but this is still too far, it seems, for modern philosophers. □

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Related book

Do visual science and anthropological linguistics have anything to say to each other? Does the make-up of our colour-vision system constrain our linguistic expression of colour categories? Does the way we use colour language suggest anything about the biological organization of colour vision? These are the questions addressed in *Color Categories in Thought and Language* edited by C. L. Hardin and Luisa Maffi (Cambridge University Press, £55, \$74.95 (hbk), £19.95, \$27.95 (pbk)), which unfortunately arrived too late for inclusion in Michael Morgan's review above. The book arose from a 1992 conference which brought together visual scientists, psychologists, linguists and anthropologists to examine claims that commonalities of basic colour term use extend across languages and cultures and probably express universal features of perception and cognition.

Mind over chatter

The Symbolic Species: The Co-Evolution of Language and the Brain

by Terrence Deacon

Norton/Allen Lane: 1997. Pp. 496. \$27.50, £20

David Poeppel

One of the troubling things about studying language is that almost everyone is willing to contribute an opinion on how language works, including scientists from other fields who should know better. This is not typically true when one studies, say, the kidney or motor control. Language is viewed as an area that licenses unconstrained speculation. Despite all lay intuitions, however, the scientific study of language requires technical expertise.

Terrence Deacon's *The Symbolic Species* exemplifies how an ambitious book about the coevolution of language and the brain fails because one half of the question (how language works) is treated in an outdated and superficial way. The author aims for a theory of language but develops a theory of everything, ranging from word meaning to empathy to consciousness. I, for one, am invariably suspicious of theories of everything.

In modern cognitive science, neuroscience and psychology, two strongly opposed positions about language dominate the agenda. One position is that acquiring, knowing and using language all reflect the existence of a specialized cognitive system or 'language faculty'. In this view, language con-

stitutes an autonomous mental domain, independent of other cognitive abilities such as face recognition or inductive reasoning. This framework was most forcefully developed by Noam Chomsky and has recently received a popular exposition in Steven Pinker's *The Language Instinct* (Morrow/Allen Lane, 1994). An important assumption of the domain-specific framework is that the ability to learn language is innately specified. In today's climate in cognitive science and neuroscience, Chomsky, Pinker and other researchers with nativist inclinations are often considered the 'bad guys'.

The 'good guys' (who I believe are wrong) argue that it is unnecessary to posit language-specific innate machinery. Instead, general learning and developmental mechanisms designed to constrain learners provide sufficient explanatory infrastructure to account for the phenomena of language. A recent empiricist manifesto of this sort is J. Elman *et al.*'s *Rethinking Innateness* (MIT Press, 1996).

The position endorsed by Deacon is clear: "No innate rules, no innate general principles, no innate symbolic categories can be built in by evolution". Perhaps this shows a poverty of the imagination. Deacon arrives at this pronouncement from a comparative and evolutionary perspective. What does this mean? First, that he compares animals and humans. Second, that he wants to explain the coevolution of language and the brain in a way that maintains the continuity of brain evolution in the face of the discontinuity in behaviour: humans have language, animals do not. He is particularly impressed with the communicative abilities of Kanzi, the chimpanzee trained by Sue Savage-Rumbaugh, who offers a "devastating challenge to the nativist, Chomskyan perspective". Precisely what that challenge amounts to is not mentioned. How a chimp can challenge a linguistic theory is still not clear to me.

Deacon's argument proceeds in three stages. He lays out what he considers to be the core of language (symbolic reference); works through the neurological ingredients that support his framework (the relative increase in the size of the prefrontal cortex); and presents his story of how language and the brain coevolved.

The central notion of what constitutes language for Deacon is symbolic reference. His conceptualization of this underlies the entire comparative and evolutionary story. Insofar as one is sceptical, the story becomes problematic. Drawing on the ideas of C. S. Peirce, Deacon argues that reference, the relation between words and the world, is iconic (based on the similarity between the object and the referring signifier), indexical (based on spatial or temporal contingencies) or symbolic. Humans alone are specialized for symbolic reference, and features such as knowledge of syntax are consequences of symbolic reference. Why are humans

human? Not because they are hairless apes with language (the generative straw man) but because they have crossed a mystical "symbolic threshold", Deacon contends.

Much of this discussion is unsatisfying because Deacon is out of touch with research on language. For example, he constantly uses the expression "grammar and syntax" (both terms have technical definitions; Deacon defines neither); he seriously misinterprets the term "deep structure" (which has precise meaning in linguistics); and the view of language acquisition that he attributes to generative linguistics implies that research halted 30 years ago.

Deacon is at his best discussing neuroscience. His breadth of knowledge is impressive throughout; his description of the neural basis of vocalization is especially clear. It is central to his argumentation that the relative increase in the size of the prefrontal cortex in humans enlarged working memory and attentional capacity and made possible the better manipulation of symbolic representations.

Again, though, technical inaccuracies weaken the presentation. The brief discussion of neuroimaging, a field that is contributing considerably to our understanding of the neural basis of language, is out of date. In his discussion of Williams' syndrome, Deacon makes a lot out of preserved prefrontal cortex and cerebellum in the face of significant reductions in "posterior cortical systems". But the brain area typically associated with language processing (the planum temporale) turns out to be bigger, relative to overall brain size, in people with this condition.

Occasional stylistic excesses also do not help: "We are not just a species that uses symbols. The symbolic universe has ensnared us in an inescapable web. Like a 'mind virus,' the symbolic adaptation has infected us, and now, by virtue of the irresistible urge it has instilled in us to turn everything we encounter and everyone we meet into symbols, we have become the means by which it unceremoniously propagates itself throughout the world".

When one makes big claims about how language works, one needs to show something about language: explicit, worked-out examples. A general discussion of what a theory might do does not suffice. Plainly, so expansive a book owes the reader more.

Who will like this book? Anyone who is already persuaded by the positions of Elman, Bates, Seidenberg and other anti-nativists. Those looking for a detailed explanation of language phenomena, within a framework that goes beyond speculation, will be disappointed. The 'bad guys' are still badder. □

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