

Turtles all the way down: How children harness the power of recursion

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Languages are thought to vary minimally in terms of their formal properties. One surprising observation, first noted in Roeper and Snyder (2005), is that the recursivity of an embedding rule is subject to variation. German has the same possessive *-s* as English, but it is not recursive: *Maria's father's bicycle* is grammatical but its German translation is not (Limbach & Adone 2010). In nominal modification more generally (Adger 2013, den Dikken 2006) languages can embed DPs within other DPs relying on 4 general strategies. i) minimal relators and linkers (Japanese *-no*, Spanish *de*); ii) Relative clauses; iii) PP embedding; and iv) case markers (English possessive *-'s*). The first two types seem uniformly unrestricted, whereas case and PPs are subject to parameterized lexical constraints. Spanish allows embedding of comitative PPs but only under instances of inalienable possession (*la mujer con lentas* vs. **la mujer con libros* 'the woman with glasses/*with books'). Once the embedding rule is learned, what constrains its application down into additional levels?

In our recent work, when English-speaking children are prompted to produce recursively modified descriptions, at first they produce only simple nominals (1), then progress to a stage where they are limited to one-level embedding structures using a given marker (such as possessive *-s*, or PP embedding) (2), but only later they learn to iterate the target embedding rule (Pérez-Leroux et al. 2012) (3). These observations support a growing body of comprehension data (Roeper 2011). The development of DPs is thus not a two but a three-stage process:

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| (1) <i>The baby</i> | Stage 1: DP unraveling. Emergence of the functional layers within DP |
| (2) <i>The baby with the woman</i> | Stage 2: Level 1: Acquisition of DP embedding rule |
| (3) <i>The baby with the woman with flowers</i> | Stage 3: Level 2: Target recursive DP embedding (rule iteration). |

On their way to Stage 3, children at times reduce the depth of the hierarchical representation by relating the various referents through verbal predication, apposition, and coordination. The evidence also shows that children prefer the typologically unrestricted (but structurally complex) relative clause strategy (Pérez-Leroux et al. under review). This preference is intensified in bilingual children (work in preparation).

As new questions emerge from the study of the acquisition of recursive embedding, the need to expand our traditional view of the development of phrasal complexity becomes apparent. How do children learn that some embedding rules can iterate, and others do not? If merge is the fundamental property of human languages, how do we explain the observed constraints, given that there are no selectional restrictions on adjunct modifiers? This is the broader question of how basic properties of language supervene into the human ability for recursive self-embedding, out of which systematicity, compositionality and productivity arise. This talk presents our collaborative crosslinguistic research on how children harness the power of recursive rules in the nominal domain.

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