Syntactic Theory and First Language Acquisition: Cross-Linguistic Perspectives

VOLUME 2
BINDING, DEPENDENCIES, AND LEARNABILITY

Editors:
Barbara Lust
Gabriella Hermon
Jaklin Kornfilt

Co-editors:
Suzanne Flynn
Shyam Kapur
Isabella Barbier
Katharina Boser
Claire Foley
Zelmira Nuñez del Prado
Edward J. Rubin
Lynn Santelmann
Jacqueline Toribio

LEA LAWRENCE ERLBAUM ASSOCIATES, PUBLISHERS
1994 Hillsdale, New Jersey Hove, UK

CHAPTER ELEVEN

Children's Postulation of Null Subjects: Parameter Setting and Language Acquisition

Virginia Valian
Hunter College and CUNY Graduate Center

This chapter covers three main points. The first is that, with respect to null subjects in young children's speech, the data collected thus far indicate no point at which the grammar of U.S. children speaking Standard English (henceforth, American children) clearly licenses null subjects, and no point at which IP and CP are clearly absent. In contrast, the grammars of children acquiring null subject languages do show clear evidence for null subjects and, equally, show evidence at least for IP. This is not to say that no American child ever has an incorrect grammar, but simply that the data thus far give us no grounds for claiming an incorrect grammar for most children. The data are briefly reviewed here.

The second point is that, in order to account for the diversity as well as the commonalities in acquisition within and across languages, theories must specifically include both a competence component and a performance component, and a model of how the two interact. Each component by itself is too weak in predictive power to handle the facts. A corollary of this is that there is no metatheoretic reason to prefer competence-deficit explanations over performance-deficit explanations.

The third point is that children's initial state is, with respect to parameters, unset. As I have argued in previous work (Valian, 1990a, 1990b), the child does not begin acquisition with one or another value preset; there is no default setting. Rather, the child entertains both options on an equal footing until sufficient evidence accrues to favor one over the other, and he or she remains with that value unless and until sufficient evidence accrues to switch to another value.

THE DATA

I first outline some of the data from my laboratory (Valian, 1991), concentrating on American English and Italian. Only fully intelligible, nonimperative, nonimitative utterances with verbs were used to calculate subject usage. Approximately 1½ hours of speech from each of twenty-one 2-year-olds were taped and transcribed. The American children ranged in age from 1;10 to 2;8, and in MLU from 1.53 to 4.38. Even the lowest-MLU subgroup—five children between MLU 1.5 and 2.0, averaging 2 years in age and producing verbs in 27% of their intelligible utterances—used subjects almost 70% of the time. Children above MLU 2 produced subjects from 84% to 96% of the time. Furthermore, the majority of children's subjects were pronouns, even in the lowest-MLU group.

The lowest-MLU group's percentages contrast sharply with the performance of the five Italian children whose longitudinal data were analyzed. At Time I (roughly ages 1;6–1;11), the Italian children's verb use was the same as that of the American children in Group I—27%; at Time II (roughly ages 2;0–2;5), verb use had increased to 39%, still lower than the American children's verb use in Group II, which was 52%. The Italian children at Times I and II used subjects only 30% of the time, less than half as often as the American children. They used pronouns for a minority of their subjects and used them less than half as often as the American children. The 30% figure for subjects includes both pre- and postverbal subjects. If only preverbal subjects are included, the Italian children produced subjects only 15% of the time. From these data, then, even the very young American children, who used verbs in only 27% of their utterances, looked very different from Italian children.

As important as the differences in frequency of subject use between American and Italian children are the corresponding features of American children's speech. In our data (Valian, 1991), for example, American children, even below MLU 2, showed the rudimentary presence of inflectional elements (modals, past tense, third person singular present *s*) and showed consistent use of nominative case for pronominal subjects. Their lack of subjects does not seem due to an incomplete grammar. Because the Italian sample was smaller, and because of syntactic differences between English and Italian, the Italian children were compared to Americans only on modals, where they used modals somewhat less than did American children.

To enlarge the basis of our cross-linguistic comparisons, our laboratory also analyzed observational speech from five Greek children, ranging in age from 2;0 to 2;5 (unpublished data in collaboration with H. Arsenidou). Greek is a null subject language. The children produced subjects in about 20% of their clauses with verbs, again in contrast to the American children. Recently, Z. Eisenberg and I analyzed speech from 15 children acquiring Brazilian Portuguese, another null subject language. The children ranged in age from

2;0 to 2;10, and in MLU (measured in words rather than morphemes) from 1.58 to 4.92. The children below MLU 2 produced subjects in 29% of their utterances with verbs, and the children above MLU 2 produced subjects in 51% of such utterances. Again, the Brazilian Portuguese children contrasted with the American children.

Thus, in our comparative studies, American children looked very different from children acquiring null subject languages. They used subjects much more, used pronominal subjects more, and were different on many other measures. Contrary to claims by Guilfoyle and Noonan (1992), the children as a group could not be described as having an incomplete grammar (i.e., with a partial tree consisting of a VP and elements that can be contained within it). Contrary to claims by Hyams (1986), the children could not be described as having a grammar that included *pro*.

At the same time, the five American children below MLU 2 in Valian (1991) were variable, and there are data from other investigators suggesting that at the onset of combinatorial speech, some English-speaking children produce subjects less than 50% of the time. It is hard to evaluate those data because of differences in data analytic procedures and reporting. Clearly, more studies are needed of children who are just beginning to use verbs, as well as more cross-linguistic and longitudinal studies.

Data from two elicited imitation tasks with American children support the conclusions from the spontaneous production data by showing similarly high subject use. Gerken (1991) presented data for 18 children ranging in MLU from 1.25 to 3.74, and in age from 1;11 to 2;6. Children included subjects in 81% of their imitations. Valian and Hoeffner (1992) recently completed a similar study. We found that 10 children with a mean age of 2;3 and a mean MLU of 2.34 imitated subjects 70% of the time, while 9 children with a mean age of 2;4 and a mean MLU of 3.71 imitated subjects 91% of the time. Núñez del Prado, Foley, and Lust (1993) gave English- and Spanish-speaking children a variety of two-clause sentences to imitate. When the second clause was a tensed embedded clause, the American child dropped the lexical subject of that clause about 2% of the time, while the Puerto Rican children dropped it about 15% of the time.

In summary, the observational data from Valian (1991), and the elicited imitation data from Gerken (1991), Valian and Hoeffner (1992), and Núñez del Prado et al (1993) converge. They show spontaneous subject production at a rate ranging between 50% and 80% in utterances with verbs, in American children ranging in age from 1;10 to 2;6, and in MLU from 1.5 to 3.0. They show marked contrasts in the behavior of children learning null and non-null subject languages.

There is no evidence to support the hypothesis (e.g., Hyams, 1986) that American children have an incorrect grammar with respect to null subjects. American children give no evidence of having *pro* in their grammars.

Whether children's very early grammars are structurally incomplete, as Guilfoyle and Noonan (1992) and Radford (1990) proposed, is less clear. On the whole, I think the data suggest that American children's early grammars are *structurally* complete, including the functional projections of IP and CP, even if they are *lexically* incomplete.

A more recent proposal to explain children's inconsistent use of subjects was Rizzi's suggestion (this volume, chapter 10) that children have CP available but do not always use it to head a sentence; the absence of CP then licenses a null constant, which is also present in the adult language (see also Lillo-Martin, this volume, chapter 13, who suggested that some absent subjects are null epithets). On this proposal, the child mistakenly treats an obligatory projection as optional. This explanation could be extended to account for the absence of subjects in adult casual speech, because both referential and nonreferential subjects are sometimes missing in spoken English. The child and adult would thus differ only in the frequency with which they treat an obligatory projection as optional, a difference best explained on performance grounds. (Rizzi himself did not draw this conclusion, but it is a natural extension of his proposal.)

Another suggestion (Rizzi, this volume, chapter 10) was that specifiers are optional in the adult grammar unless required by another principle (such as the Extended Projection Principle). In a structure without a CP specifier, a null constant in subject position will be licit. In the adult grammar, only empty categories that do not require identification (nonargumental expletives) can be used; that allows for the existence of strings with nonthematic verbs and no subjects. Rizzi assumed that in adult English empty referential subjects must be excluded. In fact, however, as mentioned earlier, casual speech contains examples of missing referential as well as missing nonreferential subjects, suggesting that adults relax the identification requirements in casual speech. That in turn suggests that the child differs from the adult only in degree, relaxing the identification requirement more often than the adult does. That difference, again, is best explained on performance grounds. A reinterpretation of Rizzi's suggestions (this volume) is that children's "stripped" structures are the result of performance pressures. If either of Rizzi's suggestions were correct, the child would be quantitatively, rather than qualitatively, different from the adult.

A performance-based alternative to competence-deficit accounts of inconsistent use of subjects is that the child's limited performance system is responsible for omissions of subjects and other elements (P. Bloom, 1990; Gerken, 1991; Mazuka, Lust, Wakayama, & Snyder, 1986; Valian, 1991). As a result of their performance limitations, children produce strings that are ungrammatical from the point of view of their own grammars, not just from the point of view of the adult grammar. Several investigators (L. Bloom, 1970; L. Bloom, Miller, & Hood, 1975; P. Bloom, 1990; Crain, 1991; Gerken, 1991;

Valian, 1991) have presented data supporting relevant performance limitations.

Notice that all children, regardless of language, should have performance deficits. Thus, all children, regardless of language, should produce subjects less often than adults do. That is an important prediction of performance accounts and it has been verified. Italian children produce subjects less often than their parents do (Valian, 1991); Chinese children produce subjects less often than adults do (Wang, Lillo-Martin, Best, & Levitt, 1992); Greek children produce subjects less often than their parents do (unpublished data in collaboration with H. Arsenidou); Brazilian children produce subjects less often than their parents do (unpublished data in collaboration with Z. Eisenberg).

Even children learning null subject languages produce subjects less often than adults do, indicating that part of their nonproduction is due to performance factors. If all children increase their use of subjects in the course of development, that suggests that something other than, or in addition to, their grammars is influencing their initial rate of subject use.

There are also data suggesting that pronominal subjects are difficult for children, regardless of language. An analysis of Valian's (1991) observational data shows an interesting pattern. If one adds together the subjects that are absent and the subjects that are pronouns and divides by total number of subjects (absent plus pronominal plus lexical), that percentage is roughly constant across the MLU range. For Group I children, MLU 1.5–2.0, it is 84%; for Group II, MLU 2.0–3.0, it is 88%; for Group III, MLU 3.0–4.0, it is 86%; for Group IV, MLU 4.0–4.5, it is 85%. However, the percentage of pronouns out of the whole total increases dramatically from Group I to Group II, from 53% to 77%, an increase of 45%. The difficulty of pronouns is also apparent in imitation tasks. Both Gerken (1991) and Valian and Hoeffner (1992) found that low-MLU children fail to imitate pronominal subjects much more than they fail to imitate lexical subjects.

The pattern found in both the observational and the imitation data could be interpreted as supporting the view that children's early grammars contain *pro*. For that reason the children initially have a small percentage of pronouns; when *pro* is expunged the children use a pronoun in cases where they formerly would have used *pro*. There is, however, an alternative interpretation, namely, that pronominal subjects create difficulties for all children, and that low-MLU children fail, for pragmatic, prosodic, and performance reasons, to use pronouns uniformly in contexts where they later will use them.

How could one test the two interpretations? If the second interpretation is correct, then increased pronoun use should be observed in children acquiring all languages, null subject languages as well as non-null subject. The data confirm that prediction. The Italian children's data (Valian, 1991) were analyzed in the same way as the American children's. At Time I the

five children (roughly ages 1;6–1;11) had a combined percentage of absent and pronominal subjects of 77%. At Time II (roughly ages 2;0–2;5) it was 81%. The percentage of pronouns out of the whole total goes from 7% at Time I to 10% at Time II. The increase is very small in absolute percentage points, but the relative increase—43%—is large. The Italian children thus show a similar pattern to the American children.

The data from our fifteen Brazilian Portuguese children are even clearer. The seven children below MLU 2 used absent plus pronominal subjects 89% of the time, and the eight children above MLU 2 used absent plus pronominal subjects 87% of the time, totals very similar to the American children's. The percentage of pronouns of the whole total increased from 18% to 38%. Again, there was a marked increase in use of pronominal subjects at higher MLUs.

The similarity across the language groups is striking. As development proceeds, children appear to increase their use of pronominals, whether their language is a non-null subject language like English or a null subject language like Italian or Brazilian Portuguese. The cross-linguistic pattern argues against an explanation based on the presence of *pro* in children's early grammars. If children increase their use of pronouns even when *pro* is continuously present, as the Italian and Brazilian Portuguese children do, then the American children's increase cannot be taken as evidence for a shift from a grammar with *pro* to a grammar without *pro*. Instead, the data show that children experience a difficulty with pronominal subjects that is independent of the target language, and that difficulty results in a selective absence of pronominal subjects at early stages of acquisition.

Difficulty in processing subject pronouns continues for quite some time. Read and Schreiber (1982) found that 7-year-olds had much more difficulty identifying and repeating the subject of a sentence when it was a pronoun, than when it was a multiword lexical NP. Similarly, Ferreira and Morrison (in press) reported that 5- and 6-year-olds had more difficulty identifying and repeating a pronominal subject than a proper name or Det-N subject. American children at those ages certainly do not have *pro* in their grammar, or any other grammatical deficit involving INFL subjects. The results with older children, like the cross-linguistic results, show that pronominal subjects are special in some way and cause processing difficulties unrelated to the Null Subject Parameter.

The data illustrate the importance of cross-linguistic information about children's use of subjects. Comparative data disentangle the strands of a child's productions. With only the speech of American children in hand, their increased use of subjects and pronominal subjects could mistakenly be attributed to a shift from having a grammar that licensed null subjects to a grammar that did not license null subjects. When, however, the same phenomenon appears in Italian and Brazilian Portuguese children, that potential explanation is demonstrated to be incorrect. Instead, two other factors,

working simultaneously, seem to be operating. Children's performance pressures target subjects, regardless of language; pronominal subjects are particularly difficult for children.

COMPETENCE AND PERFORMANCE

The context within which to understand the results reviewed here is a theory of acquisition that integrates competence and performance. Such a theory starts with the truism that even a child with a complete grammar of, for example, English could not produce or understand sentences without a performance system. A grammar alone does not buy speech. The performance system that accesses the child's knowledge and puts it to use buys speech. Conversely, a performance system cannot operate in a competence vacuum. There must be a grammar to access. It is because of the interdependence of competence and performance that it is impossible to make predictions about the child's productions by reference to either component alone. A complete theory of acquisition must specify both components, specify how each develops, and specify how the two interact.

Recent work in acquisition is moving in the direction of developing such a theory of acquisition. What would a theory that incorporated competence and performance look like? Work with adults provides us with two approaches. One approach involves linguistically informed computational models of parsing, where a given theory of competence is assumed, and parsers access competence in different ways (e.g., Berwick & Weinberg, 1984; Fodor, 1989; Pritchett, 1991).

Another approach involves linguistically informed models of production such as that of Garrett (1975). This model, which proposes different levels of productive representation, is already being adapted to language acquisition. Gerken (1991), for example, used it to argue that children's non-production of subjects is due to overuse of a trochaic template at the foot assignment level; Demuth (1992) has made a similar proposal. Overuse of such a template will result in the omission of unstressed initial syllables and thus in the loss both of pronominal subjects and of unstressed determiners. In a different vein, Mazuka and Lust (1988, 1990) have been developing production models that are intimately interconnected with competence models.

Drawing on previous approaches, I proposed (Valian, 1992) that the child has a preferred D-structure template, used to guide the syntacticization of whatever message he or she wishes to express. The D-structure template will be a tree provided by X' syntax (including CP, IP, VP, etc., assuming that all those projections are universal). Each projection will take the form of a head, single-bar, and double-bar level.

The use of a template is a way of achieving cognitive economy. The child fits the message to the preferred template, and the template incurs very little

cost (Gerken, 1991). Lexicalization of the template costs, and deviation from the template costs. In other words, the child can deviate, but the deviation will typically require economies elsewhere. Elements that will not fit into the template, such as those that would require iteration of bar levels, will tend not to be syntacticized, because syntacticization would require construction of a tree *de novo* rather than use of a prebuilt template. That predicts, for example, that auxiliary *be* will not be used as much as copula *be*, on the assumption that aux *be* requires iteration of bar levels (because two VPs are needed) and the copula does not (because only one VP is needed). That prediction is confirmed by data from both American and Italian children (Valian, 1992).

A template is parasitic on the child's grammar. For a usable template to exist, the child's grammar cannot be completely undecided. For example, the child cannot have a usable template for D-structure unless the grammar has a value for the head-direction parameter and the SPEC-direction parameter. Before the direction parameters are established, the child's template is like a mobile, with specifier and complement positions rotating around heads. In that mobile form, the template does not allow the child either to parse input or to produce speech. It is thus crucial for the child to quickly establish the direction parameters of his or her language. The paucity of word order errors even in children's earliest speech (Valian, 1986) is evidence that the direction parameters are in fact determined at the onset of combinatorial speech.

One general implication of the dependency between the parser and the grammar is that some parameters will be established before others, because they are crucial in allowing the child to produce and comprehend utterances (Kapur, this volume; Roeper & de Villiers, 1992). The child's need to parse the input and produce speech, and the nature of the target language, set priorities for grammar development. The parameters that are most frequently used in production and comprehension will be set first. The SPEC-direction parameter, head-direction parameter, and null subject parameter are candidates for parameters that will be set very early. And, as we have seen, the evidence from children's speech confirms that those parameters are indeed set early.

COMBINATORIAL EXPLOSION AND EVIDENCE SETS

In earlier work I introduced the *parsing constraint* as one constraint on an acceptable model of grammar development (Valian, 1990a). The child cannot appreciate the significance of input that contradicts the current parametric setting unless he or she is able to interpret that input as contradictory. But in order to interpret the input as contradictory the child needs access to the other, inactive, value (Valian, 1990a, 1990b), access which the standard parameter-setting account denies the child.

The obvious dilemma created by the parsing constraint can be solved by allowing both values of a parameter to feed the child's parser simultaneously

(Valian, 1990a, 1990b). In that way the child computes two inconsistent parses for relevant strings. For example, with the Null Subject Parameter, the child exposed to the string "Can't talk now" will perform one analysis on which the string is not a full sentence, and another on which the string is a full sentence with *pro* as its subject.

The dual value solution, however, creates in its turn a different problem. If the child's need for two parses is achieved by having all values of all parameters actively and simultaneously feed the parser, the child will have to perform hundreds of thousands of parses for each input. Providing the child with both values of each parameter leads to a combinatorial explosion.

The solution is to limit the occasions on which both values are activated in parsing either input or output. For the child's *output*, it will not matter which value feeds the parser because the child is not using his or her own speech as evidence. The value that feeds the output parser will either be the one for which the child has the most evidence to date (see below), or, if the grammar is completely undecided for that parameter, the value will be randomly chosen. Thus, no explosion occurs in parsing the child's output.

For the child's *input*, an explosion can also be avoided. The child's parser does not need access to both values for all of the input, but only for a relevant subset of the input. For the rest of the input it does not matter which value feeds the parser; it will either be the value for which there is the most evidence to date, or a randomly chosen value. Irrelevant input has no informational value. To understand how relevant subset is defined, it is necessary to introduce the notion of an *evidence set* for a parameter.

Each parameter defines an evidence set. Each value is associated with the structures whose presence or absence is directly entailed by the parameter. For the + value of the null subject parameter, the entailments are the presence of *pro* subjects with tensed verbs in both matrix and embedded clauses, and the absence of subjects with non-thematic verbs. (It is possible that the latter entailment does not hold across all null subject languages, see, e.g., Raposo & Uriagereka, 1990, but I am treating it here as universal.)

For the – value, the entailments are the absence of *pro* subjects with tensed verbs in either matrix or embedded clauses, and the presence of subjects with non-thematic verbs. The evidence set comprises the distinctive entailments of each value of a parameter, specifying both what should occur and what should not. (Other entailments no doubt also exist, but I concentrate on the two presented here.)

The evidence set tells the parser what to look for: (1) strings with tensed verbs but no overt subjects in both matrix and embedded position; (2) strings with non-thematic verbs. If the parser cannot identify tense or non-thematic verbs, only a single parse will result.

If the parser can identify tense, and encounters an input without an overt surface subject, a low-level parse is sufficient to recognize the absence of an

overt subject. That will key in both parametric values, which in turn will provide two possible interpretations of the input. On one interpretation there is an underlying *pro*; on the other interpretation the string is not grammatical.

If the parser can identify a non-thematic verb, a low-level parse is sufficient to recognize the presence or absence of a subject. Either case will key in both parameter values. If the subject is absent, one interpretation will be that *pro* is the subject; the other is that the string is not grammatical. If the subject is present, one interpretation is that the string is not grammatical and that the subject is some sort of intrusion; the other is that *pro* subjects are impossible.[1]

Evidence sets limit the number of occasions on which the parser computes more than one parse. Only those strings which bear on the parameter's entailments receive more than one parse. A computational explosion is thereby avoided.

THE UNSET INITIAL STATE

We now consider how parametric values are established, and their effect on the parser. The usual metaphor for setting parameters is the switch metaphor. Parameters are set one way or the other as switches are. If a parameter is set incorrectly, input triggers a change to the other value. On most parameter-setting accounts, the switch is innately set to a particular value. The switch metaphor is incompatible with the view I am proposing.

A compatible metaphor is that of a balance or scale. Each parameter is a two-pan balance, with the scales initially balanced perfectly. Each value has the same potential; neither is preweighted and neither is the default value. Language development consists of gathering evidence which will establish the correct value for each parameter. Some evidence may fall on one side of the balance, and some on the other. Once evidence begins to be tabulated, one side will weigh more than the other. Gradually, the evidence weighs one side down very far. At the earliest stages, however, initial evidence in favor of one side could be outweighed a little later by more evidence in favor of the other side. Thus, the earliest grammars could change frequently, as evidence is tabulated.

[1]In English, for weather verbs, the expletive "it" can appear, as in "it's raining." Whether weather verbs are genuinely non-thematic may be an issue. For "seem"-type verbs, the subjects are more variable: "it," as in "it seems that she enjoys good food," or a raised pronoun or lexical NP, as in "she seems to enjoy good food," "Jane seems to enjoy good food," or "I seem to enjoy good food." In the latter cases the subject is forced to raise from the lower clause to the upper clause. While previous discussions have focused on expletives, the correct focus is more likely to be non-thematic verbs.

With respect to whatever property of INFL licenses null subjects, for example, the scales are perfectly balanced initially. For a few children, some features of the input, such as the nonappearance of subjects about 5% to 10% of the time in adult speech (Valian, 1991, in press), could temporarily weight the balance in favor of INFL licensing null subjects. Later, the uniform presence of subjects in embedded tensed clauses, the morphology of English verbs, the presence of expletives (Hyams, 1986), and perhaps other properties, will weight the scale against an INFL licenser. For some children, the initial syntactic production structure (template) would have an incorrect property in INFL. For most children, however, the evidence appears to weight the correct alternative from the onset of combinatorial speech (giving rise to a correspondingly correct template).

Whichever parametric value is at the moment more strongly weighted will determine the template the child will use for all the output, and the template the child will use for parsing input outside the evidence set.

If the incorrect value is more strongly weighted the child will misparse almost all of the input. The English-speaking child, for example, will be misattributing whatever property of INFL licenses *pro* to all tensed verbs. That error will have no deleterious consequences, however, because the child is not using the form of the template to draw conclusions about the form of the grammar.[2]

Exactly how the child's learning mechanism deals with multiple parses, and exactly how the input is stored, are important topics for future research. After the parser delivers two parses the language acquisition device can either make an immediate choice between the two interpretations, effectively placing a weight on just one pan of the balance, or can delay a choice by placing equal weights on both pans.

The storage of weights can be accomplished purely passively. A two-pan balance does not compute which side weighs more; it simply registers weight on each side. That the human learner has means of tracking the frequency of input forms is clear; frequency effects are ubiquitous in language learning and language processing (Brown, Cazden, & Bellugi, 1973; Brown & Hanlon, 1970; Gathercole, 1986; Valian, in press; Valian & Coulson, 1988).

---

[2]The actual evidence set relevant to null subjects might be different from the one I sketched. Although one consequence of setting the parameter is the possibility of *pro* as subject, the cause is some property of INFL, yet to be fully specified. I have been proceeding here on the assumption that there is no simple property, like morphological uniformity, which can be read directly off the surface string and used to conclude that *pro* is or is not possible. The diversity of the world's languages appears to preclude such a simple licenser. If, however, there were such a simple licenser, the evidence set would be different and might require the child to use both values of the parameter to parse every incoming string containing INFL. Because so much of the child's input contains INFL, the child would have to establish the null subject parameter almost as soon as he or she established the head-direction parameter.

SUMMARY OF PROPOSAL

Under the proposal presented here, each parameter is initially unset, with both values available to the child as equally unweighted alternatives, as on a two-pan balance. The development of grammatical competence consists in weighting the pans differentially, via analysis of the input. Each parameter defines an evidence set, consisting of input that, when analyzed, will weight one pan or the other. The child looks for that evidence. Parameters are established in an order determined by how frequently they are needed to parse the input. Some parameters, such as the head-direction and SPEC-direction parameters, must be set in order for the child to produce any speech at all.

Comprehension and production of speech is directly handled not by the grammar, but by the child's performance system, as it is for the adult. Parsing of input and output is handled in two ways:

1. Whenever possible, the child (or adult) uses performance templates based on the current grammar, with the more strongly weighted value of each parameter feeding the parser. Templates are low-cost and allow the child to syntacticize the message or analyze the input easily.
2. When input that is part of an evidence set for a parameter enters and, via a low-level parse, is registered as belonging to an evidence set, the parser constructs a parse for each value of the parameter. The child's acquisition mechanism evaluates the consequences of each parse and weights one pan or the other more heavily. The mechanism is a hypothesis-testing device which is not itself part of the grammar.

The proposal addresses four problems in language acquisition. The first problem is the need for an account that integrates the child's developing competence and his or her developing performance, so that their complex interaction can be properly analyzed and understood, and so that predictions about production and comprehension can be firmly grounded. The proposal addresses that problem by separating the mechanism that acquires grammatical competence from the mechanism that understands and produces speech.

The second problem is that the child's parser needs multiple interpretations of relevant input. The proposal addresses that problem by defining an evidence set for each parameter; when an evidence set member is identified, all values of the parameter are accessed.

The third problem is the need to prevent a combinatorial explosion. The proposal addresses that problem by providing multiple parses only when a member of an evidence set is encountered. All output, and all evidence-irrelevant input, receives only a single parse.

The final problem is the need to account for the data. The data on acquisition of the null subject parameter(s), which have been summarized here, show very early competence but imperfect performance. The data suggest that the child determines the correct status of his or her language, with respect to null subjects, very early in acquisition.

ACKNOWLEDGMENTS

Preparation of this chapter was supported in part by a grant from the National Institute of Child Health and Human Development (HD-24369) and in part by a grant from the City University of New York PSC-CUNY Research Award Program. My thanks to J. J. Katz for helpful discussion and to an anonymous reader for helpful comments. Address correspondence to Virginia Valian, Department of Psychology, Hunter College, 695 Park Avenue, New York, NY 10021, USA.

REFERENCES

Berwick, R., & Weinberg, A. (1984). *The grammatical basis of linguistic performance.* Cambridge, MA: MIT Press.

Bloom, L. (1970). *Language development: Form and function in emerging grammars.* Cambridge, MA: MIT Press.

Bloom, L., Miller, P., & Hood, L. (1975). Variation and reduction as aspects of competence in language development. In A. Pick (Ed.), *Minnesota Symposia on Child Psychology* (Vol. 9, pp. 3–55). Minneapolis: University of Minnesota Press.

Bloom, P. (1990). Subjectless sentences in child language. *Linguistic Inquiry, 21,* 491–504.

Brown, R., Cazden, C., & Bellugi, U. (1973). The child's grammar from I to III. In C. A. Ferguson & D. I. Slobin (Eds.), *Studies of child language development* (pp. 295–333). New York: Holt, Rinehart and Winston.

Brown, R., & Hanlon, C. (1970). Derivational complexity and order of acquisition in child speech. In J. R. Hayes (Ed.), *Cognition and the development of language* (pp. 11–53). New York: Wiley.

Crain, S. (1991). Language acquisition in the absence of experience. *Behavioral and Brain Sciences, 14,* 597–650.

Demuth, K. (1992). Accessing functional categories in Sesotho: Interactions at the morpho-syntax interface. In J. M. Meisel (Ed.), *The acquisition of verb placement: Functional categories and V2 phenomena in language acquisition* (pp. 83–107). Dordrecht: Kluwer.

Ferreira, F., & Morrison, F. (in press). Children's metalinguistic knowledge of syntactic constituents: Effects of age and schooling. *Developmental Psychology.*

Fodor, J. D. (1989). Empty categories in sentence processing. *Language and Cognitive Processes, 4,* 155–209.

Garrett, M. (1975). The analysis of sentence production. In G. Bower (Ed.), *Psychology of learning and motivation* (Vol. 9, pp. 133–177). New York: Academic Press.

Gathercole, V. (1986). The acquisition of the present perfect: Explaining differences in the speech of Scottish and American children. *Journal of Child Language, 13,* 537–560.

Gerken, L. A. (1991). The metrical basis for children's subjectless sentences. *Journal of Memory and Language, 30,* 431–451.

Guilfoyle, E., & Noonan, M. (1992). Functional categories and language acquisition. *Canadian Journal of Linguistics, 37*, 241–272.

Hyams, N. M. (1986). *Language acquisition and the theory of parameters.* Dordrecht: Reidel.

Mazuka, R., & Lust, B. (1988). Why is Japanese not difficult to process? A proposal to integrate parameter setting in Universal Grammar and parsing. *Proceedings of the North Eastern Linguistics Society, 18*, 333–356.

Mazuka, R., & Lust, B. (1990). On parameter setting and parsing: Predictions for cross-linguistic differences in adult and child processing. In L. Frazier & J. de Villiers (Eds.), *Language processing and language acquisition* (pp. 153–205). Dordrecht: Kluwer.

Mazuka, R., Lust, B., Wakayama, T., & Snyder, W. (1986). Distinguishing effects of parameters in early syntax acquisition: A cross-linguistic study of Japanese and English. *Papers and Reports on Child Language Development, 25*, 73–82.

Núñez del Prado, Z., Foley, C., & Lust, B. (1993). The significance of CP to the pro-drop parameter: An experimental study comparing Spanish and English. In E. Clark (Ed.), *The proceedings of the 25th annual Child Language Research Forum* (pp. 146–157). Stanford, CA: Center for the Study of Language and Information.

Pritchett, B. L. (1991). Head position and parsing ambiguity. *Journal of Psycholinguistic Research, 20*, 251–270.

Radford, A. (1990). *Syntactic theory and the acquisition of English syntax: The nature of early child grammars of English.* Oxford: Basil Blackwell.

Raposo, E., & Uriagereka, J. (1990). Long-distance case assignment. *Linguistic Inquiry, 21*, 505–537.

Read, C., & Schreiber, P. (1982). Why short subjects are harder than long subjects. In E. Wanner & L. Gleitman (Eds.), *Language acquisition: The state of the art.* Cambridge: Cambridge University Press.

Roeper, T., & de Villiers, J. (1992). Ordered decisions in the acquisition of *wh*-questions. In J. Weissenborn, H. Goodluck, & T. Roeper (Eds.), *Theoretical issues in language acquisition: Continuity and change in development* (pp. 191–236). Hillsdale, NJ: Lawrence Erlbaum Associates.

Valian, V. (1986). Syntactic categories in the speech of young children. *Developmental Psychology, 22*, 562–579.

Valian, V. (1990a). Logical and psychological constraints on the acquisition of syntax. In L. Frazier & J. de Villiers (Eds.), *Language processing and language acquisiton* (pp. 119–145). Dordrecht: Kluwer.

Valian, V. (1990b). Null subjects: A problem for parameter setting models of language acquisition. *Cognition, 35*, 105–122.

Valian, V. (1991). Syntactic subjects in the early speech of American and Italian children. *Cognition, 40*, 21–81.

Valian, V. (1992). Categories of First Syntax: *be, be+ing,* and nothingness. In J. M. Meisel (Ed.), *The acquisition of verb placement: Functional categories and V2 phenomena in language development.* Dordrecht: Kluwer.

Valian, V. (in press). *Parental replies: Linguistic status and didactic role.* Cambridge, MA: Bradford Books/MIT Press.

Valian, V., & Coulson, S. (1988). Anchor points in language learning: The role of marker frequency. *Journal of Memory and Language, 27*, 71–86.

Valian, V., & Hoeffner, J. (1992). *Young children's imitation of subjects.* Unpublished manuscript, Hunter College, New York, NY.

Wang, Q., Lillo-Martin, D., Best, C. T., & Levitt, A. (1992). Null subject vs. null object: Some evidence from the acquisition of Chinese and English. *Language Acquisition, 2*, 221–254.