BOOKS *et al.*

HUMAN EVOLUTION

Language and Wallace's problem

By **Stephen Levinson**

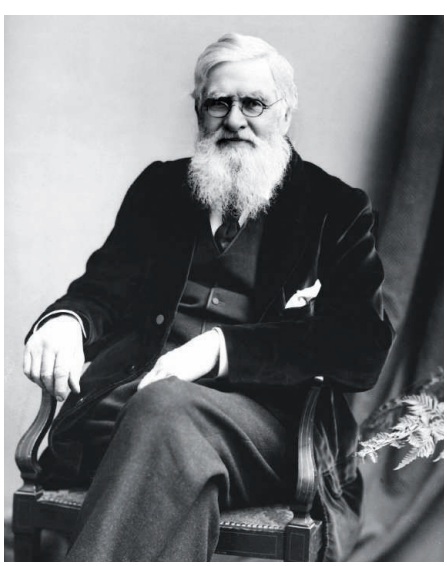
Alfred Russel Wallace, who with Darwin gave us the foundations of evolutionary theory, despaired of the power of natural selection to explain the intellectual and technological prowess of humans: "Natural selection could only have endowed the savage with a brain a little superior to that of an ape," he noted (*1*), pointing to intellectual, linguistic, and technological capabilities way beyond what would seem required for survival. What kind of improbable course of events yielded this excess of competences? In his wide-ranging *More Than Nature Needs*, Derek Bickerton takes this problem as the starting point for a novel inquiry into the evolution of language.

Bickerton dismisses many current approaches to the evolution of language with trenchant arguments. He contends that a standard comparative approach is misplaced: human prowess is not to be accounted for by the accumulation of elements exhibited among the apes or elsewhere in primates. Rather, extraordinary competences required extraordinary selective pressures, best understood by searching for analogies far away in phylogenetic space, like the signaling of pollen sources by bees. Bickerton suggests that the special pressure was a climate-induced switch to cooperative scavenging, which required a spatial signal system similar to that of the bees but more flexible about food types. Well over a million years ago, this "displacement" of message content from the here-and-now limitations typical of animal communication gave rise to "protolanguage," an unstructured string of wordlike symbols. That in turn provided a stimulus for brain reorganization, enabling the hierarchical organization of strings of words—the simple syntactic organization that Bickerton, like Chomsky, thinks is the essence of linguistic capacity. He assembles evidence for the nature of this core syntax from a wide range of sources, but especially from the structure of creoles, the stripped-down languages on which he is an expert. [Curiously, he ignores recent work on new sign languages (*2*) and "home sign" (*3*) that might have been better grist for his mill.] Unlike most of Chomsky's followers, however, Bickerton thinks the great complexity and diversity of modern languages is due wholly to cultural history.

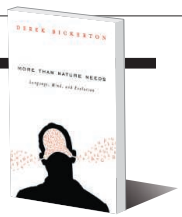
A book this wide-ranging—surveying linguistic, developmental, evolutionary, and brain research—is bound to upset specialists, who will find fault with much detail. Neither the Chomskyans nor the functional linguists are likely to be happy with Bickerton's solution: His version of a minimal nativist syntax has no place for the elaborate structures beloved of the generativists, while it remains stubbornly at odds with the psycholinguistic facts that he correctly thinks should be central to the picture. (For example, language production is incremental and involves left-to-right processing, not the bottom-up merging of units that he favors.)

But the way that the problem is set up and the directions chosen for seeking solutions is deeply thought-provoking. Wallace's problem, Bickerton points out, is that humans went beyond an adequate, simple protolanguage. There must have been something inevitable about the road to excess once the process had begun.

Among this stimulating book's loose ends, one stands out. Darwin argued both that an evolved capacity for thought must have preceded language and that language is partly responsible for its development (*4*). So was it advanced cognition that made language possible? Or did language enable our complex thinking? Bickerton wrestles with the same dilemma but comes down on the side of language enabling thought: The displacement of messages gave us "offline" thinking, and core grammar gave us the syntax of thought.



Alfred Russel Wallace.



More Than Nature Needs
Language, Mind, and Evolution
Derek Bickerton
Harvard University Press, 2014. 334 pp.

Here, *A Natural History of Human Thinking* makes compelling reading. Michael Tomasello argues that it was a change in the mode of thinking that opened the great gulf between humans and the other great apes and that language developed from that new mode. Like Bickerton, Tomasello thinks it must have taken extraordinary conditions to provoke the evolution of human capacities, and he similarly imagines cooperative foraging as the main selective force. But in a reassessment of his earlier work, Tomasello argues that apes are cognitively much closer to humans than had been thought only a decade ago. Apes reason as if using conditionals, disjunction, and negation; appear to use abstract representations exploited productively for inferences; and have advanced abilities to understand others' goals. Interestingly for Bickerton's argument, apes clearly think with "displacement," planning for the future (e.g., retaining tools). Moreover, they are able to control their impulses and sustain attention, displaying a level of meta-awareness roughly comparable to a three-year-old child. Apes thus behave in a "flexible, intelligent, self-regulated way" similar to humans. The crucial difference is that the domains in which they exercise these inferences are largely competitive, not cooperative.

Unlike Bickerton, Tomasello thinks comparative psychology reveals that the cognitive launch pad was already present in our common ancestor with the chimpanzees. Tomasello imagines two big steps to get from apelike to our mental capacities. The first, fully realized by perhaps 400,000 years ago, was the evolution of joint cooperative action, requiring recursive "mind reading" to establish common goals and assumptions. It also requires a reciprocity of perspectives in the joint enterprise and so a meta-analysis of the cooperative activity. Evidence for this stage is only indirect, but Tomasello argues that the cooperative ability of prelinguistic infants as young as one year gives us insight into our early ancestors, since they share the lack of elaborated language and developed culture.

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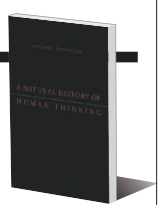
Lucas Cranach the Elder's *The Golden Age* (1530).



A Natural History of Human Thinking
Michael Tomasello
Harvard University Press, 2014
192 pp.

With the advantages of cooperatively shared information, this advance provided the niche for the development of a protolanguage (primarily gestural), which crucially added an informative mode to the ape-level imperative mode. Pointing plus intonation would soon have been supplemented with an open-ended system of iconic gestures and pantomime, allowing the depiction of the not-here-and-now, so exercising human spatial imagination. While having structured strings and predicate-argument structure, this protolanguage lacked a developed repertoire of shared conventions.

The second giant step, prompted by increasing intergroup competition, was the development of sanctioned group norms. These formed the basis for shared conventions and for cross-generational transmission, thus producing the ratchet effect of increasing cultural complexity. Norms brought conformity, internalized measures of performance, a sense of objectivity, and the need for persuasive reasoning. They gave us social institutions and also the cumulative conventionalizations of lexicon and grammar, requiring no cognitive capacities special to language. Grammar is therefore an outcome of the normative domestication of the species, not the great catalyst to human thought that it is on Bickerton's account.

The two stages seem to inevitably overlap (for example, a protolanguage will also rely on microconventions of precedence and parity between sender and receiver). Still, the book's great virtue is its conceptual analysis of the cumulative steps in cognition required to get us from ape to human. For empirical illustration of each step, Tomasello draws largely on his group's work on apes and children. He sees no innate program for the development of all these cognitive, cultural, and linguistic skills, but rather the cooperative predisposition to construct them.

So here are two alternative solutions to Wallace's problem: the acquisition of a powerful mental algorithm as a side effect of acquiring the capacity for symbolic communication, or the fundamental switch toward cooperative motivations and the deep recursive computations required for joint action, which then provided the basis for language. Bickerton's account actually presupposes something like Tomasello's fundamental cooperative turn of mind. But can Tomasello's account stand alone? Can grammar emerge just from cooperative conventions for communication, through the slow cultural acquisition of constructions? How can we account for the specialized neural circuitry associated with language, e.g., the extended wiring of the *arcuate fasciculus*, which connects Broca's and Wernicke's areas (*5*)? Tomasello's explanation seems to need extension.

For one, both books neglect speech. Humans are almost unique among the primates in our ability to mimic whatever sound we hear. We have developed an elaborate vocal apparatus, with reconfigured vocal tract, and greatly enhanced voluntary neural control of the tract and breathing that animates it (*6*). Modern human language use is multimodal, with speech, gesture, face, and gaze all involved, and the roots of this system must be ancient (*7*). The generation of messages in such a system is part of the action system, and many commentators have thought that the origins of hierarchical, recursive syntax can be found in action (*8*). Tomasello's emphasis on joint action and the recursive propositional thinking that lies behind it makes this all the more plausible (*9*) and has the advantage of making some evolutionary connection between our technological intelligence and linguistic abilities. Current linguistic opinion is divided on whether, as Bickerton assumes, something extra, more specifically grammatical, is part of our native endowment.

Oddly, neither book engages seriously with the new data from paleontology, archaeology, and ancient DNA. The development of the vocal tract, the control of breathing, and fast input-output mapping (in which the gene FOXP2 seems to play a role) can all be traced in the archaeological record (*10*). Despite some skepticism about the evidence (*11*), it seems probable that our vocal skills evolved much earlier than either author imagines, and they are likely to have had a causal role in all the other developments.

Darwin described language as "an instinctive tendency to acquire an art" (*4*). Neither book fully captures Darwin's insight—although Tomasello comes close—because both concentrate on the "cold" abstract cognitive prerequisites rather than the "hot" motivational and interactional instincts that lie behind the strongly universal patterns of multimodal communication (*12*). Nonetheless, both books are highly stimulating, especially in conjunction. ■

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