Developmental Minimalist Syntax: A proof of concept

Chomsky’s (1995; 2000; 2001) Minimalist Program (MP) posits that phrase structure is generated bottom-up via successive/cyclic applications of Merge, with great success modeling language grammars cross-linguistically. Nonetheless, many are puzzled by the disparity between such models of adult syntax and other models of cognition, with vehement disagreement at times (e.g. Ibbotson & Tomasello 2016). Though syntacticians distinguish competence from performance (Chomsky 1965), the stark difference between the Minimalist model of grammatical knowledge and the use of that grammatical knowledge (e.g. in language processing) raises an important question: is there an externally verifiable reality to the constructs of the MP (i.e. outside of language grammars themselves)? The answer may surely be “no”—our theoretical constructs may only have heuristic utility—but we present an alternative:

(1) DMS: Developmental Minimalist Syntax (an interpretive principle)

The Minimalist derivation of adult language structures recapitulates the ontological development of those same syntactic structures.

According to DMS, theoretical constructs and derivational processes that account for observed syntactic phenomena also model the pathways by which children arrive at that adult-like grammatical knowledge. Successive stages in the derivation of adult syntactic structure correlate to developmental stages: vP is contained in TP in adult language because vP is grammaticalized by children in acquisition before TP.

DMS assumes certain stable postulates: 1) bottom-up structure building via Merge; 2) a cross-linguistically-attested hierarchy of functional categories (Cinque 1999; Ramchand & Svenonius 2014; Wiltshko 2014); 3) upward syntactic movement; 4) the Copy Theory of Movement (Chomsky 2000; Nunes 2004); 5) derivation by phase (Chomsky 2001, 2008). DMS has four core principles:

Principle 1: Sequence of structure building correlates with the timeline of acquisition; Principle 2: In acquisition, new syntactic structures incorporate existing structures; Principle 3: Syntactic movement is reanalysis; Principle 4: Phases are acquisition workspaces.

Principle 1 makes clear, testable predictions about the relative order of acquisition of different types of syntactic structures—structures known to be structurally low ought to be acquired by children earlier than material known to be structurally high. Principle 2 holds that the standard method of acquisition (i.e. grammaticalization) of additional syntactic structure is one of expansion rather than replacement; as childrens grammars grow, developmentally newer structures are built upon the foundation of developmentally older structures. Tampering with older structures is predicted to have syntactic consequences, as discussed below (cf. Chomsky’s Extension Condition). A consequence of these ideas is Principle 3: movement is reanalysis of a previous generalization. As children’s grammars expand to include more layers of functional hierarchy, they update existing generalizations about intermediate and final locations of constituents (e.g. movement of subjects from Spec,vP to Spec,TP is children regrammaticalizing the position of sentence subjects as they acquire additional syntactic structure). Principle 4 states that phases serve as acquisition workspaces—a hypothesis space where a child can entertain analytical possibilities and eventually reach grammatical conclusions (e.g. within the vP phase children establish core relationships within an event). Once they grammaticalize vP, they move their analytical attention elsewhere, taking the internal structure of the vP phase for granted (assuming Hinzen and Sheehan’s 2014 theory of phases). In this way, the “computational efficiency” of phases is an acquisition strategy whose effects influence the form of adult language knowledge (an ontological fossil, as it were).

DMS is the intellectual descendant of Radford’s (1990; 1992) Small Clause Hypothesis, Rizzi’s (1994) Truncation Model, the ATOM model of Schütze & Waxler (1996), and Clahsen’s (1990/1991; 1994) proposals about acquisition stages. The specific contribution of our work is to demonstrate that contemporary syntactic theory not only accommodates key proposals from that era of theorizing, but also provides some answers to outstanding questions that seem to have lessened the original enthusiasm around these ideas (e.g. Poeppel & Waxler 1993, Hyams 1994). One such challenge was why some patterns (e.g. Germanic V2) are available to children “before they should be” if acquisition proceeds in the sequence proposed by Principle 1. We claim that there are certain systematic exceptions in which syntactic structure is acquired “too early” or “too late” (according to the core predictions of DMS).
These divergences correlate directly to recurring theoretical anomalies in the MP: “early” acquisition yields look-ahead and otherwise unmotivated head movements like V-to-T movement, whereas “late” acquisition yields countercyclic operations like Late Merger. Likewise, DMS allows for children’s use of probable or hypothesized structure before it is fully grammaticalized because phases are acquisition workspaces (cf. Roepke 1992; Clahsen 1990/1991). The resulting theory bears many similarities to the approach to language evolution adopted by Progovac (2015)—who suggests a correlation to language acquisition—and this paper engages the connections between these accounts.

This paper is limited to a 'proof of concept' because DMS has extensive empirical and theoretical consequences. We overview a range of findings from the child language acquisition literature showing that the main predictions of DMS are upheld; children reach adult-like competence in syntactic domains in precisely the relative sequence predicted by DMS (i.e. VP<vt<P<TP<CP). In this abstract we focus on English patterns for brevity, but the paper engages cross-linguistic patterns.

**VP/vP:** 1) Early speech is telegraphic, in that it is marked by a lack of functional categories; children between the ages of 1;6 and 2;6 often produce the target string *I showed you the book* as *I show book* or *Show you the book* (Brown 1973:76). 2) Two-word strings containing the verb and object are more common than ones containing the subject. Although children use subjects, verbs, and objects from their earliest multi-word utterances, verb-object combinations (e.g. *Want more apple, Need shoes*) are significantly more common (Bloom 1970: 122). 3) Children omit subjects freely until about 2;6 years of age even though null subjects are not grammatical in adult English. Crucially, this argument omission does not extend to objects; obligatory subjects are omitted while obligatory objects are not (Rizzi 1994).

**Conclusion:** VP constructions (V+O) are mastered before subjects (i.e. vP) and tense (i.e. TP).

**vP/TP:** 1) Children pass through a ‘root infinitive’ stage during which they produce predicates and arguments but do not necessarily mark verb finiteness in an adult-like way. Children often produce structures like *Papa have it* (Legate & Yang 2007). The root infinitive stage ends around 3;6 years of age for English-speaking children (Rice et al. 1998). 2) Root infinitives correlate with non-adult-like pronominal Case marking of the subject. In English, early subjects often surface in the accusative Case rather than the nominative (e.g. *Him fall down*). Errors of the opposite direction (i.e. direct objects receiving nominative Case marking) are essentially unattested in early child English.

**Conclusion:** The co-occurrence of root infinitives and non-adult-like nominative Case assignment is indicative of a lack of TP structure. The observation that the root infinitive stage persists long after the acquisition of sentence subjects suggests that TP is in fact grammaticalized later than vP, as predicted by DMS.

**CP:** 1) Although English-speaking children begin producing questions quite early (ca. 1;6 years of age), these questions often display subject-auxiliary inversion errors (e.g. *What she does like?*; Ambridge et al. 2006: 522). Such errors peak around 3;8 years of age (Rowland & Pine 2000), though they are attested through 4;10 years of age (Ambridge et al. 2006). 2) The earliest embedded clause constructions emerge after the first questions. Nonfinite complement clauses are grammaticalized before finite complement clauses. Nevertheless, both classes of embedded clauses are mastered significantly after TP-associated phenomena; although nonfinite complement clauses become increasingly productive around 3;0 years, English-speaking children do not grammaticalize complement clause constructions as a whole until the preschool years (Tomassello 2003; Diessel 2004).

**Conclusion:** CP-level constructions are mastered relatively late, after the acquisition of both VP/vP and TP structures, as predicted by DMS.

**Summary:** DMS systematically relates MP theoretical constructs to sequences in child language acquisition. This approach has many implications, from demonstrating that there is ‘theory-external validity’ to the theoretical constructs of the MP to connecting robust generative models of language structure to other aspects of cognition (e.g. development, learning). Given our range of knowledge about adult language structures both within and across languages, DMS can provide a new set of hypotheses about language acquisition and (speaking somewhat optimistically) a bridge between the relatively siloed world of generative syntactic theory and other work in cognitive science. So to answer the original question: why does bottom-up structure building work so well? Because children learn language incrementally by adding structure to existing structure, and the structure of adult language preserves that developmental history.
1 References


