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PRINCIPLES AND PARAMETERS THEORY AND LANGUAGE ACQUISITION

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Nativism

The basic idea in *PRINCIPLES AND PARAMETERS THEORY* is to distinguish the invariants of human language (the *principles*) from the major points of cross-linguistic variation (the *parameters*). Both principles and parameters are taken to reflect innately determined, biological characteristics of the human brain (see *UNIVERSAL GRAMMAR*). In the course of normal child development, however, the two diverge: The principles come to operate in much the same way in every child, with minimal sensitivity to the child's environment, while the parameters take on distinct values as a function of the child's linguistic input.

The term *parameter* is normally reserved for points of narrowly restricted variation. The Principles and Parameters (P&P) framework also acknowledges that languages vary in ways that are relatively unconstrained by Universal Grammar, such as the exact form of vocabulary items. These latter points of variation are usually treated as arbitrary idiosyncrasies, to be listed in the *LEXICON*.

The P&P framework has its origins in the two foundational questions of modern linguistics (Chomsky 1981): *What* exactly do you know, when you know your native language? And *how* did you come to know it? A satisfactory answer to these questions must address the *POVERTY OF THE STIMULUS*, including the fact that children are not reliably corrected when they make a grammatical error (Brown and Hanlon 1970; Marcus 1993).

Despite the poverty of the stimulus, by the age of about five years we observe "uniformity of success" at language acquisition (Crain and Lillo-Martin 1999): Aside from cases of medical abnormality, or isolation from natural-language input, every child acquires a grammar that closely resembles the grammar of his or her caregivers. Moreover, even when a child is younger, and still engaged in the process of language acquisition, extraordinarily few of the logically possible errors are actually observed in the child's spontaneous speech (Snyder 2007). Clearly children do not acquire grammar through simple trial-and-error learning.

Linguists working in the P&P tradition have concluded that a great deal of grammatical information must already be present in the child's brain at birth. Of course, different languages of the world exhibit somewhat different grammars, but the claim in P&P is that the options for grammatical variation are extremely limited. On the P&P

approach, the child's task during language acquisition is akin to ordering food in a restaurant: One need only make selections from a menu, not give the chef a recipe.

In other words, the information required for the child to select an appropriate grammar from among the options is far less, both in quantity and in quality, than would be required to build a grammar from the ground up. First, grammars that cannot be attained with the available parameter settings will never be hypothesized by the child, even if they are compatible with the child's linguistic input up to that point. Second, to the extent that parameters are abstract, and thus have wide-spread consequences, a variety of different sentence-types in the linguistic input can help the child select the correct option. The challenge of identifying the correct grammar is still considerable, but is far more tractable than it would be if the child had to rely on general learning strategies alone.

Investigating Language and Its Acquisition within a P&P Framework

The P&P framework was first clearly articulated for syntax, in the context of Government and Binding Theory (e.g. Chomsky 1981, 1986). Yet, the framework is considerably more general. First, the same basic architecture has been applied to phonology, notably in the framework of Government Phonology (e.g. Kaye, Lowenstamm, and Vergnaud 1990), and also (in certain work) to semantics and morphology. Second, recent syntactic and phonological research in the Minimalist Program (Chomsky 1995, 2001) and in Optimality Theory (Prince and Smolensky 2004) still crucially assumes a P&P framework, in the broad sense that it posits universal principles and narrowly restricted options for cross-linguistic variation. (This point will be discussed further in the next section.)

Within the P&P framework, research on children's acquisition of language plays a number of important roles. First, such research can clarify the Logical Problem of Language Acquisition, which any "explanatorily adequate" linguistic theory must address: How in principle can the correct grammar be chosen from among the proposed options, using only the types of linguistic input that children actually need for successful language acquisition? (See *DESCRIPTIVE, OBSERVATIONAL, AND EXPLANATORY ADEQUACY*.) Acquisition research can help determine which types of linguistic input are (and are not) in fact necessary, for children to succeed at language acquisition.

For example, some of the most compelling evidence for the *irrelevance* of corrective feedback comes from Eric H. Lenneberg's (1967, 305-9) study of a hypolingual child. Despite the fact that the child had been mute since birth, and therefore had had no possibility of producing any errors to be corrected, he performed at an age-appropriate level on comprehension tests of English grammar. Hence, receiving corrective feedback on one's own utterances seems to be unnecessary. Hearing the linguistic utterances of other speakers, produced in context, can suffice. To achieve explanatory adequacy, a linguistic theory must be able to account for this.

A second role of acquisitional evidence within the P&P framework lies in testing the acquisitional predictions of proposed linguistic *principles*. All else being equal, if one proposes that a given property of language is an innate principle of Universal Grammar,

then one expects the principle to be operative in children as early as we can test for it. (A notable exception is found in the work of Hagit Borer and Ken Wexler 1992, who propose that several specific linguistic principles undergo maturational change during childhood.)

For example, Stephen Crain and Mineharu Nakayama (1987) conducted an acquisitional test of “structure dependence,” the proposed principle that syntactic movement is always sensitive to hierarchical structure. Their study tested the prediction that structure dependence, as an innate principle, should be operative very early. The study was conducted with three- to five-year-old children acquiring English (who were the youngest subjects capable of performing the experimental task), and used prompts such as the following: “Ask Jabba if [the man who is beating a donkey] is mean.” Crucially, children never produced errors of the form, “Is [the man who ___ beating a donkey] is mean?” Such errors might have been expected, however, if the children had been at liberty to hypothesize structure-independent rules (such as “Move the first auxiliary to the beginning of the sentence”).

Third, by proposing a *parameter* of Universal Grammar, one makes predictions about the time course of child language acquisition. These predictions may involve concurrent acquisition or ordered acquisition. To see this, suppose that two grammatical constructions A and B are proposed to have identical pre-requisites, in terms of parameter-settings and lexical information. A and B are then predicted to become grammatically available to any given child “concurrently,” that is, at the same point during language acquisition.

A prediction of *ordered* acquisition results when the proposed linguistic pre-requisites for one construction (A) are a proper subset of the pre-requisites for another construction (B). In this case A might become available to a given child earlier than B, if the child first acquires the subset of B’s pre-requisites that are necessary for A. Alternatively, A and B might become available to the child concurrently, if the last-acquired pre-requisite for B is also a pre-requisite for A. In contrast, *no* child should acquire B significantly earlier than A.

As a concrete example, consider William Snyder’s (2001) work on the compounding parameter (TCP). Theoretical research had suggested a link (at least in Dutch and Afrikaans) between the verb-particle construction (cf. *Mary lifted the box up*) and morphological compounding (cf. *banana box*, for ‘a box where bananas are kept’). Snyder observed a one-way implication in the data from a sizable number of languages: If a language permits the verb-particle construction, then it also allows free creation of novel compounds like *banana box*. The implication is unidirectional, however: There do exist languages that allow this type of compounding, yet lack the verb-particle construction. Snyder therefore proposed that the grammatical pre-requisite for the English type of compounding (i.e., the positive setting of TCP) is one of several pre-requisites for the verb-particle construction.

A clear acquisitional prediction followed: Any given child acquiring English will either acquire compounding first (if [+TCP] is acquired prior to the other pre-requisites for the verb-particle construction), or acquire compounding and the verb-particle construction at the same time (if [+TCP] is the last-acquired pre-requisite for the verb-

particle construction). In no case will a child acquire the verb-particle construction significantly earlier than compounding. This prediction received strong support from a longitudinal study of ten children.

This example illustrates how the investigation of language acquisition and the investigation of mature grammars can be mutually reinforcing activities within the P&P framework. Another example is provided by the work of Diane Lillo-Martin and Ronice Müller de Quadros (2005), who considered the parametric pre-requisites for the different types of *wh*-questions in American Sign Language (ASL), according to two competing syntactic analyses. The two analyses yielded distinct predictions about the time course of acquisition, which were then successfully tested against longitudinal data from children acquiring ASL.

Areas of debate

We will mention here two areas of debate within the P&P approach to child language acquisition, and of course there are others. (1) What types of parameters, exactly, is the child required to set? (2) What are the observable consequences of an “unset” or “mis-set” parameter?

One point of disagreement in the P&P literature quite generally, including the acquisition literature, concerns the proper conception of parameters. A classic conception, which Noam Chomsky (1986, 146) attributes to James Higginbotham, is the switchbox metaphor: Each parameter is like an electrical switch, with a small number of possible settings.

Yet, this is only one of many possible ways that parameters could work. A radically different conception is found in Optimality Theory, which posits a universal set of violable constraints. Instead of choosing particular settings for switches in a switchbox, the learner has to *rank* the constraints correctly. The result is a narrowly restricted set of options for the target grammar, as required by the P&P framework. (Indeed, on the mathematical equivalence of a constraint ranking to a set of switchbox-style “dominance” parameters, see Tesar and Smolensky 2005, 45-46.)

Still another approach to parameters is to connect them to the lexicon. (See *LEXICAL LEARNING HYPOTHESIS*.) This is conceptually attractive because the lexicon is independently needed as a repository of information that varies across languages. Exactly what it means to connect parameters to the lexicon, however, has been open to interpretation.

One idea is to connect points of abstract grammatical (e.g. syntactic) variation to the paradigms of inflectional morphology. The idea is that paradigmatic morphology has to be stored in the lexicon anyway, and might provide a way to encode parametric choices. This approach can be found in (Borer 1984) and (Lillo-Martin 1991), for example. A related idea is to encode parametric choices in the morphology of closed-class lexical items. A good example is Pierre Pica’s (1984) proposal to derive cross-linguistic variation in the binding domain of a reflexive pronoun from the pronoun’s morphological shape. A variant of Pica’s approach is to encode parametric choices as abstract (rather than morphologically overt) properties of individual lexical items. This is

the Lexical Parameterization Hypothesis of Wexler and Rita Manzini (1987), who took this approach to cross-linguistic variation in the binding domain for both reflexives and pronominals.

Yet another idea is to encode cross-linguistic grammatical variation in the abstract (often phonetically null) features of functional heads. Chomsky (1995, Chapter 2) takes this approach to V-raising in French, for example, and its absence in English: In French, the functional head Agr⁰ is “strong,” and causes the verb to move up and adjoin to Agr⁰ before the sentence is pronounced. The result is the word order in *Jean* [_{AgrP} *voit* [_{VP} *souvent* [_{VP} V_t *Marie*]]], literally ‘John [_{AgrP} *sees* [_{VP} often [_{VP} V_t *Mary*]]]’, in place of English ‘John [_{AgrP} [_{VP} often [_{VP} *sees* *Mary*]]]’.

Chomsky’s approach is “lexical” in the sense that the morphosyntactic features of functional heads like Agr⁰ are taken to be listed in the lexicon. Note, however, that the possible features of a functional head are still assumed to be quite narrowly restricted. Thus, where earlier work might have posited a switch-like parameter of [\pm Verb Raising], for example, Chomsky instead posits a choice between a strong feature versus a weak feature on Agr⁰, and assumes that this particular lexical item will be present above the VP in most or all cases. For purposes of language acquisition, the difference is extremely minor; the child makes a binary choice, and it has consequences across a wide range of sentence types. Therefore Chomsky’s approach still falls squarely within the P&P framework.

The second and final point of disagreement that we will mention here concerns the consequences of “unset” or “mis-set” parameters. For concreteness we will focus on the switchbox model: Can a switch be placed in an intermediate, unset position? Alternatively, must a child sometimes make temporary use of a setting that is not in fact employed in the target language? If so, what are the consequences for the functioning of the language faculty?

One school of thought is that there is no such thing as an unset parameter: Every parameter is always in a determinate setting, be it an arbitrary setting (cf. Gibson and Wexler 1994), or a pre-specified “default” setting (e.g. Hyams 1986). On this view, temporary mis-settings may be routine during the period when language acquisition is still underway. (The notion that certain parameter settings might be defaults, or “unmarked options,” has its roots in the phonological concept of *MARKEDNESS*.)

A second school of thought maintains that parameters are initially unset. Virginia Valian (1991) proposes that an unset parameter permits *everything* that any of its potential values would allow. Somewhat similarly, Charles D. Yang (2002) proposes that the learner begins the language acquisition process not with a single grammar, but rather with a multitude of different grammars, all in competition against one another. Every grammar corresponding to a permissible array of parameter-settings is included. A consequence is that competing values of the same parameter can be in play at the same time.

A cross-cutting view is that children may temporarily entertain non-adult parameter settings (whether ‘default’ or not; see e.g. Thornton and Crain 1994). Children may then produce utterances which use a grammatical structure found in some of the world’s languages, but not in the target. On this view, what is crucial is simply that the

learner must *eventually* arrive at the target parameter setting, regardless of what parameter settings have been temporarily adopted along the way. This is the learning problem that is addressed by Edward Gibson and Wexler's (1994) Trigger Learning Algorithm, for example.

An alternative view is that the child reserves judgement on any given parameter setting until she has enough information to set it with confidence. Initially the parameter is in an unset state, but this time the consequence is that *none* of the grammatical options tied to a specific setting of the parameter is actually endorsed by the child. Snyder (2007) advances this view when he argues that children who are speaking *spontaneously*, in a natural setting, make astonishingly few of the logically possible grammatical errors. The vast majority of the errors that do occur are either errors of omission, or belong to a tiny subset of the logical possibilities for "comission" errors (where the words are actually pronounced in configurations that are ungrammatical in the target language).

Most of the grammatical comission errors that are found in studies of *elicited* production or *comprehension* are absent from children's spontaneous speech, even when the opportunities exist for the child to make them. Snyder concludes that many of these errors result from the demands of the experimental tasks. When left to their own devices, children successfully avoid putting words together in ways that would require them to make a premature commitment to a particular parameter setting.

Conclusion

Language acquisition is a rich source of evidence about both the principles and the parameters of the human language faculty. For this reason, research on language acquisition plays a central role in the P&P framework.

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