Human Language and Our Reptilian Brain: The Subcortical Bases of Speech, Syntax, and Thought (review)

Michael Tomasello

Language, Volume 80, Number 2, June 2004, pp. 325-327 (Review)

Published by Linguistic Society of America
DOI: 10.1353/lan.2004.0099

For additional information about this article
http://muse.jhu.edu/journals/lan/summary/v080/80.2tomasello.html

Reviewed by Michael Tomasello, Max Planck Institute for Evolutionary Anthropology

In his latest book, Philip Lieberman argues for the existence of what he calls the functional language system. Language is a complex biological adaptation, he argues, and like all complex biological adaptations involving behavior it rests on a combination of evolutionarily old neural circuitry, the use of old neural circuitry for new functions, and some new neural circuitry as well. As indicated by the title, Human language and our reptilian brain, he is especially eager to point out the contributions of very old parts of the human brain. Perhaps the main idea is best conveyed by his claim that ‘Ultimately, human linguistic and cognitive ability can be traced back to the learned motor responses of mollusks’ (2).

The theoretical thrust of the book is against modularity and innate linguistic knowledge as espoused by Noam Chomsky and others. L relates the rationale for modular construction in various kinds of modern technologies and then argues, briefly and persuasively, that the empirical facts are that the human brain does not work in this way: ‘Biological brains simply do not conform to the design principles of radar sets or conventional digital computers’ (11). From a similarly brief and persuasive review of the neurophysiological evidence, he claims that ‘These biological facts all argue against neural structures that code innate linguistic knowledge’ (5; see also Elman et al. 1996). He also points out that the notion of linguistic competence, as divorced from performance, is not really biologically plausible, as natural selection can work only on outwardly expressed behaviors. There is no question that language is unique to the human species, but in L’s view it is best understood as a new and unique combination of old things, the vast majority of which we share with other animal species.

The book is actually meant for a fairly wide popular audience. We thus get in Ch. 1 an elementary tour of the brain and a brief primer on connectionist networks, and in Ch. 2 we are given a lesson on how humans produce and perceive the sounds of language physically. We also learn quite a bit along the way about various kinds of brain damage and other abnormalities and their effects on human linguistic abilities. Ch. 3 reviews, textbook style, selected studies on verbal working memory and its neurophysiological bases.

Chs. 4–6 are updates and refinements of the thesis put forth originally in Lieberman 1985 to the effect that the neural mechanisms underlying human linguistic (especially syntactic) abilities evolved from ones originally adapted for the planning and sequencing of concrete motor actions. Specifically, the proposal is that a key aspect of human syntactic ability resides in the subcortical basal ganglia, which seem to be mainly responsible for sequencing motor activity: ‘In a sense, human language and thought can be regarded as neurally “computed” motor activity’ (158). He also makes it very clear in these chapters that he has never held the view that only modern humans, in the last 150,000 years, have had language. He has sometimes been caricatured as holding this view because he has been arguing for some time that earlier hominids could not produce the full range of speech sounds that characterize modern human language. But the claim is simply that the anatomical changes in the human supralaryngeal vocal tract that occurred with modern humans enabled the more efficient production and comprehension of speech—clearly implying that some forms of language and speech were already present with premodern humans. He even goes to some pains to argue that language-trained apes such as Kanzi acquire from their unique environments language skills that differ from human skills only quantitatively, not qualitatively. L’s evolutionary story is self-consciously Darwinian and gradualist.

The book makes good evolutionary arguments about how human beings came to have at least some of their linguistic abilities, especially those involving speech. In fact, exciting data from the last few years further corroborate the general account. Thus, it turns out that the ability to learn statistical regularities in sound patterns—which is demonstrated by human infants before they learn any language proper (Saffran et al. 1996, Marcus et al. 1999)—is also displayed by
at least one species of nonhuman primate (Ramus et al. 2000, Hauser et al. 2002). Moreover, infants show the same ability to find patterns in this way with sequences of visual stimuli as well (Kirkham et al. 2002)—arguing that it is not a specifically linguistic ability. Studies such as these provide striking confirmation for L’s theoretical claim that many important language mechanisms simply involve new uses for evolutionarily old mechanisms (see also Bates 1979).

The main limitation of L’s account is that it ignores some crucial aspects of human linguistic ability and its evolutionary history. First and most important, there is basically no account of the symbolic or functional dimension of language, and indeed the word communication (or social or meaning) does not even appear in the index. Nowhere in the book is there any substantive account of the natural communication of nonhuman primates and how it compares with human linguistic communication—forgivable for most books on language, but not one aimed at its evolutionary dimensions. And indeed, when such a comparison is made, it is found that other animal species communicate only with signals, not symbols; that is, they produce behaviors designed to affect the behavior or motivational states of others, not the intentional or mental states of others (Deacon 1998, Tomasello 1999). This would seem to be a qualitative difference, though obviously not one that requires positing any evolutionary discontinuities or modules. A focus on the functional/communicative dimension of language would also help to explain some of the unique aspects of human syntactic abilities as modern views of grammar emphasize the importance of its symbolic dimension for both acquisition and use (Langacker 1987, Goldberg 1995, Croft 2002).

Relatedly, there is no account of the cultural-historical dimensions of human language, and virtually none of its ontogenetic dimensions, which are necessary to explain why there is not just a single human language but 6,000 of them—a significant biological fact since no other species on the planet has multiple systems of communication used by different populations (bird song is not a system of communication). L argues from the outset that ‘we learn the sound patterns, words, and syntax of particular languages’ (2), but how did there come to be something to be learned in the first place? Where did the grammatical patterns that English and Turkish and Japanese children are acquiring come from? If an innate universal grammar is not the answer, then what is? The answer is, of course, language history. The speakers of individual languages have grammaticalized over historical time various patterns of use—constructions—and children hear individual utterances instantiating those constructions. Using their general skills of categorization, schematization, analogy, and distribution learning, children find the patterns that constitute the grammar of the language into which they are born (Tomasello 2003)—with, of course, some slippage across generations (which is one factor in historical change). The basal ganglia cannot account for any of this. The basal ganglia cannot tell us why some languages have auxiliary verbs and others do not. Nor can they tell us anything about those features of human languages that are indeed universal and where they come from. For that we need linguistic typology, another aspect of language study ignored in the current account.

This is a very good book. It is just not a complete book. The opening sentence of the final chapter says ‘Speech is a central, if not the central, feature of human linguistic ability’ (157). Given this perspective, an evolutionarily plausible, neurologically informed account of how the forms of language might have evolved is perhaps sufficient. But if we are interested in communication and the functions of these language forms—which constitute the adaptive context within which language skills evolved biologically and the social-cultural context within which particular linguistic constructions have emerged historically—then there is little here for us. One book cannot do everything, but any book purporting to provide an evolutionary theory of language should at least give some account of where the many linguistic conventions of the many languages of the human species have come from. But again, and to end on a positive note, as an account of the evolution of human speech, L’s book is to be highly recommended.

REFERENCES

Elman, Jeffrey L.; Elizabeth A. Bates; Mark H. Johnson; Annette Karmiloff-Smith; Domenico Parisi; and Kim Plunkett. 1996. Rethinking innateness: A connectionist perspective on development. Cambridge, MA: MIT Press.


MPI EVAN
Deutscher Platz 6
D-04103 Leipzig
Germany
[tomas@eva.mpg.de]


Reviewed by Georgia M. Green, University of Illinois

Postverbal behavior is a gem of a book about variation in the order of phrases that follow the verb in English sentences, in particular, the phenomena discussed in the transformational literature as heavy NP shift, dative alternation, and particle movement. If this review has a conversational flavor, it simply is reflecting the relaxed and accessible expository style of the monograph.

Ch. 1 (‘Introduction’) poses the question that the studies described in Chs. 2–4 investigate: Can we define ‘weight’ in such a way as to make testable the Principle of End Weight whereby language users prefer alternatives where phrases are ordered by increasing ‘weight’ (Quirk et al. 1972:14.8, Hawkins 1994) so that pronouns come earlier and long phrases later? Chs. 2–4 describe corpus studies and controlled judgment and elicitation experiments which indicate that the tendency for heavier phrases (however defined) to follow lighter ones in the three constructions in question reflects clear—but for the most part, not categorical—preferences. That is, despite confirming the general tendency, Wasow found substantial numbers of instances of heavier phrases preceding lighter ones, both unshifted heavy NPs, for example, and shifted nonheavy NPs. The last two chapters of the book reflect on theoretical, metatheoretical, and methodological issues raised by the investigations discussed in the core of the book. As dry as that might sound, and as interesting and thought-provoking as the first four chapters are, I found them the most impressive and exciting parts of the book.