DOES A UNIVERSAL HIERARCHICAL STRUCTURE UNDERLIE WORD ORDER TYPOLOGY?

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Theoretical syntacticians have argued that a universal underlying hierarchical structure has shaped the evolution of noun phrase word order: adjectives are structurally closest to the noun, then numerals, then demonstratives (Cinque, 2005; Abels & Neeleman, 2012). This structure can explain why, typologically, orders that transparently reflect this hierarchical structure (termed *homomorphic* orders, e.g., Dem-Num-Adj-N, Num-N-Adj-Dem, etc.) overwhelmingly outnumber orders that do not (e.g., N-Dem-Num-Adj) (Dryer, 2018). A recent series of experiments appears to support this hypothesised structure, showing that learners' inferences about word order in a new language reflect this structure, rather than linear order (Culbertson & Adger, 2014; Martin, Ratitamkul, Abels, Adger, & Culbertson, in press; Martin, Abels, Adger, & Culbertson, 2019). Participants were taught a version of their native language (or an artificial language) in which the order of a single modifier (Adj, Num or dem) relative to the noun was swapped (e.g., English speakers learned that "green car" was produced "car green" in the new language). Participants then had to guess the relative order of multiple modifiers (e.g., "two green cars"). Participants consistently inferred orders which reflected not their native language order transposed (i.e., "cars two green"), but instead the underlying hierarchical structure in this domain (i.e., "cars green two").

However, these previous experiments targeted English and Thai speakers, whose native languages are homomorphic (Dem-Num-Adj-N and N-Adj-Num-Dem respectively). From these populations, it is thus impossible to determine whether there is a universal preference for homomorphism—causally connected to typology—or whether instead the results reflect structural transfer from participants' native language. If there is a universal homomorphism bias, then even speakers of a language whose word order is *not* homomorphic should infer homomorphic word order in an artificial language. The present project aims to test this prediction, by comparing word order preferences from English-speaking par-

ticipants with those from a population whose native language, Kîîtharaka, is not homomorphic—specifically, N-Dem-Num-Adj (Kanampiu, 2017).

We used an artificial language learning task to test our hypothesis. Participants were instructed that they would be learning part of a new language called Nápíjò. In actuality, Nápíjò was an artificial language composed of three nouns and a series of modifiers, following the materials design described by Martin et al. (2019). Contrary to previous studies, however, our task required participants to produce noun phrases in the artificial language. Participants were taught word meanings by hearing labels accompanying simple cartoon scenes. Objects were depicted on a table positioned in front of a girl. Participants first learned the object names by seeing greyscale images of the objects. Participants then saw modified objects (e.g., a red feather, two mugs),[1] and heard the noun *followed* by the modifier label (in the version for English speakers) or *preceded* by the modifier label (for Kîîtharaka speakers). That is, in Nápíjò, all modifiers were on the opposite side of the noun from participants' native language. Once participants had learned the individual word meanings, and how nouns combined with single modifiers in the language, they were presented with visual stimuli that involved a colour *and* either a numeral (e.g., a group of three red feathers) or a demonstrative (e.g., the cartoon girl pointing to a red feather in front of her). They were asked how to describe these scenes—which they had not seen before—by producing phrases themselves in Nápíjò. Responses were automatically recorded and coded offline.

We tested 60 English-speaking participants who reported no knowledge of a language with postnominal modifiers (30 in each condition). We found a strong preference for homomorphic orders for both Dem+Adj (mean: 82.6%, $p < 0.001$) and Num+Adj combinations (mean: 67.5%, $p < 0.01$) (though the preference was stronger for the former than for the latter ($p < 0.05$)).

We are currently running the Nápíjò experiment with monolingual Kîîtharaka-speaking participants in the Tharaka region of Eastern Kenya. Because Kenya has a strong multilingual policy in its schools (both English and Swahili are compulsory), the population that we are targeting is an older illiterate population in rural areas with little exposure to and no fluency in languages like English. Data collection is ongoing and will be completed over the next six weeks, and comparison with our English results will allow us to say if those speakers, who have a lifetime of experience with a non-homomorphic language, will prefer homomorphic orders in Nápíjò. If so, this will provide strong support for the role of a universal underlying hierarchical structure in shaping how noun phrase word order has evolved. If Kîîtharaka speakers rather prefer non-homomorphic orders (likely a structural transfer from experience with their own language), this result will challenge our understanding of universal language structures and the pressures that shape linguistic systems over time.

[1] Demonstrative meanings were taught by showing the girl pointing at a proximal or a distal object.

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