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Report on the Cognition and Culture Workshop

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Even though explaining mental foundations of culture and cultural foundations of mental life has always been one of the ultimate objectives of collective social sciences, there seemed little hope of developing a natural science of culture until the recent interdisciplinary attempts called cognition and culture. What sets the new approach apart is its focus on understanding the relationship between individual level cognition and social processes rather than settling for explanations that appeal to only one of these levels and allowing researchers from diverse traditional disciplines to productively communicate with each other and make progress on problems that transcend their disciplinary boundaries. Thus anthropologists, religious studies experts, marketing researchers, experimental psychologists, and computer scientists can work together to identify the ecological, cognitive and ontological factors that are critical to the spread of information and to identify the patterns of complex dynamics between cognition and culture. Annual meeting of the Cognitive Science Society (CSS) is an ideal platform for such an endeavor since CSS because of its interdisciplinary nature attracts researchers from various traditional disciplines. This issue oriented workshop focuses on several open issues in the emerging science of cognition and culture. These include:

- Can cognitive science of religion explain real world religious concepts and rituals and hence real world religions?
- What role does modularity hypothesis play in explaining the preferential processing of minimally counterintuitive concepts?
- What role can computer simulation in general and cognitive modeling in particular play in advancing the cognition and culture research?
- Are religious and scientific cognition similar or different?

Cognitive Science of Religion and Real World Religions

One of the hallmarks of the cognitive approach to culture has been the observation by Boyer (1994) that most religious concepts are minimally counterintuitive (MCI) in the sense that they violate a minimal number (typically taken to mean one) of the ontological expectations of a category. Furthermore, a series of experiments (Boyer and Ramble 2001; Barrett & Nyhof 2001) have shown that MCI concepts are more memorable than intuitive concepts. This may help explain as to why such concepts are so widespread. Furthermore, preferential processing of counterintuitive concepts has been used to explain other aspects of religious thought. Lisdorf (2007) argues that counterintuitive agents such as divine concepts are introduced in rituals to form an easily comprehensible explanation of the ritual actions by appealing to the agency of hidden counterintuitive agents.

While acknowledging that counterintuitiveness of religious concepts may partly explain their wide distribution some (e.g., Atran 2002) have argued that MCI explanations fail to completely explain religious concepts. Atran (2002) for instance argues that the MCI hypothesis does not explain the reasons as to why some counterintuitive concepts (e.g., Jesus and Allah) are a religious concepts while others such as Mickey Mouse are not. Furthermore, if MCI concepts always enjoy memorability advantages then why don't cultures representations have even more of them? (Atran 2002).

Status of Modularity Hypothesis in Cognitive Science of Religion

Modularity hypothesis is the notion that mind, not unlike a swiss army knife, consists of a number of specialized modules which have been evolutionarily designed to efficiently process domain specific inputs (Fodor 1983; Cosmides & Tooby 1994). Cognitive scientists of religion including Boyer (1994) and Sperber (1994), similar to others who advocate evolutionary explanations for cultural phenomena (Cosmides & Tooby 1994), have assumed that such modularity is both implied by evolutionary history and is also needed to explain the cultural patterns such as widespread beliefs in minimally counterintuitive concepts. As Boyer and Barrett (2005) write:

"… human expertise about the natural and social environment, including what is often called semantic knowledge", is best construed as consisting of different *domains* of competence. Each of these corresponds to recurrent evolutionary problems, is organized along specific principles, is the outcome of specific developmental pathways and is based on specific neural structures. What we call a "human evolved intuitive ontology" comprises a catalogue of broad domains of information, different sets of principles applied to these different domains as well as different learning rules to acquire more information about those objects.

Boyer and Ramble (2001) further argue that:

whenever an object is identified as belonging to one such domain, this triggers specific, principled expectations… violations of intuitive expectations for domain-concepts are more salient than other types of cultural information, thereby leading to enhanced acquisition, representation, and communication.

One of the benefits of the modularity hypothesis is that it allows us to visualize how the mind could overcome computational limitations and tractably process extremely large amounts of information stored in the mental structures. The massive modularity hypothesis, however, is not without its critics who argue that the brain's functionality cannot be divided into encapsulated modules each devoted to processing data from a particular domain with limited interaction among the modules. In fact Fodor himself argued that high level mental functions are not processed by separate modules. An alternative view of the mind advocated by some is that of a general architecture (a unified architecture of cognition (Newell 1990), if you will) operating according to general computing principles. Computational tractability, these critics argue is achieved by using "fast and frugal heuristics" that allow the mind to focus on a much smaller part of the knowledge-base and the prune parts of search space of possibilities to devise solutions to computing problems (Gigerenzer et al. 1996). My colleagues and I (Upal et al. 2007) have been working to identify the heuristics that are used by people to comprehend information presented to them in folk tales that result in better memory and recall for MCI concepts.

Cognitive Modeling for Cognition and Culture Research

Traditionally, cognitive modeling research has focused on individual cognition at the expense of sociocultural processes and their relationship to an agent's cognition (Sun 2006). Social scientists, on the other hand, have traditionally ignored the contributions of an individual's cognition on the formation and spread of cultural information. One of the contributions of the cognitive science of religion to social sciences has been the insistence that social phenomena such as culture and religion must be explained in terms of individual cognitive and ecological factors (Boyer 1994; Sperber 1996) not in a never ending cyclical chain involving other social factors. This has been accompanied by a growing dissatisfaction with verbal models as being too imprecise and mathematical models as being too rigid and unable to be scaled up and lead to the growing popularity of so called agent-based social simulation models.

However, agent-based social simulation models developed to date have employed simple models of cognition. For instance, most existing social simulation systems models of social belief change model agent-beliefs as a single bit (Bainbridge 1995; Doran 1998; and Epstein 2001) and belief change involves flipping the bit from 0 to 1 or vice versa often to match the belief of one's neighbors. This means that agents in such societies can never form complex belief systems that characterize real world cultures and hence such simulations can tell us little about human cultures. Taylor et al. (2007) show how existing cognitive modeling systems such as Soar can be extended to design multiagent computer systems that simulate human societies and how such systems can be used to potentially resolve open problems in the cognition and culture research.

Scientific and Religious Cognition

On the surface science and religion appear to involve very different ways of thinking about the world with much of science focused on the material world of here and now and much of religion concerned with the supernatural and metaphysical, with science rejecting all notions of authority while the world religions insist that all truths are derived from a single central authority. However, a deeper analysis reveals that in the real world things are not quite so simple. We do not acquire much of our "scientific knowledge" through first hand experiments but learn it via the authority of our teachers or books. Similarity religious people engage in debate about issues as much as anyone else and what appears to be eternal truth does change with time. What then, if any are the differences between the two ways of thinking? and how did these difference arise and how do they sustain themselves?

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