A FRAMEWORK TRIGGERING DISPLACEMENT IN HUMAN LANGUAGE

TAO GONG

Department of Linguistics, Max Planck Institute for Evolutionary Anthropology, Deutscher Platz 6
Leipzig, 04103, Germany

JAMES W. MINETT, WILLIAM S-Y. WANG

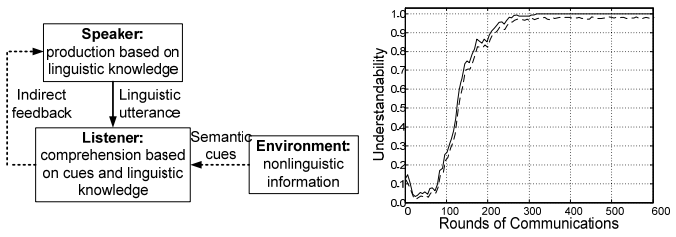
Department of Electronic Engineering, The Chinese University of Hong Kong, Shatin, Hong Kong, China

Although many species can communicate in a limited way about things that are physically present, only humans can narrate displaced events occurring outside the here and now (MacWhinney, 2008). *Displacement* (Hockett, 1960) is a crucial feature of human language, and the development from communications with non-displaced reference to those with displaced reference is a general trend in language ontogeny (Givón, 2009). However, due to lack of direct evidence of the intermediate stages from no language to a protolanguage, the emergence of displacement during language phylogeny remains puzzling to evolutionary linguists. In this paper, we propose a theoretical framework that could trigger displacement in protolanguage, and evaluate it in a simulation study.

The framework (see Fig. 1 (a)) is based on inexplicit meaning transference; an indirect feedback is adopted in communications. We assume that early hominids in primitive communications were exchanging information about frequent, integrated events occurring in their environment, and nonlinguistic information acquired from other sensory channels, such as visual cues, must have assisted comprehension of exchanged utterances. However, since the ability of intentionality sharing (Tomasello, 2003) in early hominids is limited, those nonlinguistic cues are *unreliable*; they may not always contain the speaker's intended meanings. Therefore, linguistic knowledge is also required in comprehension. Comprehension of protolanguage in this stage relies upon both linguistic and nonlinguistic information, and the unreliability of the latter could trigger the development of the former. After a number of communications like

this, a set of linguistic knowledge capable of describing these events and withstanding the interference of misleading cues could eventually emerge among individuals. Then, a transition from initially relying on nonlinguistic information to later relying on linguistic information occurs. In other words, a displaced protolanguage has emerged.

We implement this framework as the communication scenario in a multi-agent model that explores language emergence (Gong, 2009). The simulation results illustrate that a not-necessarily-high level (around 0.5) of cue reliability is enough to trigger a communal language out of holistic utterances. The emergent language, consisting of a set of lexical and simple syntactic rules, is *displaced*; it has a high value of understandability (the solid curve in Fig. 1(b)), and can be efficiently used in communications with misleading cues (the dashed curve in Fig. 1(b)). The proposed framework reveals a close connection among individuals' multiple sensory channels during the early stage of language phylogeny, and illustrates that mutual understanding in communications is an underlying driving force for displacement, in addition to other linguistic features.



(a) (b)

Figure 1. (a) The framework triggering displacement. It involves three components: the speaker, the listener, and their environment. The dashed lines indicate unreliable information; (b) the simulation results (the cue reliability is 0.6): the solid curve traces the understandability of the emergent language without cues, and the dashed curve traces the understandability with misleading cues.

References

Hockett, C. F. (1960). The origin of speech. *Scientific American*, 203, 88-96.

Givón, T. (2009). *The genesis of syntactic complexity: Diachrony, ontogeny, neuro-cognition, evolution*. Amsterdam: Benjamins.

Gong, T. (2009). *Computational simulation in evolutionary linguistics: A study on language emergence*. Taipei: Academia Sinica.

MacWhinney, B. (2008). Cognitive precursors to language. In D. K. Oller and U. Griebel (Eds.), *Evolution of communicative flexibility* (pp. 193-214). Cambridge, MA: MIT Press.

Tomasello, M. (2003). *Constructing a language: A usage-based theory of language acquisition.* Cambridge, MA: Harvard University Press.