inside. Conversely, in graph 2, a normal human being is used as the basis to understand God

until quite late in development. Then, children start to learn that God possesses certain special characteristics that set God aside from common humans.

The weak stance postulates that children initially use humans as a basis to understand God's beliefs but start to differentiate them earlier in development than Piaget postulated – before reaching the age of seven. In other words, we are envisaging the possibility of Piaget being wrong simply in terms of the onset of the differentiation. In graph 3, an infallible human is used as a basis to understand God. In graph 4, a normal human is instead used as the basis. This explains why both the human and the God line stay flat for some time in the first instance, and climb initially in the second. Although these positions are not well established in the literature, they are possibilities that one should consider when dealing with cross-cultural data. For example, graph 4 can be seen as a plausible representation of people living in a society where the concept of God as omniscient is not very widespread.

Finally, moving on to the last graph in Figure 2.1, a non-similarity perspective would predict that children being tested on the false-belief task would start differentiating between humans and God very early in development. This is the position that Justin Barrett and collaborators have been advocating (Barrett & Keil, 1996; Barrett, Richert, & Driesenga, 2001). Their main idea is that young children do not need to conceptualize human agency first and then use it as a basis to understand supernatural agency; rather young children have already the potential to think independently about different types of agents and reason accordingly. In graph 5, the God line remains close to floor level, which signifies that children from an early age attribute mostly true beliefs to God – i.e., that God knows that there are rocks in the box. The human line, on the other hand, starts

at the same level as the God line but then by the age of 4 steeply climbs – children increasingly say that humans believe that the box contains crackers, as their capacity to attribute false beliefs improves.

Experimental data from the United States supports the prediction of this non-similarity position (Barrett, Richert, & Driesenga, 2001). In figure 2.2, the results of a surprising contents experiment run with a sample of American children recruited from Reformed and Lutheran Protestant churches are presented. Children in the US sample can be seen to treat humans and God in the same way up to age 4. By age 5, they already sharply differentiate between the two agents. The divergence between God and the mother took place as children started to attribute false beliefs to the latter. A Wilcoxon Signed-Ranks Test for matched pairs comparing “crackers” responses between mother and God at each specific age detected significant differences only for 5- and 6-year-olds ($Z = 2.37, p = .018, N = 17$ and $Z = 2.93, p = .003, N = 9$, respectively).



Figure 2.2. False-belief task – US children

However, there is no available cross-cultural evidence that addresses this question. In the next section, we present data on a similar false-belief task run with a sample of Yukatek Maya children, in order to provide a test of these theoretical predictions.

Sample composition

The Maya sample consisted of 48 children divided in four age groups: eleven 4-year-olds (4,0-4,11), twelve 5-year-olds (5,0-5,11), twelve 6-year-olds (6,0-6,11), and thirteen 7-year-olds (7,0-7,10). Twenty-six children were male, and twenty-two female. The experimenter piloted the protocol with some 3-year-olds, but since most of them seemed to have difficulty in concentrating long enough they were dropped from the sample. The

children resided in four small rural villages in the Quintana Roo state in the Yucatán peninsula (Southeastern Mexico). The overwhelming majority of people living in the rural interior of Quintana Roo are ethnic Maya.

The children generally began attending preschool when they were four or five years old, and started primary school when they turned six. Both the preschool and the primary school offer bilingual education, in Spanish and Yukatek Mayan. Although many individuals below the age of 50 are reasonably proficient in Spanish, the favoured language in the domestic environment is Yukatek. For this reason, most of the children who enter preschool are virtually monolingual in this language.

Materials and Procedure

All children were interviewed in Yukatek by a native speaker, who has participated in several other studies in the region and is known to many of the participants' families. The experiment consisted in a version of the "surprising contents" task. Participants were interviewed either in the hut of the experimenters or in their family's hut. The agents used were a doll named Soledad and the Catholic God (the Maya have adopted this religious entity into their pantheon several centuries ago). We decided not to use the mother as stimulus in Yucatán as it proved impossible to interview the children while their mother was away. In this situation, it would not have been feasible to control for the possibility of the child thinking the mother had a chance to see what was inside the container. The researchers used a container made out of a dried squash, known in Yukatek as *ho'ma*, which keeps maize tortillas warm after cooking them. The *ho'ma* has a small opening carved out on top, just large enough to put one's hand through. Every family visited by

the experimenters owned at least one and usually several of these containers. Although they may be occasionally used to store other objects, there was high consensus among the participants that the normal, appropriate content was indeed tortillas, as measured by control questions asked at the beginning of the experiment (“What is this container called?”; “what would you usually find in it?”).

The *ho'ma*'s opening was closed with a piece of cardboard, so that children could not tell what was inside. One of the experimenters opened the container to reveal a pair of shorts, a most unusual content. The container was closed again and the experimenters then asked the set of questions about the doll and God, in the following form: “What does X think is in the *ho'ma*?” In this experiment, children were not asked questions about other agents' behaviour. However, Barrett et al. (2001) obtained very similar results when a sample of US children were asked a question about behaviour – “Where would agent X look for object Y?” instead of “Where would agent X think the object is located?”

Results

Answers were coded as 1 when children said “tortillas” and 0 when they said “shorts.” The percentage of children answering “tortillas” in each age group for the doll and God is shown in figure 2.3.

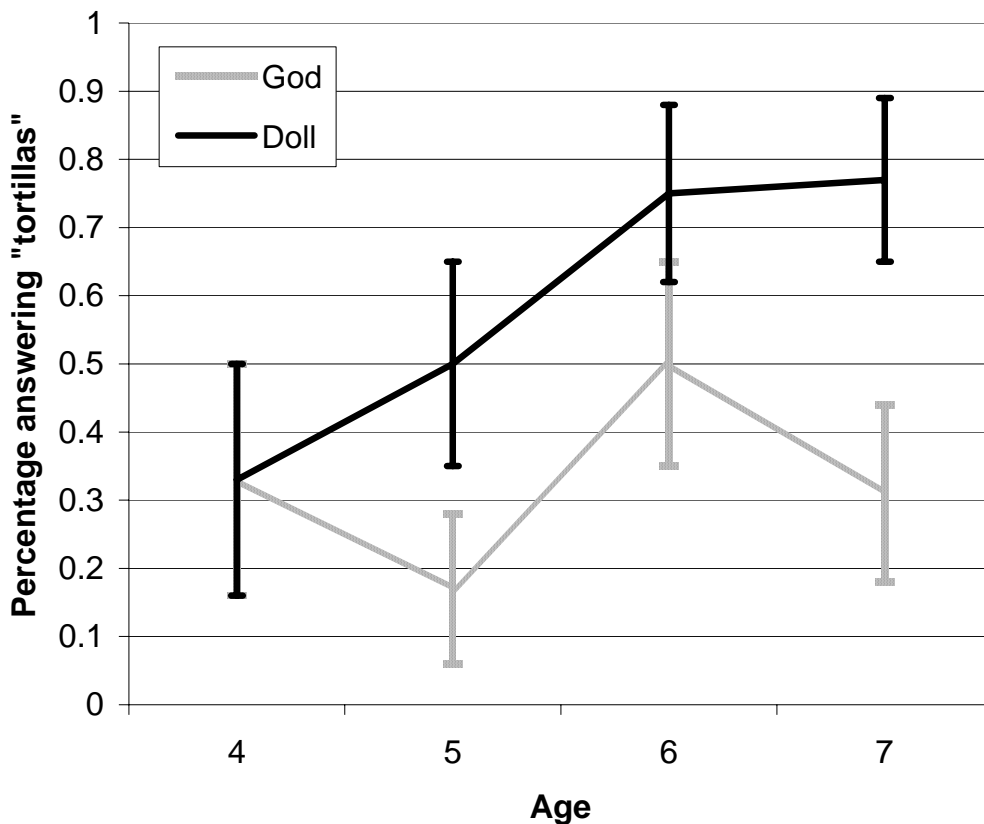


Figure 2.3. False-belief task – Maya children. Error bars show ± 1 standard error.

The answers for the doll showed a statistically significant positive correlation with age, $r(46) = .341$. Therefore, as age increased, Maya children were more likely to attribute false beliefs to the doll. For example, 33% of the 4-year-olds said that the doll would think tortillas were in the container compared to 77% of 7-year-olds. In contrast, children treated God differently from the doll – as in the US, no significant correlation was detected between answers for God and age, $r(46) = .066$. A Wilcoxon Signed-Ranks Test for matched pairs comparing “tortillas” responses found significant differences between God and the doll for 5-year-olds ($Z = -2.000, p = .046, N = 12$) and 7-year-olds ($Z = -2.449, p = .014, N = 13$), but not for 4- and 6-year olds.

When looking at the results, some patterns become apparent. The human line follows the same developmental course in both samples, but the Maya children seem to reliably pass the task about a year later than the American children. In the Maya sample, the difference between God and humans is not significant for 6-year-olds, while it is both for 5- and 7-year-olds. Furthermore, Maya children do not seem to reach the near-ceiling levels that are reported for many Euro-American samples of the same age on the ‘doll’ false belief question: a *t*-test against chance for 6- year-olds did not reach significance ($t(11) = .75, p = .082$); even 7-year-olds, while significantly above chance ($t(12) = .77, p = .047$), are below the performance level of the American sample.

Discussion

The vast majority of developmental studies of false-belief understanding in reference to humans focus on samples of Euro-American and East Asian children, often from relatively high SES backgrounds (see Wellman, Cross, & Watson, 2001). The cross-cultural evidence available from traditional societies so far is incomplete and inconclusive. At any rate, the two available studies of traditional populations (Avis & Harris, 1991; Vinden, 1996) and the present one seem to show that there is some uniformity in the way false belief understanding develops, at least where human agency is concerned. However, even a brief inspection of the data presented above reveals that Yukatek children seem to be able to reliably pass a false-belief task only at age 7 (although their performance level is extremely close, though not significantly above chance, a year before); besides, they fail to reach near-ceiling levels at the same age as the children in the American sample. One possible explanation is that children in this

community are less familiar than American children with the question/response format that characterizes this experimental task. This suggestion is corroborated by the fact that we were not able to successfully test an adequate number of 3-year-olds due to their shyness, which does not usually pose problems to American experimenters. Another problem, now related to the God results, is the anomalous performance of 6-year-old Maya children. This is less easily explained, but may be due to small sample size. To fully account for the general delay in performance in relation to humans, and the 6 year olds' performance in relation to God, further studies are needed.

Now turning to the general discussion of the theoretical positions and their predictions, we can say that, while our results do not address the question of whether children consider the mother as a special kind of agent, they do add to the US findings in speaking against the idea that young children need to use humans as a basis to reason about God, which is the rationale behind all similarity positions. In this sense, the Maya results go in the direction of the non-similarity position, thus providing cross-cultural evidence for the perspective advanced by Barrett and collaborators.

It is important to emphasize that this implies simply that young children do not treat God and humans in the same way in terms of attribution of beliefs. That children truly understand God as a different sort of agent, and not just a human with a few strange properties (e.g. infallible beliefs, ability to make mountains etc.) is difficult to disambiguate. Also, by no means do the data here support the claim that children's concepts of God are completely independent of their understanding of people in general and their parents in particular. For example, Christian theology teaches about a God who

practiced self-anthropomorphization by becoming human in the form of Jesus of Nazareth.

The present results, however, clearly demonstrate that Yukatek young children, as well as American young children, do not treat God as *merely* human. For this reason, this work joins the growing literature that provides evidence against Piaget's notion that young children cannot treat other agents as importantly different from humans. For example, contrary to Piagetian artificialism (Piaget, 1969), Petrovich (1997) found that, although 4-year-olds know that humans make machines and God does not, when asked to account for the origins of natural objects such as large rocks or mountains, they gave God the credit and not people. Similarly, several studies have uncovered evidence that 4-year-old (and, in some cases, older) children believe magicians are a special type of agent able to perform actions that apparently violate natural causation (Chandler & Lalonde, 1994; Rosengren & Hickling, 1994). Further, recent research suggests that 4- and 5-year-olds appreciate differences in perceptual abilities of different agents across sensory modalities (Richert & Barrett, 1999) and appreciate that God is more likely than humans to possess various forms of perceptual knowledge (Barrett, Richert, & Driesenga, 2001).

Bibliography

- Astington, J. W., Harris, P. L., & Olson, D. R. (Eds.). (1988). *Developing theories of mind*. Cambridge: Cambridge University Press.
- Avis, J., & Harris, P. (1991). Belief-desire reasoning among Baka children: evidence for a universal conception of mind. *Child Development, 62*, 460-467.
- Barrett, J. L., & Keil, F. C. (1996). Conceptualizing a non-natural entity: anthropomorphism in God concepts. *Cognitive Psychology, 31*, 219-247.
- Barrett, J. L., Richert, R. A., & Driesenga, A. (2001). God's beliefs versus mother's: the development of nonhuman agent concepts. *Child Development, 72*, 50-65.
- Carruthers, P., & Smith, P. K. (Eds.). (1996). *Theories of theories of mind*. Cambridge: Cambridge University Press.
- Chandler, M. J., Fritz, A. S., & Hala, S. (1989). Small-scale deceit: deception as a marker of two-, three-, and four-year-olds early theories of mind. *Child Development, 60*, 1263-1277.
- Chandler, M. J., & Lalonde, C. E. (1994). Surprising, magical and miraculous turns of events: children's reactions to violations of their early theories of mind and matter. *British Journal of Developmental Psychology, 12*, 83-95.
- Csibra, G., Gergely, G., Bíró, G., Koos, O., & Brockbank, M. (1999). Goal attribution without agency cues: the perception of 'pure reason' in infancy. *Cognition, 72*(3), 237-267.
- Dennett, D. (1978). Beliefs about beliefs. *Behavioral and Brain Sciences, 1*, 568-570.
- Flavell, J. H., Flavell, E. R., Green, F. L., & Moses, L. J. (1990). Young children's understanding of fact belief versus value beliefs. *Child Development, 61*, 915-928.
- Gergely, G., Nádasdy, Z., Csibra, G., & Bíró, S. (1995). Taking the intentional stance at 12 months of age. *Cognition, 56*(2), 165-193.
- Gopnik, A., & Meltzoff, A. N. (1997). *Words, thoughts, and theories*. Cambridge, MA: MIT Press.
- Hala, S., Chandler, M., & Fritz, A. S. (1991). Fledgling theories of mind: deception as a marker of 3-year-olds' understanding of false belief. *Child Development, 62*, 83-97.
- Lewis, C., & Osbourne, A. (1990). Three-year-olds' problems with false belief: conceptual deficit or linguistic artifact? *Child Development, 61*, 1514-1519.
- Perner, J. (1993). *Understanding the representational mind*. Cambridge, MA: MIT Press.
- Perner, J., Leekam, S. R., & Wimmer, H. (1987). Three-year-olds' difficulty with false belief. *British Journal of Developmental Psychology, 5*, 125-137.
- Petrovich, O. (1997). Understanding of non-natural causality in children and adults: a case against artificialism. *Psyche en Geloof, 8*, 151-165.
- Piaget, J. (1960). *The child's conception of the world*. Paterson, NJ: Littlefield, Adams & Co.
- Piaget, J. (1969). *The psychology of the child*. New York: Basic Books.
- Premack, D., & Woodruff, G. (1978). Does the chimpanzee have a theory of mind? *Behavioral and Brain Sciences, 1*, 515-526.
- Richert, R. A., & Barrett, J. L. (1999). Perspectives in a new sense: children's understanding of various agents' perception across sensory modalities.

- Rosengren, K. S., & Hickling, A. K. (1994). Seeing is believing: children's explanations of commonplace, magical, and extraordinary transformations. *Child Development, 65*, 1605-1626.
- Siegal, M., & Beattie, K. (1991). Where to look first for children's knowledge of false beliefs. *Cognition, 38*, 1-12.
- Vinden, P. G. (1996). Junín Quechua children's understanding of mind. *Child Development, 67*, 1707-1716.
- Wellman, H. M. (1990). *The child's theory of mind*. Cambridge, MA: MIT Press.
- Wellman, H. M., & Bartsch, K. (1988). Young children's reasoning about beliefs. *Cognition, 30*, 239-277.
- Wellman, H. M., Cross, D., & Watson, J. (2001). Meta-analysis of theory-of-mind development: the truth about false belief. *Child Development, 62*, 655-684.
- Wellman, H. M., & Wooley, J. D. (1990). From simple desires to ordinary beliefs: the early development of everyday psychology. *Cognition, 35*, 245-275.
- Whiten, A. (Ed.). (1991). *Natural theories of mind*. Oxford: Blackwell.
- Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: representation and constraining function on wrong beliefs in young children's understanding of deception. *Cognition, 13*, 103-128.

Chapter III

Children's Attributions of Belief to Natural and Non-natural Entities: Yukatek Evidence

Introduction

The attribution of knowledge to others is a cornerstone of human sociality. The pervasive assumption that one's beliefs, desires, and intentions are at least partly responsible for one's actions is often accurate, and helps people interact with each other. It is likely that such an important capacity should have a cross-culturally robust ontogenetic path. The mechanisms through which humans attribute beliefs to others have been the object of numerous experimental studies in the last twenty-five years. We now have a good general picture of the way this capacity develops; children generally start correctly attributing beliefs to other humans in verbal tasks from the age of four (Wellman, Cross, & Watson, 2001).

Recently, it has been found that much younger children may be able to make inferences about agents' beliefs when non-verbal tasks are used (Onishi & Baillargeon, 2005; Southgate, Senju, & Csibra, 2007; Surian, Caldi, & Sperber, 2007). Some, however, have proposed that these results do not give evidence for the kind of belief attribution that is characteristic of older children (Perner & Ruffman, 2005), but rather for a more rudimentary capacity that is nonetheless developmentally connected with the

later language-dependent stage (Surian, Caldi, & Sperber, 2007). This appears to be confirmed by the finding that adults perform badly on nonverbal false-belief tasks while shadowing dialogue, but not while tapping a pre-recorded rhythm (Newton & de Villiers, 2007).

The research reviewed so far only deals with cases where the targets of belief attribution are fellow humans. Yet we know that humans also attribute beliefs to non-human agents; both to natural entities like animals, and to entities that cannot be directly perceived – entities that often figure in religious and magic thought and that I will refer to as non-natural.

In previous work (Knight, Sousa, Barrett, & Atran, 2004), we provided one of the few empirical studies of false-belief understanding among children of small-scale, traditional societies. We showed that the development of this capacity roughly follows the same course that it does in the West. I say ‘roughly’ because in the case of Yukatek children the capacity to correctly attribute false beliefs to other humans appeared to emerge between ages 5 and 6, somewhat later than expected. This delay is probably explainable in terms of a combination of the lack of familiarity of Maya children with experimental procedures and of shyness in the face of strangers’ questioning.

In the same article, we also showed that children’s development follows a different course when the beliefs are attributed to an all-knowing entity, in this case the Catholic God. As predicted by our hypothesis and suggested by previous results (Barrett, Richert, & Driesenga, 2001), children had no difficulty in appreciating that such an entity would always know what is invisible or otherwise unknowable to humans, and this

appreciation showed no developmental changes, as can be seen from the following table (see Materials, below, for a description of the other non-natural entities).

Variable	Effect of age			
	β	<i>SE</i>	Odds ratio	Wald statistic
Human	.685	.308	1.983	4.94*
Chiichi'	.638	.301	1.892	4.48*
Masters/Sun	.667	.301	1.949	4.91*
God	.129	.291	1.138	.198

Table 2.1. Results of logistic regression of non-natural entity variables on age (* $p < .05$)

In this paper, I would like to expand on the previous findings by presenting data concerning Yukatek children's attribution of beliefs to a range of natural and non-natural entities. I start by looking at the overall picture of non-natural false-belief attribution, and then move on to investigating the role of individual differences in the attribution of false beliefs.

Sample Composition

The sample consisted of 46 Yukatek Maya children of ages ranging from four to nearly eight (average = 6.06, $SD = 1.11$). 25 children were male, and 21 female. The protocol was also piloted with some three-year-olds, but since most of them seemed to have difficulty in concentrating long enough they were dropped from the sample. All children resided in four small rural villages in the Quintana Roo state in the Yucatán peninsula (South-eastern Mexico). The overwhelming majority of people living in the rural interior of Quintana Roo are ethnic Maya.

The children generally began attending preschool at four or five years of age, and started primary school upon turning six. Both the local preschool and the primary school offer bilingual education, in Spanish and Yukatek Mayan. Although most individuals below the age of 50 are reasonably proficient in Spanish, the favoured language in the domestic environment is Yukatek. For this reason, most of the children who enter preschool are virtually monolingual in this language.

Contrary to expectations, Yukatek families are quite small, with one or two offspring households being common. This is reflected in the declining birth-rate of Mexico (20.36 births per thousand inhabitants, in 2007 – compare with neighbouring Guatemala’s 29.09, according to the CIA world factbook), partly attributable to the Government’s family planning policies (Barber, 2007).

Materials

All children were interviewed either in the hut of the experimenters or in their family’s hut, in Yukatek, by a native speaker and ethnic Maya who has participated in several other studies in the region and is known to many of the participants’ families. The natural agents used included a doll named Soledad, representing a human, and four stuffed toys representing animals commonly found in the area: a dog, a peccary (*kitam*, similar to a wild boar), a bee, and a jaguar. Children were instructed to think of these dolls as representing real humans and animals. The non-natural agents were the Catholic God (the Maya have adopted this religious entity into their pantheon several centuries ago), the Sun (*k’in*), the Masters of the forest (*arux* or *uyumil k’aax*), and minor spirits known as Chiichi’. The Yukatek God concept differs in interesting ways from that of mainstream

Catholicism, but, more relevantly, it shares with it the characteristic of omniscience. The existence of the Sun as a divinity among the pre-Hispanic Maya is well documented (Vail, 2000), and it still figures in the contemporary pantheon. The Masters of the forest are described as taking human or animal forms, appearing in the corn fields (*milpas*) or in the forest at night, and serving in some ways as administrators of shared natural resources and protectors of crops and harvests, when appeased (Zolla, 1994). Finally, the Chiichi' are spirits often invoked by parents to instil fear into children who misbehave – they thus appear to play much the same role as the bogeyman in the USA. While adults state that they believe in the existence of the other non-natural entities, none does so for the Chiichi'. All of the supernatural entities were not visually represented, but simply named to the children.

Procedure

Participants were interviewed either in the hut of the experimenters or in their family's hut. The experiment consisted in a version of the “surprising contents” task, described in Chapter II. Before running the experiment, checks were run to make sure that the participant was familiar with each of the natural and supernatural entities; all children turned out to be. The nine questions were then asked in random order. Children were compensated for their participation with a small gift.

Results

Natural and Non-natural Entities across Ages

The overall proportions of children answering ‘yes’ (that is, stating that the entity knows what is inside the container) and ‘no’ to each of the nine stimulus questions is presented in figure 3.1. The contrast between the human and God stimuli, whose development was investigated in the previous paper, is immediately evident, but also evident is the similarity between the human, animal, and Chiichi’ stimuli, that between the Sun and the Masters of the forest, and the overall peculiarity of the response pattern to the God probe.

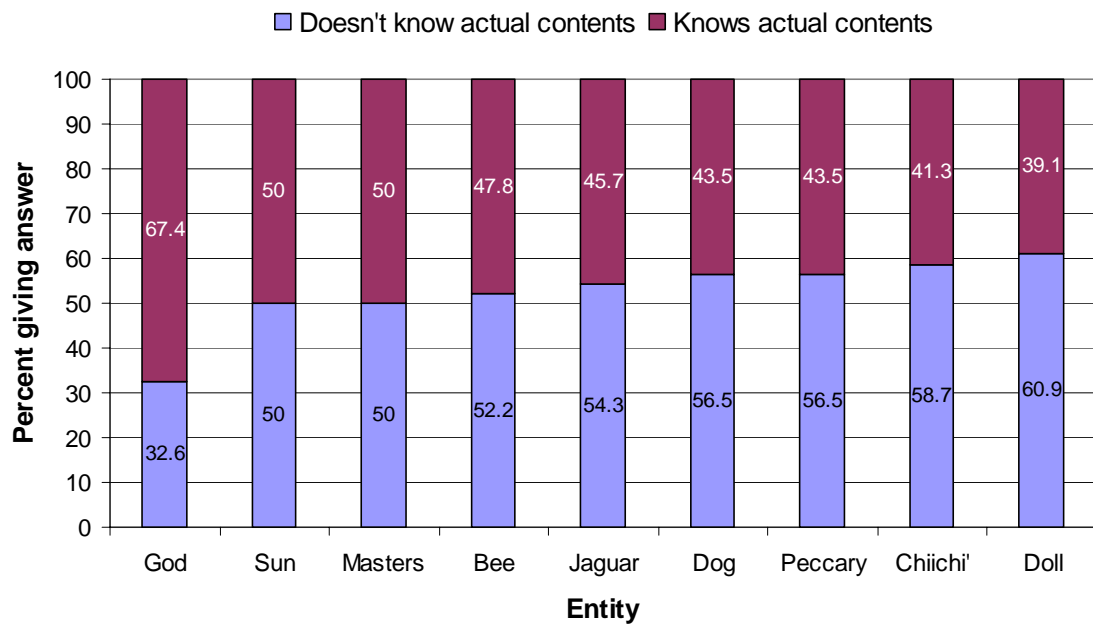


Figure 3.1. Proportion of response categories ($N = 46$)

McNemar tests ($N = 46$ for all) reveal a statistical difference between the human and God variables, as expected ($p = .001$), but no difference between the human and other natural and non-natural probes. Children’s answer to the God question, however, were found to

differ from those given to other non-natural entity questions (Chiichi', $p = .002$; Sun and Masters of the forest, $p = .008$ for both), as well as animal questions (Dog and Peccary, $p = .003$ for both; Jaguar, $p = .006$; Bee, $p = .022$). On this measure of omniscience, God thus appears to be perceived as performing better than all other entities.

Individual Differences

An interesting pattern emerges when dividing the sample into two groups based on how participants answered the human false-belief questions, and then compared the participants' answers using the human and God variables as reference.

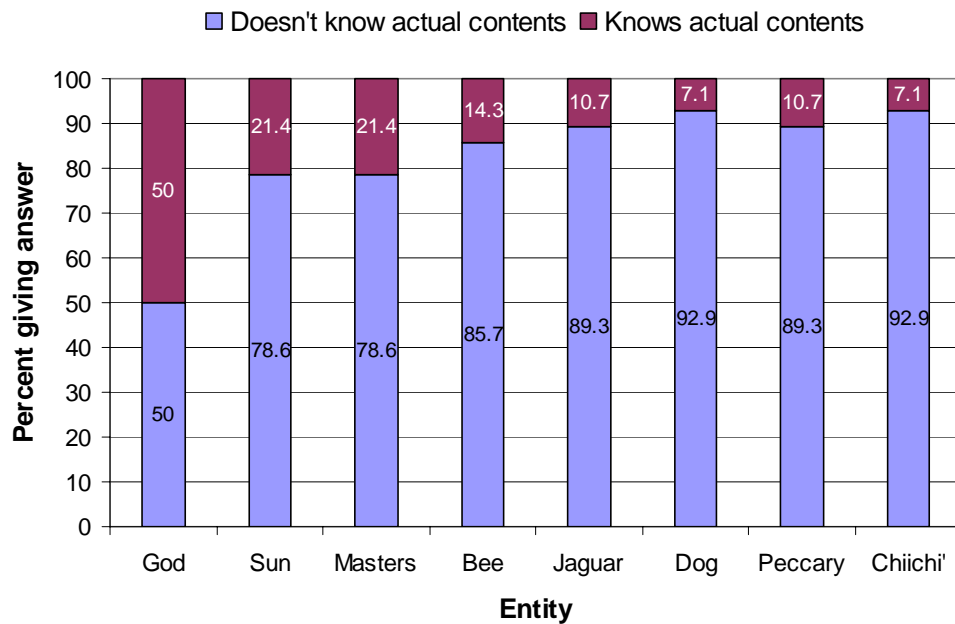


Figure 3.2. Proportion of response categories, human false belief test passers ($N = 28$)

McNemar tests show that virtually all participants who answered that the doll would know what is in the container ($N = 18$) also answered that God, the Sun, the Masters of

the forest, the Chiichi', and all the animals would know. Furthermore, children in this group did not differentiate between God and any of the other non-natural entities. Conversely, children who answered that the doll would not be aware of the surprising contents ($N = 28$) gave different responses for God ($p < .001$), and the Sun and the Masters of the forest ($p = .031$ for both), though not for the Chiichi' (*n.s.*). Again in contrast to the previous group, these children also differentiated between God and both the Sun and the Masters of the forest ($p = .008$), as well as between God and the Chiichi' ($p < .001$) and God and all the animals (Dog, $p < .001$; Peccary and Jaguar, $p = .001$; Bee, $p = .006$). In other words, children who incorrectly said that a human would know about the surprising contents extended this property to all natural and non-natural entities. Those who passed the false belief test with the human stimulus instead differentiated between different types of entities, classifying the animals and Chiichi' as indistinguishable from humans, the classical Mayan divinities the Sun and the Masters of the forest as being unlike humans and Chiichi' on the one hand and God on the other, and the Catholic God as being dissimilar to everything else.

Discussion

The data show that Yukatek children are able to use their knowledge of natural and non-natural entities when attributing beliefs to them. Children were shown to differentiate between humans, animals, and local non-natural entities on the one hand, and the Catholic God on the other. As previous studies suggest, it is likely that the properties that are commonly associated with the concept of God make it very salient and distinctive for

a majority of the children in the sample (Barrett & Keil, 1996; Barrett, Richert, & Driesenga, 2001; Boyer, 1994; Boyer, 2001; Knight, Sousa, Barrett, & Atran, 2004; Richert & Barrett, 1999).

It was also found that the capacity to correctly attribute false beliefs to humans in a surprising-contents task does not result in the child indiscriminately attributing false beliefs to all natural and non-natural entities. Children who pass the test show a nuanced understanding of the beliefs of different entities. In contrast, children who fail the test tended to adopt a blanket approach, attributing the same beliefs to both natural and non-natural entities almost without exception.

The analysis of individual differences also raises an important methodological point. Since the questions posed to the children in our sample (and in many other false-belief experiments) could be answered with a yes or a no, the results can be interpreted in at least two different ways. On the one hand, it is possible that children attribute beliefs in a stable manner – that is, it may be that at each age point children either do or do not attribute human-like beliefs to any of the entities they were asked about. On the other, it is possible that at some ages (particularly when overall performance in false-belief tasks hovers around chance level) children attribute beliefs in an unstable, probabilistic way – for example, they may answer ‘yes’ 30% and ‘no’ 70% of the time.⁴ A repeated-measures approach would help us to disambiguate these possibilities, but it is not immediately evident how one could go about implementing it. Since we are looking at a mental process that is affected by development, the gap between tests repetitions should not be longer than a few weeks; otherwise, it would be impossible to say whether the child who

⁴ It is, of course, also possible that some children in each age group have a consistent approach and others do not.

attributed true beliefs in the first test and false in the second is using a probabilistic approach or has developed a capacity for mindreading. But frequent re-testing is not the answer either, because it introduces the confounding variable of training effects.

The fact that children were asked about nine different entities in one sitting, while not resolving the question altogether, can be used to argue for children mostly adopting a consistent approach to belief attribution. Both children who pass the human false-belief test and those who do not are remarkably consistent in their judgements – if a significant proportion of them were to have answered the questions probabilistically, we would not have expected to see such uniform results.

Bibliography

- Barber, S. L. (2007). Family planning advice and postpartum contraceptive use among low-income women in Mexico. *International Family Planning Perspectives*, 33(1), 6-12.
- Barrett, J. L., & Keil, F. C. (1996). Conceptualizing a non-natural entity: anthropomorphism in God concepts. *Cognitive Psychology*, 31, 219-247.
- Barrett, J. L., Richert, R. A., & Driesenga, A. (2001). God's beliefs versus mother's: the development of nonhuman agent concepts. *Child Development*, 72, 50-65.
- Boyer, P. (1994). *The naturalness of religious ideas: a cognitive theory of religion*. Berkeley: University of California Press.
- Boyer, P. (2001). *Religion explained: the evolutionary origins of religious thought*. New York: Basic Books.
- Knight, N., Sousa, P., Barrett, J. L., & Atran, S. (2004). Children's attributions of beliefs to humans and God: cross-cultural evidence. *Cognitive Science*, 28, 117-126.
- Newton, A., & de Villiers, J. G. (2007). Thinking while talking: adults fail nonverbal false-belief reasoning. *Psychological Science*, 18(7), 574-579.
- Onishi, K. H., & Baillargeon, R. (2005). Do 15-month-old infants understand false beliefs? *Science*, 308(5719), 255-258.
- Perner, J., & Ruffman, T. (2005). Infants' insight into the mind: how deep? *Science*, 308(5719), 214-216.
- Richert, R. A., & Barrett, J. L. (1999). Perspectives in a new sense: children's understanding of various agents' perception across sensory modalities.
- Southgate, V., Senju, A., & Csibra, G. (2007). Action anticipation through attribution of false belief by 2-year-olds. *Psychological Science*, 18(7), 587-592.
- Surian, L., Caldi, S., & Sperber, D. (2007). Attribution of beliefs by 13-month-old infants. *Psychological Science*, 18(7), 580-586.
- Vail, G. (2000). Pre-Hispanic Maya religion. *Ancient Mesoamerica*, 11, 123-147.
- Wellman, H. M., Cross, D., & Watson, J. (2001). Meta-analysis of theory-of-mind development: the truth about false belief. *Child Development*, 62, 655-684.
- Zolla, C. (Ed.). (1994). *Diccionario enciclopédico de la medicina tradicional mexicana*. Mexico City: Instituto Nacional Indigenista.

Chapter IV

Culture, Class, and Cognition: Evidence from Italy

Nisbett and colleagues (Nisbett, 2003; Nisbett & Masuda, 2003; Nisbett, Peng, Choi, & Norenzayan, 2001) have argued that East Asians are inclined to reason and perceive in a holistic fashion, that is to say, to emphasize relationships and similarities among objects and events in the broad perceptual and conceptual field. Westerners instead tend to reason more analytically, that is, to focus on a central object (or person) and its attributes and to reason about it using categories and rules.

A variety of findings support these contentions. For example, Abel and Hsu (1949) found that Chinese-American participants gave more whole card response to Rorschach inkblots than did European Americans, whereas Americans gave more responses that referred only to a part of the inkblot. Ji, Peng and Nisbett (2000) found that Chinese participants were more field dependent in the rod and frame test: when making judgments of the verticality of the rod, they were more influenced by the position of the frame. Ji et al. also found that Chinese participants were better able to gauge degree of relationship among elements presented in the perceptual field. Masuda and Nisbett (2001) presented animated vignettes of underwater scenes to Japanese and American participants and asked them to report what they saw. Japanese reported many more field or context elements than did Americans, who tended to emphasize attributes of central objects. Chiu

(1972) presented triplets of pictures (e.g., cow, chicken, grass) to American and Chinese children and asked them which two belonged together. American children tended to group based on categorical associations (cow goes with chicken because they are both animals); Chinese children tended to group based on relationship (the cow eats the grass). Ji, Zhang and Nisbett (2004) showed the same phenomenon with college students using words instead of pictures. Norenzayan, Smith, Kim and Nisbett (2002) examined the category learning of East Asians and Americans. They found that East Asians made many categorization errors when the object they were trying to categorize bore a strong resemblance to an exemplar of another category. Americans were much less likely to make categorization errors under these circumstances.

Nisbett and his colleagues have argued that these differential perceptual and cognitive tendencies are rooted in the different social practices of the two regions. East Asians are more dependent on each other in many respects, and their attention is focused on the social world and hence the field as a whole. In general, Westerners are less dependent on each other and hence have the luxury of focusing on a central object and their goals with respect to it. For instance, for most Westerners categorization is based on the features of the object, and rules are those that are presumed to apply to the relevant categories. The rules brought to bear are presumed helpful in predicting and controlling the behaviour of the object. The more frequent application of rules independently of context (and semantic content) is thus a distinguishing feature of Western cognition.

Until now, the study of cognitive variability deriving from differences in social organization and social practice has been restricted to cross-national comparisons. However, inasmuch as nations are relatively recent products of complex historical

processes, they are not homogeneous cultural entities. Thus, we may expect to find some differences between a nation's subcultures.

An interesting test case is offered by Italy. The history of this country is peculiar because its northern and southern areas were characterized by quite different forms of social and political organization for many centuries before independence and unification. Independent communes, insulated to a degree from the power of monarchs, formed themselves in northern Italy as early as the late Middle Ages. Citizens participated in these communal republics in relatively unconstrained fashion, and the formation of craft guilds increased the degree of freedom of these communes. The South, governed with an iron hand by Norman kings, failed to foster civic involvement, social responsibility, and mutual assistance, which favoured the development of the Mafia and of *clientelismo* – vertical systems of patron-client exchanges involving lopsided reciprocal obligations (the more powerful person in the exchange gaining the most from the relationship). Networks of civic engagement found in the North, such as neighbourhood associations, cooperatives, sports clubs, etc., were instrumental in creating a dense network in communities, which in turn facilitated free cooperation between citizens (Banfield, 1958; Putnam, 1993). This kind of cooperation was characterized by voluntary association, rather than hierarchical relations or close kinship ties. One intriguing cognitive measure supporting the existence of a difference in social orientation between northern and southern Italians is reflected in the type of insults people favour. While the frequency of insults directed at the person (stupid, etc.) is approximately the same in both regions, Southerners have been found to use “collective” insults, directed at the target’s family, more frequently (Semin & Rubini, 1990). Given the above evidence, we would expect

southern Italians to be more concerned with relationships in their social and cognitive habits than northern Italians. Thus northern Italians are relatively independent in their social practices whereas southern Italians are relatively interdependent. If so, then we might expect the cognitive habits of Northerners to resemble those of Americans, that is, to be relatively analytic, and the cognitive habits of Southerners to resemble those of Asians, that is, to be relatively holistic.

Intra-national comparisons need not be restricted to different regions. Different social classes differ in their social practices. Many of the differences attributable to class can be explained in terms of the different social environments afforded by wealthier and poorer family life. For example, comparisons of working and middle class communities in the US have shown that parent/child interaction differs in ways that affect children's cognition – for example by making children more or less prepared for the kind of question/answer scripts they will encounter in mainstream schooling (Heath, 1986) or by causing children to perceive themselves as more or less autonomous entities (Andersen, 1986). Across the world, lower SES individuals have also been found to have more frequent contact with kin (Allan, 1979; Rossi-Doria, 1962/1948); to perceive themselves to have less self-efficacy (Gecas, 1989) and less internal locus of control (Kohn, 1969; Mirowsky & Ross, 1986) – and, realistically, they tend to have fewer opportunities for choice and self-direction in their lives (Inkeles, 1969; Kohn, 1969). Socialization for higher SES children involves teaching independence and self-discovery and is more likely to emphasize obedience for lower SES children in both America (Kohn, 1969) and Italy (Pearlin & Kohn, 1966). Thus it may be possible that differences in social orientation derive from factors such as relative wealth, in addition to long-term historical

processes. If that is true, we may expect lower-SES people to be relatively more interdependent, because of the forms of social structure and practices that are associated with class membership (see Kohn, 1969; Triandis, McCusker, & Hui, 1990). In fact, the importance (both positive and negative) of kin-based social networks in poor societies is a well-investigated phenomenon in economics and anthropology (Knack & Keefer, 1997; Stack, 1974; Wiessner, 1982). If working-class people are more interdependent in their social orientation than middle-class people then we might expect them to be more holistic in their cognitive habits than middle-class people.

In the remainder of this paper, we present the results of a study examining whether the well-documented subcultural differences in social practice are associated with measurable cognitive effects. The task, adapted from Ji et al. (2004), consisted of a printed list of twenty items, each composed of three words (e.g., Monkey, Panda, Banana). This task is akin to that originally used by Chiu (1972), except that we – like Ji et al. (2004) – employed written words instead of pictures as stimuli. Participants were asked to choose which two of the three words in each item “went together” by circling them. The words in each item could be grouped in two meaningful ways, one showing preference for thematic relationships (e.g., Monkey and Banana), the other for categorical relations (e.g., Monkey and Panda).

Ji et al. (2004) found that relatively interdependent Chinese participants strongly preferred pairing items according to their thematic relationships, while relatively independent Americans favoured categorical relations. We hypothesized that southern Italians and low SES participants, because of their greater social interdependence, would

be more likely to choose thematic pairings than northern Italians and high SES participants.

Sample Composition

Participants were recruited among final-year students in four Italian high schools. The schools were selected to include two ‘classics’ orientation high schools, one in the North (Milan) and one in the South (Naples), and two IPSIAs (*Istituti Professionali di Stato per l’Industria e l’Artigianato*, or State Professional Institutes for Industry and Crafts), one in the North (Monza, close to Milan) and one in the South (Crotone, in the district of Calabria).

In Italy, high school students can choose among several educational paths; they can study ancient Greek and Latin in addition to literature, history, and philosophy (the ‘classics’ orientation, which is perceived as the most prestigious); they can focus on mathematics, physics, and chemistry (the ‘scientific’ orientation); or they can learn several modern languages (the ‘linguistic’ orientation). In addition to these, there are several other courses of study available, mostly focusing on the acquisition of practical (electronic, electrical, mechanical, and chemical) trade skills. Institutes offering trade-oriented training, known as IPSIAs, rank lower on the prestige scale than the three non-trade-oriented kinds of schools described above, but children who attend them to graduation still represent a privileged segment of the population, since at the time the study was conducted formal education in Italy was only compulsory to age 16.

The final sample included 268 students recruited from four schools. The schools were chosen to be representative of the region and of two different class levels (upper

middle, represented by the Classics orientation schools, and lower to lower middle, represented by the IPSIAs). Though no data were collected on the earnings of the students' families, we take the content of the student's educational path (more theoretical in the case of classics schools, more applied in the case of IPSIAs) and the location of the school (center of a large city for classics schools, and either periphery of a large city or small town for IPSIAs) to be reliable proxies for family SES, and by extension, class membership.⁵ The final sample comprised four groups: North, high SES ($N = 59$), North, low SES ($N = 47$), South, high SES ($N = 75$), and South, low SES ($N = 74$).

Materials and Procedure

Participants were tested by paper and pencil in Italian. Access to the participants was granted by the principal of each school as well as the teacher, during whose teaching time the tests were administered. Students signed a sheet outlining their rights as participants, and kept a copy for reference.

Seven out of the twenty groups of words were test items, the remaining thirteen being fillers. The test items were dispersed among the fillers; the relative order of the three terms in each test item was also counterbalanced. Each test item response was coded as either 1 (denoting thematic classification) or 0 (denoting categorical classification). Meaningless pairings (e.g., Panda and Banana) were only chosen 47 times out of 1,752 total answers, and, given both the rarity of their occurrence and their irrelevance to the hypotheses being tested, were left out of the analysis. The scores on the

⁵ It could be argued that a complete analysis would require location to be crossed with both orientation and region, but this is not possible because there are no Classics orientation high schools either in the periphery of large cities or in smaller towns. Since in Italy wealthier people are likely to reside in the central areas of larger cities, we take this to corroborate the idea that study orientation closely matches SES/class distributions.

seven test items were averaged for each individual, resulting in a continuous proportion ranging from 0 to 1, with higher values indicating stronger preference for thematic relationships.

The statements were translated by the first author, whose first language is Italian, and who is fluent in English. The items' intelligibility was tested on several Italian native speakers. No changes needed to be made.

Results

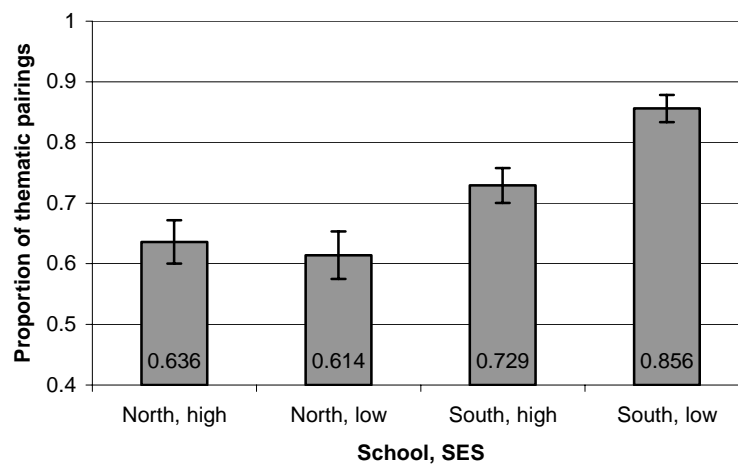


Figure 4.1. Proportion of thematic pairings by school and SES. Bars represent \pm one standard error.

Scores were subjected to a two-way analysis of variance with two levels of SES (low, high) and two of Region (North, South). Results are presented graphically in Figure 4.1. There was a main effect of region, indicating a significantly greater preference of southern participants for thematic pairing, $F(1, 251) = 29.14, p < .001$. The interaction of region and SES also reached significance, indicating that SES had a greater effect in the

South than in the North, $F(1, 251) = 5.74, p < .05$. A series of Tukey HSD post-hoc tests was run on the individual group scores. The South, low SES group was found to differ from all others (North, high SES: mean diff. .22, $p < .001$; North, low SES: mean diff. .24, $p < .001$; South, high SES: mean diff. .13, $p < .01$); the South, high SES group was marginally significantly different from the North, low SES group (mean diff. .12, $p = .056$); no other differences were found. Thus, within the South, lower SES participants were more likely to choose thematic associations than higher SES participants, showing a social class effect, whereas there was no SES difference among the Northerners. Although these results cannot be directly compared to those of Ji et al. (2004) as the stimulus set was not exactly the same, it may be noted that the Southerners in our sample are closer to the classification style of their Chinese participants than to that of the Americans.

One-sample t -tests against chance (.5 level) showed a preference for thematic sorting significant at the $p < .001$ level for the overall sample ($M = .723, t(254) = 13.68$, for both regional groups (North: $M = .626, t(105) = 4.79$; South: $M = .792, t(148) = 15.53$), and for both SES groups (High: $M = .688, t(133) = 8.29$; Low: $M = .762, t(120) = 11.38$).

Discussion

The present research is an extension of previous findings in that it shows that different social practices within a nation can affect the way people deal with a simple cognitive task. We show that this is true of subcultures that share a language, many years of common history, and (in the case of SES) even the same geographical location. We

found that, as predicted, the preference of the southern Italian participants for thematic categorization was stronger than that of their northern counterparts, and thus more strongly shifted in the Asian direction. With regard to SES, a marked difference in categorization style in the expected direction was found for southern Italy, but not for northern Italy.

Overall, our results strongly support our hypothesis that cognitive differences may be found between groups not separated by vast geographical distances or thousands of years of lack of contact. Italy is a strongly integrated nation with a single official language, and yet it houses regional subcultures, which, in spite of their proximity, are dissimilar enough to produce significant measurable differences in cognition. The results also show that social class may affect people's performance on simple cognitive tasks. However, the presence of an interaction between region and SES suggests the existence of a complex relationship between the two. Rather than speculating about the nature of this relationship, we choose the route of further research.

The results provide indirect support for the contention of Nisbett and his colleagues (Nisbett, 2003; Nisbett, et al., 2001) that the cognitive differences they find between Asians and Westerners are due to the social differences, namely that the interdependence of Asians prompts attention to relationships whereas the independence of Westerners encourages a focus on objects and their proper categorization. Southern Italians, and working class people in the West, resemble Asians in that their social relations are of a relatively interdependent nature. Northern Italians, and middle class people in the West, have social structures and practices that foster independence.

Bibliography

- Abel, T. M., & Hsu, F. L. K. (1949). Some aspects of personality of Chinese as revealed by the Rorschach test. *Rorschach Research Exchange Journal and Journal of Projective Technique*, 13, 285-301.
- Allan, G. A. (1979). *A sociology of friendship and kinship*. London: Allen & Unwin.
- Andersen, E. S. (1986). The acquisition of register variation by Anglo-American children. In B. Schieffelin & E. Ochs (Eds.), *Language socialization across cultures*. Cambridge: Cambridge University Press.
- Argyle, M. (1994). *The psychology of social class*. London: Routledge.
- Banfield, E. C. (1958). *The Moral Basis of a Backward Society*. Glencoe, IL: The Free Press.
- Chiu, L.-H. (1972). A cross-cultural comparison of cognitive styles in Chinese and American children. *International Journal of Psychology*, 7, 235-242.
- Gecas, V. (1989). The social psychology of self-efficacy. *Annual Review of Sociology*, 15, 291-316.
- Heath, S. B. (1986). What no bedtime story means: narrative skills at home and school. In B. Schieffelin & E. Ochs (Eds.), *Language socialization across cultures*. Cambridge: Cambridge University Press.
- Inkeles, A. (1969). Making men modern: on the causes and consequences of individual change in developing countries. *American Journal of Sociology*, 75, 208-225.
- Ji, L.-J., Peng, K., & Nisbett, R. E. (2000). Culture, control, and perception of relationships in the environment. *Journal of Personality and Social Psychology*, 78(5), 943-955.
- Ji, L.-J., Zhang, Z., & Nisbett, R. E. (2004). Is it culture, or is it language? Examination of language effects in cross-cultural research on categorization. *Journal of Personality and Social Psychology*, 87(1), 57-65.
- Knack, S., & Keeper, P. (1997). Does social capital have an economic payoff? A cross-country investigation. *Quarterly Journal of Economics*, 112, 1251-1288.
- Kohn, M. L. (1969). *Class and conformity: a study in values*. Homewood, IL: The Dorsey Press.
- Masuda, T., & Nisbett, R. E. (2001). Attending holistically vs. analytically: Comparing the context sensitivity of Japanese and Americans. *Journal of Personality and Social Psychology*, 81, 922-934.
- Mirowsky, J., & Ross, C. E. (1986). Social patterns of distress. *Annual Review of Sociology*, 12, 23-45.
- Nisbett, R. E. (2003). *The geography of thought: how Asians and Westerners think differently... and why*. New York: The Free Press.
- Nisbett, R. E., & Masuda, T. (2003). Culture and point of view. *Proceedings of the National Academy of Sciences*, 100(19), 11163-11170.
- Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: holistic versus analytic cognition. *Psychological Review*, 108(2), 291-310.
- Norenzayan, A., Smith, E. E., Kim, B. J., & Nisbett, R. E. (2002). Cultural preferences for formal versus intuitive reasoning. *Cognitive Science*, 26, 653-684.

- Abel, T. M., & Hsu, F. L. K. (1949). Some aspects of personality of Chinese as revealed by the Rorschach test. *Rorschach Research Exchange Journal and Journal of Projective Technique*, 13, 285-301.
- Allan, G. A. (1979). *A sociology of friendship and kinship*. London: Allen & Unwin.
- Andersen, E. S. (1986). The acquisition of register variation by Anglo-American children. In B. Schieffelin & E. Ochs (Eds.), *Language socialization across cultures*. Cambridge: Cambridge University Press.
- Banfield, E. C. (1958). *The Moral Basis of a Backward Society*. Glencoe, IL: The Free Press.
- Chiu, L.-H. (1972). A cross-cultural comparison of cognitive styles in Chinese and American children. *International Journal of Psychology*, 7, 235-242.
- Gecas, V. (1989). The social psychology of self-efficacy. *Annual Review of Sociology*, 15, 291-316.
- Heath, S. B. (1986). What no bedtime story means: narrative skills at home and school. In B. Schieffelin & E. Ochs (Eds.), *Language socialization across cultures*. Cambridge: Cambridge University Press.
- Inkeles, A. (1969). Making men modern: on the causes and consequences of individual change in developing countries. *American Journal of Sociology*, 75, 208-225.
- Ji, L.-J., Peng, K., & Nisbett, R. E. (2000). Culture, control and perception of relationships in the environment. *Journal of Personality and Social Psychology*, 78(5), 943-955.
- Ji, L.-J., Zhang, Z., & Nisbett, R. E. (2004). Is it culture, or is it language? Examination of language effects in cross-cultural research on categorization. *Journal of Personality and Social Psychology*, 87(1), 57-65.
- Knack, S., & Keefer, P. (1997). Does social capital have an economic payoff? A cross-country investigation. *Quarterly Journal of Economics*, 112, 1251-1288.
- Kohn, M. L. (1969). *Class and conformity: a study in values*. Homewood, IL: The Dorsey Press.
- Masuda, T., & Nisbett, R. E. (2001). Attending holistically vs. analytically: Comparing the context sensitivity of Japanese and Americans. *Journal of Personality and Social Psychology*, 81, 922-934.
- Mirowsky, J., & Ross, C. E. (1986). Social patterns of distress. *Annual Review of Sociology*, 12, 23-45.
- Nisbett, R. E. (2003). *The geography of thought: how Asians and Westerners think differently... and why*. New York: The Free Press.
- Nisbett, R. E., & Masuda, T. (2003). Culture and point of view. *Proceedings of the National Academy of Sciences*, 100(19), 11163-11170.
- Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: holistic versus analytic cognition. *Psychological Review*, 108(2), 291-310.
- Norenzayan, A., Smith, E. E., Kim, B. J., & Nisbett, R. E. (2002). Cultural preferences for formal versus intuitive reasoning. *Cognitive Science*, 26, 653-684.
- Putnam, R. D. (1993). *Making democracy work: civic traditions in modern Italy*. Princeton: Princeton University Press.
- Rossi-Doria, M. (1962/1948). Cos'è il Mezzogiorno agrario. In B. Caizzi (Ed.), *Nuova antologia della questione Meridionale*. Milano: Edizioni di Comunità.

- Semin, G. R., & Rubini, M. (1990). Unfolding the concept of person by verbal abuse. *European Journal of Social Psychology, 20*(4), 463-474.
- Stack, C. B. (1974). *All our kin: strategies for survival in a black community*. New York: Basic Books.
- Triandis, H. C., McCusker, C., & Hui, C. H. (1990). Multimethod probes of individualism and collectivism. *Journal of Personality and Social Psychology, 59*, 1006-1020.
- Wiessner, P. (1982). Risk, reciprocity and social influences on !Kung San economics. In E. Leacock & R. B. Lee (Eds.), *Politics and history in band societies*. Cambridge: Cambridge University Press.
- Putnam, R. D. (1993). *Making democracy work: civic traditions in modern Italy*. Princeton: Princeton University Press.
- Rossi-Doria, M. (1962/1948). Cos'è il Mezzogiorno agrario. In B. Caizzi (Ed.), *Nuova antologia della questione Meridionale*. Milano: Edizioni di Comunità.
- Semin, G. R., & Rubini, M. (1990). Unfolding the concept of person by verbal abuse. *European Journal of Social Psychology, 20*(4), 463-474.
- Sloman, S. (1993). Feature-based induction. *Cognitive Psychology, 25*, 231-280.
- Stack, C. B. (1974). *All our kin: strategies for survival in a black community*. New York: Basic Books.
- Triandis, H. C., McCusker, C., & Hui, C. H. (1990). Multimethod probes of individualism and collectivism. *Journal of Personality and Social Psychology, 59*, 1006-1020.
- Wiessner, P. (1982). Risk, reciprocity and social influences on !Kung San economics. In E. Leacock & R. B. Lee (Eds.), *Politics and history in band societies*. Cambridge: Cambridge University Press.
- Wiley, A., Rose, A., Burger, L., & Miller, P. (1998). Constructing autonomous selves through narrative process: a comparative study of working-class and middle-class families. *Child Development, 69*, 833-847.

Chapter V

Some Problems with Property Ascription

Ascription in General

Through fieldwork, anthropologists acquire knowledge about what individuals in a social group tend to do and say. They also progressively become able to make accurate inferences about the desires, beliefs, preferences, etc. of some individuals in that group. In writing ethnography, anthropologists routinely ascribe such behavioural and mental properties to some or all individuals in their chosen population. In this paper, we look at some troublesome aspects of the practice of ascription in anthropology. To begin, we need to specify what we mean by ascription.

Ascription refers to the practice of attributing a property to an individual or a group. There are several kinds of ascription, dealing with different aspects of the individual or group in which one is interested. Most individual physical properties can be ascribed after a single observation (e.g., “*x has blue eyes*”). In contrast, behavioural properties, while observable, require at least repeated observation to be accurate. For example, imagine that an observer wishes to state that a certain individual wears hats – clearly, a single observation of hat-wearing behaviour is not sufficient. Of course, this is not to say that individual behavioural properties cannot be ascribed at all. Someone need

only observe a consistent pattern over a period of time and report it; if the person in question wears a hat significantly more frequently than others in his social group,⁶ then the ascription is warranted. This is not to say that it is an error-proof endeavour; for example, once a working hypothesis has been established (in this case, that someone wears hats), the observer can unwittingly assign more weight to instances that confirm, rather than disconfirm, the hypothesis.⁷ Luckily, biases of this sort can easily be controlled by simple statistical means.

In many cases anthropologists are interested in going beyond simple behavioural observations to describe mental activity – beliefs, desires, preferences, emotions, etc. This endeavour still requires the anthropologist to rely on the observation of behaviour, and to infer the existence and characteristics of mental activity from those observations.⁸ This process of inference is more error-prone than that involved in the ascription of readily observable properties, such as behavioural or physical traits, because an inferential step is added in order to understand the non-observable cognitive processes believed to be the cause of behaviour (Jones, 2000). The complexity of this inferential

⁶ Just how much of the time one needs to be wearing a hat to have that property ascribed depends on one's assumptions and objectives. For example, imagine we want to contrast the behaviour of an individual – call him Paul – with some people who never wear hats. If we want to ascribe to Paul the behavioural property of hat wearing, we might be satisfied if he wears a hat only infrequently. In contrast, if our aim is to compare Paul to a group of people who often wear hats, the proportion of time when Paul wears a hat needs to be significantly higher if the ascription is to be more than trivial. This of course is also true if we substitute groups for individuals.

⁷ Comprehensive descriptions of the psychological characteristics of this and other biases are available in many textbooks and collections, including those edited by Kahneman & Tversky (2000) and Gilovich et al. (2002).

⁸ Not all mental activity is inaccessible to the same degree. For example, it is argued that physiological markers of some emotions, such as fear or embarrassment, can be directly measured without necessarily having to look at measures of mental activity. Similarly, behavioural economists are able to elicit preferences by having people make choices in experimental situations, rather than stating their preferences outright. The advantage of these techniques is that they allow the investigator to circumvent problems inherent in self-report described by Nisbett & Wilson (1977).

process is also compounded by the fact that we do not yet fully comprehend the nature of thought.

To appreciate the extra layer of complexity that this problem generates, consider the following comparison. Celestial bodies that are too remote to be visible from earth, while not observable, can still be perceived in many cases. The discovery of their existence (and the estimation of their location and mass) often derives from the observation of unexpected movements in the trajectory of other, visible objects. Thus astrophysicists, like anthropologists, have to rely on the observation of the perceivable in order to make inferences about the non-perceivable. But anthropologists encounter an additional problem. The visible and invisible objects in which astrophysicists are interested are fundamentally homogeneous. This has resulted in the establishment of standard procedures for locating non-visible objects in space. Thought, on the other hand, is quite different from behaviour. Thinking ultimately takes the form of electrical activity in the brain. Beyond that, there is no agreed-upon description of the form of mental activity except that it consists in some sort of computation. That is problematic, because the neural level is not necessarily the most valuable level of description of all cognitive processes.

Psychology, and the cognitive sciences in general, have not yet reached a stage of development where they can produce laws of mental activity comparable to those of astrophysics. Because there exist no universally applicable formal principles to guide belief ascription, social scientists often use an intuitive process. This, a component of the

human ‘mindreading’ system (Harris, 1992; Nichols & Stich, 2003; Perner, 1993; Wellman, 1990; Wellman, Cross, & Watson, 2001), is remarkably efficient in guiding our everyday interactions with other human beings (and some animals, some imaginary entities, and perhaps even some inanimate objects), and as such it is routinely exploited by anthropologists in the field, even without their awareness. Lienhardt (1961), while describing an instance of Dinka sacrifice, invokes the notion of ‘collective concentration’ of attention on a single action, and postulates that this is a defining characteristic of such ritual activity. Lienhardt does not operationalize this notion or speculate on its psychological nature; and yet, as inferred by Carrithers (1992), he is able to perceive that collective concentration is taking place from a variety of cues such as eye gaze, body orientation, and changes in activity. The nature of many intuitive cognitive systems devoted to the understanding of social dynamics is such that they are often employed by anthropologists in the field before becoming the object of psychological research. Indeed, psychological arguments for the existence and importance of the joint attention mechanism as a building block of the human capacity for culture have only recently been made by Tomasello et al. (2005).

The capacity of anthropologists to use intuitive, informal attribution has the distinct advantage of allowing them to understand the people they study with reasonably high success and reasonably little effort, and to pass on this knowledge to others. At the same time, the unreflective use of ascription can lead to inaccurate or misleading descriptions. By way of example, let us consider a typical anthropological ascription:

The Dobuans are bad sailors, *hugging the reef and disembarking every night* (Benedict, 1989/1934, p. 157. Our emphasis).

The italicized claim is a behavioural ascription, based on Reo Fortune's observations during his fieldwork in Dobu, and is entirely justifiable – assuming that it is supported by easily obtainable and verifiable evidence. We can guess that Fortune accurately observed that Dobuans did not stray far from the reef, nor did they show any willingness to sail overnight (in sharp contrast with the members of other Melanesian societies). But note that the quote also carries an implicit ascription of a mental property, captured by the evaluative expression 'bad sailors.' In this case, it is clear that by the use of the word 'bad' Fortune intends to emphasize that the Dobuans' tendency to hug the reef does not derive from, say, a religious rule prohibiting high-seas navigation, but rather from the fact that the Dobuans, lacking any special necessity to engage in demanding sailing activities, devote little effort to the improvement of their nautical skills.

It would be surprising if a competent anthropologist such as Fortune had completely failed to grasp the reason for the Dobuans' lack of sailing proficiency; readers are aware of that and so, when reading the above statement, are immediately able to understand what it entails. But not all forms of ascription are as useful as this one; and the ease with which anthropologists produce ascriptions, and readers understand them, means that some misleading ones may well go unnoticed.

There are many ways in which ascription can be misleading. We will focus on what we see as the most common and problematic cases, namely those where:

1. A property is ascribed to a collective entity, but it is unevenly distributed among social sub-groupings;

2. An ascribed mental property is alleged to cause an individual's behaviour, but its existence is empirically unsupported;
3. A belief is ascribed to an individual, although another belief that effectively contradicts the first one is also entertained by the same individual.

The first sort of problem has been recognized by anthropologists and has been, in our opinion, successfully dealt with. The other two, which deal with anthropological claims about cognition, will need to be rethought in the light of what we now know about the operating principles of the mind.

Collective Ascription and Social Variability

Collective ascription refers to the practice of attributing properties to groups rather than individuals. This is in many ways unavoidable, in that the aim of most anthropologists is to present culturally distributed patterns of action and belief, rather than idiosyncratic ones. However, when a property is unevenly distributed among the members of a society, and its distribution happens to map onto some social sub-groupings, ascribing that property to the entire society is unwarranted.

A number of anthropologists, starting more formally with the establishment of the 'ethnoscience' approach in the 1960s, have tried to show how collective ascription has the potential to mask the diversity present in even the smallest society (Bernard et al., 1986; Pelto & Pelto, 1975; Rodseth, 1998; Vayda, 1994). While these anthropologists did not dispute the usefulness of generalized abstraction, they also believe that it should not be the discipline's single aim or sole form of presentation of evidence. Vayda (1994) and

Pelto & Pelto (1975) went further by saying that the study of variation is potentially even more revealing than the study of shared properties. This approach takes as its starting point empirical observations of intra-cultural differences in knowledge or belief and tries to map them onto grouping variables such as age, urbanisation, and gender. These grouping variables are implicitly assumed to be (at least in part) causally responsible for the existence of differences. A number of empirical studies demonstrate the existence of, and propose explanations for, intra-cultural differences in a variety of domains, including: preference for delayed economic gratification in Uganda, across the rural/urban axis (Thompson, 1975); medical knowledge in a Tarascan community, across age and expertise levels (Garro, 1986); botanical knowledge among the Aguaruna, across expertise levels (Boster, 1986); and beliefs about the role and significance of breastfeeding among the Navajo, across age and degree of bilingualism (Wright, Bauer, Clark, Morgan, & Begishe, 1993). It has now become impossible for anthropologists to ignore the uneven distribution of cultural content across adults in any society.

More recently, some anthropologists have proposed that differences between children and adults are also very relevant. In particular, Toren (1993) and Hirschfeld (2002) have noted how, since anthropology is primarily concerned with culture, and since much of culture is believed to be socially transmitted, interactions between older and younger generations are presumably responsible for the reproduction of a large amount of cultural knowledge. In spite of these crucial implications for the study of culture, and of the availability of several ethnographies dealing with childrearing practices, child health and nutrition and other related matters, no strong anthropological interest in development

has emerged. Conversely, the psychological study of cognitive development has generated an impressive number of findings relating to the development of the understanding of the biological world, other people's beliefs and desires, number and mathematics, physics, and social groupings, which are all but ignored by anthropologists, regardless of how relevant they may be to their concerns. The use of collective ascription (perhaps a reflection of this neglect) can obscure the highly important processes whereby culture is acquired, and misleadingly present an image of society where a 7-year-old, an adolescent, an adult, and an elderly person perceive and think about the world in just the same way.

The theoretical stance of these ethnoscientists and developmental anthropologists, regardless of their differences, contrasts sharply with old and new defenders of the particularistic approach, particularly of the postmodern variety (e.g., Crapanzano, 1980; Price, 1998), who, while anti-essentialist in orientation, are not concerned with the *explanation* of variability. The non-postmodern approach to intra-cultural variability, we might say, is concerned with variability that is not random with respect to the socio-cultural environment (Malley & Knight, forthcoming). Many postmodern anthropologists, instead, are in general interested in variability *per se*. Variability, in this latter sense, is perceived as being irreducible to social or cultural categories – or at least such reduction is judged to be uninteresting.

Ascription of Empirically Under-Supported Mental Properties

The type of collective ascription criticized above fails because social variability is not taken into account. If a property is temporary or in flux, or if not all members of a social group can be shown to possess a certain property to a similar extent, unqualified collective ascription is not an adequate means of description. Other problems with ascription are neither as obvious to see nor as easy to correct. In some cases, anthropologists explicitly state that the property they ascribe to a group is meant to be possessed by all of its members; the degree of intra-cultural variability is presumed to be minimal.⁹ There is nothing psychologically unsound about this approach; but if the ascribed property proves to be empirically unsupported, the ascription is unwarranted. Here, we look at two examples: the ascription of ‘structuring’ and ‘irrational’ beliefs.

The Ascription of ‘Structuring’ Beliefs

Naming one of his influences as Freudian psychoanalysis, Lévi-Strauss is well-known for ascribing unconscious motives to people that cause their thoughts to be structured in certain cross-culturally recurring ways. Defenders of the structuralist approach postulate the existence of a level of cognition which is inaccessible to conscious thought, but which nonetheless informs it. Lévi-Strauss, like Freud, insisted (quite rightly, as it turns out) that people are often unaware of what drives them to action. The Lévi-Straussian unconscious, however, differs in significant respects from the Freudian one, most

⁹ In the previous section, we encountered cases where the property shows variability, and where this variability can be shown to map onto social subgroupings. Now we are going to deal with cases where the property is supposed not to show variability, and therefore to be equally distributed among social subgroupings. There is, of course, another possibility: that the property shows variability, and that the variability does not map onto social subgroupings. An example of such a property is blood type; properties of this kind are not interesting to anthropologists, because their presence and distribution in a population are not attributable to socio-cultural processes.

importantly in that the former is not thought to originate in the affective bonds of the family and society (Hénaff, 1998). In a sense, Lévi-Strauss adds to claims about the psychic unity of humanity a multi-layered view of the mind, in which primacy is given to the structuring unconscious (the mind that causes) over the conscious (the mind that thinks). But besides the now dated characterization of psychological processes as either fully accessible or fully inaccessible to consciousness, the problem with structuralism and similar psychoanalytic theories is that most of the explanatory work is done by mental structures whose nature and workings are extremely vague. As a result, while they can be invoked to produce plausible *a posteriori* explanations of certain phenomena, it is very difficult to produce a test that can give evidence for the phenomena being the product of these structures, or of some quite different structures or processes.

For example, Lévi-Strauss proposes that all humans are endowed with a ‘dualistic’ or ‘binary’ mind. A direct consequence of this is that all sorts of cultural phenomena – ranging from social organization patterns to categorization to myth – are dually structured, one part standing in opposition to the other in various ways. While it is true that many cultural products are indeed dually structured, we should not immediately subscribe to Lévi-Strauss’ conclusion that they are so structured because they are a product of a dualistic mind. Indeed, almost everything we know about cognition today suggests that the brain is a collection of specialized mechanisms dedicated to handle specific input (see for example the papers in Hirschfeld & Gelman, 1994). Lévi-Strauss’ theory can account for the patterns we observe, but it is neither strongly predictive (because all sorts of cultural objects can stand in all sorts of binary, ternary, quaternary,

etc. opposing relations to almost anything else), nor does it converge with other evidence about mental processes.

Other symbolic approaches run into similar problems. Jones (2000) classifies structuralist ascriptions of cognitive properties as a type within the category of ascription of unconscious symbolic beliefs, which he defines as “[beliefs] in which, without being aware of it, one categorizes things as having attributes far different from the ones that appear on the surface” (p. 132). Jones observes that the cognitively naïve theory of the unconscious that characterize such kinds of ascription make it impossible to decide which thoughts are being processed beyond what can be directly perceived from the environment. This impossibility makes the choice of one thought over others as explanatory arbitrary. Jones defends the idea that there are empirically sound ways to constrain the range of possible thoughts taking place in someone’s mind at a specific time. Psychological theory, unlike structuralist and psychoanalytic theories, allows one to place such constraints by postulating that the mind is organized in such a way that only a restricted number of related thoughts can become available at any one time. The associative structure of semantic memory is an example of a mechanism that could serve this purpose, at least in some cases.

The Ascription of ‘Irrational’ Beliefs

‘The Bororo...boast that they are red Araras [Macaws].’ That does not simply mean that after their death they become Araras, nor that the Araras are Bororo metamorphosed, and must be treated as such. It means another thing altogether. ‘The Bororo,’ states von den Steinen, who did not want to believe them, but had to give in to their formal statements, ‘quite clearly state that they *actually are* Araras, exactly as if a caterpillar stated that it is a butterfly.’ This is not a name

that they are giving themselves; this is not a parentage that they are proclaiming. What they want to mean is a relationship of fundamental identity. (Lévy-Bruhl (1910, part I, ch. 2), quoting von den Steinen (1894): authors' translation)

This is a well-known account of lowland South American Indians recorded by von den Steinen and used by Lévy-Bruhl as one of the main pieces of evidence for his theory of primitive mentality. This sort of ascription carries with it the implication that some fundamental cognitive properties displayed by the traditional subjects of anthropological inquiry differ dramatically from those of Westerners. Debates about the rationality of 'primitives' have a long history in philosophy and the social sciences and focus on many different aspects (Hollis & Lukes, 1982; Wilson, 1970). Here, we will focus on 'irrational' beliefs of the sort reported by von den Steinen and briefly sketch the two most popular positions taken in this debate – intellectualism and symbolism – and one possible solution to the disagreements, and then relate these three positions to the practice of ascription.

Many anthropologists of the late 19th and early 20th century were concerned with showing how 'irrational' beliefs such as those relating to magic were in fact fully rational, given the limited or erroneous knowledge available to people in the specific group in which such beliefs obtained. This approach, championed by J. G. Frazer (Frazer, 1976/1890) among others, has become known as 'intellectualism.' In contrast, defendants of the symbolist approach like Mary Douglas, Victor Turner, and Lévi-Strauss propose that the language used to express apparently irrational beliefs is not to be interpreted literally. Such beliefs are simply an indirect expression of other domains, ranging from cosmology to social structure to ways of classifying the world and its contents. Therefore,

apparently irrational beliefs are unproblematic – for the same reason that metaphors are not irrational. For example, a more recent ethnographer reinterpreted the Bororo assertion reported by von den Steinen in terms of social relations:

It turns out that (1) only men say ‘we are red macaws;’ (2) red macaws are owned as pets by Bororo women; (3) because of matrilineal descent and uxorilocal residence, men are in important ways dependent on women; (4) both men and macaws are thought to reach beyond the women’s sphere through their contacts with spirits (Crocker, cited in Sperber, 1982, p. 152)

Symbolist interpretations of apparently irrational beliefs thus appear to be quite plausible; yet when attempting to interpret other ‘irrational’ beliefs in the same way, one soon finds out that not all such beliefs can be so reduced to other rational meanings. For example, the Bororo also state that they can have real contact with spirits, and are quite adamant about the literal truth of such statements. Sperber (1982) has proposed an explanation that is neither intellectualist nor symbolist, but rationalist and universalist. He noted that propositions by themselves cannot be rational or irrational; it is what one does with propositions that determines their rationality. It is possible that these ‘apparently irrational beliefs’ are unlike other beliefs; in particular, that people have a conscious appreciation of an epistemological difference between them and purely factual beliefs. Apparently irrational beliefs are believed, but are believed in a different sense from such things as “water wets the skin when applied to it.”¹⁰ Sperber, in other words, introduces the notion that commonly used terms used in ascription, such as *thought* and *belief*, may refer to a suite of related, but different phenomena. The possibility that different forms of beliefs might exist should not be ignored. Anthropologists are understandably drawn to unusual, surprising, or counterintuitive utterances; but when they assert that these reflect

¹⁰ Sperber further suggests that many apparently irrational beliefs – which can take the form of statements such as “god is everywhere” – do not refer to single, well-understood propositions. He uses the term *semi-propositional* to refer to those representations that can be plausibly interpreted in different ways within or across individuals.

a speaker's *beliefs*, they risk producing unwarranted ascriptions. Over the years, statements like “we are red macaws” have caused observers to ascribe to the speakers the properties of irrationality, of limited understanding of the natural world and causality, and of symbolic/associative thinking. None of these strategies provides strong evidence that the property being ascribed is what is causing the ‘irrational’ utterance to be produced. In contrast, an approach like Sperber’s is more psychologically plausible and open to empirical confirmation. For example, when people reason about apparently irrational beliefs we should expect that their inferential processes be impaired, producing fewer and shallower chains of inference; that the products of such inferences be less readily agreed upon; and that the holders of these beliefs refer to authority more often.

Intra-Individual Variability, Context Effects, and the Ascription of Belief

In this section, we argue that ascription can fail because of another way in which the common usage of the category of *belief* is misleading. We start by reviewing empirical work that suggests that incompatible representations of a single concept¹¹ may exist in the mind and be accessed in different contexts, and we will suggest that to ascribe one form of belief when one has evidence of incompatible representations is deceptive.¹² In the following discussion, we take it for granted that there is value in studying aspects of culture in relative isolation. We recognize that this is not an uncontroversial claim.

Stafford (forthcoming) argues that the uneasy relationship between anthropologists and

¹¹ Here we deal with the simplest case, in which two representations are clearly dissociable. However, we cannot exclude that in some instances, even including several of the cases we describe, further representations may exist.

¹² It could be argued that the examples we review can be explained in terms of Sperber’s theory, outlined in section 3.2. That is, the Bororo could have a dual incompatible representation of the self – one as humans, the other as red macaws. While this is indeed possible – and even likely – we treat the cases we look at in section 4 separately, because they do not all focus on claims of irrationality.

psychologists originates in this very issue, and rightly points out that there is much to be learned by looking at many aspects of a culture at once. Here, as in the rest of this paper, we have no intention to dismiss anthropological methods altogether, but to suggest that the problems that we illustrate in this section can in most cases be circumvented through careful use of methods derived from psychology.

Evidence for the existence of incompatible representations

'Virgin birth' among the Australians and Melanesians

Starting in the late 1800s, ethnographic reports started appearing which purported to show that people in some Australian and Melanesian societies lacked knowledge of the link between sexual intercourse and procreation (or, in other interpretations, of the sperm and egg fertilisation process, and in others still, of physiological paternity). These reports provoked widespread discussion in anthropological circles. In an early review Ashley-Montagu (1937) stated that "by far the largest number of field-workers assert that the Australians are ignorant of the relationship between intercourse and childbirth" (p. 176) He also noted how contemporary critics either believed that Australians never possessed this knowledge, or that they had, but then lost it through the acquisition of new and incompatible spiritual beliefs.

Several decades later, Leach (1961; 1966) reignited the debate, partly in response to the continued claims of some anthropologists (notably Spiro, 1968) about lack of knowledge of physiological paternity among Australians. Leach, in his typically impassioned style, presents several strands of evidence for his conviction that Australians

and Trobrianders are not ignorant of such facts. First, he notes how Roth, the author of the late-18th-century ethnography of the Tully River Blacks that started the controversy, reports that his informants freely stated that the cause of pregnancy in animals other than humans is indeed copulation. Secondly, Leach refers to more recent ethnography by Meggitt, which suggests that context may make a difference to how Walbiri talk about conception: “in ritual contexts, men speak of the action of the *guruwari* (spirit entities) as the significant factor; in secular contexts they nominate both the *guruwari* and sexual intercourse. The women, having few ritual attitudes, generally emphasise copulation.” Lastly, Leach suggests that Roth’s and other anthropologists’ tendency to attribute implausible beliefs to non-Western people is simply a reflection of their beliefs in the irrationality of primitive peoples. After all, Westerners also have beliefs about virgin birth, but these are imbued with religious significance, and play an insignificant role in everyday life; therefore, these ‘untrue’ beliefs about procreation should be interpreted in structural terms, as key elements of a cross-culturally recurrent pattern of ideas.

Unfortunately, the evidence is insufficient to allow us to settle the question of what Australians and Melanesians actually knew about reproduction.¹³ But it is possible that they had incompatible representations of reproduction in which one version of the concepts was used in everyday contexts (for example when talking about non-human animals, and possibly in some instances even when talking about humans), while the other, akin to religious dogma, was reserved for the ritual context and for answering direct questions about the process of social reproduction. Leach seems to intuit this

¹³ Helpful evidence would include a simple experiment that required people to reason about human procreation in unfamiliar contexts. Several of the following illustrations rely on such experiments to argue for the existence of incompatible representations.

possibility, but he is unable to articulate this in psychological terms because of his reliance on the old anthropological notion of belief that Sperber criticizes. We will return to the question of belief and rationality at the end of this section, after giving further examples of incompatible representations from the anthropological and psychological literature.

Understandings of Biological Inheritance among the Vezo

During her fieldwork in Madagascar, Astuti noted that Vezo adults invoke a variety of social mechanisms to account for the physiognomy of their young infants. For example, a child might be said to look like someone his mother used to dislike when she was pregnant or like someone in whose company she used to spend a lot of time; the infant's appearance might suddenly change because of a spirit's unwelcome visitation; the birth of a baby with a misshapen foot might be explained by the fact that the mother, when still a child, used to make fun of a person with a similar handicap; and so on. What is striking about these causal accounts is that they all establish the resemblance of infants with people who are *not* biologically related to them. Therefore, based on what they say about their children, one could conclude that Vezo adults do not distinguish between social and biological causality, as they seemingly ignore the role that procreation plays in the transmission of bodily properties from parents to offspring. This conclusion has great theoretical relevance for anthropology, because it appears to support the culturalist orientation in kinship studies, which claims that people in different cultural traditions have radically different understandings of the process of birth and of biological kinship, often emphasizing social aspects at the expense of biological ones.

Yet Vezo adults are also able to articulate a different view of the processes that give babies their looks. When asked to reason about the hypothetical adoption of a child whose birth parents had died soon after the birth of their son, Vezo adults overwhelmingly judged that the adopted child would grow up to have the same bodily properties of his birth parents, while sharing the beliefs, skills and customs of his adoptive parents (see Astuti, Solomon, & Carey, 2004; and Bloch, Solomon, & Carey, 2001, for further details). Vezo informants thus articulated different representations of the process of procreation and reproduction and of the link that exists between parents and their offspring. Crucially, the biological representation is articulated when people reason inferentially about fictional kinship relations. In contrast, when people are engaged in social life, they tend to articulate the non-biological view. By claiming that infants resemble those who are not biologically related to them, people manage to extend and stretch kinship relations well beyond the boundaries of biological kinship.

Understandings of Non-Human Life Forms among the Ma' Betisék

Karim (1981) reports that the Ma' Betisék of Malaysia hold a belief system about plants and non-human animals and their relation to humans that contains two irreconcilable views. The first, expressed by the concept of *tulah* (curse), refers to the idea that plants and animals, having been cursed by the ancestors, are fit for human consumption. The second, expressed by the concept of *kemali'* (tabooed object), refers to the idea that “acts involving the killing and destruction of plants and animals bring humans misfortune and death because both plant and animal life are derived from, and are essentially similar to, human life” (p. 1). As in the Vezo case, *Tulah* and *kemali'* ideas are often relegated to

specific contexts – the former appearing more frequently when people engage in economic activities, the latter in ritual ones.

Understanding of God among US Students

Barrett and Keil (1996) found a discrepancy between the way US college students thought about God when asked directly and while engaged in recall tasks. As the authors expected, participants explicitly represented God as possessing a number of non-anthropomorphic properties such as omnipotence, omnipresence, infinity, non-materiality – in accordance to current theological principles. However, when asked to recall and paraphrase stories, they attributed more anthropomorphic traits to God; for example, they tended to imagine God as moving very swiftly from place to place rather than being everywhere at the same time. This example suggests that the non-anthropomorphic properties that people learn and explicitly maintain to be characteristic of God are not easily accessible when performing moderately taxing cognitive tasks.

Self Construal among Westerners

Psychologists Hazel Markus and Shinobu Kitayama (1991) have argued for a cultural tendency to construe and perceive the self as more or less interdependent, or connected to other members of one's group. They have also suggested that different patterns of self-construal prevail regionally, and in particular that the Japanese and other East Asians rate high on the interdependence scale, while Americans of European descent rate low. More recently, a large number of studies have shown that forms of self construal appear to affect other aspects of cognition, such as categorization, inductive reasoning, etc. (Knight

& Nisbett, in press; Nisbett, 2003; Nisbett, Peng, Choi, & Norenzayan, 2001). Yet, regardless of their broad cultural patterning and wide cognitive impact, these conceptions of the self have also been found not to be fully stable within cultures. Gardner, Gabriel, & Lee (1999) showed that it is possible to make European-Americans answer questions about social values in a more interdependent manner if they are subtly primed beforehand by having to circle plural (rather than singular) pronouns in a text, as part of an unrelated reading task. The effect found by Gardner et al, while not invalidating the findings of Markus & Kitayama (1991), shows that the cross-cultural differences may be best explained by the culturally-influenced preferential adoption of a cognitive style. This hypothesis is both plausible, because it does not require radically different cognitive endowment at birth (which, though not advocated by Markus and Kitayama, could not be ruled out through their results), and interesting for anthropologists, because it offers a way of explaining cultural variability. More to the point, it shows once again that people can hold contrasting and incompatible representations of the same concept – in this case, the self – and deploy them in different contexts.

Theories of Incompatible Representations and their Relation to Ascription

In the above examples, the context in which a concept is deployed was shown to have an effect on the way it was represented. The role of context in shaping behaviour is a popular topic in psychology (see for example Darley & Batson, 1973; Ross & Nisbett, 1991), but the possibility of concepts being represented and deployed in radically different ways according to context is relatively understudied. This possibility significantly affects the practice of ascription. Statements to the effect that:

- Australians and Melanesians believe that there is no link between sexual intercourse and procreation;
- The Vezo believe that bodily properties are socially transmitted;
- The Ma' Betisék believe that the animals and plants are human-like and therefore unfit for human consumption;
- European-Americans believe God to be omnipresent and the self to be an independent and bounded entity

are not erroneous. However, they are incomplete, because they fail to mention that virtually opposite forms of these beliefs are held by the same individuals and deployed in certain contexts.

It is true that anthropological terms such as “contested” and “negotiated”, routinely used to qualify the nature of ascribed meanings and beliefs, are evidence of an intuitive appreciation of the problems of belief ascription. However, such terms rarely carry with them the precision necessary to do justice to this particular phenomenon. The need for a change in language is clear, but exactly what sort of change is needed depends on a full understanding of the cognitive underpinnings of incompatible representations.

While we are still far from such an understanding, contemporary theories of concepts offer some clues. It has often been assumed that concepts are represented by linguistic (or language-like) lists or networks of features. These feature lists are thought to be instantiated in a non-linguistic form in the brain. A closely related and widely accepted assumption is that concepts are context-independent – the representation of the

concept of *chair*, for instance, includes features such as *has legs*, *is used to sit on*, and so forth, but excludes such information as where a chair is usually found. Some psychologists, however, disagree. Lawrence Barsalou and his colleagues (Barsalou, 1982; Barsalou, 2002; Barsalou et al., 1993; Yeh & Barsalou, 2006) have argued that concepts are mentally represented by a combination of generic and episodic information. Furthermore, they have challenged a fundamental assumption of category learning, that the cognitive system collects shared features of concepts while discarding information about the situations in which one is likely to encounter the concepts. According to Barsalou, background information of this sort is stored along with feature information, and influences performance on a variety of cognitive tasks. The information that is relevant for a concept varies depending on the goal of the situation. For example, Barclay et al. (1974) presented participants with a series of sentences containing the same word (e.g., *piano*) in different contexts. Some of the sentences stressed one feature of the target word (e.g., *The man lifted the piano*), and some another (e.g., *The man tuned the piano*). After studying the sentences, participants were asked to recall them, and were given cue words to help recall. Sentence recall was significantly better when cues were related to the situation-specific concept of the target word (e.g., *heavy*, for the first example) than when they were related to the target word but not to the situation (e.g., *has a nice sound*, for the first example).

Barsalou and colleagues' proposal offers a very general explanation for the sort of phenomena we are describing. However, the situated cognition model needs some modifications if it is to be used to explain our examples of incompatible representations.

Whereas the features of the piano evoked in different contexts in Barclay et al.'s experiment are not contradictory (it is easy to state that a piano is both heavy and sounds nice in the same sentence) the features of the cases we describe above are always so (it is harder to state that sexual intercourse does and does not play a role in procreation at the same time). In other words, while it is true that a certain situation may cause participants to be more attentive to certain features at the expense of others, in the examples we outlined above situations seem to cause participants to attribute to concepts certain features in one situation and their opposites in another. By analogy, we should be able to devise a situation in which people readily attributed the feature of absolute lightness to a piano – that, however, does not seem plausible.

This issue should not induce us to believe that incompatible representation is not explainable within the framework of situated cognition. It is possible that the set of incompatible representations we looked at form a subset of all instances of situated cognition, characterized by this peculiar context-dependent denial or affirmation of features. We give two arguments to support this suggestion, one psychological and proximate, the other anthropological and ultimate.

First, current psychological models of semantic memory can provide a simple implementation of the process of incompatible representation. Network theories of semantic memory suggest that incompatible representations may not require specialized psychological machinery. Memorized concepts are generally believed to be roughly instantiated in network form, with a central node and several associated properties

instantiated as links to other nodes. Each of the links that connects central and peripheral nodes is weighted; that is, it is more or less strongly associated with the concept. The number and weight of links attached to each concept vary according to social, cultural, and individual factors. Some concepts are linked to a number of attributes in complex ways; different contexts may cause the weights to alter so that some properties become more strongly activated and others less so. If we think of concepts as network representations with a weighted set of properties, it becomes possible to sketch a basic psychological model of how incompatible representations may be processed in the brain. The properties of concepts with incompatible representations could be grouped into two (or more) mutually exclusive subsets. When a certain context causes a significant number of the members of the first subset to fire, members of the other subset stop firing and become inhibited, and vice versa. The difference between incompatible and normal representation could, therefore, be merely quantitative.

But this account of process is insufficient; we also need to ask why incompatible representations should exist at all, where ordinary cognitive tasks can be tackled with little effort by the situated cognition model. Maurice Bloch (1989a; 1989b) has suggested that anthropologists' fascination with rituals and the ritual context has often obscured their understanding of other, more mundane ways of conceptualizing the world that take place outside of that context and in many ways contradict it. Non-ritual ways of thinking about the world are based in humans' (evolved) cognitive capacities interacting with, and developing in, a varied social and ecological environment. Yet anthropologists have been singularly reluctant to talk about non-ritual cognition, perhaps because it is less obviously

variable across cultures (and thus less ‘visible’), or perhaps because of a vested disciplinary interest in emphasizing difference. Bloch (1989b) has suggested many several anthropological claims about ways of experiencing and understanding the world presented as being peculiar to certain societies (such the non-durational concept of time that Geertz ascribes to the Balinese) are indeed incomplete. What they show is not the existence of radically different ways of conceptualizing the world, but rather the fact that people in different cultures will use in the ritual context versions of some everyday concepts, ideas, etc. that are incompatible with their everyday use. In another paper, Bloch (1989a) has also proposed that the products of cognition in the ritual context be termed ‘ideology.’ Cognition in the ritual context is only explainable with reference to the process of political domination. The practice of ritual creates images of society that contradict everyday understandings of it; these images are endorsed by those who hold the power, and serve both to legitimate power and to “mystify, invert and hide the real conditions of existence” (Bloch, 1989a, p. 130).

The everyday/ritual distinction seems to provide a *prima facie* explanation for most of the cases of incompatible representation we outlined above. It is also psychologically plausible, in that it underscores the role of cognitive effort in dealing with certain concepts or, more accurately, with certain ways of representing concepts. Cognition in the ritual context seems to be more expensive – affording fewer and shallower inferences, etc. This is not surprising; after all, Bloch’s argument is an evolutionary one, suggesting that the mechanisms used in non-ritual contexts are better

suited for the majority of mental activity, which happens to take place in the everyday, non-ritual context.

However, it appears that not all cases of incompatible representation can be mapped on an everyday/ritual context shift. Take for example the shift between independent and interdependent views of the self that Gardner et al. (1999) demonstrated. This phenomenon does not appear to be dependent on ideology and the ritual context. Both views of the self are equally ontologically plausible and philosophically defensible; both are emphasized in US culture. This suggests two alternative interpretations. On the one hand, it may be that what we are calling incompatible representations are a psychologically unitary phenomenon, which in some (or even in most) cases can be explained in terms of Bloch's theory. Cases such as the representations of the self could simply be less typical exemplars. On the other hand, it may be that incompatible representations are only superficially similar phenomena with different psychological underpinnings. From the few instances of context-dependent incompatible representations that have been described by anthropologists and psychologists, it is difficult to choose between these two alternatives.

Conclusions

In the course of this paper, we have noted several problems with ascription as it has been practised in anthropology. We would like to emphasize once again that ascription is a given of anthropological writing, in many ways unavoidable, and in a large number of cases even beneficial to understanding. Collective ascription that is justified and well

supported is an excellent way to present data in a compact and easily interpretable way. Therefore, we have chosen to focus on cases where the common language of ascription is an inappropriate way of presenting evidence. Some of these cases have been successfully addressed by anthropologists. With the knowledge we now have about how ideas, beliefs, skills, expertise and so forth are unevenly distributed within social groups, careless claims – common only a few decades ago – that the x do or believe y (Jones, 2005) have become harder to defend, and fallen out of favour among anthropologists (although they remain popular in everyday language). But the ascription of cognitive properties without sufficient justification is still practised in anthropology. The discipline's ambitious (though not universally shared) aim to be a science of humankind means that practitioners of other, more strictly bounded and epistemologically uniform disciplines will often take issue with the methodology, theoretical orientation, or form of evidence presentation of anthropologists – this much is unavoidable, and should not necessarily discourage anthropologists from attempting to answer big questions. Yet to make strong claims about cognition without engaging with psychologists and other cognitive scientists is not defensible, and ultimately counterproductive, as parts of anthropology become liable to be taken over by related fields.

A different problem arises from our description of recent findings that suggest that concepts may be deployed in context-specific, incompatible forms. This is a more difficult issue, since there is no consensus in psychology and allied disciplines as to the cognitive underpinnings of these phenomena. Until a mapping of their domain and explanation of their psychological nature are available, anthropologists would be well

advised to consider contextual effects on representation, and to temper strong ascriptions of belief in the light of the cross-cultural evidence reviewed here.

Bibliography

- Ashley-Montagu, M. F. (1937). Physiological paternity in Australia. *American Anthropologist*, 39(1), 175-183.
- Astuti, R., Solomon, G. E. A., & Carey, S. (2004). *Constraints on conceptual development: a case study of the acquisition of folkbiological and folksociological knowledge in Madagascar*. Oxford: Blackwell.
- Barclay, J. R., Bransford, J. D., Franks, J. J., McCarrell, N. S., & Nitsch, K. (1974). Comprehension and semantic flexibility. *Journal of Verbal Learning and Behaviour*, 13, 471-481.
- Barrett, J. L., & Keil, F. C. (1996). Conceptualizing a non-natural entity: anthropomorphism in God concepts. *Cognitive Psychology*, 31, 219-247.
- Barsalou, L. W. (1982). Context-independent and context-dependent information in concepts. *Memory and Cognition*, 10(1), 82-93.
- Barsalou, L. W. (2002). Being there conceptually: simulating categories in preparation for situated action. In N. L. Stein, P. J. Bauer & M. Rabinowitz (Eds.), *Representation, memory, and development: essays in honor of Jean Mandler* (pp. 1-15). Mahwah, NJ: Erlbaum.
- Barsalou, L. W., Yeh, W., Luka, B. J., Olseth, K. L., Mix, K. S., & Wu, L.-L. (1993). Concepts and meaning. In K. Beals, G. Cooke, D. Kathman, K. E. McCullough, S. Kita & D. Testen (Eds.), *Chicago Linguistics Society 29: papers from the parasession on conceptual representations*. Chicago: University of Chicago Press.
- Benedict, R. (1989/1934). *Patterns of culture*. Boston: Houghton Mifflin.
- Bernard, H. R., Pelto, P. J., Werner, O., Boster, J., Romney, A. K., Johnson, A., et al. (1986). The construction of primary data in cultural anthropology. *Current Anthropology*, 4, 382-396.
- Bloch, M. (1989a). From cognition to ideology. In *Ritual, history, and power: selected papers in anthropology*. London: Athlone Press.
- Bloch, M. (1989b). The past and the present in the present. In *Ritual, history, and power: selected papers in anthropology*. London: Athlone Press.
- Bloch, M., Solomon, G. E. A., & Carey, S. (2001). Zafimaniry: an understanding of what is passed on from parents to children: a cross-cultural investigation. *Journal of Cognition and Culture*, 1(1), 43-68.
- Boster, J. S. (1986). Exchange of varieties and information between Aguaruna manioc cultivators. *American Anthropologist*, 88(2), 428-436.
- Carrithers, M. (1992). *Why humans have cultures: explaining anthropology and social diversity*. Oxford: Oxford University Press.
- Crapanzano, V. (1980). *Tuhami: portrait of a Moroccan*. Chicago: University of Chicago Press.
- Darley, J. M., & Batson, C. D. (1973). 'From Jerusalem to Jericho:' a study of situational and dispositional variables in helping behaviour. *Journal of Personality and Social Psychology*, 27(1), 100-108.
- Frazer, J. G. (1976/1890). *The golden bough* (Abridged ed.). London: Macmillan.
- Gardner, W. L., Gabriel, S., & Lee, A. Y. (1999). "I" value freedom, but "we" value relationships: self-construal priming mirrors cultural differences in judgment. *Psychological Science*, 10, 321-326.

- Garro, L. C. (1986). Intracultural variation in folk medical knowledge: a comparison between curers and noncurers. *American Anthropologist*, 88(2), 351-370.
- Gilovich, T., Griffin, D., & Kahneman, D. (Eds.). (2002). *Heuristics and biases: the psychology of intuitive judgment*. Cambridge: Cambridge University Press.
- Harris, P. (1992). From simulation to folk psychology: the case for development. *Mind and Language*, 7, 120-144.
- Hénaff, M. (1998). *Claude Lévi-Strauss and the making of structural anthropology* (M. Baker, Trans.). Minneapolis: The University of Minnesota Press.
- Hirschfeld, L. A. (2002). Why don't anthropologists like children? *American Anthropologist*, 104(2), 611-627.
- Hirschfeld, L. A., & Gelman, S. A. (Eds.). (1994). *Mapping the mind: domain specificity in cognition and culture*. Cambridge: Cambridge University Press.
- Hollis, M., & Lukes, S. (Eds.). (1982). *Rationality and relativism*. Oxford: Blackwell.
- Jones, T. E. (2000). Ethnography, belief ascription, and epistemological barriers. *Human Relations*, 53(1), 117-152.
- Jones, T. E. (2005). How many New Yorkers need to like bagels before you can say "New Yorkers like bagels?" Understanding collective ascription. *The Philosophical Forum*, 36(3), 279-306.
- Kahneman, D., & Tversky, A. (Eds.). (2000). *Choices, values, and frames*. Cambridge: Cambridge University Press.
- Karim, W.-J. B. (1981). *Ma' Betisék concepts of living things*. London: Athlone.
- Knight, N., & Nisbett, R. E. (in press). Culture, class, and cognition: evidence from Italy. *Journal of Cognition and Culture*.
- Leach, E. R. (1961). Golden bough or gilded twig? *Dædalus*, Spring 1961, 371-387.
- Leach, E. R. (1966). Virgin birth. *Proceedings of the Royal Anthropological Institute*, 1966, 39-49.
- Lévy-Bruhl, L. (1910). Les fonctions mentales dans les sociétés inférieures. from Electronic edition available at http://www.uqac.ca/class/classiques/levy_bruhl/fonctions_mentales/fonctions_mentales.html
- Lienhardt, R. G. (1961). *Divinity and experience: the religion of the Dinka*. Oxford: Clarendon Press.
- Malley, B. E., & Knight, N. (forthcoming). Some cognitive origins of cultural order.
- Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, 98, 224-253.
- Nichols, S., & Stich, S. (2003). Mindreading: an integrated account of pretence, self-awareness, and understanding other minds.
- Nisbett, R. E. (2003). *The geography of thought: how Asians and Westerners think differently...and why*. New York: The Free Press.
- Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: Holistic versus analytic cognition. *Psychological Review*, 108(2), 291-310.
- Nisbett, R. E., & Wilson, T. D. (1977). Telling more than we can know: verbal reports on mental processes. *Psychological Review*, 83(3), 231-259.
- Pelto, P. J., & Pelto, G. H. (1975). Intra-cultural diversity: some theoretical issues. *American Ethnologist*, 2(1), 1-18.

- Perner, J. (1993). *Understanding the representational mind*. Cambridge, MA: MIT Press.
- Price, R. (1998). *The convict and the colonel: a story of colonialism and resistance in the Caribbean*. Boston: Beacon Press.
- Rodseth, L. (1998). Distributive models of culture: a Sapirian alternative to essentialism. *American Anthropologist*, 100(1), 55-69.
- Ross, L., & Nisbett, R. E. (1991). Introduction. In *The Person and the Situation: Perspectives of Social Psychology*. Philadelphia: Temple University Press.
- Sperber, D. (1982). Apparently irrational beliefs. In M. Hollis & S. Lukes (Eds.), *Rationality and relativism*. Oxford: Basil Blackwell.
- Spiro, M. E. (1968). Virgin birth, parthenogenesis and physiological paternity: an essay in cultural interpretation. *Man (N.S.)*, 3(2), 242-261.
- Stafford, C. (forthcoming). Linguistic and cultural variables in the psychology of numeracy. *The Journal of the Royal Anthropological Institute*.
- Thompson, R. W. (1975). Gratification patterns in Buganda: an exploration of intra-cultural diversity. *American Ethnologist*, 2(1), 193-206.
- Tomasello, M., Carpenter, M., Call, J., Behne, T., & Moll, H. (2005). Understanding and sharing intentions: the origins of cultural cognition. *Behavioral and Brain Sciences*, 28, 675-735.
- Toren, C. (1993). Making history: the significance of childhood cognition for a comparative anthropology of mind. *Man (N.S.)*, 28(3), 461-478.
- Vayda, A. P. (1994). Actions, variations, and change: the emerging anti-essentialist view in anthropology. In R. Borofsky (Ed.), *Assessing cultural anthropology*. New York: McGraw-Hill.
- von den Steinen, K. (1894). *Unter den Naturvölkern Zentralbrasiliens*. Berlin: Dietrich Reimer Verlag.
- Wellman, H. M. (1990). *The child's theory of mind*. Cambridge, MA: MIT Press.
- Wellman, H. M., Cross, D., & Watson, J. (2001). Meta-analysis of theory-of-mind development: the truth about false belief. *Child Development*, 62, 655-684.
- Wilson, B. R. (Ed.). (1970). *Rationality*. New York: Harper & Row.
- Wright, A. L., Bauer, M., Clark, C., Morgan, F., & Begishe, K. (1993). Cultural interpretations and intracultural variability in Navajo beliefs about breastfeeding. *American Ethnologist*, 20(4), 781-796.
- Yeh, W., & Barsalou, L. W. (2006). The situated nature of concepts. *American Journal of Psychology*, 119(3), 349-384.

Chapter VI

Some Cognitive Origins of Cultural Order

The origins of thought are paradoxical. To some uncertain degree, thought is a product of one's cultural environment and historical situation. But the cultural environment and historical situation are themselves imaginal, products of thought processes.

Anthropological theory has been rife with attempts, some more plausible than others, to establish some kind of mapping between *mind* and *culture*. Emile Durkheim (1995[1912]) famously declared the independence of the social from the psychological – while in the same breath positing a simple identity between psychological and social states. Other early theorists, most famously Lucien Levy-Bruhl (1923), tried to derive an understanding of individual mental processes from cultural stories and practices. The ensuing years saw more sophisticated ideas emerge as anthropologists worked with improved ethnographic techniques and more developed psychological theory. Contemporary cognitive anthropology reflects the great progress both anthropology and psychology have made in the last century. Yet the paradox is not dissolved, nor do we expect it to be: *culture* and *mind* are irreducible terms.

Still, the *relation* between culture and cognition is much better understood than it used to be, and has progressed from a simple aporia to a research problem. The

paradoxical nature of the problem has led to a bifurcation of theoretical emphases in cognitive anthropology. One line of thought, represented by Roy D'Andrade's (1987) studies of folk models of the mind, Naomi Quinn's (1996; Strauss & Quinn, 1997) studies of US Americans' models of marriage, and Claudia Strauss's (1990; Strauss & Quinn, 1997) studies of US Americans' ideas about economic individualism, has emphasized the mechanisms by which individuals acquire and represent cultural models. A second line of thought, represented by Scott Atran's studies of folkbiology (1990) and religion (2002), Pascal Boyer's (1994; 2001) study of religious representations, Lawrence Hirschfeld's work on kinship (1986; 1989) and race categories (1996), and Maurice Bloch's (1998; Bloch & Sperber, 2002) work on memory, language, and kinship has explored the ways in which cognitive predispositions favour the reproduction of some cultural representations over others. Broadly, the first of these lines emphasizes the malleability of cognition, treating local cultures as fixed patterns (or sets of patterns) that individual minds absorb. The second line of thought treats cognition as a fixed set of predispositions that shapes cultures over generations of cultural transmission. Neither perspective denies the validity of the other – both are patently necessary. But even together they are incomplete.

Both lines of theory focus on cultural and cognitive representations. But culture and cognition are dynamic, as much process as substance, and in this article we outline a mapping between cognitive processes and dynamic cultural patterns. We argue that some kinds of cultural patterns – kinds that have been repeatedly observed by ethnographers in many places – can be understood as the operation of dynamic cognitive processes

documented by psychologists. Specifically, we will argue that the (partial) systematicity of cultures, the recurrence of distinctions across conceptual domains, and the conceptual ‘bleeding’ of symbols are the products of basic principles – basic *processes* – of cognitive functioning.

The present argument has some limitations the reader should note. First of all, we aim to explain patterns that have commonly been *presupposed*, without explanation, in definitions and characterizations of culture. We assume here that there really are patterns of action and social interaction that can be called *culture*, and that ethnographers have gone some considerable way toward identifying those patterns. We shall clarify what we mean by cultural order below, but for the moment let us note only that we do not think analyses purporting to show cultural *disorder* have shown any such thing, and certainly not enough to vitiate the many quality ethnographies done in anthropology’s classical period. Our aim here is to build on earlier findings, and therefore we shall settle for indicating the kinds of patterns we have in mind by reference to classic ethnographies, rather than attempting to argue them as if we were discovering them anew.

Secondly, our intent is *explanatory* rather than interpretive or critical. Explanation is, epistemologically, the most valuable kind of theory because explanatory theories – at least successful ones – do the most to broaden our knowledge. Their breadth is also their vulnerability, making them open both to different kinds of empirical falsification and to charges of incoherence with other knowledge. Our goal is precisely to establish a bridge between previously unrelated areas of knowledge, in the hope that the connection will

open the door to further investigations; a goal of this sort is best served by an explanatory argument.

Finally, the present argument is necessarily abstract. We discuss here general patterns of organization of thought and behaviour, and there is no way to discuss such things in purely concrete terms. Yet the abstraction has to do only with our subject matter, not with the rather simple logic of our argument, and we have provided, we hope, enough examples to convey what we have in mind.

Culture and Cognition

The problem of culture, as we see it, is one of order. To throw the problem of cultural order into sharp relief, let us adopt – for the time being – Dan Sperber’s epidemiology-of-beliefs perspective on culture (e.g., Sperber, 1985b; Sperber, 1996). In Sperber’s framework, mental representations (variously constructed as ideas, beliefs, etc.) and public representations (public events like gestures, utterances, or writings) become part of a population’s *culture* if they are highly recurrent in that population. Ideas are more or less “cultural” depending on how many minds, in a given population, have them.

In this minimal definition, a culture consists in the co-occurrence of ideas in a population: if a large portion of the population has the notion of *bedroom slippers* and also the notion of *bologna*, then these two ideas are part of that population’s culture. No connection between these ideas is presupposed: the ideas *may* be psychologically or semantically connected – as in hierarchies of concepts or semantic networks – but they

need not be. They need only recur across minds to be part of culture. Sperber thus identifies culture with a particular kind of order – the semantic resemblance between the contents of individual minds in a population.

Neither Sperber nor we prejudge the causes of this resemblance. Indeed, we expect that the causes vary widely, from purely architectural features of human cognition, to environmental regularities, to the activities of institutions – and perhaps most often to various combinations thereof. To give one example of the first type of cause, human memory performs best when dealing with specific sorts of input. Several aspects of cultural products affect their chances of being learned, stored, recalled, and transmitted. As predicted by Boyer's (1994; 2001) cognitive theory of religion, it has been found that concepts that are minimally counterintuitive (that is, different from everyday concepts in strange or unexpected ways, but not altogether bizarre) show the least amount of degradation in recall accuracy (Norenzayan, Atran, Faulkner, & Schaller, 2006; Owsianiecki, Upal, Slone, & Tweney, Forthcoming); this, among other things, facilitates the spread of religious ideas in a population. While this article focuses on causes of this first kind, decades of anthropological work have provided evidence for the two latter types.

One property of culture that comes with this Sperberian definition for free, as it were, is its scalability: because culture is defined by distributional rather than ontological criteria, it is assumed that ideas will vary across populations, across groups within a population, and even across individuals within a group – there need be no *special*

explanation for cultural variation. Cultural variation is (at most, for some variation is functional variation, itself a kind of order) a step or two in the direction of disorder, the unrealized limiting case being a population in which the contents of one mind reveal absolutely nothing about the contents of any other minds in the population. On this view, the opposite of culture is not, as has sometimes been suggested, *variation*, but *variation that is random with respect to the social environment*. Blood types display this latter kind of variation; the pattern of distribution of blood types within a population is not correlated with sociocultural factors, and as such it is uninteresting to anthropologists.¹⁴ Imagine we were to take any society and divide its population into groups based on blood types. Such groups would not tell us anything about their members culture – that is, group membership would not correlate with any meaningful social or cultural factors. The cultural variation within the blood-type groups will be equal to the cultural variation between them.

We have adopted the Sperberian definition of culture as a heuristic because it casts into sharp relief some other kinds of order in which we are interested. Specifically, it allows us to investigate the super-individual, synchronic cultural patterns anthropologists have frequently noted. We would not object to others preferring a different definition of culture. Nothing in our argument depends on Sperber's definition: we adopt it solely because it clarifies the phenomena we wish to explain – our interest is

¹⁴ This is not to say that, once such unevenly distributed properties are discovered they cannot be exploited as the basis of *folk* theories of their significance. For example, in Japan and other Asian countries, a theory that predicts personality from blood type is very popular; in Nazi Germany, certain blood types were interpreted as racial markers. Naturally, such phenomena *are* interesting to anthropologists.

in specific cultural phenomena, and these remain however culture is defined. What matters is that these cultural phenomena can be mapped to cognitive processes.

Cognition, as much as *culture*, is a tendentious word, so if we are to invoke cognitive processes to explain cultural phenomena, we must be quite clear about what we mean by it. Following early Chomsky (1957) and the other major thinkers of the cognitive revolution (e.g., Bateson, 1972), we understand cognition to be an information-processing account of the activities of the human mind. Underlying this approach is psychologists' discovery that many of our mental activities are organized by their information-processing functions, and that information processing really is the key to understanding much of the mind.

Anthropologists (and, recently, cultural psychologists—see for example Cole, 1996; Nisbett, 2003) have shown convincingly that there are important differences in information processing across cultures. Minds are malleable at more than a surface level. But our appeal here will be to some of the deepest operating principles of mind, those that enable an individual's adaptation to his or her environment, including the principled acquisition of local ways of thinking and feeling. At present there is no evidence that these vary, and reason to believe they are part of our biological inheritance as a species.

Three Cultural Phenomena and their Cognitive Sources

1.1 Cultural Systems

A Sperberian definition of culture allows that cultures might be mere aggregates of ideas (practices, meanings, etc.), but many anthropologists (e.g., Geertz, 1973) go further and attribute to cultures some kind of systematicity. Systematicity has been a touchy subject in anthropology for some time now, owing partly to anthropologists' recognition that cultural order and coherence have sometimes been products of domination – indeed, sometimes even the ethnographic recording of particular bits of cultural order (or particular kinds of variation) has amounted to a political act. Yet the counterclaim, that there is *no* systematicity to culture, is hardly plausible, and studies in linguistic anthropology show how cultural patterns emerge even from individual conversations (cf. Tedlock & Mannheim, 1995). The remaining, and larger, problem is how to characterize it, and in this anthropologists have sometimes turned to a linguistic analogy.

The notion of a cultural or symbolic “grammar” is sometimes used to capture the systematic nature of cultures. Roger Keesing, for example, invokes the notion of a symbolic grammar, and the phenomenon it is intended to describe, in a particularly clear way (1982:214f.):

I noted earlier. . . the temptations for kin groups to try to simplify and reduce periods of sacredness and the taboos and ritual sequences they entail. In these and other ways, and simply by error and failure in the transmission of lore and variations in personal style and knowledge, small changes are being introduced into local groups. Individuals – all individuals – are in small ways changing and contributing to “the system.” But this process of corner-cutting, error, convenience, and style would seem to erode structures as well as preserve them. We can think of a kind of informational or behavioral entropy at work in the way individuals apply and modify the cumulated ways of the group. How, then, are order and coherence maintained? Where do the new forms that *conform* to

existing structures, even render them more elegant, come from? For the Kwaio, my data strongly suggest that despite continual small and local shifts in procedure, structural coherence and the overall order of the symbolic grammar are maintained across generations largely because of the impress of expertise, construed as ancestral will.

Keesing here describes the structure of culture as a “symbolic grammar,” and suggests that the grammar is maintained by expertise, which partly countervails a natural tendency toward entropy.

Keesing does not invoke cultural grammar as an *explanation* of cultural order, but only as a *description* of it – the relation between cultural behaviour and cultural grammar is thus different from the relationship between linguistic behaviour and linguistic grammar. And there are problems with this metaphor: John Gatewood (1998) argues that because anthropologists have repeatedly found that behaviour is not rigorously segmentable, the notion of a cultural grammar makes little sense. We agree, but there are compelling reasons to believe that *thought* is in fact segmentable at many levels – as we will see below – so we do not regard Gatewood’s as a fatal criticism.

Whatever the problems with “cultural grammars” as theoretical constructs, the basic observation underlying the notion remains: the ideas and practices found in societies seem to have an internal logic to them, and thus systematicity is a real property of cultures. We take the explanation of this systematicity to be a significant anthropological problem.

In saying that cultures are systematic we do not adopt the extreme claims (still found in introductory textbooks) that cultures are integrated wholes. Although there are no *a priori* reasons that cultures could not be highly integrated entities with clearly defined borders, in reality such claims have never been strongly empirically supported. Not only has there never been evidence of integration at this level, but there is no social or psychological mechanism yet discovered that would generate such a pattern. Even a process of ideational (practical, semantic, etc.) variation and selection in an isolated population would not necessarily produce thoroughgoing cultural integration. Work showing that cultural signifiers are frequently indeterminate and negotiated, subject to the often-conflicting interests of their recruiters, is merely the latest nail in the coffin of an implausible claim.

Yet there is ample evidence that subsets of cultural ideas are connected by a variety of logical, causal, predictive, and practical relations – indeed, one can hardly read ethnography without seeing all of these kinds of connections between ideas (practices, meanings, etc.) at play. It is in fact lower-level conventions – especially tacit agreements about communication – that enable more abstract cultural signifiers to be negotiated: such negotiations can take place only within a defined framework if interlocutors are to understand each others' bids at all.

We think culture to be not an integrated whole (i.e., a unified system without tensions and contradictions) but rather a series of internally coherent systems. These systems – for the classification of animals, performing a sacrifice, gossiping, and so forth

– are socially shared, although they are not usually identical from one individual to the next (Strauss & Quinn, 1997). Different cultural systems intersect in the individual, who acquires a great number of them in enculturation. Each system is internally coherent, a model or tool for thinking about some domain, but different systems may contradict each other, and in this they serve as a repertoire or resource that an individual may put to his or her own ends.

This more modest version of cultural order remains an anthropological problem. A Sperberian definition of culture allows that ideas might merely co-occur without any connection between them, and casts into sharp relief the fact that many cultural ideas enjoy some degree of coherence with others. This systematicity requires an explanation, some kind of process or mechanism that could produce such interconnected pools of local order.

1.2. Cognitive Source: Relevance Theory

The explanation of cultural systematicity requires some kind of process that either creates new connections, thus filling in gaps between otherwise unrelated culture elements, or preferentially reproduces those culture elements that happen to be connected, in some way, to others.¹⁵ Although both kinds of processes are part of normal human cognition, scientists' understanding of the first is extremely fragmentary, and so we shall focus on the preferential reproduction of systematic ideas. Fortunately, psychologists have

¹⁵ One might also postulate, of course, that cultural elements are only invented and “published” in an already systematized form. While we think it likely that this does account for some cultural systematicity, it cannot account for many of the patterns in which ethnographers have been most interested, and at present it is not possible to say much about it.

excellent reason to believe that human cognition is biased toward systematic representations, a bias that is summed up in Sperber & Wilson's (1995) cognitive principle of relevance.

The cognitive principle of relevance states, briefly, that human cognition is geared to the maximization of effects for the expenditure of effort, to getting the most informational bang for its energetic buck. Experimental evidence for this operating principle is growing (Van der Henst, Carles, & Sperber, 2002; Van der Henst & Sperber, 2004), but some principle of this kind is implied in all cognitive models of learning (cf. Holland, 1992; Holland, Holyoak, Nisbett, & Thagard, 1986). In order for the mind to sort out the implications of its environment, it must have some system for ranking different sets of inferences in order of processing priority, and cognitive effect is the most general ranking principle.

Applied to individual thought the cognitive principle of relevance states that, *ceteris paribus*, people will attend more to inferences with relatively greater cognitive effects than to those with relatively smaller cognitive effects, with the entailment that the greater an inference's connectivity to other ideas and the stronger those connections, the more cognitive resources will be allocated to its processing. Individual human thought will, therefore, tend to favour representations that are systematized more than those that are less so.

In application to communication, this implies that, *ceteris paribus*, people will attend more to those messages that connect to their existing ideas, that have ramifications for their mental models of the world, than to those that do not. Sperber and Wilson, following Grice (1989), suggest that communicators who want to have their message heard implicitly recognize this and usually adjust their message accordingly. Not only are cognitively integrated messages more likely to be heard, they are also more likely to be voiced.

The implications of this principle for the study of culture are enormous. If much of culture is communicative – and it is (Leach, 1954) – then we would expect cultures to tend toward systematicity. In a society where individual minds were completely random with respect to the social environment, we would expect that people would attend to those messages that resonate with the contents of their individual minds, and that consequently such relevant messages would spread more quickly across the population than messages that did not resonate with existing ideas. Within a short time, we would expect not only that culture – convergence among the mental representations in a society – would emerge but also that *the emergent culture would be considerably systematic*.

Thus the simple but profound cognitive principle of relevance can explain the emergence of systematic properties in culture. The systemic properties that emerge from the independent operation of individual, systematizing minds are not necessarily global or coherent the way early anthropologists envisioned. Because cultural patterns must bubble up from individual interactions before propagating across a society, we may expect to

find patterns at all scales, from the intimate habits of a pair of lovers to socially global properties such as dead metaphors and other stock idioms. The extent of any particular cultural pattern cannot therefore be stipulated or presumed, but must be investigated empirically. Some *kinds* of patterns, however, are more likely than others, and in the next two sections we will investigate two particularly common kinds of order.

2.1. Cross-Domain Correspondences

Ethnographers have long noted that communities often use a small set of distinctions repeatedly, across a variety of semantic, conceptual, and practical domains, to capture what are locally perceived as correspondences across these domains. Over the years, there have been many attempts at systematizing and finding commonalities among these cross-culturally recurrent strategies. Among these attempts, Ortner (1973) lists the following: cultural themes (Benedict), integrative concepts and dominant values (DuBois), dominant orientations (Kluckhohn), dominant symbols (Turner), and core symbols (Schneider). Ortner places herself in the same tradition as the above authors in her discussion of ‘key symbols.’ In her formulation, symbols are ‘vehicles for cultural meaning’ (p. 1339). Key symbols are those symbols that have the most cultural salience, in terms of how frequently they are invoked, of how much elaboration they show, and of how many contexts they appear in.

A second strand of anthropological enquiry has dealt with a particular kind of recurrent distinctions: dual organization. Many societies, regardless of scale, divide themselves into moieties; one’s moiety affiliation often determines one’s residence, one’s

range of potential partners, and one's power relationship with others. But dual organization often extends beyond social organization, to cosmology, art, and folk philosophy. The fact that dual social divisions are found on every continent prompted early anthropologists to speculate that they are a primitive form of social organization, and that the tendency of members of many cultures (even non-dualistic ones) to engage in dualistic thinking ultimately derives from them. In contrast, Lévi-Strauss (1963 [1956]) proposed that dual social organization is a result, rather than a cause, of dualistic thinking. Since then, anthropologists have devoted a lot of attention to the study of dual organization and dualistic thought. Simple oppositional binarisms, such as male-female, right-left, and pure-polluted, are among the most commonly used (and most frequently studied) cross-domain distinctions worldwide (see e.g. the papers in Maybury-Lewis & Almagor, 1989; Needham, 1973). Roy Rappaport (1984 [1968]), for example, observed that the Tsembaga Maring used a hot/dry/hard (*romba-nda*) vs. cold/wet/soft (*kinim*) distinction to describe differences between pairs of items in vastly different domains, such as ritually prepared warriors and women; physical strength and fertility; upper body and lower body; land-only animals and animals associated with water; food and drink; and red spirits (hot), a female spirit (*kun kaze ambra*, cold), and spirits of the lowlands (cold).¹⁶

¹⁶ Although Rappaport notes that the Tsembaga Maring regard these as opposing principles, he leaves ambiguous how static or dynamic these classifications may be. Frequently he reports that *x* is regarded as “hot” without specifying precisely what $-x$, its “cold” opposite, is. Therefore it is possible that some terms presented as opposites here are in fact missing a third term: for example, the full distinction between ritually prepared warriors and women might be ritually prepared warriors : [men] :: [men] : women – but the bracketed term is not discussed by Rappaport. Rappaport also does not indicate whether his informants’ use of the hot-cold opposition reflects an underlying catalogue of opposites or only a rough-and-ready distinction applied as conversationally appropriate. These ambiguities, however, do not vitiate his observation that the Tsembaga Maring use classifications as described above.

A third perspective on cross-domain correspondences comes from outside anthropology. George Lakoff, a linguist, and Mark Johnson, a philosopher, have proposed that metaphor, rather than being an inconsequential characteristic of language, is a way of organizing the ordinary conceptual system – they argue that “the essence of metaphor is understanding and experiencing one kind of thing in terms of another” (Lakoff & Johnson, 1980:5).

We would argue that the three approaches we just described, in spite of their different foci, essentially point to a single phenomenon: the recurrent use of distinctions across different domains. Often the distinctions are dichotomous; sometimes they are polytomous. Their significance, the patterns of rights, duties, and permissions that they reveal, and the image of the world that they embody vary from one society to the next. Yet in every culture some distinctions are used in ways that cross conceptual, semantic, and practical boundaries.

From an epidemiology-of-beliefs perspective, this level of cultural organization is quite unexpected: there is no *a priori* reason to expect that from the aggregation of ideas in a community there will emerge such large-scale patterns. The use of these distinctions in such a variety of domains, each with its own behavioral implications, suggests that the contrast is drawn in a form that it is not readily used in communication, or even verbalized at all. Rather, Tsembaga infer, as did Rappaport, the nature (and limits) of this distinction from the variety of contexts in which it is used. It is presently an open anthropological question how such distinctions arise.

2.2. Cognitive Source: Decomposition

Our second cognitive principle is that of decomposition, the cognitive strategy of breaking processes down into their component elements, each of which is handled by dedicated cognitive mechanisms: the processing of a visual object's identity, for example, is handled by a different mental subsystem than is the object's location. The enormous variety of neural deficit (Gardner, 1985) and experimental studies (Hirschfeld & Gelman, 1994) attest to the mind's tendency to parcel out different aspects of a task to different mechanisms. As a consequence of the cognitive principle of decomposition, the mind is best viewed as bundles within bundles of task-specific microprocessors.¹⁷

Interaction between the principle of decomposition and the principle of relevance yields a mind in which the specialized sub-processors may be used for a wide variety of problems that seem, on a surface level, to have little in common. For example, the theory of mind mechanism – the specialized cognitive mechanism used to interpret other people's states of mind – is used not only in interactions with other people, but in reading texts, and in thinking about computers, nations, and all sorts of non-human animals. These kinds of problems have nothing obvious in common, but notions of understanding and intent are useful cognitive tools for making sense of them. One might say, with

¹⁷ Those familiar with psychological literature will recognize the similarity between our principle of decomposition and notions of modularity (structural or functional) and domain specificity. We have chosen the more general, but more precise, notion of decomposition rather than either of these terms because claims about modularity and domain specificity often conflate a variety of issues—innateness, anatomical distinctiveness, relation to semantics—which need not burden our argument, and because the arguments between connectionists and modularity advocates are irrelevant to the present argument, because connectionist networks decompose the computational components of the processes they perform.

Daniel Dennett (1987), that the theory of mind is a very powerful mental heuristic, even when applied to entities that cannot really be said to have minds.

We suggest that this is how cross-domain distinctions should be understood. Distinctions are conceptual tools, and, while they may be expressed as opposing terms, they often seem to involve further dimensions of contrast not obviously related to the terms they use. The calculation of cross-domain distinctions is a computational process, used for a variety of problems that may not have anything obvious in common. When the Tsembaga Maring used a hot/dry/hard (*romba-nda*) vs. cold/wet/soft (*kinim*) distinction to describe differences between ritually prepared warriors and women, strength and fertility, upper body and lower body, land-only animals and animals associated with water, food and drink, it may not be because there is any obvious resemblance between hotness, warriors, strength, land-only animals, and food – there is not, or at least not more than between hotness, *women*, *fertility*, and land-only animals. Rather, we suggest, the same computational process that serves, along with others, to distinguish cold and hot is also employed, along with different others, to distinguish women from men and, along with still others, to distinguish animals associated with water from those that live on land only. What precise computational elements these distinctions share we cannot say without further investigation, nor can we be sure that an ethnographer could hit upon precisely the same tool as native informants. What we can say is that the recurrence of distinctions is not surprising, given the principles of decomposition and relevance, and we suggest that these operating principles of the mind explain why there is a general phenomenon of cross-domain distinctions. Of course, more specific explanations would

be required to account for specific distinctions – our concern here is only to explain them generally, as a common property of cultures – but, conversely, more specific explanations are by themselves insufficient to explain the generality of the phenomenon.

3.1. Conceptual ‘Bleeding’

The second attribute of culture treated here is the ‘bleeding’ of properties between associated concepts. The ‘bleeding’ of properties across distinct but associated (indeed, often jointly invoked) concepts is well documented in the anthropological literature, and forms the basis of what Claude Lévi-Strauss (1966) terms the “science of the concrete.” While Levi-Strauss focused on dyadic pairs – such as the Siberian Iakut’s use of a woodpecker’s beak to treat a toothache – conceptual bleeding is not limited to them: Godfrey Lienhardt (1961) discusses the tendency among the Dinka for clan divinities to form “little groups of associated images.” Lienhardt’s first example is worth quoting at length because of the large number of associations involved (1961:111):

The imagery of the divinities of the Pajieng clan is an illustration of this. It may be said of this clan, by those who are not members of it and when no members are present, that its divinity is Excrement. Pajieng. . .acquired the black cobra as its clan-divinity; this is a deadly snake, and the Dinka regard its swift bite as inevitably fatal. The black cobra. . .is for this and other reasons specially associated with night-witches, who are thought to use its blood and venom to injure their victims. The darkness of the cobra and its unexpected and deadly attack connect it with the secret nocturnal operations of the most powerful witches the Dinka can imagine; and as the cobra sheds and leaves its skin (*roc kuac*) and disappears, to appear anew and claim further victims, so witches are thought to renew themselves and return to cause further injury. One of the signs which lead a man to suspect witchcraft is to find human excrement in his homestead when he wakes in the morning. To excrete in the homestead, as an anti-social act of particular unpleasantness, is thought to be a witch’s habit. Hence the total constellation of imagery around the black cobra includes human excrement, and thus the notion that Excrement may be the divinity of the clan which respects this creature.

In the case of another clan, Pajiek, brushes, head carrying rings, and “more widely the whole action of sweeping” are all respected because they are made out of *wec* grass, the clan divinity. Lienhardt reports that lions and anthills are divinities of the same clan because lions often find shelter in the bushes surrounding anthills. The *deleib* palm is associated with a certain grain because the pestle used to grind the grain is made of *deleib* palm wood. Lienhardt gives further examples, and many more could be recounted from the anthropological literature, but we trust that these suffice to identify the kinds of associations we have in mind.

It is worth noting at this point that Sperber (1985a) has suggested that data of the kind reported by Lienhardt are often interpretive descriptions of fragmentary patterns that have been uttered at some point by some informants. Lienhardt, then (in Sperber’s view), is effectively conflating several of these patterns in order to reflect what he perceives as the inherent systematicity of these representations. While we have reservations about the way Lienhardt presents his evidence, we believe that, in this case, the apparent systematicity is not simply an interpretive artifact. Sperber’s main example of interpretation in ethnography is Evans-Pritchard’s account of sacrifice in *Nuer religion*. Sacrifice, according to Evans-Pritchard, is a form of contract between humans and God. Sperber rightly notes that this interpretation of sacrifice is many times removed from what Evans-Pritchard could actually observe. Conversely, it is perfectly plausible that Dinka readily and explicitly made these associations in speech (though we cannot be certain because the accurate reporting of utterances was not Lienhardt’s aim). It is very likely that different Dinka would not recognize all of these associations, or would

interpret some of them differently; nonetheless, we think that the propensity to make such associations is, as we will later argue, simply the outcome of the way memory is instantiated in the mind. For now, let us stipulate that at least some of these associations are made by at least some people under some circumstances.

The sorts of associations people make are not principled in an obvious and transparent way. Some of the associations above could be described loosely as “causal” – the connections between excrement and witches, between pestle and grain – but as many are coincidental – the blackness of cobra and night, the lion and the anthill – so we do not see a particular causal bias in the connections. Rather, associations seem to follow a variety of paths, some quite opaque to outsiders, as Lienhardt notes (1961, p. 112). That a large number of different kinds of associations can connect concepts in people’s minds is also evidenced by a linguistic study by Casagrande and Hale (1967), who found that in Papago folk definitions concepts can be linked by 13 different relations, including precedence, co-occurrence, source, analogy, and others.

Unlike the cross-domain distinctions discussed above, conceptual bleeding focuses on explicitly described and readily verbalized properties of the specific concepts involved. In understanding cross-domain distinctions, the ethnographic challenge is to discern precisely the unarticulated principle of distinction; the challenge in understanding conceptual bleeding is to trace the (usually heterogeneous) connections from one concept to another.

3.2. Cognitive Source: Semantic Networks

Our third and final cognitive principle derives from associative theories of semantic memory (Smith, 1978). Semantic memory refers to the capacity of humans to acquire and use knowledge about the world. It is generally defined in opposition to episodic memory, which refers to the capacity to remember previous experiences as experienced (Tulving, 1985; Tulving, 1995). The vast number of things we hold in our memory, and the speed with which they can be retrieved, imply that this knowledge is organized in an efficient way. When trying to build a computer model of human information processing, Quillian (1968) proposed that semantic memory is organized as a network composed of nodes – concepts – and links between the nodes, which represent the properties of the concepts. These associative links are weighted; that is, they are more or less strongly activated when the corresponding node is activated.¹⁸

Two general characteristics of network models are particularly relevant for the understanding of conceptual bleeding. The first is known as “spreading activation” (Collins & Loftus, 1975). This refers to the notion that the activation of a node in the network through retrieval (recalling the concept of seagull) also leads to a partial activation of connected nodes (bird; fish as food; etc.) However, because the activation of connected nodes is only partial, downstream activations fade out over the space of the network.

¹⁸ The best-known implementation of the associative network approach is known as the hierarchical network model, but the specifics of this version (and their criticism) are not relevant for our claims.

The second relevant characteristic is known as the developmental perspective. This simply posits that strength of association (and therefore ease of activation, and ultimately of recall) is proportional to degree of exposure. The connection between the ‘my birthday’ network node and my date of birth is very strong, because it has been activated thousands of times. That between ‘my grandfather’s birthday’ and his date of birth has been activated many fewer times, and so it would take me longer to state my grandfather’s birth date than my own.

Three decades of psychological research has provided a great deal of evidence for the network organization of semantic memory. To take just one classic example, Meyer and Schvaneveldt (1976; Meyer, Schvaneveldt, & Ruddy, 1972) found that semantic priming aids performance in a lexical decision task. Lexical decision tasks are simple experiments in which participants are given a stimulus – a string of letters – and asked to decide whether it forms a word or not. Meyer and colleagues used stimulus pairs, composed of either two words, two nonwords, or one of each; in the two-word pairs, they used both semantically related (bread, butter) and non related items (bread, engine). Participants had to make lexical decision about each element of the pair in turn. These decisions were faster if a stimulus word was preceded by a semantically related stimulus word. Speed of response can be used as a metric for closeness of association, which makes it possible to map the network with some precision.

How far can evidence obtained in laboratory studies speak to the anthropological problem of conceptual ‘bleeding?’ While anthropologists rightly criticize the ease with

which some psychologists extrapolate from small samples to the whole of world cultures, there is a vast amount of real-world evidence that converges with the experimental evidence for the semantic network organization model of memory.

First, associative theories of semantic memory can account for the developmental process of cultural learning observable in all human societies. In particular, the model helps explain problems associated with adult cultural learning. While children acquire their native culture effortlessly, learning (as an immigrant, a refugee, or an anthropologist) the structuring principles of a new culture after having been raised in another is a strenuous task that entails the meticulous dismantling and rebuilding of semantic networks. For example, the association between cobras and witches found among the Dinka would not be familiar or intuitive to most people who have been raised outside Dinka society. The classic memory studies by Bartlett (1932) showed that when English participants struggled to remember the unfamiliar features of a Kwakiutl tale (originally collected by Franz Boas), they filled in what they perceived as holes in the narrative with their own culturally-derived expectations.

Secondly, the semantic network organization of human memory predicts that it will perform best when dealing with specific sorts of input. As we argued in the introduction, most common cultural products exploit the most efficient aspects of the memory system. For example, content-rich myths that do not rely on verbatim narration are very widespread in oral cultures, even though there is no intrinsic reason for their popularity. Naturally, the opposite also holds: cultural items that run afoul of the same

formal constraints – specifically, in failing to exploit the network-like structure of semantic memory – will be less likely to be remembered, and therefore to be transmitted from one person to the next.¹⁹ Bateson (1958 [1936]), for example, estimates that learned Iatmul men can remember between ten and twenty thousand names. However, he argues that rote memory plays a negligible role in the process of remembering (1958 [1936]:222f.):

The names which are remembered are almost all of them compounds, each containing from four to six syllables, and they refer to details of esoteric mythology, so that each name has at least a leaven of meaning. The names are arranged in pairs, and the names in any one pair generally resemble each other much as the word Tweedledum resembles the word Tweedledee—with the notable difference that the altered syllable or syllables generally have some meaning and are connected together by some simple type of association, e.g. either by contrast or by synonymy. A progressive alteration of meaning may run through a series of pairs.

Let us now reconsider the cross-culturally recurrent phenomenon of conceptual bleeding in the light of the above considerations.

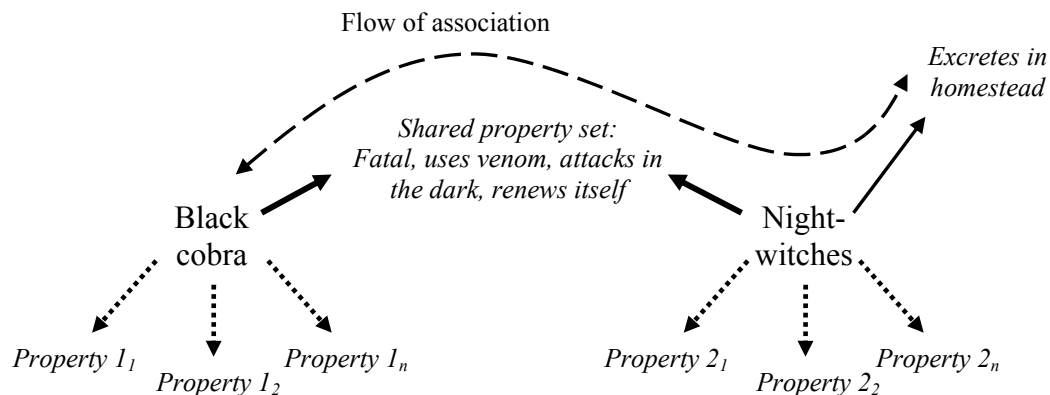


Figure 6.1. A representation of Dinka associations between concepts. Properties of concepts are italicized; properties that are presumed to exist, but for which there is no direct evidence are

¹⁹ Although exceptions do occur – witness the importance of accurate genealogical recitation in many societies – they are characteristically 1) of fundamental cultural significance, and 2) their handling is restricted to a specialized sector of society (who can presumably devote time and resources to this special kind of learning).

connected to concepts by dotted arrows. The path of association described by Lienhardt is depicted by a dashed line.

Because of the organization of human memory, properties shared by two concepts become activated when either concept is recalled; and when a concept is recalled, the activation spreads from it to other concepts through the properties they have in common, progressively losing power. Thus in the Dinka example the cobra and the night-witch are both dangerous, use venom to injure their victims, and are able to renew themselves. The large number of shared properties makes it likely that invoking the image of a cobra will prime that of a witch in people's minds – and vice versa. The enhanced ease of activation is in turn responsible for the increased likelihood that both concepts will be recalled and produced at the same time, and that the association will be recognized by others who possess the same kind of network structure.

Conclusions

At the outset of this paper, we undertook to show that some organizational features of culture could be fruitfully described and explained in terms of operating principles of the human mind. Arguments about the relation between culture and mind tend either to see culture as mind writ large or to see mind as culture writ small. Whether as a matter of disciplinary priority (“We have the *real* action”) or familiarity and comfort, anthropologists and psychologists have tended to minimize each other's purview and to make extravagant claims about their own. But this is nonsense: culture and mind cannot be reduced to each other, either at present or in the foreseeable future.

The kind of theorizing we engage here focuses on the interaction between

dynamic cognitive processes and larger social and ecological processes. It differs from preceding kinds of inquiries in its dynamism: whereas most other work on culture and cognition holds one term fixed and examines its influence on the other, we focus on the interaction between cognitive and social *processes*. Harvey Whitehouse's theory of modes of religiosity (2004) is the best developed theory along these lines, delineating broad patterns in religiosity that result from the interaction of memory and social structure. Malley's (2004) ethnography of evangelicals' Bible use also emphasizes the interaction between social and cognitive processes in an institutional context.

We have tried here to show how a few kinds of cultural patterns may be identified with a few cognitive processes. But in making this identification we do not dispose of either. The cultural patterns that ethnographers have observed among the Dinka and the Trobrianders and the Maring are not straightforward manifestations of individual thought, but are the product of minds in interaction with each other and their environment, in a historical context. This is why we have spoken of *kinds* of cultural order: a *kind* of cultural order can be identified with a cognitive process, but the specific ideational structure that emerges could not have been predicted from cognition alone. Conversely, the cognitive processes we have described are manifest also in many non-cultural forms, and general cognitive processes cannot be derived from the kinds of specific inputs that ethnographers have identified.

Bibliography

- Atran, S. (1990). *Cognitive foundations of natural history: Towards an anthropology of science*. Cambridge: Cambridge University Press.
- Atran, S. (2002). *In gods we trust: The evolutionary landscape of religion*. Oxford: Oxford University Press.
- Bartlett, F. C. (1932). *Remembering: an experimental and social study*. Cambridge: Cambridge University Press.
- Bateson, G. (1958 [1936]). *Naven: a survey of the problems suggested by a composite picture of the culture of a New Guinea tribe drawn from three points of view* (Second ed.). Stanford: Stanford University Press.
- Bateson, G. (1972). *Steps to an ecology of mind*. New York: Ballantine Books.
- Bloch, M. (1998). *How we think they think: anthropological approaches to cognition, memory, and literacy*. Boulder, CO: Westview Press.
- Bloch, M., & Sperber, D. (2002). Kinship and evolved psychological dispositions: the mother's brother controversy reconsidered. *Current Anthropology*, 43(5), 723-748.
- Boyer, P. (1994). *The naturalness of religious ideas: a cognitive theory of religion*. Berkeley: University of California Press.
- Boyer, P. (2001). *Religion explained: the evolutionary origins of religious thought*. New York: Basic Books.
- Casagrande, J. B., & Hale, K. L. (1967). Semantic relationships in Papago folk definitions. In D. Hymes (Ed.), *Language in culture and society*. New York: Harper & Row.
- Chomsky, N. (1957). *Syntactic structures*. The Hague: Mouton.
- Cole, M. (1996). *Cultural psychology: a once and future discipline*. Cambridge, MA: Harvard University Press.
- Collins, A. M., & Loftus, E. F. (1975). A spreading activation theory of semantic processing. *Psychological Review*, 82, 407-428.
- Collins, A. M., & Quillian, M. R. (1969). Retrieval time from semantic memory. *Journal of Verbal Learning and Behaviour*, 8, 240-248.
- D'Andrade, R. G. (1987). A folk model of the mind. In D. Holland & N. Quinn (Eds.), *Cultural models in language and thought* (pp. 112-148). Cambridge: Cambridge University Press.
- Dennett, D. C. (1987). *The intentional stance*. Cambridge, MA: MIT Press.
- Durkheim, É. (1995[1912]). *The elementary forms of religious life* (K. E. Fields, Trans.). New York: The Free Press.
- Gardner, H. (1985). *The mind's new science: a history of the cognitive revolution*. New York: Basic Books.
- Gatewood, J. (1998). *Some formal contrasts between language and other forms of behaviour-action*. Paper presented at the 97th meeting of the American Anthropological Association, Philadelphia.
- Geertz, C. (1973). *The interpretation of cultures: selected essays*. New York: Basic Books.
- Grice, H. P. (1989). *Studies in the way of words*. Cambridge, MA: Harvard University Press.

- Hirschfeld, L. A. (1986). Kinship and cognition: Genealogy and the meaning of kinship terms. *Current Anthropology*, 27(3), 217-242.
- Hirschfeld, L. A. (1989). Rethinking the acquisition of kinship terms. *International Journal of Behavioral Development*, 12(4), 541-568.
- Hirschfeld, L. A. (1996). *Race in the making: Cognition, culture, and the child's construction of human kinds*. Cambridge, MA.: MIT Press.
- Hirschfeld, L. A., & Gelman, S. A. (1994). *Mapping the mind: Domain specificity in cognition and culture*. Cambridge: Cambridge University Press.
- Holland, J. H. (1992). *Adaptation in natural and artificial systems: an introductory analysis with applications to biology, control, and artificial intelligence*. Cambridge, MA: The MIT Press.
- Holland, J. H., Holyoak, K. J., Nisbett, R. E., & Thagard, P. R. (1986). *Induction: processes of inference, learning, and discovery*. Cambridge, MA: The MIT Press.
- Keesing, R. M. (1982). *Kwaio religion: the living and the dead in a Solomon Island society*. New York: Columbia University Press.
- Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. Chicago: University of Chicago Press.
- Leach, E. R. (1954). *Political systems of highland Burma: a study of Kachin social structure*. Cambridge: Harvard University Press.
- Lévi-Strauss, C. (1963 [1956]). Do dual organizations exist? In *Structural anthropology*. New York: Basic Books.
- Lévi-Strauss, C. (1966). *The savage mind*. Chicago: The University of Chicago Press.
- Lévy-Bruhl, L. (1923). *Primitive mentality* (L. A. Clare, Trans.). New York: The Macmillan company.
- Lienhardt, R. G. (1961). *Divinity and experience: the religion of the Dinka*. Oxford: Clarendon Press.
- Malley, B. E. (2004). *How the Bible works: an anthropological study of Evangelical Biblicalism*. Walnut Creek, CA: AltaMira Press.
- Maybury-Lewis, D., & Almagor, U. (Eds.). (1989). *The attraction of opposites: thought and society in the dualistic mode*. Ann Arbor: University of Michigan Press.
- Meyer, D. E., & Schvaneveldt, R. W. (1976). Meaning, memory structure, and mental process. *Science*, 192, 27-33.
- Meyer, D. E., Schvaneveldt, R. W., & Ruddy, M. G. (1972). *Activation of lexical memory*. Paper presented at the meeting of the Psychonomic Society, St. Louis, MO.
- Needham, R. (Ed.). (1973). *Right and left: essays on dual symbolic classification*. Chicago: University of Chicago Press.
- Nisbett, R. E. (2003). *The geography of thought: How Asians and Westerners think differently – and why*. New York: Free Press.
- Norenzayan, A., Atran, S., Faulkner, J., & Schaller, M. (2006). Memory and mystery: the cultural selection of minimally counterintuitive narratives. *Cognitive Science*, 30, 531-553.
- Ortner, S. B. (1973). On key symbols. *American Anthropologist*, 75, 1338-1346.
- Owsianiecki, L., Upal, A., Slone, D. J., & Tweney, R. D. (Forthcoming). Role of context in the recall of counterintuitive concepts.

- Quillian, M. R. (1968). Semantic memory. In M. Minsky (Ed.), *Semantic information processing*. Cambridge, MA: MIT Press.
- Quinn, N. (1996). Culture and contradiction: The case of Americans reasoning about marriage. *Ethos*, 24(3), 391–425.
- Rappaport, R. A. (1984 [1968]). *Pigs for the ancestors: ritual in the ecology of a New Guinea people* (Enlarged ed.). New Haven: Yale University Press.
- Smith, E. E. (1978). Theories of semantic memory. In W. K. Estes (Ed.), *Handbook of learning and cognitive processes* (pp. 1-56). Hillsdale, NJ: Erlbaum.
- Sperber, D. (1985a). Interpretive ethnography and theoretical anthropology. In *On anthropological knowledge: three essays*. Cambridge: Cambridge University Press.
- Sperber, D. (1985b). *On anthropological knowledge: three essays*. Cambridge: Cambridge University Press.
- Sperber, D. (1996). *Explaining culture: a naturalistic approach*. Oxford: Blackwell.
- Strauss, C. (1990). Who gets ahead? Cognitive responses in heteroglossia in American political culture. *American Ethnologist*, 17(2), 312-328.
- Strauss, C., & Quinn, N. (1997). *A cognitive theory of cultural meaning*. Cambridge: Cambridge University Press.
- Tedlock, D., & Mannheim, B. (Eds.). (1995). *The dialogic emergence of culture*. Champaign, IL: University of Illinois Press.
- Tulving, E. (1985). How many memory systems are there? *American Psychologist*, 40, 385-398.
- Tulving, E. (1995). Organization of memory: quo vadis? In M. S. Gazzaniga (Ed.), *The cognitive neurosciences*. Cambridge, MA: MIT Press.
- Van der Henst, J. B., Carles, L., & Sperber, D. (2002). Truthfulness and relevance in telling the time. *Mind and Language*, 17(5), 457-466.
- Van der Henst, J. B., & Sperber, D. (2004). Testing the cognitive and communicative principles of relevance. In I. Noveck & D. Sperber (Eds.), *Experimental pragmatics*: Palgrave.

Chapter VII

Conclusions

The preceding papers share a number of themes; the first three show in different ways how the social environment in which people are raised interacts with their evolved and developing mind to create culturally variable cognitions. Chapters V and VI instead outline some of the ways in which anthropologists have failed to accurately characterize the psychology of the people they study.

The two papers on belief attribution in Yukatek children confirm that this is a cross-culturally early-emerging capacity; at the same time, they underscore the crucial role played by culture. Humans in every society attribute knowledge to others. Why they should do so is clear – being able to predict what others will do and to generate a viable hypothesis that can account for why they are doing it places one at a distinct advantage in terms of co-operation, and the capacity to co-operate is, after all, one of the foundations of human (and more generally animal) sociality (Hamilton, 1964; Stevens & Hauser, 2004; Wilkinson, 1984). But beyond this general adaptive capacity, the social environment in which children are raised was shown to affect how children attribute knowledge to others. As they grow, Yukatek children become exposed to testimony about super-natural entities from their parents, elders, and peers. They process this testimony

and use their knowledge to determine whether the Catholic God or a number of local religious entities are sufficiently unlike humans to have different psychological traits. Such a task appears simple at first glance, but it should be remembered that, at least in some contemporary formulations, cross-culturally recurrent cognitive processes, such as belief attribution, are thought to be strongly modular in Fodor's sense, and thus unable or unlikely to access encyclopaedic knowledge. In contrast, the picture of cognition that emerges from these studies is of a specialized mechanism with significant scope for cultural variability.

Although only a few years ago the effect of culture on cognition was a minority interest, it has now become a well-established topic in psychology (see e.g. Nisbett, 2003; Nisbett & Masuda, 2003; Nisbett, Peng, Choi, & Norenzayan, 2001; Norenzayan & Nisbett, 2000; Norenzayan, Smith, Kim, & Nisbett, 2002). Even psychologists who have no interest in studying culture now have no misgivings in admitting that it can influence the most basic processes.

Predictably, after an initial period in which macro-differences (at the level of nations and culture areas) were the principal focus of research for cross-cultural psychologists, attention is now shifting to differences between groups that are more closely related to each other. Although effect sizes predictably weaken as one chooses ever smaller and more similar units of analysis, it is remarkable that measurable differences may be found inside single countries, or even within a region of a country.

Chapter IV argued that historical processes can shape the structure of familial and extra-familial social relations; this, in turn, is thought to affect performance on a simple

categorization task. The difference found between northern and southern Italians can be explained in terms of centuries of divergent social processes, which can be linked both to historical accident and to ecological conditions. The difference between SES-based groups can also be explained in similar terms, but the fact that the effect is only found in the Southern sample requires further investigation. It is possible that the less pronounced economic inequality found in northern Italy acts as a restraint to the cultural differentiation of class-based groups. In other words, it is possible that low-SES sectors of society only become measurably more interdependent than the wealthier members of their society when they are seriously marginalized. This study is just the first step in understanding the effects of sub-national and sub-cultural effects on basic cognitive tasks.

Chapter V revisits the topic of the attribution of knowledge, this time from the perspective of the professional anthropologist. It is meant as a further illustration of the idea that mindreading is a universal capacity – used even by academics – but also as a warning against the unreflective application of our innate tendencies when thinking scientifically. The problems of ascription are many, but I think that the most insidious are those of which people are unaware. The ascription of beliefs to individuals runs into particularly serious difficulties when we deal with incompatible representations – contradictory beliefs held by the same individual and deployed in different contexts. This phenomenon requires not only new thinking, but also new ways of expressing ideas linguistically.

Chapter VI argues that three organizational features of culture observed by anthropologists – its systematicity; the recurrence of distinctions across semantic, conceptual, and practical boundaries; and the ‘bleeding’ of properties between associated concepts – may find their origin in fundamental operating principles of the human mind – respectively, the cognitive principle of relevance, the decompositionality of cognitive processing, and the network structure of semantic memory. The reframing of some features of culture in cognitive terms may open up some ethnographic observations, so far resistant to anthropological explanation, to new avenues for theory and relevant data from other disciplines. In the Introduction, I commented on the lack of a coherent and widely shared epistemological framework in anthropology, and pointed out that in some cases it resulted in the creation of non-cumulative knowledge – or, as Geertz put it, of new theory that does not speak to previous hypotheses. The fact that some important properties of culture have been identified by several anthropologists and that they have been left unexplained, as mere observations, is a direct consequence of this approach, and this paper goes some way towards improving that situation.

To conclude, I would like to return to a point I made in the Introduction about the challenges of interdisciplinarity. I argued that anthropologists who accept the epistemological strictures of psychology have to invest a significant amount of their time and resources in re-training. In a certain sense, it is easier for a psychologist to accept that culture matters – for example, that cultural groups may differ significantly on a number of basic psychological measures that were until that point thought to be culture-

independent. The epistemological commitment on their side is often small or non-existent. Yet they too have to struggle to think in a new way.

The last decade has seen a multiplication of institutional efforts to minimize such struggles and to expand the field of culture and cognition. One example of such efforts is the establishment of the Culture & Cognition program at the University of Michigan. I am privileged to be among the first to have been able to train interdisciplinarily from the beginning of my academic career. I should like to think that the topical breadth of the previous papers, as well as their essential methodological and epistemological unity, are not atypical of current directions in culture and cognition. I hope this work serves to illustrate that, in spite of the efforts involved, anthropologists and psychologists have much to gain from listening to each other.

Bibliography

- Hamilton, W. D. (1964). The evolution of altruistic behaviour. *The American Naturalist*, 97, 354-356.
- Nisbett, R. E. (2003). *The geography of thought: how Asians and Westerners think differently... and why*. New York: The Free Press.
- Nisbett, R. E., & Masuda, T. (2003). Culture and point of view. *Proceedings of the National Academy of Sciences*, 100(19), 11163-11170.
- Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: holistic versus analytic cognition. *Psychological Review*, 108(2), 291-310.
- Norenzayan, A., & Nisbett, R. E. (2000). Culture and causal cognition. *Current Directions in Psychological Science*, 9(4), 132-135.
- Norenzayan, A., Smith, E. E., Kim, B. J., & Nisbett, R. E. (2002). Cultural preferences for formal versus intuitive reasoning. *Cognitive Science*, 26, 653-684.
- Stevens, J. R., & Hauser, M. D. (2004). Why be nice? Psychological constraints on the evolution of cooperation. *Trends in Cognitive Sciences*, 8(2), 60-65.
- Wilkinson, G. S. (1984). Reciprocal food sharing in the vampire bat. *Nature*, 308, 181-184.