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A Biological/Computational Approach to Culture(s) Is Cognitive Science

Tamás Biró

Amsterdam Center for Language and Communication, University of Amsterdam

Beller, Bender, and Medin rehearse an often repeated statement (challenge 1a): "Cognitive science is not on the right track" because it "never took some of the crucial dimensions of cognition seriously." Namely, "from the very beginning, they have excluded some fundamental dimensions of cognition from examination—affect, context, culture, and history […]" (p. 345).

To overcome this criticism, I suggest promoting the following perspective on cognitive science. A cognitive approach to any phenomenon—action planning, face recognition, language, culture, arts, religion, etc.—views it as the product of the human brain/mind (or, as the emergent product of interacting brains/minds). The focus on the brain invites biological aspects, while studying the mind entails the computer metaphor. Bottom-up (neuron-to-phenomenon) and top-down (phenomenon-to-neuron) approaches together aim to understand how information flow in the brain produces the observable abilities of the mind. Indeed, many in the first generations of cognitive scholars decided to deny, ignore, put in parenthesis, or underplay the above-mentioned "fundamental dimensions of cognition." Yet I suggest viewing their decision as a—conscious or unconscious—research strategy, dealing first with (over)simplified cases. Imagine physics if Galilei and Newton had decided not to pursue their research for they could not satisfactorily account for drag and friction! Luckily, the above-mentioned dimensions are gradually reincorporated into cognitive science: not by throwing out the achievements of the earlier generations, but by developing them further.

If cognitive science is about a biological/computational approach to functions of the brain/mind, then all such functions ought to interest cognitive science. Functions traditionally studied by humanities are not exceptions, and cognitive scientists must join

Correspondence should be sent to Tamás Biró, Amsterdam Center for Language and Communication (ACLC), University of Amsterdam (UvA), Spuistraat 210, 1012 VT Amsterdam, The Netherlands. E-mail: t.s.biro@uva.nl; birot@birot.hu

forces with those representing the knowledge—including facts, methods, concepts, and theories—accumulated by century-long research. Differences in methodologies and emphases do not necessarily hinder cooperation. Linguistics provides a good example: The cognitive approaches supplement past and present research on language as a historical and social phenomenon, resulting in a continuous spectrum without a clear borderline between "cognitive" and "non-cognitive" schools (Biró, 2011). By presenting the exclusion of the above-mentioned dimensions as a mere research strategy, different methodologies become complementary to each other and apparent conflicts evaporate.

A series of fields in humanities—literature, music, visual arts, and religion—have all developed cognitive approaches. The cognitive study of religion is flourishing, and anthropologists such as Scott Atran, Pascal Boyer, Thomas Lawson, Dan Sperber, and Harvey Whitehouse have played a central role in these developments. They have done so by all rights, as anthropologists possess a very special kind of expertise (knowledge, including, again, facts, methods, concepts, and theories) in the cultural domains. Therefore, I contend, cognitive science very much needs anthropology: Only together can they decipher the cultural brain.

Much has been said in this debate about the methodologies of cultural anthropology, as opposed to those of psychology. Much could be said about "bottom-up" approaches to culture: for example, eye-tracking and visual arts, neuroimaging and religious practices. Much less appreciated are top-down approaches: how to create novel cognitive models of culture, and proceed from phenomena toward the mental computation. Only by promoting such efforts can we reinforce the currently unsecure position of cognitive anthropology: by showing to both anthropologists and cognitive scientists that culture(s) can be explained (and not only interpreted) in gradually better ways. To convince the anthropologists, top-down approaches proceed from fieldwork observations—not experiments. To convince the cognitive scientists, they proceed toward cognitive models—not interpretations. Top-down models will then bridge the split between cognitive and non-cognitive approaches to anthropology, similarly to the methodological spectrum in linguistics.

Cognitive models of culture ought to be more than "formal anthropology," adding fancy formulae to theories; they should show the way through Marr's three levels of analysis. Phenomena recast as computation must be solvable by algorithms that can be implemented on human wetware. Brain plasticity suggests that very different phenomena are realized by very similar physical implementations. Hence, cognitive modelers of culture may borrow approaches from other domains. For instance, applying *Optimality Theory* (Prince & Smolensky, 1993/2004), a linguistic framework, to anthropological topics—kinship terminology (Jones, 2010), sleeping arrangements (Smolensky & Dupoux, 2011), and religion (Biró, 2011)—ensures that distant domains of (higher) cognition be accounted for by analyses comparable on the algorithmic level. Optimality Theory connects the knowledge accumulated in traditional theoretical linguistics to cognitive modeling (Smolensky & Legendre, 2006). Why not attempt something similar, connecting traditional theories to (computational) cognitive models, in anthropology?

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