

Semantics drives postnominal position of fractions in improvised gestures

Angelika Kiss & Jida Jaffan, University of Toronto

Background. Word order universals have intrigued linguists for a long time, and it remains an unsettled issue whether there is a “basic word order”, at a phrasal or sentential level, from which all currently attested word orders could be derived from. One way of looking into this question is through a silent gesture paradigm, where participants who have no knowledge of any sign language communicate with improvised hand gestures [1], an experiment that arguably mimics the earliest stage of language evolution [2]. Experimenters who used this paradigm offered syntactic generalizations about “structural distance”, which is determined by semantic scope. For example, within a noun phrase, adjectives are closest to the nouns they modify, numerals are next, and demonstratives are furthest, see Figure 1. [3].

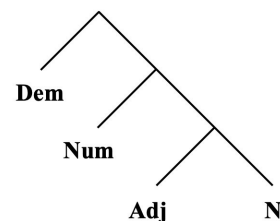


Figure 1. Structure of an NP [3]

However, structural distance cannot account for another aspect of linearization, namely on which side of the head the given modifier appears (e.g., Adj-N vs. N-Adj). There is reason to believe that besides syntax, semantics, too, is a driving force shaping emergent word order ([4], [5]). Specifically, emergent word order has shown to be sensitive to temporal ordering within events. Christensen et al. [6] propose that improvised gestures show “structural iconicity” in that created objects are gestured after the verb because they start existing after the event (e.g., ‘create a unicorn’ is gestured with a VO order), while objects that existed before the event happened are gestured before the verb (e.g., ‘hug a unicorn’ is gestured with an OV order). This experiment shows us that lexical semantics plays a crucial role in the placement of its argument.

Predictions. In this paper, we test the structural iconicity hypothesis for quantified expressions. Assuming that the fraction of an object (e.g., a quarter of an apple) comes to existence as an individual after the whole object (the apple) did, the temporal aspect of the two would predict the order *apple-quarter* in gesturing. If this order appears equally frequently as the *quarter-apple* order, it tells us that structural distance is the one and only organizing principle, while if a whole-fraction order is prevalent, it supports the importance of structural iconicity. On the other hand, numerals, which have no such temporal implications, are expected to appear on either side of the noun [4].

Experiment. We elicited silent gestures of 12 target items (6 numeral, 6 fraction construction and mixed with fillers) from 30 participants of various language backgrounds via Zoom. The overall trend among our participants was that when a noun is modified by numerals, there is only a slight tendency for them to precede the noun, while fractions have a strong tendency to follow the noun. This was found to be significant ($\beta = 0.15$, $SE = 0.02$, $z = 2.42$, $p < .000$).

Discussion. These results support the proposal that beyond structural distance (syntax), structural iconicity (semantics) is to be considered an equally strong organizing principle which shaped word order in the world's languages.

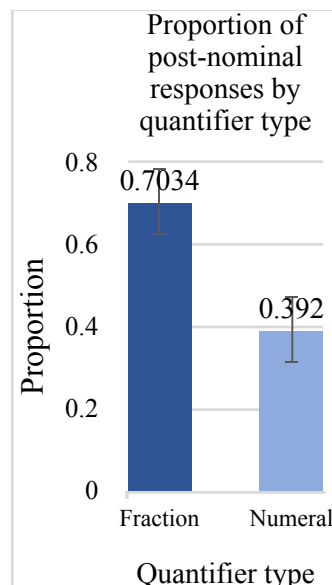


Figure 2. Distribution of pre- and postnominal quantifiers

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