



Comment

An ecological account of language evolution! Way to go!
Commentary on “Modeling the cultural evolution of language”
by Luc Steels

Salikoko S. Mufwene

University of Chicago, Department of Linguistics, 1010 E. 59th Street, Chicago, IL 60637, USA

Received 13 October 2011; accepted 14 October 2011

Available online 25 October 2011

Communicated by L. Perlovsky

Luc Steels [1] has just demonstrated how useful modeling can be to investigations on language evolution, including both language change and the phylogenetic emergence of language. He shows that language must have evolved gradually, by successive co-options of hominines' mental capacities and anatomical structures, at different stages of the human phylogeny, in response to ever-increasing communicative pressures arising from social interactions. Self-scaffolding appears to have played a central role: the same mind that helped hominines evolve conspecific cooperation and a more complex social organization than other primates also helped them produce a more complex culture, including a wider range of tools and, particularly, more complex communicative means for more explicit exchanges of information, viz., languages. (As explained below, they need not have emerged monogenetically.)

Languages may be conceived of as hybrid technologies (like computers, consisting of hardware and software) produced by the gradual domestication of the hominine anatomy by the mind since *Homo erectus*. In the case of speech, this involved co-opting the lungs and the buccopharyngeal structure for the production of phonetic sounds, the hardware that left no choice but to manipulate the ensuing linear structure toward producing rich vocabularies and complex utterances.

An important question has been how to account for the transition from vocalizations to phonetic communication. As hypothesized long ago by Jean-Jacques Rousseau [2], pressures for a larger vocabulary would have evolved vocalic differentiation followed by syllabic variegation [3], which enhanced perception and the potential for large numbers of symbols. Syntax as rule-governed compositionality would have started at the word level, with culture-specific principles regulating how sounds could combine to produce acceptable words. The technology also breaks the linear sequencing of sounds with pauses to mark boundaries first between words and, at a higher level, between larger chunks construed as constituents and sentences. Principles that are partly culture-specific and partly universal regulate how words can combine into longer and complex utterances: sentences and narratives. *Pace* Steels, constituent structure facilitates mental processing.

Internal word structure (morphology, which forgoes pauses) would have emerged later to facilitate vocabulary growth. Module-specific “rules” and “constraints” would have emerged both to systematize the production of words and longer utterances. Mutual accommodations between interactants produced communal norms, minimizing communication failure. Steels is correct in underscoring the significance of variation, a normal state of affairs in populations,

DOI of original article: [10.1016/j.plrev.2011.10.014](https://doi.org/10.1016/j.plrev.2011.10.014).

E-mail address: s-mufwene@uchicago.edu.

which consist of individuals innovating non-identically, on separate occasions, in response to setting-specific communicative pressures. Moreover, speakers learn from each other by inference, which leaves a lot of room for “imperfect replication” [4] or “transmission error” [5]. Languages are thus the kinds of technologies that have been produced incrementally and collectively, with different (generations of) users contributing their respective adaptations [6]. This scenario makes Steels’ invocation of uniformitarianism plausible, as similar exaptive strategies have been used at different times to solve communicative problems, differences lying essentially in the kinds of materials that are co-opted.

Languages are thus complex cultural artifacts, subject to principles of cultural evolution. Unsurprisingly, as aptly argued by Steels, they vary from one community/culture to another. Although the human mind can be claimed to be the same intra-specifically, it allows for alternative solutions to, for all intents and purposes, the same problems. Different populations appear to have adopted different ones, within the limitations imposed by the phonetic technology, itself a consequence of the anatomical structure that has been co-opted. If humans did not live in communities, which develop their respective norms, typological variation would have obtained across individuals.

Steels also shows that no specific “language organ” was critical to the emergence of human languages. An all-purpose intelligence capable of solving various problems and transferring strategies from one kind to another did the job [3,7]. Ultimately, what distinguishes humans from other animals, including other primates, is our mind and what it can produce. Even if a case could be made for a “language organ” (a construct that is still undefined!), it is likely to be a case of mental evolution. It cannot be localized in the brain, even if it could be attributed a discontinuous structure. If it is genetic, the relevant combination of genes is still elusive. Steels’ story sounds plausible, and the whole ecological account in terms of successive exaptations does not deny the role of biological evolution. After all, the latter permitted particular hominine minds to co-opt particular anatomies under specific social pressures at different stages of the human phylogeny [8,9].

References

- [1] Steels L. Modeling the cultural evolution of language. *Physics of Life Reviews* 2011;8(4):339–56 [in this issue].
- [2] Rousseau J-J. *Discours sur l’origine et les fondements de l’inégalité parmi les hommes*. Amsterdam: M.M. Rey; 1755.
- [3] MacNeilage P. *The origin of speech*. Oxford: Oxford University Press; 2008.
- [4] Lass R. *Historical linguistics and language change*. Cambridge: Cambridge University Press; 1997.
- [5] Deacon TR. *The symbolic species: the co-evolution of language and the brain*. New York: W.W. Norton & Co.; 1997.
- [6] Arthur BW. *The nature of technology: what it is and how it evolves*. New York: Free Press; 2009.
- [7] Lieberman P. *Toward an evolutionary biology of language*. Cambridge, MA: Harvard University Press; 2006.
- [8] Mufwene SS. Language ecology, language evolution, and the actuation question. In: Áfarli T, Maelum B, editors. *Language contact and change: grammatical structure encounters the fluidity of language*. Amsterdam: John Benjamins [in press].
- [9] Mufwene SS. The origins and the evolution of language. In: Allan K, editor. *The Oxford handbook of the history of linguistics*. Oxford: Oxford University Press [in press].