Explaining word-order preference using computer simulations of language evolution

The utterance in (1) could be considered a garden-variety example of natural language given its SOV word order, verb agreement, and case marking. In spite of its appearance, however, it is produced by an agent in an artificial-intelligence computer model (the glossing is a proxy for convenience only; agents do not share our real-world concepts).

(1) sor talotam-er unatomu-ul
1 man-U teach.V-1
'I taught a man.'

Crucially, the argument-marking strategies identified in (1) have not been modeled as such directly. Instead, the first generation of agents starts with a (randomly generated) lexicon of referential expressions and a small set of more general (neurobiological) constraints on cognitive processing architectures and external pressures. Indeed, the very first speaker of the language exemplified in (1) would have uttered the exact same meaning (in the exact same context) as in (2). At this stage, word order is random and case marking and verb agreement are lacking. Instead, the lexical ad-hoc marker *esesan* 'student' is used to make clear the man is having the student role in a teaching event with the speaker:

(2) talotam esesan usasuro unatomu
man student 1 teach.V
'I taught a man.'

Examples of the more general principles that have been implemented in the model are a desire for communicative success (Grice 1975, Arbib 2015), influence of frequency and recency on word activation in production (Balota and Chumbley 1985, Fenk-Oczlon 1989), automatization and therefore reduction of pronunciation (Nettle 1999, Jurafsky et al. 2002), erosion of form and bleaching of meaning (Bybee 1985, Heine and Kuteva 2008), incremental production of utterances (van Bergen 2011, Schouwstra and de Swart 2012), and generalization of tendencies into rules (Yang 2005).

Using computer simulations, it can be explored whether and how grammatical structures may emerge from such principles over time. Thus, it can be shown that in virtually all (simulated) languages verb agreement for speech act participants develops (Ariel 2000, Siewierska 2013), a preference for actor–undergoer–verb (SOV) order emerges (Dryer 2013), and case marking is always *differential* eventually, i.e. used in a restrictive rather than generalized way (cf. Sinnemäki 2014).

In this talk I will focus on the development of grammatical word order. Since agents preferably talk about themselves (Dahl 2000), the forms referring to themselves are highly activated, and therefore generally the first to be articulated (assuming incremental production). Since speech-act participants tend to have actor roles (Dahl 2000), this results in a tendency for the actor to appear first in the utterance. Verbs being least topical, they are mostly produced last, leading to a verb final tendency. Together, these preferences lead to an initial SOV preference, which becomes stronger over time as a result of grammaticalization and eventually turns into a conventional rule (Yang 2005).

In sum, using a computational model of cultural language evolution, this talk will show how processing constraints may explain typological word-order distributions. It is predicted that all languages go through an initial SOV stage (which of course can be overridden again by other principles, cf. Hawkins 2004).