On the particulars of Universal Grammar: implications for acquisition

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ABSTRACT

This study addresses the primitives of Universal Grammar, arguing in favor of an impoverished version of it that is not shaped in the form of principles and parameters. First, we review previous accounts on variation that make a case for lexical and/or syntactic parameters and claim that there are empirical arguments for viewing variation as confined to one component of grammar: morphophonology. Second, we discuss the process of language acquisition in the absence of parameters and parametric hierarchies and we show how the acquisition task is viable without assuming parameters. The cues that aid the learner are identified and schematically integrated in the form of an acquisition algorithm.

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1. On the poverty of the stimuli

Die-hard generativists Robert Berwick and Massimo Piattelli-Palmarini recently edited a volume entitled "Rich languages from poor inputs" (Piattelli-Palmarini and Berwick, 2013). With this title they were clearly alluding to the well-known 'Poverty of Stimulus' (POS) that has been at the heart of nativist/empiricist debates since Chomsky discussed it in the 1970s (although the central ideas go back 20 years, with his 1959 review of Skinner's, 1957 *Verbal Behavior*). The logic of POS is clear: if the intricacies of grammatical knowledge cannot be derived from properties of the environment, they must come from within. Following Chomsky, Universal Grammar (UG) is the term generative linguists use to designate this internal capacity, whatever it turns out to be.

In the literature, however, it is common to find characterizations of UG that are a bit more precise about 'what's (expected to be) within'.[1] Thus, Chomsky (1980, p. 66) writes, "[t]he argument from the poverty of the stimulus leaves us no reasonable alternative but to suppose that these properties are somehow determined in universal grammar, as part of the genotype". Or, in a similar vein: "From the point of view I have adopted, universal grammar and the steady state are real. We expect to find them physically represented in the genetic code and the adult brain, respectively" (Chomsky, 1980, pp. 82–83).

Chomsky has not always been so committed to a 'genetic' characterization of UG. For instance, in Chomsky (1967, p. 9), he limited himself to saying that the basic principles underlying the knowledge of every particular grammar "are determined by the nature of the mind", which is obviously not identical to saying that properties of UG are directly expressing particular fragments of the human genotype. Likewise, in Chomsky (1975, pp. 91–92), he was talking about biology seeking to determine "the genetic mechanisms that guarantee that the mental organ, language, will have the required character" — which, again, is not the same thing as seeing UG "as part of the genotype".

But seeing UG as "part of the genotype" has somehow become part and parcel of generative grammar. Numerous authors have indeed claimed that intricate properties of grammar are to be considered a part of the "genetic organization of the mind" (Jenkins, 1979, p. 111). Certainly, within the Government and Binding (GB) era, it became standard to take UG to refer to a genetically encoded state of knowledge containing the principles of language which, given a minimum of external stimulation, give rise to this specific aspect of human cognition (Chomsky, 1980, p. 243). As Lorenzo and Longa (2009) point out, this foundational claim of GB explains the proliferation of expressions such as "blueprint" (Hyams, 2002: 229), "genetic endowment" (Lightfoot, 1982, p. 56; Haegeman, 1991, p. 12; Anderson and Lightfoot, 2002, p. 22; Guasti, 2002, p. 271), "genetic equipment" (Lightfoot, 1982, p. 22; Guasti, 2002, p. 18), "genetic make-up" (Thornton and Wexler, 1999, p. 11), "linguistic genotype" (Chomsky, 1980, p. 75; Lightfoot, 1982, p. 21; Hoekstra and Kooij, 1988; Lightfoot, 2006, p. 45) or "genetic program" (Chomsky, 1980, p. 244; Wexler, 1999; Yang, 2004) to refer to that part of our genetic endowment which is seen as responsible for the growth of grammars in the early development of children.

From generic statements inspired by the ethology literature such as "children have triggering experiences that stimulate their genetic properties to develop into their phenotypic properties" (Lightfoot, 2006, p. 45), linguists quickly moved to claims like:

> "[A] basic tenet of this theory [the theory of UG] is that much linguistic knowledge is part of the child's genetic makeup. This knowledge is encoded in the form of universal principles". (Thornton and Wexler, 1999, p. 1)

Guasti (2002, p. 1) expresses herself in very similar terms: "human beings are innately endowed with a system of richly structured linguistic knowledge". Indeed, examples along these lines abound. Thus, when discussing the property of structure-dependence, Smith (1999, p. 173) argues that universal properties of language like such a property "have become encoded in the genes of the children". It seems that "if innate, language must be genetic" (Uriagereka, 2007).

Jerne summarized this view nicely:

> "It seems a miracle that young children easily learn the language of any environment into which they were born. The generative approach to grammar, pioneered by Chomsky, argues that this is only explicable if certain deep, universal features of this competence are innate characteristics of the human brain. Biologically speaking, this hypothesis of an inheritable capability to learn any language means that it must somehow be encoded in the DNA of our chromosomes. Should this hypothesis one day be verified, then linguistics would become a branch of biology." (Jerne, 1993, p. 223)

We believe that this is not the only way for linguistics to become a branch of biology. Indeed, we think that the narrower, genocentric vision of UG has proven very problematic, and in fact threatens to delay the integration and assimilation of results from linguistics into biology, which has slowly but unmistakably dropped its genocentrism (see Pigliucci and Müller, 2010 for a collection of relevant essays and perspectives; see also Fodor and Piattelli-Palmarini, 2010, and the work of Longa & Lorenzo cited in footnote[1]).

Chomsky himself has broadened the scope of nativism by recognizing three factors that enter into language design[2]:

1. "Genetic endowment, apparently nearly uniform for the species, which interprets part of the environment as linguistic experience.
2. Experience, which leads to variation, within a fairly narrow range.
3. Principles not specific to the faculty of language." (Chomsky, 2005, p. 6)

Biologists have long recognized the role of factors of the third kind (see Seilacher's, 1970 triangle, made famous by S. J. Gould, e.g., Gould and Lewontin, 1979; Gould, 2002), but unlike linguists, who recently have tried to 'third-factorize' UG, as it were, biologists are clear that nothing is really a matter of just one or two factors. It's the three factors working in tandem (Lewontin's, 2000 *Triple Helix*) that yield properties of the organism. As such, it is counterproductive to ask whether, say, language variation is the result of first, second or third factors (as Gallego, 2010 does). It is the three of them together.

Still, emphasis on "the third factor" has had the benefit of highlighting the impoverished, underspecified, or minimal(ist) character of UG. To the extent that we can speak of Poverty of the Stimuli (plural intended): not just the environment (factor 2) is impoverished, so are the other factors. It is only when the three of them join forces that one can begin to reconstruct some aspects of the old vision of UG.

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[2] Chomsky spells out the content of this third factor by distinguishing between "(a) principles of data analysis that might be used in language acquisition and other domains; (b) principles of structural architecture and developmental constraints that enter into canalization, organic form, and action over a wide range, including principles of efficient computation, which would be expected to be of particular significance for computational systems such as language" (Chomsky, 2005, p. 6). It is interesting to note that (a) and (b), as used in the literature, correspond to two senses of epigenetic factors (epigenesis and epigenetics). Accordingly, if one were tempted to continue using the term UG to refer to the first factor, i.e. genetic endowment (Chomsky, 2005, pp. 1, 6), we think that a term like "epiUG" could be used to refer to the third factor. A reviewer asks if we mean to say that grammatical properties cannot be directly encoded in the genes. Yes, we mean exactly this. But we think that this position does not require special arguments in its favor. It is standard in biology: genes code for proteins, not for grammatical properties. Taking into consideration, first, the polymorphic nature of genes and, second, the fact that developmental processes depend on non-genetic factors as well, a direct link between the genotype and the phenotype is simplistic and simply untenable.