

**Nondiscreteness and Variation
in Child Language:
Implications for Principle
and Parameter Models
of Language Development**

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1. INTRODUCTION

Within the idealizations of linguistic theory, language acquisition is viewed as an “instantaneous” process (Chomsky, 1965). One abstracts away from the effects of maturation as well as issues related to the presentation of data. Actual acquisition is of course not instantaneous.¹ In normal development children progress through stages, they make errors (errors from the viewpoint of the adult language), and there are delays. The challenge for any developmental theory is to explain these stages, errors, and delays. It must specify those factors—learning, maturational, grammatical, and so forth—that extend the acquisition process beyond the idealized instant.

The purpose of this chapter is to explore the kinds of predictions that the principle-and-parameter (henceforth P&P) model (Chomsky, 1981) makes with respect to actual, real-time acquisition. I am concerned with two questions in particular: First, do such models predict *discrete stages* in the course of language development and thereby preclude “gradualness,” and second, do P&P theories predict *universal stages*, that is, stages that are invariant across children and languages? I argue that whereas parameter models do indeed predict discrete changes in the child’s

¹But see Crain (1992), who proposed that actual development is very close to instantaneous, at least as regards principles of core grammar.

grammar—or to follow Chomsky's (1986) terminology, the child's I(nternalized)-language—this need not show up as discrete stages in the child's E(xternalized)-language. I further argue that the gradual, piecemeal kind of development that is often observed in children's language results from the staggered development of different modules of language and from interactions between the different modules. Thus, the appearance of "gradualness" is largely an effect of modularity.

I begin by laying out some of the basic assumptions of the P&P framework. In section 2, I turn to the issue of discreteness and in section 3 I consider the question of variation. I should note that it is not my intention to defend any particular parameter or any particular analysis. Rather, I am interested in the broader question of whether the P&P model has the right general character to provide an explanatory account of certain fundamental aspects of actual language development. Finally, in section 4, I consider a couple of alternatives to the "standard" view of parameter setting and I show that these models are problematic in various respects.

2. PRINCIPLE-AND-PARAMETER THEORY: SOME BASIC ASSUMPTIONS

The central concern of linguistic theory is to explain how human beings come to acquire a system of linguistic knowledge the complexity, specificity, and richness of which is vastly underdetermined by the available data. This is the so-called logical problem of language acquisition or what Chomsky sometimes referred to as "Plato's Problem" (Chomsky, 1986). Linguistic theory answers that we are innately endowed with a set of linguistic principles, Universal Grammar (UG), which interact with the input from a particular linguistic context to determine in each of us a particular adult grammar.

Within current conceptions, UG is a parametrized system (Chomsky, 1981, and references cited there). The parameters of UG express the limited range of variation that exists across languages. Languages are either head first (VO) or head last (OV) (English vs. Japanese); pro-drop or non-pro-drop (Italian vs. German); verbs undergo syntactic movement or they do not (French vs. English); question words undergo syntactic movement or they do not (English vs. Chinese); anaphors are locally bound or they are not (English vs. Icelandic); and so on. The parameters of UG must be "fixed" by the child through experience. The P&P framework makes the implicit assumption, with respect to learning, that the fixing of parameters (and language development, more generally) is an "error-driven" process (Wexler & Culicover, 1980). Children progress from one

developmental stage (read grammar) to the next when they encounter input data that are not analyzable by the current grammar.² This input is said to "trigger" a change from one state of linguistic knowledge to another state of linguistic knowledge. Given a finite number of parameters, each with a finite number of values (ideally, each parameter is binary), the transition is straightforward. If the child's parameter *P* is set at value *x*, then recalcitrant data will trigger a resetting to value *y*. Error-driven acquisition usually presupposes that in the child's grammar *P* is set to some "initial" or "default" (also referred to as the "unmarked" value; Wexler & Manzini, 1987).³ This value may or may not be the correct value for a particular adult "target" language. Where it is incorrect, the input data will force a resetting to the correct value. A further assumption is that the child does not have access to negative evidence—information about the ill-formedness of certain strings—and thus parameters must be fixed on the basis of positive evidence.

Language development thus involves, among other things, fixing the parameters of UG at the values that are correct for a particular linguistic community. The system that results from the fixing of parameters is a "core grammar" (Chomsky, 1981), a central component of linguistic knowledge. Like the familiar "instantaneous acquisition," core grammar is an idealization insofar as what is actually represented in the mind of an individual goes beyond core grammar in various ways. The actual internalized knowledge is a core grammar plus a "periphery" of language-specific rules and constructions, lexical and marked properties, pragmatic rules, and much else.

Central to the P&P model is the modularity hypothesis, that is, the thesis that human language is an epiphenomenon that arises through the interaction of rules and principles in a number of distinct modules. There is modularity within the syntax proper. For example, "passives" are formed by the interaction of principles of case assignment, theta-role assignment, and Move alpha (cf. Baker, Johnson, & Roberts, 1989; Chomsky, 1981; Jaeggli, 1986; and not through a single transformational operation as in the standard theory; Chomsky, 1965). And there is modularity within the larger "language faculty," which contains (minimally) a syntax, a semantics, morphological and phonological components, a pragmatics, as well as a lexicon and language processor, and various other cognitive faculties that affect language. Thus, the P&P theory

²Equivalently, we may think of this as a parsing problem, that is, the child's parser (which incorporates a grammar) is unable to assign a well-formed representation to some input—a failed parse.

³But this assumption is not uncontroversial. See, for example, Valian (1990, 1992), who argued that children start out with *all* values of a parameter, and Verrips (in press). These proposals are discussed in section 4.

marked a radical shift away from a system of language-specific and construction-specific rules prevalent in earlier theories to general principles with parameters of variation.

Any linguistic theory imposes a particular conception of development and thus the theory must reckon with the facts of actual development insofar as these are apparent. Some have argued that the P&P model predicts *discrete stages* in language development and have criticized the model on these grounds because the "stages" of language acquisition appear to be nondiscrete. For example, Verris (in press) claimed that "the fact that transitions [from one stage to the next, NMH] extend over a long period of time and that they appear to be gradual rather than sudden and complete poses a problem for the parametric approach." Similarly, Pizzuto and Caselli (1992) argued that parameter models preclude "gradual" or "partial" acquisition and thus fail to explain those cases where the child shows less than perfect mastery of some aspect of language. Others have argued that the P&P model predicts a *universal course* of development and thus fails to account for the cross-linguistic and individual variation we find during development (Bates & MacWhinney, 1987).⁴ In the sections that follow I explore these issues and criticisms in more detail.

2.1. Nondiscreteness and Modularity

As typically conceived, parameter setting is a discrete operation. For example, the switch from a hypothesized default (+ pro-drop) setting to a (- pro-drop) setting (Hyams, 1986b) is discrete. Fixing the head parameter results in a language that is either head first or head final and not something in between, and so on. Focusing in, then, on the development of core grammar, we have a picture in which the child passes through a series of discrete stages, each corresponding to the fixing of a particular parameter (e.g., pro-drop, verb raising, head direction, etc.). But the picture just described is a highly idealized one; the child's language is not a pure reflection of parameter setting or core grammar. As noted, the system of knowledge that develops in the mind of an individual extends beyond core grammar in various ways. Alongside parameter setting the child must acquire all the peripheral properties of the language, language-specific rules and constructions, the lexicon, the discourse and pragmatic rules, and the marked and exceptional aspects of the language. If development in the different modules is staggered, either due to un-

⁴Bates and MacWhinney (1987) claimed that parameter-setting models predict "sudden and all-or-none decisions, carried out in a single specified order, with essentially no opportunity to turn back once a parameter is set" (p. 158).

even maturation or differences in availability or accessibility of input, we would have the appearance of partial or nondiscrete development. Also, one can imagine interactions between the various components, or even between two parameters, which would mask a discrete development and give rise to apparent gradualness (such cases are discussed later).

Consider, for example, the acquisition of "passives." Borer and Wexler (1987) argued that principles of A-chain formation (NP movement) mature at a relatively late point in development. However, the child knows the morphological properties associated with passives prior to the maturation of A-chain (the case and thematic properties of passive participle formation). As a result the child controls adjectival (lexical) passives earlier than verbal passives, which are derived via movement. According to Borer and Wexler, because actional verbs have semantic properties that make them better "adjectives" (e.g., the *torn* doll vs. *the *seen* doll), the child's first passives will be restricted to these verbs (see Maratsos, Fox, Becher, & Chalkley, 1985). We thus have the appearance of gradual acquisition (some verbs are passivized before others); the gradualness, however, is an artefact of uneven development of the different components that make up the "passive construction."

In addressing the question of whether the P&P model predicts discrete stages in language development it is useful to distinguish two senses of the word "language," which Chomsky (1986) referred to as I-language and E-language. *I(nternalized)-language* is the system of knowledge represented in the mind of an individual.⁵ The I-language of the child is whatever system of knowledge is represented in the child's mind at some particular maturational point. *E(xternalized)-language*, on the other hand, refers to a set of actual or potential utterances. With respect to the child, E-language would be the set of utterances associated with a particular period of development. Most discussions of discreteness in language acquisition center around the apparent gradualness of transitions in the child's E-language, that is, changes in the set of utterances associated with different "stages" (cf. Bates & MacWhinney, 1987; Pizzuto & Caselli, 1992; Verris, in press). Thus, null subject sentences do not disappear from the child's corpora in one fell swoop, just as the full range of passivized verbs do not appear at once. It is important to bear in mind, however, that the P&P theory is a theory of I-language and discreteness is a property associated with rules and principles. Thus, to the extent that the theory predicts discrete changes in development, it predicts them with respect to the child's I-language and such changes need not be per-

⁵I-language is what was previously referred to as the "grammar" and the term *grammar* is now reserved for the linguist's theory of the I-language. This eliminates the previous ambiguity associated with the term.

fectly reflected in the child's E-language. Viewed from a slightly different perspective, discreteness (like instantaneous acquisition) exists under idealized circumstances, circumstances in which the different modules of I-language develop at precisely the same rate and in complete isolation from one another. Such discreteness is not likely to show up in actual development, which involves interactions between the parameters of core grammar and rules, principles, lexical properties, and so forth outside the core, and in which the rate and manner of development in different components varies. We expect the child's E-language to reflect the interaction of these modules.

The section that follows explores the effects of modularity in language development in more detail, focusing in on the acquisition of binding (anaphora). We begin by outlining some of the different components that enter into binding.

2.2. Discreteness and Modularity: Binding as a Case in Point

As noted earlier, the P&P framework marked a shift away from construction-specific rules to general principles and parameters, a modularized system. Consider, for example, the properties of reflexive and non-reflexive pronouns. "Reflexivization," formerly a transformational rule deriving "himself" from "him" under a particular structural description (Lees & Klima, 1963), is now described by general principles of grammar that determine the structural domain within which an anaphor must be syntactically bound and a pronoun must be syntactically free—Principles A and B of the binding theory (Chomsky, 1981; we return to this later). There are, moreover, pragmatic principles that specify the contexts within which a pronoun may *corefer* with an antecedent, as distinct from being *bound* to an antecedent (Reinhart, 1983). Thus, coreference is possible between *her* and *Lucy* in (1a), though *her* is not c-commanded by *Lucy* and hence there is no binding relation between the two NPs.

- (1) a. Most of *her* friends adore *Lucy*
 b. **John* loves *him*
 c. *John* loves *himself*

In (1b), in contrast, neither binding nor coreference is possible between *John* and *him*. Binding is ruled out by Condition B of the binding theory, which requires that pronouns be free from a local antecedent (i.e., within the same clause). Coreference is ruled out by a pragmatic principle that states roughly that coreference is blocked where a bound anaphora interpretation is possible (if the two sentences have the same

meaning). Because the sentence in (1c) containing a bound anaphor is well-formed, the sentence in (1b), under a coreference construal, is blocked (Grodzinsky & Reinhart, 1993; Reinhart, 1983).

Languages exhibit a certain amount of variation with respect to binding domains. Thus, anaphors such as English *himself* or Icelandic *sjálfan sig* must be bound within a strictly local domain (i.e., the minimal clause containing the anaphor), whereas Icelandic *sig* (self) may take an antecedent from a higher clause under certain specific structural constraints. Thus, the Icelandic sentence in (2) is grammatical.

- (2) *Jón* vildi að *María* rakadi *sig* á hverjum degi
 (John wanted that Maria shaved [subj.] himself everyday)
 'John wanted Maria to shave himself everyday'

Whether an anaphor is "local" or "long distance" is, on some accounts, determined by its morphological structure (Pica, 1987; Reinhart & Reuland, 1991). Thus, morphologically simple anaphors, such as Icelandic *sig*, are assumed to undergo head movement at the level of Logical Form (LF) (not overt syntactic movement), that is, they can "escape" the local clause by moving through the functional head positions, INFL and COMP, and thus find their antecedents in a higher clause. Morphologically complex anaphors, such as English *himself* and Icelandic *sjálfan sig* are NPs and not heads and hence cannot escape the local domain.

There are also lexical factors that affect binding relations. For example, Icelandic has two classes of verbs. When *sig* occurs with verbs of the *raka* (shave) class, as in (2), *sig* may take either a local or long distance antecedent. However, when *sig* occurs with verbs of the *gefa* (give) class, it must take the long distance antecedent (Hyams & Sigurjónsdóttir, 1990; Sigurjónsdóttir, 1993; Sigurjónsdóttir & Hyams, 1991). For example, the most natural interpretation of the sentence in (3) is with *Jón* as the antecedent to *ser*. (*Ser* is the dative form of *sig*.)

- (3) *Jón* vildi að *Pétur* gæfi sér bók í jólagjöf
 'John wanted (subj) that Peter gave self (= John) a book for Christmas'
 'John wanted Peter to give self (= John) a book for Christmas'

Thus, the properties of anaphors in particular languages are determined by the interaction of several modules. Minimally, anaphoric relations involve the syntax, semantics, pragmatics, and the lexicon. Because the acquisition of anaphora involves development in many domains, it is not likely to be an all-or-none development. (What is the likelihood, after

all, of all of the relevant principles developing at the same time?). Interestingly, such a discrete development of binding is more expected under a standard theory analysis in which reflexivization was captured by a single (albeit, complicated) rule.

In the following sections, we first look at three "case studies" in the acquisition of binding. It becomes apparent that cases of "gradual" or "partial" acquisition arise through the interactions of the different modules just discussed. In section 2.3 we discuss lexical development and its interaction with principles of grammar.

2.2.1. The Apparent Delay of Condition B. Let us first consider the so-called developmental delay of Condition B. A number of researchers have shown that in comprehension tasks, children do significantly worse in interpreting sentences such as (4a) than sentences like (4b) (Chien & Wexler, 1991; Jacobowicz, 1984; Jacobowicz & Olsen, 1988; J. Koster & C. Koster, 1986; McDaniel, Cairns, & Hsu, 1990; Wexler & Chien, 1985).

- (4) a. Pluto told Donald to wash him.
b. Pluto told Donald to wash himself.

Specifically, in (4b) children as young as age 4;6 correctly interpret the local antecedent *Donald* as the antecedent to *himself*, in accordance with Principle A of the binding theory. Principle A requires that anaphors be locally bound. In contrast, the same children incorrectly allow *Donald* to serve as antecedent for the pronoun *him* in (4a), thereby violating Principle B of the binding theory, which requires that pronouns be locally free. As noted earlier, languages vary with respect to what constitutes a binding domain for binding; in English the domain is the minimal clause containing the reflexive or pronoun. In other languages the domain may be larger, for example, the minimal tensed clause (Johnson, 1984; Wexler & Manzini, 1987; Yang, 1983) Children must determine the binding domain for their specific language.⁶

⁶In this section, we discuss binding in terms of parameter setting, though strictly speaking, the binding theory may not be parameterized in the manner suggested by Wexler and Manzini (1987). Wexler and Manzini proposed, following Johnson (1984) and Yang (1984), that UG makes available a set of binding domains, the minimal clause containing a subject, the minimal tensed clause, minimal indicative clause, and so forth. Children choose the appropriate domain for their language. As noted earlier, however, Pica (1987) more recently proposed that the choice of binding domain for a particular language follows from the morphological properties of specific anaphors, and hence is not a parameter as such.

Though these different approaches to binding have important theoretical consequences, we ignore them for the purposes of this discussion. On either analysis, children must make a determination about some property of their language that would lead to a discrete

Prima facie, the experimental results pertaining to sentences such as (4a,b) lead to the conclusion that children know the binding domain for Principle A early on, but that they do not have similar knowledge of Principle B. However, Montalbetti and Wexler (1985), Wexler and Chien (1985), Chien and Wexler (1991), Grodzinsky and Reinhart (1993) argued that children do in fact know Principle B, which blocks *anaphoric binding* between *Donald* and *him* in (4a); what they do not know (Chien & Wexler, 1991), or fail to use due to processing limitations (Grodzinsky & Reinhart, 1993), is the pragmatic principle discussed previously, which bars *coreference* between these two NPs (Reinhart, 1983). Sentences such as (4a), which allow both binding and coreference, do not permit us to tease apart children's knowledge of Principle B from their knowledge of the pragmatic principle. However, it is easy to construct examples that do tease the two principles apart. Pronouns can *bind* to quantifiers, but they may not *corefer* with them because quantifiers are not referential. We can therefore use sentences containing quantifiers to unambiguously test children's knowledge of Principle B because in this instance the pragmatic principle does not apply.

Chien and Wexler (1991) carried out the relevant experiments. Their results show, in fact, that children do not allow the pronoun *him* to take *every bear* as antecedent in sentences such as that in (5), evidence that they have the appropriate binding domain for pronouns.

- (5) Pluto told every bear to wash him.

Their acceptance of a local antecedent in sentences such as (4a) results from the fact that they are allowing *coreference* between the two NPs—an option not available in (5)—in violation of the pragmatic principle.⁷

If we simply took the results related to children's interpretation of sentences (4a) and (5) at face value, we would conclude that children sometimes know Principle B and sometimes do not. In other words, they had only partial or imperfect knowledge of the principle. A more fine-grained analysis shows, however, that the children know the appropriate binding domain for pronouns (evidenced by their performance on sentences

development with respect to binding (either by choosing a particular binding domain directly or by determining the morphological structure of a particular anaphor, from which the binding domain can be deduced). Also, both analyses present a highly modularized picture of the system of anaphora. Thus, it seems to us that couching the discussion in terms of parameter setting in no way violates the spirit of Pica's analysis, or other principle-based accounts, such as Reinhart and Reuland (1991), as they relate to acquisition and the issues of discreteness and modularity.

⁷There is further evidence involving children's interpretation of VP-ellipsis that supports this conclusion. See Thornton and Wexler (1991) for discussion.

with quantified antecedents), but their knowledge of this specific syntactic principle is obscured by their lack of knowledge (or inability to implement)—another principle belonging to a completely independent component, namely, pragmatics.⁸

2.2.2. Long Distance Reflexivization in Icelandic. Consider a second example involving long distance reflexivization in Icelandic. As noted earlier, Icelandic has a “long distance” anaphor *sig*. When *sig* occurs in a subjunctive or infinitival clause, it may take a long distance antecedent, but not when it is contained in an indicative clause. We do not attempt to explain this property of Icelandic grammar here, but simply refer to it as the indicative constraint (cf. Sigurjónsdóttir, 1993; Sigurjónsdóttir & Hyams, 1991, for discussion). Thus, the sentence in (2) is grammatical in Icelandic with *Jón* as the antecedent to *sig*, though the sentence in (6) is not.

- (6) **Jón* veit að María rakar *sig* a hverjum degi
'John knows that Maria shave (ind.) himself everyday'

By about age 3;6, Icelandic children freely allow reflexives to take a long distance antecedent, which suggests that the binding domain for Icelandic *sig* is set at that point. However, at that age, long distance reflexivization is not appropriately restricted; children allow long distance reflexivization out of indicatives as well, as in (6). The indicative constraint emerges at around age 4;6. We hypothesize that this is the point at which Icelandic children sort out the morphological contrasts that mark subjunctive versus indicative versus infinitive. (This hypothesis is supported by the longitudinal data showing that children begin using subjunctive morphology at this point.) Thus, we propose that children need not learn the indicative constraint (which follows from general principles of grammar that make an indicative clause an opaque domain—the Tensed S condition of Chomsky, 1977), but that this innate constraint can emerge only after the child has identified the various mood/aspect/tense distinctions. At this point the child will correctly restrict the long-distance use of *sig* to nonindicative clauses.

The acquisition of long distance reflexivization in Icelandic happens in pieces, as is expected given the modularity of the system. First, *sig* is analyzed as a long-distance anaphor, that is, as undergoing head movement. As discussed in the next section, this presupposes a particular kind of morphological analysis. Next, the precise domain that *sig* can move

⁸See Chien and Wexler (1991) and Grodzinsky and Reinhart (1993) for detailed discussion of this issue.

out of is determined; that is, the indicative constraint emerges. This latter development depends on the child's lexical knowledge of how tense and mood distinctions are marked. Note that each grammatical development contributing to the phenomenon is discrete so the “gradualness” exists only with respect to the child's E-language and not with respect to I-language.

2.2.3. Long Distance Reflexivization in English. In a series of experiments designed to test the English-speaking child's knowledge of the binding principles, Chien and Wexler (1991) found that there was a marked tendency for the youngest children in their study to select a nonlocal antecedent for the reflexives *himself* and *herself*. Thus, in an act out task with sentences such as (7), children often chose *Kitty/Snoopy* as the antecedent to *herself/himself*.

- (7) $\left\{ \begin{array}{l} \text{Kitty} \\ \text{Snoopy} \end{array} \right\}$ wants $\left\{ \begin{array}{l} \text{Sarah} \\ \text{Adam} \end{array} \right\}$ (child's name) to point to $\left\{ \begin{array}{l} \text{herself} \\ \text{himself} \end{array} \right\}$

Connell and Franks (1991) proposed that the long distance responses do not result from a lack of knowledge of the relevant binding principle (Principle A). Rather, they claim that the long distance responses are due to the fact that these children have failed to analyze the English anaphors as NPs. Recall that according to Pica (1987), anaphors that are heads, such as Icelandic *sig*, may escape the local clause and find a long-distance antecedent, whereas NP anaphors are clausebound. Thus, if English-speaking children fail to analyze the internal structure of anaphors such as *himself* and *herself* and analyze them instead as being morphologically simple, it will follow from general principles of grammar that these anaphors may take a long distance antecedent. The Connell and Franks hypothesis receives some interesting support from the fact that the children's performance on anaphors in the Chien and Wexler studies did not improve even where they were provided with a gender cue. Thus, in a sentence such as (8a), children were still likely to choose the long-distance antecedent, namely, *Kitty*, even though this did not match the gender of the anaphor. Interestingly, however, in a sentence such as (8b), which contained a pronoun, children were extremely sensitive to the gender of the pronoun and most often matched it to the same gender antecedent.

- (8) a. Kitty wants Adam (child's name) to point to himself.
b. Kitty wants Adam (child's name) to point to her.

If children are failing to segment the anaphor into a pronoun + self, the lack of attentiveness to gender would follow.

The morphological misanalysis hypothesis predicts that children who allow a long distance antecedent for the English anaphors will only allow the antecedent to be a subject and not an object. This is because on Pica's analysis the anaphor moves to INFL and is thus c-commanded by the subject, but not the object. Thus, only a subject can count as a proper antecedent for an anaphor that undergoes head movement. In contrast, an NP anaphor can take either a subject or object antecedent. Connell and Franks (1991) tested this hypothesis directly with a group of 10 children. Their results show a striking confirmation of the hypothesis. All five children who allowed long distance binding also allowed only a subject antecedent. Four of the remaining children had local binding only and they allowed either a subject or object to serve as antecedent. (We return to the issue of the individual differences later.) Thus, in the development of English anaphora we see that the effects of a syntactic principle, Principle A, is masked by development in a separate, morphological component.

In the aforementioned examples we have seen how principles of core grammar, specifically the binding principles, may interact with other modules (pragmatic, morphological, etc.) to give rise to the gradualness that often characterizes children's E-language. Shifting the focus to I-language, however, we see that the development of the relevant principles and parameters in each component is discrete. The next section discusses the lexicon.

2.3. Lexical Development

Within parameter theory, there is an important distinction between grammatical development and lexical development. While parameter setting is a discrete operation, the learning of particular morphemes and their associated syntactic, semantic, and phonological properties is expected to be piecemeal and gradual.⁹ Thus, we do not expect that children will acquire all the verbs in a language in one fell swoop, or that they will acquire all the properties associated with a particular lexical item at the same time. The gradualness of lexical development extends to the learning of inflectional paradigms. Individual affixes must be learned and this learning depends on a number of semantic, syntactic, and phonological factors.

On many analyses there is an interesting interaction between principles and parameters and lexical development. Thus, Wexler and Manzini (1987) proposed a "lexical learning" approach to acquisition of binding. The binding principles are innate, but children must learn the individual

⁹The distinction between grammatical development and lexical learning has been discussed quite explicitly within the parameter-setting framework. (See, for example, Chien & Wexler, 1991; Hyams, 1988; Wexler & Manzini, 1987).

anaphors and pronouns in their language. For example, the English-speaking child must learn that *himself* is an anaphor. Having learned this lexical property, the anaphor is "plugged into" the appropriate principle (Principle A), effectively setting the principle into operation.

In Hyams (1986a) I proposed a model of the acquisition of inflection involving both parameter setting and lexical (affix) learning. I suggested a parameter of UG, the stem parameter, which attempts to describe a morphological difference between languages like English, in which a verb may surface as a bare stem—for example, *talk*—and languages like Italian, in which the verb must always bear an affix—for example, **parl* (from *parlare*, 'to speak'). The stem parameter is a well-formedness condition on word formation—a bare stem is/is not a well-formed word. With respect to acquisition, I claim that children "set" this parameter very early on, which is to say that they determine at a young age what constitutes a well-formed word in their language.¹⁰

The analysis makes two specific predictions for languages of the Italian type. First, Italian children will never produce verbs in their bare stem form (whereas English-speaking children, who, by hypothesis, learn inflection as a "marked" property of the language, will use bare stem forms). Second, children acquiring Italian will learn the inflectional affixes in their language earlier than English-speaking children (which is crucially not a direct deductive consequence of the stem parameter but related to it). This is because, given the Italian setting of the stem parameter, Italian children do not have the option of omitting inflectional elements. Thus, they are forced to a more rapid lexical development. Both these predictions are fully supported by the Italian acquisition data (Pizzuto & Caselli, 1992; chap. 6, this volume). First, Italian children do not produce bare stem forms. Second, the Italian children acquire the singular present-tense affixes (1,2,3 person singular) significantly earlier than English-speaking children acquire the third person singular—*s*.¹¹

¹⁰The difference between Italian-like languages and English-like ones with respect to inflectional requirements seems to be an important grammatical difference between the two language types, one that is reflected not only in the differences in the acquisition of inflectional morphology in the two languages but also in the language of adult aphasics. As discussed in Grodzinsky (1990), Italian agrammatic aphasics do not drop inflection in the way that English-speaking aphasics do. The parameter analysis developed in Hyams (1986b) attempted to provide a unified account of this shared property of child language and aphasic language.

¹¹Two of the Italian children reached criterion on these forms during Brown's Stage I, and one child in Stage III (age range 1;10–2;1), whereas the English children reached criterion for the third person *-s* at Stage IV, Stage V, or beyond (age range 2;4–3;10, or beyond). The development of plural forms could not be measured because the child failed to use plural subjects. See Pizzuto and Caselli's (1992) Table 9 and their discussion section. See also Hyams (1992b) for further discussion of the Pizzuto and Caselli results and the acquisition of Italian morphology.

The manner in which parameter-setting interacts with lexical development has been a source of some confusion, however. Thus, Pizzuto and Caselli (1992; chap. 6, this volume) claimed that the stem parameter account also predicts that "Italian children will master all verb inflections . . . and that they do so more or less immediately, at the same time as, or shortly after they begin to produce verbs" (1992; p. 506). In fact, the stem parameter account makes no such prediction. As noted earlier, the setting of the stem parameter entails only that the child know a specific condition on word formation. It does not predict instantaneous and simultaneous acquisition across several inflectional paradigms. The fact that Italian children acquire inflectional morphology gradually—for example, singular forms preceding plural forms and present-tense affixes developing prior to past-tense morphology—is entirely consistent with the view of lexical development proposed with the P&P framework.

Pizzuto and Caselli expressed what is perhaps a common misunderstanding about parameter models—that the course of acquisition is determined *solely* by the setting of parameters and hence all of the observable properties of early child language should be accounted for within the parameters of core grammar.¹² However, as discussed previously, the P&P model stresses the modular and interactive nature of language development—exactly the opposite view. We argue here, in fact, that it is precisely the interaction of parameter setting with other aspects of linguistic knowledge (e.g., morphological, lexical, pragmatic) that gives rise to the appearance of "partial" or "gradual" acquisition that we observe in the child's language.

In the next section we turn to the issue of variation.

3. VARIATION WITHIN A PARAMETER-SETTING MODEL

3.1. Cross-linguistic Variation

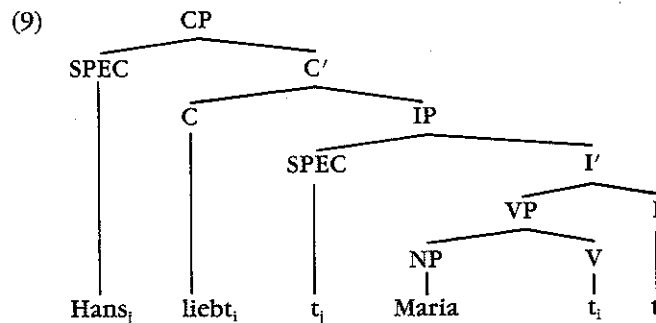
Another criticism of the P&P model is that it predicts a *unique* or *universal* sequence in development and hence precludes both cross-linguistic variation and variation among individual children. For example, Bates and MacWhinney (1987) claimed to "present cross-linguistic evidence

¹²Pizzuto and Caselli (1992) stated that their data "do not seem to support a parameter-setting account of language acquisition, in which a limited set of innate 'principles' or 'parameters' univocally [sic] determine acquisition" (p. 47). The notion that within P&P models all aspects of acquisition are determined solely by parameter setting is also implicit in much of the discussion in Bates and MacWhinney (1987), to be discussed later.

to suggest that languages vary not only in their end point (as parameter models would predict) but also in the initial hypotheses that children hold about their grammar. The evidence indicates that the sequence of 'parameter testing' is apparently not universal" (p. 158). The implication, which is made explicit elsewhere in their chapter, is that parameter theory predicts that the sequence *should* be universal. In this section, we show that this notion of "universality" is not only misconceived, but runs directly counter to the spirit of the P&P model, which is to describe variation within principled limits—both the variation exhibited by adult languages and that shown within the course of development. In what follows we discuss word order variation in the early grammars of German, Italian, English, Spanish, and Irish. We will see how differences in word order follow directly from the interaction of various parameters.

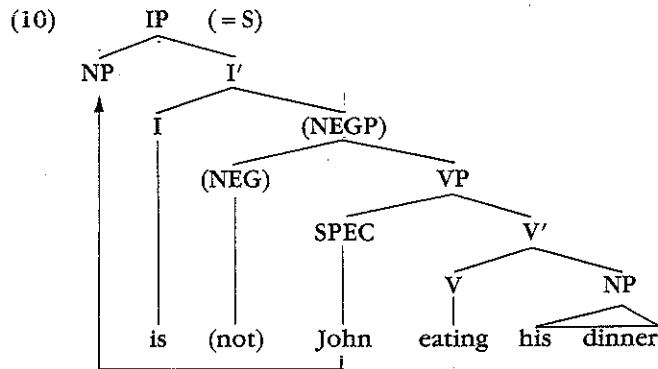
As a point of departure, consider the early grammars of English, Italian, and German. These three child languages share the property of having phonologically unrealized subjects (as do all child languages). In Hyams (1983, 1986b) I argued that this is due to an initial setting of the null subject parameter under which null subjects are licensed. The parameter will have to be reset in English and German, but not in Italian. In other respects the three languages are quite different. English word order is strictly subject-verb-object (SVO), whereas in Italian postverbal subjects predominate in the earliest stages, giving rise to a verb-object-subject (VOS) order. In German, in contrast, we find both SVO and SOV orders, with verb final patterns predominating (Clahsen, 1986, 1991).

German is a verb-second (V2) language, which is to say, a language in which tensed verbs in root clauses raise to functional head positions (INFL and then COMP under standard analyses). Thus, the verb ends up in C while the SPEC-CP position is occupied by the subject or other XP, as illustrated in (9). (Irrelevant details omitted.) In (9) and all subsequent diagrams, *t* is a "trace" and indicates the position from which the coindexed element has moved. Thus, Hans_i has moved from SPEC IP position, for example.



As has been extensively documented, German children set the verb raising parameter very early (Clahsen, 1991; Hyams, 1992a; Meisel & Müller, 1992; Poeppel & Wexler, 1993; Weissenborn and Verris, 1992; Wexler, 1991). They distinguish between finite and nonfinite verbs; they raise finite forms to a functional head position resulting in (S)V_O order, whereas nonfinite forms remain in sentence final position, allowing the basic (S)OV order to surface.¹³ Thus, although 2-year-old German and English-speaking children have the same setting along the null subject parameter (null subjects are possible), they differ with respect to the verb raising parameter; German children raise verbs, English children do not. The difference obviously arises from differences in the input languages; German children see evidence of verb raising in the input—for example, different word orders in main and subordinate clauses—and no such evidence is forthcoming in English. Verbs also raise in Italian (and other Romance languages), though only as high as INFL. We return to this later.

The variation in the position of subjects that we see in English and Italian children is due to a different parameter. Within current grammatical theory, subjects are assumed to be base-generated within the VP and then raised to the external subject position (Kitagawa, 1986; Koopman & Sportiche, 1991), as illustrated in (10). In (10) and in all subsequent tree diagrams, irrelevant details are omitted.



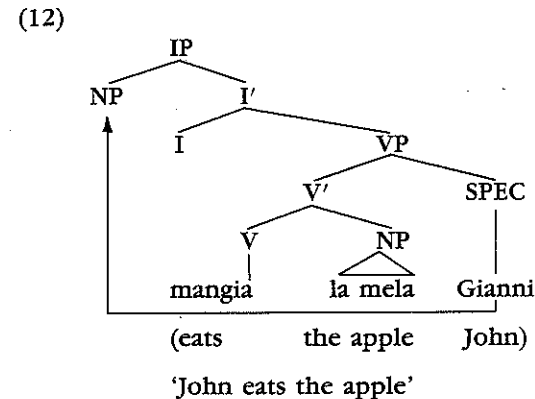
There are parametric options associated with VP-internal subjects. First,

¹³There is disagreement over whether children raise the verb only as far as INFL (Clahsen, 1991; Meisel & Müller, 1992) in the early stages or whether they raise all the way up to C (Hyams, 1992a; Deprez & Pierce, 1993; Weissenborn & Verris, 1992). This issue is irrelevant to our present concerns.

the internal subject position, the SPEC(ifier) of VP on some accounts, may be to the left or right of V'. Second, subject raising may be obligatory or optional.¹⁴ In English, SPEC-VP is on the left (as illustrated in 10, and the subject must raise from the VP-internal position to the external subject position ([NP,S]). That subject raising is required is evidenced by the fact that in noninterrogative sentences subjects are always to the left of negation, as in (11).

- (11) a. John is not eating his dinner
 b. *Not John is eating his dinner
 c. *Not is John eating his dinner
 d. *Is not John eating his dinner

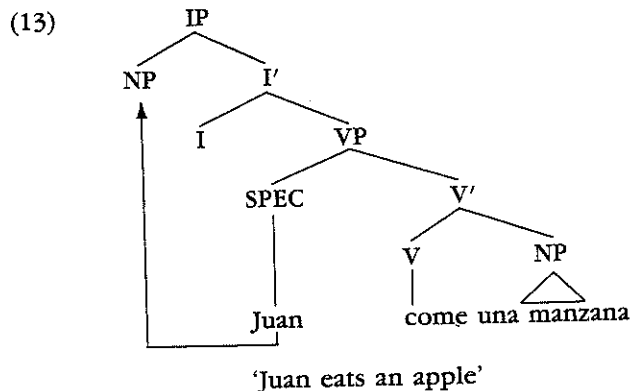
In Italian, on the other hand, SPEC-VP is to the right of V' as in (12), and subject raising is optional. If the subject raises to the external subject position, indicated by the arrow in (12), it appears preverbally; if the subject remains within the VP, it appears postverbally.



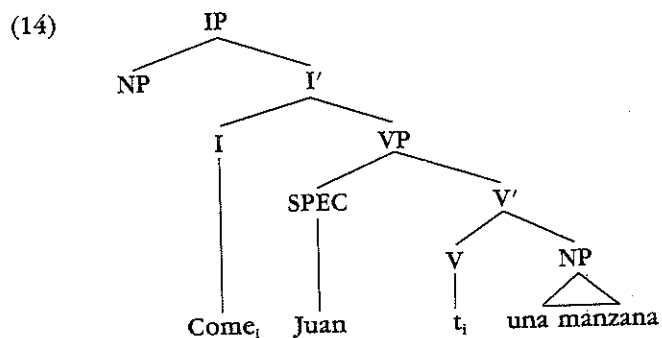
Interestingly, Spanish, a language typologically quite close to Italian, differs from Italian with respect to the base position of the subject. SPEC-VP is to the left of V' in Spanish (Belletti, personal communication, 1992) and the subject may raise to the external subject position;

¹⁴The optionality or obligatoriness of subject raising need not be stipulated, but rather derives from the different ways in which nominative case is assigned, whether via SPEC-head agreement or government. See Koopman and Sportiche (1991) for details and Deprez and Pierce (1992) for an extension of the theory to child language.

as in English. Both structures result in an SVO word order, illustrated in (13).



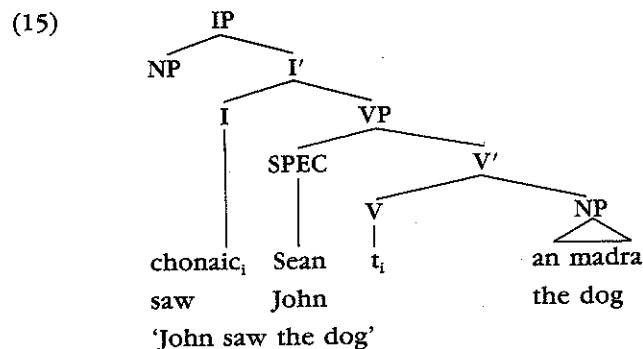
Postverbal subjects are possible in Spanish and Italian. In Spanish, however, postverbal subjects occur when the verb raises to I and the subject remains inside the VP, as in (14).¹⁵



In other languages—for example, Irish—the subject does not raise at all (Koopman & Sportiche, 1991). Irish is underlying SVO; SPEC VP is to the left of V'. The verb raises to I while the subject remains within VP producing a derived VSO order, as in (15).¹⁶

¹⁵Verbs in Italian also undergo raising to I. This movement does not affect the relative order of the subject and verb, as should be clear from the diagram in (12).

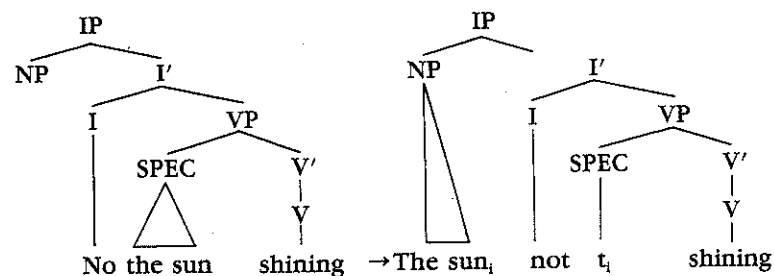
¹⁶One construction in which the verb does not raise in Irish is the verbal noun construction. This is discussed further in the text.



The VP-internal subject hypothesis has direct implications for development. Because the VP-internal subject is the "basic," nonderived position and because subject raising does not occur in all languages, we might expect the early grammar *not* to have subject raising. Irish would then represent the "default" case and subject raising would be triggered in those languages where it is evidenced in the input, such as in English. If this is the case, then subjects in the very early grammar will occur within VP at S-structure, even where this is not an option for adult speakers of the language. Lebeaux (1988), Pierce (1992), Guilfoyle and Noonan (1990), and Deprez and Pierce (1993) adopt essentially this hypothesis to explain why English-speaking children initially have "sentence external" negation, as in the familiar "No the sun shining" (Klima & Bellugi, 1967; Stage A). On their analyses, children do not have sentence external negation; negation is where it should be (in some I projection). Rather, children have VP-internal subjects, which makes the negation appear to be external. At some point subject raising is triggered and we begin to see subjects appear in the external subject position, evidenced by the onset of sentence internal negation, as in "the sun not shining" (Klima & Bellugi, 1967; Stage B). The two stages are diagrammed in (16).

(16) Stage A

Stage B



By hypothesis, initial parameter settings are universal and thus we predict that Italian children will also begin with VP-internal subjects. However, because of the differences in the position of the SPEC-VP in Italian and English, Italian subjects will appear in postverbal position. This prediction is confirmed by Bates (1976), who reports that postverbal subjects predominate until about age 2. (See also Schaeffer, 1990, for discussion.)

Interestingly, young Spanish-speaking children show a marked preference for SV(O) word order, in contrast to Italian children (Grinstead, 1992). This is so despite the fact that in the adult language postverbal subjects are quite common. The child's preference for preverbal subjects is also explained under the VP-internal subject hypothesis. Recall that in Spanish the base position for subjects, that is SPEC-VP, is to the left of V'. If Spanish children have neither subject raising nor verb raising at the earliest stage, then their sentences will reflect the basic, nonderived SV(O) order.

Let us turn finally to Irish. Irish presents an interesting case. Despite the fact that the adult language is rigidly VSO, young Irish-speaking children sometimes adopt SVO order. The child's use of SVO word order in the absence of evidence has been argued by some to support the notion that SVO reflects the "natural order" of actions (McNeill, 1975) or concepts (Osgood & Tanz, 1977), or the child's tendency to order the predicate or new information first (MacWhinney & Bates, 1978). Hickey (1990) observed, however, that the children's SVO sentences all occur in the "verbal-noun construction." This is a construction that is similar to the progressive in English in that it is formed with the copula in I. The verbal-noun is marked with a particle *ag*. In the adult language, the presence of the copula in I blocks verb raising and thus *be* SVO word order surfaces, as in (17) (from Hickey, 1990).

- (17) Ta an ghaoth ag seideadh.
(Be the wind blow - Vn)
'The wind is blowing'

At the relevant stage of development young Irish children (like English-speaking children) omit the copula (indicated by the _____) and thus they appear to have SV(O) word order, as in (18) (from Hickey, 1990).

- (18) _____ moncai ag ithe
(Monkey eat-Vn)
'Monkey eating'

Hickey showed, however, that Irish children have knowledge of the "positional requirements" of verbs in the language. Outside the verbal-

noun construction, Irish children have correct VSO word order, which by hypothesis, is derived through verb raising to I.

To sum up, certain parameters come fixed at an initial, default setting, which may be reset on the basis of language-specific evidence—triggers. These initial settings are presumed to be universal. However, this in no way entails that the "sequence of parameter-testing" is universal, nor that there is a "universal schedule" in the acquisition of particular forms, as suggested by Bates and MacWhinney. We see that children acquiring different languages, children who are at the same developmental level, can have very different grammars. Though parameters arguably have a default value, they can be quickly reset as a function of the input data, for example, the verb raising parameter. Other parameters may remain fixed at the same setting for longer periods of time, for example, the subject raising parameter, but still give rise to different languages—VOS order in Italian, SVO in English and Spanish, and VSO in Irish—through the interaction with other aspects of the grammar, such as the position of specifiers.¹⁷

There is also evidence that initial parameter settings may be reset (i.e., set to the native language requirement) at different points in different languages. For example, the subject raising parameter seems to be reset in Italian by around age 2;0; at this point Italian children have both postverbal and preverbal subjects. In English, the parameter seems to be reset somewhat later, roughly between ages 2;0 and 3;0, as evidenced by the

¹⁷As an example of the kind of cross-linguistic developmental differences that a parameter model would have difficulty with, Bates and MacWhinney (1987) discussed the well-known observation that children acquiring fixed word order languages learn the correct order early, whereas children learning languages with more flexible word order and rich verbal morphology learn the morphological system at a young age. They correctly noted that there does not seem to be a universal strategy of "word order before morphology" or vice versa. Why Bates and MacWhinney discussed this as a potential counterexample to parameter theory is unclear. There is nothing within the P&P model or the theory of grammar more generally that would lead one to expect that children should have an initial preference for encoding grammatical relations via word order rather than morphology or vice versa.

A second purported universal discussed and rejected by Bates and MacWhinney is the notion that children rely on semantic information such as animacy before using grammatical information such as word order. Bates and MacWhinney noted that whereas English-speaking children rely on word order to uncover grammatical relations, children acquiring languages with freer word order such as Italian, use animacy as a cue to uncovering grammatical functions. Again, they correctly pointed out that there is no universal sequence from semantics to syntax. Although claims have been made that children universally rely on word order (e.g., Sinclair & Bronckart, 1972) or semantic strategies (e.g., Bever, 1970), nothing along these lines has ever been proposed within a P&P framework, and the model in no way predicts such a universal developmental sequence. Hyams (1983, 1986b), one of the earliest acquisition studies within a parameter-setting framework, argued at length against the hypothesis that early grammars are "semantically-based."

appearance of sentence internal negation. Variation of this sort can be explained in one of two ways; either it is due to differences in the children or differences in the input data. It is unlikely, as a general rule, that Italian children mature earlier than English-speaking children, so we must assume that the English "lag" is related to properties of the input. A possible explanation for the lag is that the evidence for subject raising in Italian can be deduced from the order of major lexical categories, whereas in English, it depends on the position of functional elements. Thus, the Italian child hears SVO sentences, and this is sufficient evidence that the subject may raise from its base position. In English, in contrast, subject raising is string vacuous (i.e., the order is SVO whether the subject is internal or external), unless the sentence contains a negative marker or adverbial, for example, 'John does not go' versus '*Not John goes.' If children process functional elements such as negation differently from lexical elements (cf. Garrett, 1980; Lebeaux, 1988; Wu, 1991), then the delay in parameter resetting can be explained as a function of the relative inaccessibility of the English triggering data. A similar kind of explanation would account for the fact that verb raising emerges earlier in German and Irish than in Spanish and Italian.

3.2. Individual Variation

In the previous section, we saw how the interaction of parameter setting with other aspects of grammar and with other components of language (e.g., the processing component) could give rise to different child grammars and different developmental sequences cross-linguistically. But what about the variation that we find among individual children acquiring the same language? According to Bates and MacWhinney (1987), "If parameters are set by 'input data,' then the intermediate stages of acquisition should look the same for all children within a given language—assuming that the linguistic environment is in fact the same on all relevant dimensions" (p. 186).

Individual children raised in the same household receive roughly the same environmental input, yet we are not surprised to find that they develop differently from one another. In the same way, children raised in roughly the same linguistic environment can show individual differences in their language development. Children mature at different rates and within the domain of language there are various components that undergo maturation—the lexicon, the grammar, the language processor, and so on. The rate of maturation in one component may have far-reaching consequences for development in another component. Moreover, there is a difference between "input data" and "intake data" (White, 1981).

Though the input data may be roughly the same for different children in a particular environment, the data that the individual child intakes is dependent on his particular level of maturation. Thus, individual differences may arise out of the different rates of maturation and interactions between the various language-related modules.

To illustrate the point, let us return to our discussion of long-distance reflexivization by English-speaking children (section 2.1.3). We saw that in the early grammar children may allow *himself/herself* to take a nonlocal antecedent contrary to what is possible in the adult language (Chien & Wexler, 1991), and this is arguably due to a morphological misanalysis (Connell & Franks, 1991). The children are analyzing the English anaphors as morphologically simple heads, which may therefore escape the local clause. Recall, however, that not all of the children in the Connell and Franks study had a long distance binding. They found that five of their subjects had long distance binding and allowed only subject antecedents, and five had a strictly local binding and allowed both subject and object antecedents. (Recall that the head movement analysis of long distance binding predicts that these two properties will covary.) The ages of the two groups overlapped and hence there is no reason to assume that these two grammar types represent different developmental stages. Rather, it would appear that some children misanalyze the English anaphors as simple and hence allow long-distance binding, and others have the correct morphological analysis and as a result do not allow long-distance binding. The long distance children will at some point develop the correct morphological analysis of *himself/herself* and the local binding of these elements will follow as a deductive consequence.

There are any number of other examples that illustrate the same point. Even if the data and the sequence of parameters to be set is uniform within a particular language, there are many other aspects of language that fall outside the parameters, but interact with them in crucial ways, for example, morphological analysis, lexical development, pragmatic development, and so on. Individual children may vary in the rate and manner of development in all domains, and depending on the nature of the interaction between the different modules, the effects may be quite widespread and varied. Moreover, Borer and Wexler (1987) and Felix (1986) have argued that parameters themselves may be subject to maturation. To the extent that this is so, individual children may vary in the rate that specific parameters mature.

To sum up, although parameter models predict that certain aspects of development will be universal, this in no way precludes variation at other points. Different languages present different input to the child and individual children (and components) mature at different rates. These factors clearly influence the course of development and provide for a range

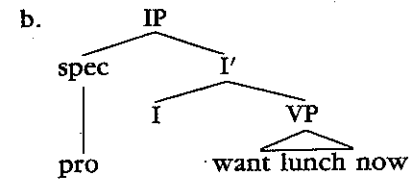
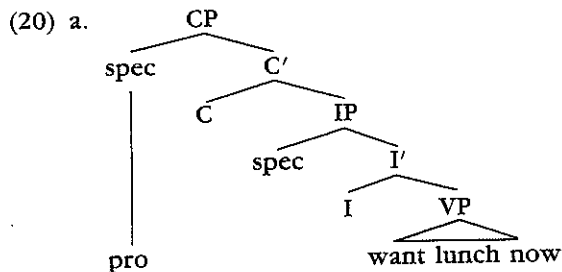
of cross-linguistic and individual variation. It is important to bear in mind, however, that the variation that we observe in child language exists within well-defined limits. Children do not construct "wild grammars." The challenge for any developmental theory is not simply to account for variation, but to uncover the constraints that narrow the child's hypothesis space.

4. NONDETERMINISTIC MODELS

In this section we return briefly to the issue of discreteness and to the question of how those aspects of language development that appear to be gradual can be explained within a parameter-setting model. I propose that the gradualness is an artefact of the interaction and uneven maturation of different modules of language. There is, however, at least one alternative proposal—gradualness arises because parameters do not come fixed at an initial default value that may be (discretely) reset. Rather, the child's parameters are "open" at the initial state and children analyze the data using *all* values of the parameters. Verris (in press), for example, proposed that children use a developmental strategy called MAX (maximize input), which states: "For every input string, create as many UG-allowed representations as possible." Representations that are not possible in the adult language are gradually eliminated, eventually leaving the child with the correct parametric setting for his language. So, for example, with respect to the null subject parameter, the particular parameter discussed by Verris, English-speaking children initially allow both a (Dutch-like) null topic representation (null subject in spec CP), and a (Italian-like) null subject representation (null subject in spec IP) for input sentences such as those in (19).

- (19) a. Want lunch now?
b. Seems like you're trying to get rid of me.

They have, in Verris' words, "competing representations," such as those in (20). (Irrelevant details omitted.)



Eventually, the English-speaking child eliminates the null-subject representation in (20b), but this does not completely eliminate null subjects. Rather, the number of null subjects in certain contexts, that is, in spec IP, reduces to zero; whereas those in other contexts, that is, in spec CP (= topic position), with other licensing and identification requirements may still occur. Eventually the child is left with whatever the correct representation is for such sentences in English, and the relevant parameter value.¹⁸ In this way, the loss of null subjects is "gradual," though as Verris noted, the gradualness is only apparent because what is really involved is a "step-wise" decrease.¹⁹

Verris' proposal is similar in many respects to an earlier one by Valian (1990, 1992), who also argued against the idea of an initial setting and the triggering hypothesis, more generally. Valian (1992) proposed a "scale (or hypothesis testing) model" according to which the child "entertains both values (of a parameter) on an equal footing until sufficient evidence accrues to favor one over the other" (p. 2).²⁰ On Valian's model, development consists of "gathering," "amassing," "tabulating" evidence in favor of one or the other parameter values until "gradually the weight of evidence is clear and weighs down one side very heavily" (1992, p. 12).

Like Verris, Valian discussed this possibility with respect to the null subject parameter. But the child at the initial state is faced with many parametric options. Pursuing the logic of the competing representations

¹⁸Verris did not specify what she took to be the representation for sentences such as (19) in English (but see Haegeman, 1990; Hyams, in press-b; Rizzi, in press; for some suggestions), nor how the English-speaking child narrows down the options to precisely these cases, though she did discuss the use of null subjects by German-speaking children in somewhat more detail. This is an important learnability issue, but it is tangential to the central issue discussed in the text, which concerns the plausibility of the nondeterministic, "competing representations" hypothesis.

¹⁹As Verris noted, this is an empirical hypothesis. If she is right, we should find null subjects disappearing from specific contexts in a fairly well-defined manner.

²⁰Valian's objections to the default setting hypothesis relate to her idea that if children have only one value of a parameter, then they are unable in principle to analyze/parse input data that conflict with that initial setting. As noted in the introduction, however, parameter setting is a "failure-driven" model of development. It is precisely the assumption of a failed parse under some particular parameter value that triggers the resetting to the other value. For discussion of this and other issues raised by Valian (1990, 1992), see Hyams (in press-a) and Kim (1993).

hypothesis, the child would start out with *all* the values of *all* parameters, or in other words, the entire set of possible adult grammars, null subject, non-null subject, verb raising, nonverb raising, subject raising or nonsubject raising, and so forth—a rather implausible assumption on the face of it.

The hypothesis is also implausible from a computational point of view. With respect to Valian's proposal, it is clear that the psychological mechanisms needed to tip the scales in favor of one or the other value would require very large computational resources. At the very least the child must have an accurate memory for previous linguistic data, past failed hypotheses, and parameter settings. The scale model and Verrips' MAX strategy both entail that the child has the ability to represent and compare the multiple, and in principle very large numbers, of representations of a sentence that are generated by the competing grammars. Assuming, for example, that there are five parameters relevant to a particular sentence, the child's grammar would generate 2^5 representations for that sentence. More generally, the grammar would generate 2^n representations for every sentence, where n is the number of relevant parameters, until the child converges on the correct adult value. Thus, the developmental picture that unfolds is one in which the younger you are the more representations/grammars you must cope with.

5. CONCLUSION

In this chapter, we considered the issues of nondiscreteness and variation in child language and the implications of these for P&P models of language development. We have argued that whereas parameter models predict discrete changes in children's system of linguistic knowledge, at least as regards properties of core grammar, they do not necessarily predict discrete changes in their language. The child's language (like the adult's) is epiphenomenal, the result of the interaction of principles and rules in several different components—the grammar, the lexicon, the pragmatic component, language processors, and so forth. Moreover, the child's language is several steps removed from the parameters of core grammar, the level at which parameters are set. We have proposed that interactions between the different modules as well as differences in the rate and manner of maturation of these different modules give rise to the gradual development that we observe in the child's language. Maturation factors in addition to differences in input also account for the cross-linguistic and individual variation that exists across child languages. We considered a number of phenomena (related to binding and word order) in which a particular development (or developments), which are discrete

at the level of grammar, show up as "partial" acquisition when viewed from the perspective of the child's E-language. Thus, to understand the developmental process, one must focus on the child's internalized system of knowledge (the I-language). In this respect the study of child language is no different from the study of adult language.

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Syntax-Semantics Mappings as an Explanation for Some Transitions in Language Development

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1. INTRODUCTION

The study of different languages is of obvious relevance to the theory of language development. For one thing, it provides a description of the "target state" of the acquisition process; one could not come to understand the process through which children come to acquire principles of word order in different languages, for instance, without some theory of how word order is understood by adult speakers of those languages. As Macnamara (1982) stressed with regard to cognitive development in general, in order to explain how children come to possess competence within a given domain, we have to have some understanding of just what this knowledge is supposed to be.

Linguistic theory also deals with the unlearned core of linguistic knowledge—what is sometimes called Universal Grammar (UG) (Chomsky, 1981). This is the "initial state" of the acquisition process. To acquire language, children must move from this initial state, which is present in all humans, to possessing properties of adult competence that are not universal and must therefore be learned through attending to adult input (Pinker, 1979, 1984; Wexler & Culicover, 1980). For instance, languages differ in how they express the thematic roles of arguments; some use word order, others use case markers and order is