The bio-psychology of syntactic derivations – questions for the next 50 years.

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Derivations have been at the heart of generative syntax since Syntactic Structures, defining the relation between the traditional (19th century) distinction between inner and outer forms of sentences. Three fledgling research areas show promise for future understanding of the mental and biological context for how learning derivations recruits available computational resources in the child.

1. **Recent research on the perception of isolated excerpts of spoken language show that the Poverty of the Stimulus for both children and adults is much more impoverished than normally recognized: e.g., 3-4 word excerpts of spoken language are impossible to decode in isolation – but as soon as they are given a context, even a following context, they pop into immediate recognition. This re-raises the notion of the "psychological moment" in which actual processing moves both forward and backward in time, while appearing to move only forward. The question now becomes, does the psychological moment converge with syntactic-semantic phases, thereby giving a behavioral concomitant of their structure?**
2. **How are derivations discovered (aka "learned") in the dynamic interaction of experience and mental structure during individual development? That is, does the motivation to discover derivations depend on a general problem solving model of learning? Such a model explains (well, at least describes) the motive to learn language as based on the universal enjoyment of solving problems. Such a model requires a dominant Canonical Sentence Form in each language to provide the basis for statistical generalizations. This has implications for configurational structural "universals" such as the Extended Projection Principle.**
3. **Derivations have consistently been built in large part by movement, and/or upward structure building. Why is the building/movement always from a more to less embedded part of a syntactic hierarchy? Chomsky suggests that building complex structures from simple ones necessitates this compositional order (and socalled "unification" grammars have this property as well). One speculation is that the neurological computational engine for such syntactic composition is co-provided by brain areas with a long evolutionary refinement for vision. Current vision science supports the notion that object recognition builds from and then binds features and components into object representations, especially representations of con-specific motion. In addition, our research shows that motion itself is more easily perceived from a more embedded visual sub-scene to a less embedded one, than in the opposite direction.**

   These considerations lead towards an integrated hypothesis about the genetic, individual and social basis for the discovery and formation of specific derivational syntactic structures. If the individual motivation in the child involves both problem solving and desire to be like grownups, then the discovery of hierarchically organized derivations may be recruiting evolved mechanisms for the visual perception of conspecifics in general. Stranger things have turned out to be true.

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