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The *science* of cognitive science

Maurice Bloch (2012) argues that ethnographers' animosity toward and ignorance of cognitive science is based on a false dichotomy between 'nature' (as in universal human nature) and 'culture'. Bloch characterises ethnography as evoking and describing culturally and historically specific symbolic systems that ground and enable meaningful lives. He further argues that there is no such thing as 'super-organic meaning'. All meaning, even culturally constructed meaning, is the product of individual human minds and must be interpreted by individual minds. Cognitive science, including philosophy and linguistics as well as psychology, is the science of mental representations, and thus of the symbols individual minds create, interpret and use in practice, communication and thought.

Bloch argues that ignoring the science of mental representation, at the very least, makes the work of ethnographers less nuanced and rich than it might otherwise be and, at worst, leads to theoretical commitments that are deeply counterproductive. Conversely, he argues that cognitive scientists' refusal or inability to understand the profound lessons of the work of ethnographers from Malinowski through Boas through Evans-Pritchard through Geertz symmetrically makes their work less nuanced and rich than it might otherwise be and similarly leads to avoidable, theoretically important, errors. Here I focus on the latter possibility. I respond to two of Bloch's worries concerning where cognitive science has gone wrong by virtue of not properly appreciating the cultural/historical specificity of symbol systems. Although I believe these worries are groundless, I endorse Bloch's call for rapprochement, and conclude with other reasons cognitive scientists should enlist in the more sustained collaboration Bloch advocates.

Bloch's worries:

Worry I

Cognitive science (like cultural anthropology) focuses on only one level of mental representation. For cognitive science, he claims, that level is the implicit, the presuppositional, the modular. Bloch asserts, first, that cognitive scientists assume that the representations that articulate this level of cognition are innate, unchanging through development, and thus immune to modification as a function of historical/cultural processes. He counters that culture affects all mental representations from birth.

It is simply false that cognitive science focuses on only one level of mental representation. A central project in cognitive science is finding the principled distinctions among kinds of mental representations. Bloch's book is itself full of such work – chapter 8 discusses principled distinctions among kinds of memory (e.g. working memory, episodic memory, semantic memory). Chapter 6 draws on (and barely scratches the surface of) cognitive science research on distinct representational systems that draw on different kinds of representations of the self.

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Cognitive science distinguishes between sensory representations (all animals), perceptual representations (at least as evolutionarily ancient as insects) and propositional representations (perhaps only humans; for an illuminating discussion see Burge 2010). Kahneman (2012) synthesises the huge literature that characterises the difference between 'System I' representations (modular, automatic, fast) and 'System II' representations (explicit, reasoned, demanding of executive function). The latter are as much a focus of study in cognitive science as are the former. Bloch correctly lauds the discovery of rich innate conceptual content embedded in modular systems of representation that include representations of objects, representations of intentional, communicative and causal agents, representations of number and even representations of some aspects of the social world (for a review, see Carey 2009). These representational systems are perception-like in some ways, including being modular, which means they respond to only some input that would be relevant to the computations being carried out, and being supported by innate perceptual input analysers that identify entities in the domain. They differ from classical perception in having rich inferential content (central conceptual role). It is an *empirical finding* (and not an assumption) that core cognition continues to function throughout the life span. For example, core object representations continue to articulate a level of representation called 'mid-level' vision, a level of representation that is distinct from explicit, verbalisable, knowledge of the physical world, and that plays a role in object-based attention, and in working memory models of the immediate visual world.

Many cognitive scientists emphasise the discontinuity between core cognition and later developing explicit, verbalisable knowledge. One (of many) of the signature properties of later developing explicit representations is that these undergo conceptual change; no aspect of them is unrevisable. In sum, no cognitive scientists assume that representations are monolithic. Nor is it true that cognitive science as a discipline is committed to a set of *conceptual* primitives that are unchanging atomic elements of thought. Although some cognitive scientists, including Pinker, Fodor and others, do favour this picture, many do not (see Carey, in press). The important point is that *all* cognitive scientists consider this an empirical question, one with central theoretical import, and this is an empirical question that begs for the collaboration Bloch seeks.

Worry II

Cognitive science adopts an external stance in its theorising – it is concerned with characterising the human mind from the outside, as an object of study. Ethnography, from Malinowski on, seeks to understand the mind from the subjects' point of view. Meaning must be characterised from the inside.

There are two complementary projects within cognitive science. One is indeed external in Bloch's sense – attempts to understand the architecture of the mind in terms of different types of processes (sensation, perception, attention, different systems of memory). Characterising levels or kinds of representational systems is part of this project. Here the goal is indeed to characterise the mind from the outside. And most cognitive scientists assume that cognitive architecture, including a variety of attested distinct *kinds* of mental representations, is universal. But this assumption is recognised as such, held with humility, not pronouncement. If there were any ethnographic work that suggested cultural variation in cognitive architecture, i.e. a people with no sensation/perception divide, no System I/System II divide, no divide between working

memory and episodic memory, cognitive scientists should be (and would be) lining up to explore this possibility.

The other project seeks to understand representational *content*, or meaning. Characterising moral systems, or characterising the framework theories that ground explanatory understanding, is part of this latter project, as is characterising the content of innate representational systems. Cognitive scientists, like ethnographers, appreciate that meaning must be characterised from the inside. Characterising meaning from the inside involves discovering the format of a system of symbols, the computations they enter into (their conceptual role), as well as characterising what entities in the world they apply to. Because inferential role is part of what determines the meaning of a symbol, whether a publically available symbol or a mental representation, and inferential roles (for some representational systems) are historically, culturally and individually specific, this *requires* studying meaning from the inside. Even innate systems (and thus culturally universal systems of representation, at least in infancy) must be specified from the inside. For example, experiments can show that infants have some representations with numerical content. Infants guide choices on the basis of numerical information, and can carry out numerical calculations (e.g. 1 + 1 is precisely 2; 5 + 5 is approximately 10). But that does not tell us what the nature of infants' mental symbols are, or exactly what numerical content they have. Several decades of work has answered those questions in this case, showing that the innate systems of representations with numerical content are widely shared in the animal kingdom, and that the 'number' representations are not integer representations, indeed, are not even as rich as the culturally constructed tally systems, or the culturally constructed body counting systems and finite numeral list representations that are probably the historically earliest systems of representation capable of capturing exact cardinal values greater than 3. These latter explicit systems are far from innate, are not cross-culturally universal and are mastered with great difficulty by children, thus illustrating some of the differences between innate modular systems of representation and later developing explicit ones (see Carey 2009). They are also different in content, and showing this requires characterising each system being compared in its historical/cultural specificity.

Bloch asserts that there are no representational systems that are impervious to modification through cumulative cultural development, pointing to the fact (and I accept that this is a fact) that environments differ in culturally systematic ways from the first hour of birth. This misses the main point of modularity, which is that modular systems have strong constraints on the input that determines their output and guides learning within them. We *know* that the lines in the Muller-Lyer illusion are equal, because we have been told, or because we use culturally constructed measuring tools (e.g. rulers) to measure them, but this knowledge does not affect how we *see* them. We simply do not know how strong the constraints from innate core systems are on later developing explicit representations and metarepresentations. We also do not know *how* explicit systems of representation, so completely different in nature (specified from the outside) and content (specified from the inside) from innate modular systems, arise. These theoretical/empirical questions are of foundational importance in cognitive science, and the collaboration Bloch calls for is one of the best ways to shed light on them.

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References

Bloch, M. 2012. *Anthropology and the cognitive challenge*. Cambridge: Cambridge University Press.
Burge, T. 2010. *Origins of objectivity*. Oxford: Oxford University Press.
Carey, S. 2009. *The origin of concepts*. New York: Oxford University Press.
Carey, S. in press. Why theories of concepts should not ignore the problem of acquisition, in E. Margolis and S. Laurence (eds.), *Concepts: new directions*. Cambridge: MIT Press.
Kahneman, D. 2012. *Thinking: fast and slow*. New York: Ferrar, Strauss, and Giroux.