Born to Parse

How Children Select Their Languages

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6 Variable Properties in Language: Their Nature and Selection

6.1 UG Is Open

So children are born to parse and they do so initially with the toolkit provided by a simple, parsimonious UG. For example, by virtue of that toolkit, children build binary-branching structures using the bottom-up Project and Merge operations. Heads project to phrasal categories, and Merge combines two elements into one element with two parts. A DP may carry an index to help indicate its referential possibilities, and indexical relations must conform to the demands of the syntax–semantics interface, particularly the principles of the Binding Theory (§4.1). Categories may be copied and deleted, subject to certain limits, and deletion is subject to the demands of the syntax–sound interface, particularly the principle that elements with no phonetic content (deleted items) be understood in a structurally prominent position, namely the complement of an overt, adjacent head (§4.2). Work by Minimalists over the last few decades has greatly simplified and "naturalized" our ideas about UG.

These tools enable children to begin to assign abstract linguistic structures to what they hear, to parse their ambient E-language, and this, in turn, determines many aspects of the meaning of expressions. Parsing is central and is carried out using the toolkit provided initially by UG and then also by the emerging I-language. The developing I-language, incorporating the invariant principles of UG, is the parsing mechanism; there is no separate cognitive device specialized for parsing, as if parsing was a separate part of the language faculty. Invariant properties stem mostly from UG and from parsing at the two interfaces. Meanwhile variable properties stem largely from parsing of E-language. Invariant properties of UG coexist with the variable properties of different I-languages. This is how I-languages are selected and elaborated, in turn enriching the parsing functions. If a child hears heads preceding their complements, she selects a property for her I-language such that the language is head-initial; other people's I-languages may be head-final. If she hears words that have the distribution of Infl elements, like English *can* and *must*, she categorizes or parses those words as instances of Infl, unlike their French translations *pouvoir* and *devoir*, which are verbs. If *can* and *must* are instances of Infl, then they have distinctive syntactic properties that distinguish them from verbs and other heads. The phenomena of the child's E-language trigger elements of the emerging I-language and induce the child to gradually enrich that I-language, selecting the elements of her internal, individual, private system.

If her younger brother experiences different E-language, perhaps because the family has moved to a different city, he may select a somewhat different I-language, because UG is open, open to the demands of her E-language and to those of her brother's different E-language.

UG provides the tools that enable the initial parsing, and then the demands of the emerging I-language begin to have a shaping effect. However, under the view adopted here, UG does not provide a set of predefined binary structural parameters that the child "sets" by evaluating and comparing the generative capacity of various candidate I-languages, selecting the most successful. Rather, our UG is open, consistent with a very wide range of variable properties that syntacticians have observed across many languages. UG, indeed, enables children to parse the variable properties of their E-language as they select their personal I-language.

Children select skeletal structures that are elaborated and fleshed out with the variable properties that result from parsing. They do not calculate what grammars can generate, nor do they evaluate grammars or set UG-defined parameters. Treating children as language-acquisition devices that evaluate and rank the "success" of multiple I-languages in generating a target language has not proven successful. If there are thirty or forty independent parameters, there are a billion or a trillion possible I-languages, each generating an infinite number of expressions. The memory capacity that such an approach requires is astronomical and well beyond the limits of imaginable feasibility.

That parametric vision discussed in §1.2, where children are viewed as setting UG-defined parameters, incorporates a vision of the variation between I-languages being highly restricted, limited to binary options. But that is not at all what we find. Instead, we find new I-languages emerging that fall into a wide range of types, with phenomena often not found in neighboring or closely related languages. The variation found can be understood as resulting from children parsing highly variable E-language. We have seen several examples of very idiosyncratic properties emerging in the history of English, for example in §2.4–§2.6, where we can understand how the new I-languages might have emerged through the parsing that seems to have been involved.

We have shown how children discover very specific things through parsing their E-language:

We have seen how *may*, *could* and some other verbs came to be parsed as Infl elements in Early Modern English, no longer categorized as verbs, as they were by Sir Thomas More: §2.4.

We have observed that Dutch finite verbs like *begrijpt* and French finite verbs like *comprend* are copied into high, complementizer positions and manifest verb-second properties in Dutch and French I-languages, while their translations like *understand* in English systems are not so copied: §2.5.

We have cast light on how, in nineteenth-century English, individual forms of the verb *be* like *been* or *being* begin to show up in idiosyncratic positions, not occupied by other forms of the verb: §2.6.

We have shown how in English a few centuries earlier some forty psych verbs including *like*, *ail*, and so on came to be parsed quite differently, with a different meaning, syntax, and morphology: §3.3.

We have learned how modern Chinese-speaking children discover that *ba* is a light verb, whereas in ancient times individuals parsed such forms as serial verbs: §3.4.

We have seen that null-subject languages may have different properties, being understood by new speakers differently from in earlier generations in ways that would not be expected if language variation were a function of on–off switches on structures defined at UG: §3.5.

We can now understand how such complexities arise over the course of time and how I-languages may change from generation to generation by virtue of children experiencing different external language, which require them to parse their experience differently from in earlier generations. We have shown how these developments might have taken place, given a certain view of how children parse what they hear.

In addition, it is worth noting that viewing variable properties as reflecting binary structural parameters provided by the genetic material is not one adopted by biologists examining other kinds of biological variation nor by cognitive scientists studying aspects of human cognition other than language. No doubt this is for reasons akin to the lack of success of the Principles and Parameters approach to linguistic variation. A central point of this book has been to argue for a different vision of linguistic variation. Now let us take a look at similarities between the discovery-and-selection approach to language variation and a view taken by some evolutionary biologists. The upshot will be that linguists do not need to treat variable properties as requiring mechanisms that are quite different from what biologists postulate in other domains.

6.2 Darwin's Finches

Innovative work by evolutionary biologists has approached variation as resulting from a process similar to what this book has been arguing for. Darwin lamented ([1859] 1991) that neither he nor anybody else had ever seen a new species emerging, and he regarded that as a major failure of his theory, but the finches of the Galápagos Islands that came to bear his name have been recognized in recent decades as illustrating natural selection in progress (Weiner 1995).

Taxonomists are usually either splitters or lumpers. "Faced with the diversity of Darwin's finches, some splitters recognized dozens and dozens of species and subspecies. Some lumpers went so far as to call them all a single species" (Weiner 1994: 41). "There were so many freaks, so many misfits that broke the serried ranks in the museum drawers … Naturalists read and reread the reports of those who had seen Darwin's finches alive, they sorted and resorted the stiff little rows of specimens in the museums and they wondered what on earth was happening on Darwin's islands" (Weiner 1994: 42).

Rosemary and Peter Grant did the early revelatory work, leading to the discovery of thirteen species of finch in the Galápagos archipelago, each with a distinctively shaped beak (Grant & Grant 1989). The Grants discovered why the different species had distinctive beaks. The particular beak of each species enabled it to eat the food that was available on its own particular island: big seeds, little seeds, tree bark, even blood (the vampire finch pecks other birds' wings and tails, wounding them and sipping their blood), depending on the island. Over time, natural selection resulted in different beak shapes that were efficiently specialized for these different types of food.

The Grants collected data that show that natural selection occurs and can be seen to occur from year to year. Indeed, they were able to implement a model that predicted which beaks should evolve on different islands, given the seeds there. For each island, the model "predicted correctly the divergent paths of evolution for the beaks of finches for every one" (Weiner 1994).

In short, finches on the Galápagos Islands typically have one of the thirteen beaks the Grants identified, and the specific beak shape is the one suitable for picking up the seeds of the island they inhabit. This specialization developed over time: initially the finch's genetic material was neutral or "open" with respect to beak size and shape, but natural selection led to further specifications such that the Grants' correlation between beak characteristics and feeding patterns emerged, reflecting new genetic information.

I suggest that the kind of variation we have seen in the syntax of different languages and in different historical stages of languages is typical of the kind of variation that inspired Darwin and the Grants. It is not the kind of variation that is subject to genetically defined limitations characterized by syntactic parameters. Rather, it reflects the openness of genetic information, the way in which the environment might enhance genetic properties.

Of course, the enhancements that we see in Darwin's finches are different from those that we see in the language of three-year-old children: the finch species have selected particular beak shapes, and that selection is inherited by their offspring, whereas the three-year-old child selecting the I-language of some form of English has selected new I-language elements, and each child has to discover their I-language anew. There is no comparable inherited change.

However, the nature of the variable properties, beak shapes and I-language elements, shows similarities, and both constitute responses to environmental factors, for instance, the availability of seeds on the home island or the available distribution of words like *can* and *must*, which leads them to be categorized or parsed as Infl elements. As with specific beak shapes on different islands, so with specific I-language elements emerging in, being selected by, three-year-old children.

So variable properties across the I-languages of the world may be seen as similar in nature to the variable properties that we see elsewhere in the biological world. And in all these cases, external factors have internal effects, whether on genetic makeup or on emerging I-languages. Variation familiar to biologists is not fundamentally different from what comparative linguists observe. Seeing the similarities may enhance communication between linguists and evolutionary biologists (and others in the wider scientific community) and between different kinds of linguists who have become used to working in their isolating silos.

We view UG as open, with its effects complemented by the very specific effects of parsing. This is analogous to biologists seeing the genetics underlying variation in beak shapes as open enough to be enhanced by the effects of natural selection. This takes us into the world of complex adaptive systems, self-organization, and variation stemming from apparently minor fluctuations and varying initial conditions in evolutionary and cell biology, statistical biophysics, and other factors (Casti 1994; Haken 1984; Kauffman 1995; Prigogine & Stengers 1997). Modeling fluctuations and noise in linguistic experiences and in the availability of seeds on the Galápagos Islands stimulates an interest, widely shared these days, in minor oscillations that yield change across many domains. Comparative linguists interested in the acquisition of variable systems by young children could bring much to those broad discussions.

We have seen how several very specific variable properties may emerge in some individuals as they parse the ambient language to which they are exposed and assign linguistic structures that are different from those that earlier language users assigned. We also noted at a number of points that observing how linguistic and other structures change often reveals something about their nature. The result is a very different vision of variable properties. Proponents of binary, UG-defined parameters (§1.2) expect to see variable properties falling into narrow classes of recurring variation. The alternative vision that we have sketched, being based on the parsing of E-language, leads us to expect greater variation in I-languages, and indeed that is what we find in examining how I-languages may change from user to user across generations: languages develop idiosyncratic properties not shared by languages that are closely related historically. UG keeps languages similar to each other in conforming to invariant properties that are part of our biological endowment. But UG is open, open enough to allow languages to vary as parsing requirements demand, when children discover new contrasts and select new I-language structures accordingly. Evolutionary biologists have found that same kind of variation in the beaks of Darwin's finches, and we expect that the parsing-based analysis we have developed and the approach to learning it entails will lead to a better understanding of language variation than the Principles and Parameters vision has yielded, one where information provided by UG is supplemented by information that emerges through learning through parsing.