

The development of syntactic subjects in Portuguese-speaking children*

VIRGINIA VALIAN

AND

ZENA EISENBERG

Hunter College

(Received 22 August 1994. Revised 26 June 1995)

ABSTRACT

In order to separate competence and performance factors in acquisition of knowledge of syntactic subjects, we audiotaped and analysed the spontaneous speech of 20 Portuguese-speaking two-year-olds in natural conversation with Portuguese-speaking adults. We separated the children into three groups based on Mean Length of Utterance in Words: 1;5-1;9; 2;0-2;9; 3;0-4;9. Our cross-sectional data demonstrated that Portuguese-speaking children increased their use of subjects from 28% in the lowest-MLUW group to 57% in the highest-MLUW group. The children in the highest-MLUW group almost perfectly matched the adult speakers in the study on every measure. The increase in children's use of subjects was primarily due to an increase in the use of pronominal subjects. A comparison between Portuguese- and English-speaking children suggests that adult competence about the status of subjects is present at the onset of combinatorial speech, as shown by differential production of subjects. Each group also experiences performance limitations, as shown by the increase in subject use as development proceeds.

INTRODUCTION

The case of 'null' subjects provides one example of how crosslinguistic comparisons can be used to separate competence and performance. In the

[*] This research 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. We thank Stephanie Aubry and Heliana Mello for discussion of earlier drafts, James Hoeffner for comments on memory development, and two anonymous readers for their helpful reviews. We thank the children, parents and day care centres whose participation made this study possible. Address for correspondence: Virginia Valian, Department of Psychology, Hunter College, 695 Park Avenue, New York, NY 10021, USA.

present study, we examine the speech of very young Portuguese speakers, and compare it with the previously reported speech of comparable American English speakers (Valian, 1991), in order to tease apart which aspects of developmental change are due to changes in children's knowledge of subjects and which are due to changes in their ability to access and use their knowledge.

Children learning language must determine, in the course of acquisition, whether their language is one which, like Portuguese, allows non-overt subjects or is one which, like English, does not. (1) is grammatical in Brazilian Portuguese, although it lacks an overt subject, but its equivalent in English, (2), is ungrammatical.

- (1) Estou indo ao cinema
 (2) Am going to the movies

We are adopting principles-and-parameters theory as our linguistic framework, although we do not adopt it as a theory of language acquisition (Valian, 1990a, 1990b, 1993, 1994). Within parameter theory, the underlying structure (D-structure) of (1) has a subject, referred to as *pro* (called 'little' *pro*). *pro* is a phonetically unrealized pronoun similar in most respects to overt pronouns (e.g. *I, you, it*). Languages like Portuguese allow *pro* as a subject. Languages like English, in contrast, do not allow *pro* subjects. Thus, children are not simply learning whether their language requires an overt subject; they are also learning whether *pro* subjects are allowed in their grammar.

Exactly what differentiates languages which allow *pro* subjects from those which do not is not yet known. One property that distinguishes null and non-null subject languages (other than the possibility of non-overt subjects) is the existence of expletives. In null subject languages there is no overt expletive pronoun like the *it* in (3), whereas in non-null subject languages expletives exist. The presence or absence of expletives is thus a reliable indicator of whether the language allows null subjects. In Portuguese, a null subject language, the only way of forming (3) is by using (4), of which (5) is the English equivalent.

- (3) It's raining today
 (4) Está chovendo hoje
 (5) Is raining today

Explanations of inconsistent subject use

All children, regardless of language, initially use overt sentence subjects inconsistently. That is, children use overt subjects for 20–70% of their tensed verbs; even children learning English do not initially use subjects 100% of the time, or even 90% of the time. The question we address is how

best to understand that phenomenon, and the subsequent developmental changes in children's use of subjects.

Two accounts can be contrasted. One set of explanations attributes a common property, which licenses *pro*, to both non-null and null subject speakers' initial grammars. The identity of the null subject is given by the verb ending or by a preceding topic (Hyams, 1986; Hyams & Wexler, 1993). On the '*pro*' hypothesis, American children's early grammars are deficient. A related set of explanations treats empty subjects as other types of null constituents (Lillo-Martin, 1994; Rizzi, 1994). A final set of competence-deficit explanations proposes that the child's early grammar lacks functional categories (such as inflections and complementizers), and therefore allows the subject position in the Verb Phrase (VP) to go unfilled (Guilfoyle & Noonan, 1992; Roeper & Rohrbacher, 1995). (See Valian, 1991, for a fuller description of the major competence-deficit proposals.)

In contrast to competence-deficit explanations are explanations which treat inconsistent subject usage as the reflection of a deficit in the child's ability to access and use its grammatical knowledge. The performance-deficit explanations have in common the idea that the child has performance limitations that interfere with her ability to use all of the knowledge she possesses (L. Bloom, 1970; Mazuka, Lust, Wakayama & Snyder, 1986; P. Bloom, 1990, 1993; Valian, 1990b, 1991, 1994; Gerken, 1991, 1994; Nuñez del Prado, Foley, Proman & Lust, 1993). Speech activities which are automatic in the older child and adult are likely to require more deliberate, and therefore more cognitively demanding, processing in the younger child.

We propose, following work by Chi (1978) and Case, Kurland & Goldberg (1982), that processing limitations are reduced as learners develop and recruit effective mnemonic strategies, and as their cognitive and perceptual operations become faster and more efficient. Those operations then require less processing space, increasing the effective working memory capacity of the child. Studies of dual task performance in adults have shown that with practice, cognitive and motor tasks can become increasingly automatized (La Berge & Samuels, 1974; Schneider & Shiffrin, 1977). An unfamiliar, unpractised task requires attention and therefore places demands on limited processing resources. With practice, however, task performance becomes increasingly free of attentional control and, with sufficient practice, becomes 'automated'.

In the case of children's production of subjects, we hypothesize that the various cognitive operations that go into planning and producing an utterance become more and more automatic as the child gains linguistic experience. The result is less strain on the child's limited capacity. At the beginning, however, the child attempts to economize in production by performing as few computations as possible. One type of computation is the insertion of lexical items and syntactic features (Valian, 1992). The child minimizes

such insertions at the onset of combinatorial speech. Inconsistent subject use is one result of that economy.

The available data support performance-deficit explanations better than competence-deficit explanations of American children's early inconsistent use of subjects. Valian (1991), for example, found that very young American and Italian children differed markedly in early subject use. Even American children with a Mean Length of Utterance (MLU) below 2.0 morphemes used subjects an average of 69% of the time, compared to their Italian peers who used subjects only 30% of the time. The American children's speech showed no clusterings predicted by any competence-deficit account. Data from elicited imitation tasks have likewise indicated that American children have no competence deficit with respect to subjects (Nuñez del Prado *et al.* 1993; Valian, Hoeffner & Aubry, in press).

Several lines of evidence from American children have suggested that performance limitations are at the root of children's failure to produce subjects consistently. For example, L. Bloom (1970), P. Bloom (1990), and Valian (1991) each found a relation between the length of a child's VP and the likelihood of the child's using a subject. VPs are longest when no subject is used, second longest when a pronominal subject is used, and shortest when a full lexical subject is used. Similarly, Valian *et al.* (in press) found that children were more likely to imitate the subject of short sentences than long ones.

Despite the overall support for performance-deficit explanations, certain features of children's development are also compatible with competence-deficit explanations. Two examples are noteworthy. First, in elicited imitation tasks, young American children imitate pronominal subjects at a much lower rate than lexical Noun Phrase (NP) subjects (Gerken, 1991; McGregor & Leonard, 1994; Valian *et al.* in press). Although the data can be interpreted as due to the use of a metrical template invoked under performance limitations (Gerken, 1991, 1994), or to independent difficulties with pronouns, or to pragmatic influences, they can also be interpreted as a competence deficit. If children mistakenly allow *pro* subjects, they will tend to use *pro* instead of an overt pronoun.

The second example concerns the course of development. English-speaking children increase their use of subjects over the course of development, but the data for speakers of null subject languages are less clear. A performance-limitation explanation would predict that ALL children will increase their use of subjects over time, because all children's performance limitations will decrease over time. A competence-deficit explanation, on the other hand, would predict that only American children's subjects would increase. Even very young children of null subject languages would be expected to use subjects at the adult rate. And prior research on Italian (Valian, 1991), in accord with the competence-deficit expectation, indicated

that Italian children's subjects as a whole did not increase over the one-year period from 1;6 to 2;6 that formed the basis of the observations (although pre-verbal subjects did increase).

Research on children learning Asian languages is more in accord with a performance-deficit prediction. Young Chinese (Wang, Lillo-Martin, Best & Levitt, 1992), Japanese (Mazuka, Lust, Wakayama & Snyder, 1986), and Korean (Kim, in press) children all use subjects less frequently than do older children and adults. The differences between young Italian speakers on the one hand and young speakers of Asian languages on the other hand could reflect differences in how *pro* is licensed and identified in Romance and Asian languages. (Although the exact mechanisms of licensing and identification are currently in dispute, it is clear that they differ in the two language types. In Romance null subject languages, including Portuguese, 'rich' agreement allows and identifies *pro*. In Asian null subject languages, the absence of overt agreement is related to the possibility of *pro*, while identification occurs via discourse.) But Valian's (1991) Italian data might be anomalous, or an increase might have occurred after 2;6. We accordingly examine the development of subjects in another Romance language, Portuguese. We predict that Portuguese-speaking children's development will demonstrate an increase in the use of subjects similar to that found in English-speaking children.

If subject use does increase among all children, regardless of language type, that has important theoretical implications. Data from Valian (1991) show that pronominal subjects in particular increase across development in English-speaking children. Hyams & Wexler (1993) have interpreted the increase as the consequence of a shift from a null subject grammar to a non-null subject grammar. Their reasoning is that the initial availability of *pro* substitutes for overt pronouns; as *pro* is phased out, use of overt pronouns increases. If, however, children of null subject languages also increase their use of pronominal subjects, that reasoning is untenable.

An examination of Portuguese-speaking children's sentence subjects will allow a test of competence- and performance-deficit explanations. If Portuguese-speaking children increase their use of subjects in the same way that English-speaking children do, that will argue strongly for a performance-deficit explanation.

Subject-verb agreement in Portuguese

Italian and Spanish are 'classic' Romance null subject languages. Each person/number combination in the present tense is distinct. The morphology on the verb thus provides a unique identification of the person and number of the non-overt subject. But unique identification is not a necessary property of null subject languages, even within the Romance language family.

Portuguese, for example, does not provide unique identification, even though it is a null subject language.

In order to familiarize the reader with Portuguese, we review a few facts about subject-verb agreement in Portuguese. The conjugation paradigm for *to go* in Standard Brazilian Portuguese is shown in (6). There are many dialects of Brazilian Portuguese, and the paradigms differ from dialect to dialect. We are concerned here only with Standard Brazilian Portuguese, which we refer to hereafter simply as Brazilian Portuguese. As can be seen, 2nd person singular (2ps) and 3rd person singular (3ps) share a verb inflection, as do 2nd person plural (2pp) and 3rd person plural (3pp).

(6)

Singular		Plural	
Eu (I)	vou	A gente (we)	vai
		Nós (we)	vamos
Você (you)	vai	Vocês (you, pl.)	vao
Ele (he)	vai	Eles (they, m.)	vao
Ela (she)	vai	Elas (they, f.)	vao

Brazilian Portuguese and European Portuguese are mutually intelligible dialects, but there are differences between them. Brazilian and European Portuguese differ with respect to 2ps. In European Portuguese a distinctive form of 2ps, *tu*, with its own distinct verb ending, is commonly used; *você* is a formal 2ps pronoun in European Portuguese. In Brazilian Portuguese *você* is the informal 2ps pronoun; *tu* also exists in some dialects of Brazilian (not represented in our sample).¹

The 1st person singular (1ps) verb ending is distinct from all other person/number combinations in both European and Brazilian Portuguese. There are two forms of 1st person plural (1pp). One (*a gente*) uses the same verb ending as the 2ps and 3ps; the other (*nós*) has an ending distinct from all other combinations. *A gente* is used more often than *nós* in Brazilian Portuguese, but if a null subject is used for the 1pp, the *-os* verb ending is used, allowing for distinctiveness.

[1] Other syntactic differences between European and Brazilian Portuguese exist. For example, Brazilian Portuguese has a distinct present progressive form, which European Portuguese had at one time but no longer has. European Portuguese now uses an infinitive where Brazilian Portuguese uses the progressive. The languages also differ in placement of object clitics. Brazilian Portuguese places the object before the verb, as in (1), but European Portuguese usually places the pronoun directly following the verb, as in (2). Brazilian speakers accept (2) as grammatical, although in some dialects it is unnatural.

(1) Eu vou te mostrar isso
 I go you to show this ['I am going to show you this']
 (2) Eu vou mostrar-te isso
 I go show-you this ['I am going to show you this']

Adult use of subjects among Brazilian Portuguese speakers

Since Portuguese differs from Italian and Spanish in the non-uniqueness of its verb endings, one might expect that speakers of Portuguese would use subjects more than speakers of either Italian or Spanish. Comparative figures for frequency of subject use are not available. Valian (1991) calculated estimates from Italian parental speech collected by Bates (1976) and concluded that subjects were used approximately 50% of the time by Italian parents when speaking to their children. The rate of subject use in adult-to-adult conversations is not known.

Although Portuguese speakers believe that null subjects are more common in European than Brazilian Portuguese (Lira, 1982; Wheeler, 1982; Teixeira, 1986; Galves, 1987), quantitative data for European Portuguese are not available. Several investigators, however, have presented estimates of subject use in Brazilian Portuguese. The estimates vary widely from sample to sample, perhaps reflecting differences in source of conversation and differences in data tabulation. (Most investigators have provided only minimal information about how data were tabulated.)

Lira (1982) examined 15 minutes of speech from 30 Brazilian speakers who were being interviewed about their lives. She examined all subject positions, and noted whether they were filled by a lexical subject (e.g. *o livro* - 'the book'), by a pronominal subject (e.g. *eu* - 'I'), or were empty. Overall, she found that 65% of subject positions had either a lexical or pronominal subject, and that 68% of the overt subjects were pronouns. If that figure is compared with Valian's (1991) estimate for Italian speech, it would indicate that Brazilian Portuguese speakers use subjects more often than Italian speakers do. Adult-to-adult speech may well differ, however, from adult-to-child speech.

Other data are restricted to the percentage of pronominal subjects out of pronominal plus null subjects, with full lexical subjects excluded from consideration. Lira (1982) found that speakers used a pronominal subject 56% of the time, with a range from approximately 40 to 75%, depending on the person and number of the pronoun. Duarte (1993), in contrast, reports use of pronouns 75% of the time. (Duarte refers to Lira's data as similar to her own, but she seems to have misinterpreted Lira's tables.) Duarte's source, however, was the text of a play rather than spontaneous speech, and thus might not accurately reflect actual usage.

Figures for individual person-number combinations have also been reported (again with lexical NPs excluded from consideration), with most data available for 3ps. Tarallo (1993) found that 3ps pronouns were used 66% of the time in Brazilian speech. Duarte (1993) reports unpublished work examining informal television interviews, and estimates 61% overt

pronominal subjects for 3ps. Lira (1982) is again lower, reporting overt 3ps usage of 47%.

Figures for 1ps are provided by Lira (1982), who estimates that *eu* is used in a little over half the possible contexts, and Duarte (1993), who estimates from the text of a play that *eu* is used in 80% of the possible contexts. What is especially interesting about those figures is that the 1ps verb ending is unique. Brazilian Portuguese speakers need never use a pronoun to convey the identity of the 1st person subject, yet they use subjects even more for 1st person than for 3rd person. Thus, whatever the source of Brazilian speakers' relatively high use of subjects, the phenomenon is not restricted to those person-number combinations which are ambiguous, but occurs across the entire system.² Despite the wide variation in estimates of pronoun use in Brazilian Portuguese, and the lack of data from Italian, most investigators (Lira, 1982; Wheeler, 1982; Teixeira, 1986; Galves, 1987) have concluded that null subjects are used less often in Brazilian Portuguese than in Italian, Spanish, or European Portuguese.

In the present study, we examine the spontaneous speech of children speaking Brazilian and European Portuguese. We also measure the speech of adults interacting with the child in order to establish the characteristics of adult input, and to compare adult-to-child speech with previously collected adult-to-adult speech. We compare the results for children's usage of subjects with Valian's (1991) data for American children. Since very similar data collection and data analytic procedures are used, a more meaningful crosslinguistic comparison than any which are currently available can be made. We predict that Portuguese-speaking children will, like American children, show an increase in use of subjects as a function of MLU, and an increase in use of pronominal subjects in particular.

METHOD

Children

Twenty children (7 girls, 13 boys) were audiotaped, using a cassette tape-recorder, in natural conversation and play. The two-year-olds were recruited in the U.S. and Brazil among acquaintances of the second author (Z. E.), and via churches, day care centres, and nursery schools. The children's families ranged in socio-economic status from working class to upper-middle class.

[2] Both Duarte (1993) and Tarallo (1993) report a diachronic increase in the use of pronominal subjects in Brazilian Portuguese. Duarte has proposed that, as Brazilian Portuguese evolved from a language in which verb endings encoded more distinctions than the present one with few distinctions, speakers increased their use of overt subjects. Tarallo has hypothesized a diachronic relation between the loss of the use of object pronouns and the increase in the use of subject pronouns. An evaluation of those hypotheses is beyond the scope of the present paper.

One child was bi-racial; the others were white. The children ranged in age from 2;0 to 2;10.

Ten children were observed in Brazil and 10 in the U.S. All children were monolingual Portuguese speakers. The children observed in the U.S. had at most a word or two of English in their productions; their exposure to English was minimal because they were cared for either at home by monolingual parents or in a monolingual Portuguese-language day care centre.

Of the 10 children observed in the U.S., five (MLUW's of 1.67, 2.31, 2.49, 2.83, and 2.94) spoke a European Portuguese dialect and five spoke a Brazilian Portuguese dialect. The results were similar whether the European Portuguese children were included or excluded; we included them in order to increase sample size. The children who spoke European Portuguese did not use fewer overt subjects than the children who spoke Brazilian Portuguese; rather, they used subjects somewhat more often, a phenomenon which seemed linked to their MLUW and their verb usage. (A description of each subject is available from the senior author.)

An additional 15 children were excluded from the study. Two spoke a mixture of English and Portuguese; one spoke only English; seven refused to speak altogether; three used primitive and unintelligible speech; one was not successfully recorded due to a malfunctioning tape-recorder and one provided too little speech for analysis.

Procedure

All sessions were conducted, recorded, and transcribed by the second author (Z.E.), a female native speaker of Brazilian Portuguese. Each child was seen once at the child's home, day care centre, or nursery school. The child's adult conversational partner varied, depending on the availability of an adult. Three of the children spoke with their mother; six with a day care or nursery school teacher; 11 with the observer. There were no discernible differences due to partner. (A list of each child's conversational partner is available from the senior author.)

Fifteen to 30 minutes were devoted to spontaneous conversation, in which illustrated children's books were used to stimulate conversation. The books did not tell a story, but displayed different objects. For the children taped in the USA, the book was Richard Scarry's *Best Word Book Ever* (1980). None of the children had seen the book before. For the children taped in Brazil, two books were used, *Meus Primeiros... Sons* (1992), and *Minhas Primeiras... Formas* (1992).

Transcription and MLU calculation

The second author (Z.E.) transcribed each tape using conventional Portuguese orthography. Doubtful portions were placed in parentheses, and completely unintelligible portions were so indicated. Utterances with doubt-

ful portions were included in analyses, and those with unintelligible portions were excluded.

Each child's Mean Length of Utterance in words (MLUW) was calculated according to Brown's (1973) procedures. Since Portuguese is a highly inflected language, and a given noun or verb ending encodes a number of grammatical features, words were counted instead of morphemes. In keeping with Brown's procedure, we excluded certain utterances: those which were unintelligible in whole or in part, incomplete utterances, and hesitations. Seven of the 20 children had fewer than 100 utterances available for an MLUW count; for those children, plus two others, the first page of the transcript was included in order to maximize the number of utterances available. The seven children with fewer than 100 utterances had from 64 to 93 utterances.

Eight adults' MLUWs were also calculated. Two of the eight had fewer than 100 utterances; those two had 55 and 87 utterances available. For those two adults, plus one other, the first page of the transcript was used.

Utterances used in analyses

Three classes of child utterances were eliminated from further analyses. The first class, discards, consisted of utterances unintelligible in whole or in part, interrupted utterances, and utterances that consisted solely of single word assents, dissents, or hesitations. (Unintelligible utterances, interrupted utterances, and hesitations were also excluded from MLUW calculations.) The second class consisted of imitations and routines (utterances that were repeated with no variation from one time to the next). The third class consisted of imperatives. All other utterances were considered usable.

Since multi-clause utterances were used by both children and adults, the unit of analysis for assessing subject use was the clause rather than the utterance. In multi-clause utterances where the verb of an embedded clause was an infinitive which could not take a subject (e.g. the equivalent of 'I want to go'), the utterance was scored as a single clause. There were no apparent differences between embedded and matrix tensed clauses, and they were therefore combined. (The small number of multi-clause utterances prevents meaningful sub-analyses.)

There were also no apparent differences between *wh*-questions and other structures, so we included *wh*-questions in analyses. In most *wh*-questions the *wh*-word was an object or adjunct. For example, in the equivalent of 'where is she?', 'she' is the subject. In the equivalent of 'where is (she)?', the subject was considered to be absent. When the *wh*-word was the subject, as in the equivalent of 'who bought you that doll?', the sentence was scored as having a pronominal subject. (The small number of *wh*-questions prevents meaningful sub-analyses.)

Scoring

Verb use. We calculated the percentage of non-imitative, non-imperative clauses with verbs out of all usable clauses for all children and eight adult conversational partners (see below for description of adult sample). (the numerator was the number of non-imitative non-imperative clauses with verbs. The denominator was the number of usable non-imitative non-imperative clauses, including a verb or not.)

Subject use. For all the children and the eight adults we computed the percentage of all subjects out of the clauses that included a verb (with the exception, as noted above, of infinitives where a subject could not be expressed). (The numerator was the number of grammatical subjects; the denominator was the number of clauses with a verb.) We also computed the percentage of all subjects which were pronominal. (The numerator was the number of pronominal subjects; the denominator was the number of all subjects.)

Type of pronominal subjects in adults. Speech from eight of the adult conversational partners was used to calculate how often different pronouns were used in subject position. One of the eight spoke European Portuguese, the rest spoke Brazilian Portuguese. We also calculated, for those adult utterances that lacked a subject, the person and number of the missing subject. Since the observer (Z.E.) was the adult in 11 sessions, we included her data only once, choosing a session at random. Two female teachers were the adult in two sessions each; here we chose the session for each teacher that contained the largest number of utterances. All the other adults (three mothers and two female teachers) were included.

RESULTS

Children's use of verbs and subjects

The children were divided into three MLUW groups to facilitate comparison with earlier data from American children (Valian, 1991) and with data from the Portuguese-speaking adults in this study. The data on use of verbs and subjects are displayed in Table 1. The data for all children are shown first, followed by the data broken down by MLUW group, followed by the data from eight adults. (See the Method for a description of the adult sample.)

Group I ($N = 7$) ranged in MLUW from 1.58 to 1.93; Group II ($N = 10$) ranged from 2.06 to 2.94; Group III ($N = 3$) ranged from 3.35 to 4.75. The mean MLUW for Group III was very similar to the mean MLUW for the adults. As MLUW increased, so did the children's use of verbs. In Group I a mean of 36% of all usable clauses included a verb; in Group II 56%; in

TABLE 1. *Children and adults: verb use, subject use, and pronominal subject use^a*

	MLUW	Age	Mean % (S.D.) +V. Clauses ^b	Mean % (S.D.) +Subj Clauses ^c	Mean % (S.D.) ProN Subjects ^d
All children					
N = 20	2.39 (0.79)	2;6 (0;3)	51 (18)	37 (20)	68 (24)
Group I					
N = 7	1.71 (0.13)	2;5 (0;3)	36 (10)	28 (20)	61 (17)
Range	1.58-1.93	2;2-2;9	24-52	8-59	37-87
Group II					
N = 10	2.43 (0.34)	2;6 (0;2)	56 (16)	38 (17)	70 (30)
Range	2.06-2.94	2;0-2;8	34-78	27-72	60-96
Group III					
N = 3	3.83 (0.79)	2;6 (0;4)	72 (2)	57 (22)	79 (14)
Range	3.35-4.75	2;3-2;10	70-74	44-82	64-91
Adults					
N = 8	3.88 (0.75)		76 (8)	56 (6)	80 (7)
Range	3.02-5.17		65-92	49-65	68-89

^a See Table 2 for frequencies.

^b Numerator = usable non-imperative non-imitative clauses with a verb; denominator = usable non-imperative non-imitative clauses.

^c Numerator = +V clauses with a subject; denominator = +V clauses.

^d Numerator = pronominal subjects; denominator = lexical and pronominal subjects.

Group III 72%. The Group III children and the adults use verbs to the same extent (72% and 76%, respectively).

The children's use of subjects increased from a mean of 28% of all clauses with verbs in Group I to 38% in Group II to 57% in Group III. The similarity between Group III and the adults is again notable: their average use of subjects was the same. Finally, though to a lesser degree, the percentage of subjects that were pronouns increased from 61% in Group I to 79% in Group III. Again, the mean for the children in Group III is the same as the mean for the adults, who used pronominal subjects 80% of the time. (Data for each child individually are available from the senior author.)

To analyse further children's use of lexical, pronominal, and null subjects, we examined all subject positions, filled and unfilled. The pronominal data in this analysis, shown in Table 2, differ from the data shown in Table 1. In Table 1, we present the percentage of overt subjects that are pronominal. In Table 2, we present the percentage of subject positions that are pronominal. Table 2 shows that the percentage of subject positions occupied by full lexical NPs changes little as MLUW increases. In Group I 9% of all subject positions are lexical, in Group II 10%, and in Group III 14%. The adult percentage is 11%. In contrast, the percentage of positions occupied by pronouns increases considerably across groups. In Group I 18% of all

DEVELOPMENT OF SUBJECTS IN PORTUGUESE

TABLE 2. *Children and adults : frequency of verbs and subjects*

	Verb		Lexical S.		Pronominal S.		Null S.	
	Freq	%	Freq	%	Freq	%	Freq	%
All children								
<i>N</i> = 20								
Mean	52	51	4.5	10	16	27	32	63
S.D.	30	18	3.1	9	15	19	20	20
Group I								
<i>N</i> = 7								
Mean	34	36	3.3	9	7.3	18	24	72
S.D.	9.7	10	2.4	7	7.7	16	5.9	20
Group II								
<i>N</i> = 10								
Mean	59	56	4	10	18	28	36	62
S.D.	36	16	2.6	9	17	20	25	17
Group III								
<i>N</i> = 3								
Mean	71	72	8	14	29	43	34	44
S.D.	27	2	5	14	9	8	24	22
Adults								
<i>N</i> = 8								
Mean	152	76	18	11	63	44	72	44
S.D.	148	8	19	5	53	7	77	6

TABLE 3. *Intercorrelations between child variables*

	MLUW	Age	% Verb Use	% Subj. Use	% Pron. Subj.
MLUW		0.21	0.71***	0.48*	0.36
Age			0.19	0.17	0.68***
Verb use				0.57**	0.51**
Subject use					0.30
<i>N</i> = 20					

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

subject positions are pronouns, in Group II 28%, and in Group III 43%. The adult percentage is 44%. As with the data in Table 1, the children in Group III are almost identical to the adults.

Table 2 shows that the increase in subjects that Table 1 documents is due primarily to a changing trade-off between null subjects and pronominal subjects. Null subjects decrease with development, becoming expressed as pronouns. Lexical subjects are relatively stable.

Correlations among child subject use and other variables

We computed simple and partial correlations in order to examine the relations among children's MLUW, age, verb use, subjects use, and pronominal subject use, yielding the zero-order correlation matrix shown in Table 3. Our basic findings were that MLUW and verb use were positively correlated with overall subject use, and that age and verb use were positively correlated with pronominal subject use. Portuguese-speaking children's use of subjects increases as a joint function of increasing MLUW and increasing verb use.

The principal correlates with subject use were MLUW and verb use. MLUW was significantly correlated with subject use, $r = 0.48$, $p < 0.05$. That correlation was only slightly reduced when age was partialled out, $r = 0.46$, $p < 0.05$, but was eliminated when verb use was partialled out, $r = 0.14$. Since MLUW and verb use were highly correlated, $r = 0.71$, $p < 0.001$, that suggests that the relation between MLU and subject use is mediated through their joint intercorrelations with verb use. As would be expected on that interpretation, verb use was positively related to subject use, $r = 0.57$, $p < 0.01$, a relation that was in turn eliminated when MLUW was partialled out, $r = 0.36$. Children's MLUW and verb use thus jointly contribute to subject use.

The data from Portuguese-speaking children partially replicate Valian's (1991) data from American children. Valian also reported significant correlations between MLU and subject use, and between verb use and subject use in American children. In contrast to the Portuguese data, however, the American correlation between MLU and subject use remained strong when verb use was partialled out, and the correlation between verb use and subject use remained high when MLU was partialled out. For the Portuguese-speaking children, MLUW and verb use correlated jointly but not independently with subject use.

MLUW was not related to how often children use pronominal subjects, but age and verb use were. The simple correlation between age and pronominal subject use was 0.68 , $p < 0.001$. Age remained strongly associated even when MLUW and verb use were partialled out, $r = 0.70$, $p = 0.001$. Verb use was also related to pronominal subject use, $r = 0.51$, $p < 0.05$. Even when MLUW and age were partialled out, verb use continued to be positively correlated with pronominal subject use, $r = 0.47$, $p < 0.05$. Unfortunately, Valian (1991) did not report correlations with pronominal subjects, so that comparisons are not possible there.

The children's MLUW and age were not correlated. That finding was unexpected, given the typical positive correlation among English-speaking children between MLU and age. Cultural differences may be responsible.

American children tend to speak in front of strangers regardless of their level of linguistic sophistication. Many of the children in the present study were reluctant to speak in the presence of a stranger, as the refusal by seven children to speak at all indicates. Older children with limited speech were probably less shy than younger children with limited speech; conversely, the younger children with more advanced speech were probably more willing to speak than the younger children with less advanced speech. If so, a real relation between MLUW and age may exist in the population of Portuguese-speaking children, but be masked in our sample.

It is important to consider whether the children's shyness could have influenced other features of our data. If the younger children were more linguistically advanced than comparably aged children from the general population, and the older children less advanced, the developmental patterns that we have observed should be more marked in the general population. We may thus be underestimating how much development takes place.

Differences between Brazilian and European Portuguese children

Five of the children – one in Group I and four in Group II – spoke European Portuguese. If their data were excluded, the statistics for Group II would change. The four European Portuguese children in that group had a mean MLUW of 2.64 and a mean verb use of 62 %, compared to an MLUW of 2.29 and verb use of 52 % for the Brazilian Portuguese children. The European children correspondingly used subjects more than their Brazilian counterparts, 52 % compared to 28 %. Thus, if the European Portuguese children were excluded, the increase in Brazilian children's use of subjects would not be apparent until Group III.

Subject-verb agreement

The children made few errors of subject-verb agreement. Across all 20 children, only nine errors were recorded; the errors were spread across the MLUW range. Seven of the nine errors were use of the 3ps ending with a 1ps pronoun. The other two were the use of the 3ps ending with a 3pp noun. For the four lowest-MLU children, only 3ps verb endings were used.

Group comparisons with American data

Table 4 compares the children from the present study with the data from Valian's (1991) English-speaking U.S. children. In order for a crosslinguistic comparison of subject use to be meaningful the children must be roughly equated on other measures. The Portuguese-speaking children were placed into MLU groups corresponding to the U.S. children's MLUs, and the mean MLUs are very similar. At each MLU level the children in the two language groups are also very similar in verb usage. The Portuguese-

TABLE 4. Comparison of English- and Portuguese-speaking children^a

	N	MLU	Age	% (S.D.) V	% (S.D.) Subj.	% (S.D.) Pron. Subj.
English I	5	1.77	2;0	27 (12)	69 (12)	77 (15)
Portuguese I	7	1.71	2;5	36 (10)	28 (20)	61 (17)
English II	5	2.49	2;5	52 (9)	89 (4)	87 (6)
Portuguese II	10	2.43	2;6	56 (16)	38 (17)	70 (30)
English III	8	3.39	2;5	70 (8)	93 (4)	85 (5)
Portuguese III	3	3.83	2;6	72 (2)	57 (22)	79 (14)
Portuguese Adults	8	3.88		76 (8)	56 (6)	80 (7)

^a The data for the English-speaking children are taken from Valian (1991).

speaking children are probably more linguistically advanced than the English-speaking children they are matched to: the Portuguese-speaking children's MLU measurements were in words rather than morphemes, and they use verbs slightly more often than the U.S. children.

Although the two language groups are similar in MLU, age and verb use, they differ dramatically in subject use. In Groups I and II, the American children use subjects more than twice as often as the Portuguese-speaking children, and in Group III more than 1.5 times as often. Note also that the variance is much greater for the Portuguese-speaking children. With respect to pronouns, there is much less difference between the language groups, and by Group III the American and Portuguese children are similar.

The most important comparison, however, concerns the course of development. Both groups increase their use of verbs, subjects and pronominal subjects with increasing MLU. Thus, an increase in the use of subjects happens not just in a non-null subject language like English, but in a null subject language like Portuguese as well.

The analysis of subject positions shown in Table 2 throws more light on children's crosslinguistic development. Both language groups show a stable use of lexical subjects across development. For the Portuguese speakers, use of lexical subjects increased slightly from 9% to 14% of all subject positions. For the English speakers, use of lexical subjects was 16% in Group I, 12% in Group II, and 14% in Group III (calculated from data in Valian, 1991). Not only are the two groups similar in the stability of usage of lexical subjects, but the absolute use is similar.

The two language groups are also similar in trading empty subjects for pronominal subjects as development proceeds. The Portuguese-speaking children increased their use of pronominal subject positions from 18% of all subject positions in Group I to 43% in Group III. The American children showed an increase from 53% in Group I to 79% in Group III. Development

DEVELOPMENT OF SUBJECTS IN PORTUGUESE

TABLE 5. *Adult subject use and other variables: intercorrelations and summary statistics*

	MLUW	% Verb Use	% Subj. Use	% Pron. Subj.
MLUW		0.91**	0.68	-0.41
Verb use			0.49	-0.37
Subject use				-0.11
Mean ($N = 8$)	3.88	76	56	80
s.d.	0.75	8	6	7
Range	3.02-5.17	65-92	49-65	68-89

** $p < 0.005$.

progresses similarly in the two languages, even though, in absolute terms, American children use many more pronouns than Portuguese children.

One crosslinguistic comparison we did not perform was VP length as a function of type of subject (lexical, pronominal, empty). Too few utterances with verbs were present in the Portuguese-speaking children's data to allow a meaningful subdivision.

Adult usage

The eight adult samples included the observer (Z. E.), three mothers and four teachers. We performed a correlational analysis with the adult variables, and, as Table 5 shows, only one intercorrelation was significant, that between adult MLUW and adult verb use, $r = 0.91$, $p < 0.005$.

To compare our adult sample with published reports of pronominal usage among Brazilian adults, we examined each pronominal subject (excluding *wh-* pronouns) and each empty subject position and labelled it according to the person and number of the subject. The analyses thus exclude subjects consisting of a lexical NP. In the former case the pronoun itself determined the person and number; in the latter case the context plus the verb ending determined the person and number.

Table 6 shows the basic breakdown of the different types of subject, and the number of expressed and null subjects of each type. As can be seen, the adults frequently used 2ps (35% of all subjects). For the seven Brazilian Portuguese speakers the 2ps was always *voce*; for the European Portuguese speaker it was always *tu*. The adults also used 3ps (39%) forms often. High usage of 2ps and 3ps would be expected, since the adult was talking to a child, and often pointing to objects depicted in a book. 1ps (11%) and all plural forms (15%) were used less often.

Table 6 also demonstrates what percentage of pronominal subject positions were expressed as overt pronouns. 1ps has a uniquely identifying verb inflection; pronouns were expressed 41% of the time that the 1ps was used.

TABLE 6. Distribution of overt and null pronouns in adult speech^a

	Adult	Child				Singular				Plural				Total		
		MLUW				2		3		1, 2, 3		1, 2, 3				
		ProN	Null	Tot	ProN	Null	Tot	ProN	Null	Tot	ProN	Null	Tot	ProN	Null	Tot
1. ^b	0	0	0	8	6	14	8	19	27	6	4	10	22	29	51	
2. ^b	5	3	8	25	12	37	5	15	20	3	7	10	38	37	75	
3.	8	1	9	10	6	16	12	11	23	0	2	2	30	20	50	
4.	11	7	18	22	8	30	15	14	29	2	2	4	50	31	81	
5.	16	20	36	70	47	117	41	59	100	16	25	41	143	151	294	
6. ^c	2	10	12	16	7	23	15	39	54	5	8	13	38	64	102	
7.	0	1	1	2	0	2	1	2	3	2	2	4	5	5	10	
8.	1	1	2	18	6	24	8	8	16	3	3	6	30	18	48	
Total	43	43	86	171	89	263	105	167	172	37	53	90	356	355	711	
	Mean % each person-number combination (pronominal + null) of total combinations															
	Mean % of pronominal subjects ^d															
	11				35				39				15			
	41				71				39				40			
	52															

^a 1 ps = eu; 2 ps = vocé; 3 ps = ele or ela; 1 pp = nós or a gente; 2 pp = vocês; 3 pp = eles or elas. Since so few plural subjects were used, all three persons were combined.

^b A European Portuguese adult and child.

^c A Brazilian adult and European Portuguese child.

^d Denominator = pronominal + null subjects.

2ps and 3ps endings are identical for Brazilian Portuguese speakers; pronouns were expressed 71% of the time that the 2ps was used, and 39% of the time that the 3ps was used. Despite the uniqueness of the 2ps inflection in European Portuguese, that adult used a 2ps subject at the same rate as the Brazilian Portuguese speakers. Overall, among our sample, use of an overt pronoun did not correlate directly with the amount of information available in the verb ending. Rather, usage was affected, at least in part, by adult conversational goals.

Correlations between child and adult variables

The simple correlations showed no direct relations between child and adult characteristics. The strongest simple correlation (which did not reach statistical significance) held between child MLUW and adult subject use, $r = 0.63$, $p < 0.10$. That relation remained at the same level when child age and child verb use were partialled out. When child verb use was partialled out, child age was negatively (but non-significantly) related to adult verb use, $r = -0.70$, $p < 0.08$. When both child MLUW and child verb use were partialled out, the negative relation between child age and adult verb use remained the same, $r = -0.70$.

DISCUSSION

We have found that, as development proceeds, Portuguese-speaking children increase their use of subjects in general, and their use of pronominal subjects in particular. That pattern of development duplicates the pattern shown by American English-speaking children (Valian, 1991). Children of both language groups also show a positive relation between use of subjects and MLUW, and between use of subjects and use of verbs. (Note that the correlations are logically independent. Children could have increased their use of subjects without showing a concomitant increase in their MLUW – for example, by shortening their VPs. Similarly, children could have increased their MLUW without increasing their use of subjects – for example, by including more elements in the VP.) In both language groups, most of the increase in subject use is an increase in pronominal subjects; there is a developmental trade-off between pronominal subjects and missing subjects.

Our data, when combined with data in the literature, suggest that all children, regardless of target language, will increase their use of subjects as development proceeds, particularly pronominal subjects. The only extant data to contradict that conclusion are Valian's (1991) Italian children, who failed to show an increase in subjects over the one-year period that they were recorded. The Portuguese-speaking children in the present study had an average age of 2;6, the age at which recording of the Italian children ended.

We predict that Italian children will also show a developmental increase in the use of subjects if they are studied over a longer time period.

Our data raise two related questions: why children begin acquisition by using subjects less often than they eventually will; why empty subjects become pronouns over time. We begin by considering two answers that cannot be correct, given the nature of the comparative data. One answer would arise from parameter-setting accounts of the acquisition of the correct value of the null subject parameter. The other answer would arise from proposals that children's first grammars lack certain categories.

It cannot be the case that a marked increase in use of subjects necessarily reflects a change of grammar type from a null subject language to a non-null subject language. Some explanations (e.g. Hyams, 1986) of American children's increased use of subjects link that development to such a change in grammar. That explanation cannot encompass the fact that Portuguese-speaking children also increase their use of subjects, since they are not changing from a null to a non-null subject language. Hyams & Wexler's (1993) interpretation of the trade-off between missing subjects and pronouns over the course of development in American children is similarly flawed. They interpreted the trade-off as showing that American children change their grammar from one in which null subjects are allowed to one in which they are not. Our Portuguese data bring out the fallacy in that interpretation, since they show exactly the same trade-off. Hyams & Wexler's interpretation illustrates the need to investigate multiple languages; languages provide natural control groups for each other.

The second answer that cannot be correct is one which attributes children's inconsistent use of subjects to a grammar lacking functional categories. On the no-functional-categories hypothesis, children's SPEECH lacks functional categories because their GRAMMARS lack them. At first glance, pronominal subjects appear to fit the no-functional-categories proposal rather well. Pronominal subjects are considered to be Determiner Phrases (DP's) rather than Noun Phrases (NP's; see discussion in Radford, 1990). As such, they are functional phrases which one would therefore expect to be absent both from the child's grammar and from the child's speech.

On closer examination, however, the no-functional-categories hypothesis does not fit the data. The American-, Italian-, and Portuguese-speaking children who have been studied all use pronouns, even at a very early point in acquisition. American and Portuguese children even use them as a majority of their subjects. Pronouns are present, just less frequently than they will be in the future. Further, the Portuguese-speaking children in our study never used a verb without an inflection, and, beginning at MLUW 1.72, gave good evidence of subject-verb agreement. (Children below that MLUW had very few subjects, which were predominantly 3ps.) Further, elicited imitation data show asynchronous development of subjects and

functional categories (Valian *et al.* in press): children with very low imitation of functional categories do not necessarily show very low imitation of subjects, and children with low imitation of subjects do not necessarily show low imitation of functional categories. Thus, although children may in some sense lack functional categories early in development, that lack does not appear to be linked to the expression of overt subjects.

We conclude that children of all language groups know, from the beginning of combinatorial speech, whether or not their language licenses *pro* subjects (though the mechanism of acquisition remains obscure). Their knowledge is reflected in differing rates of initial subject use: English-speaking children initially use subjects anywhere from two to four times as often as null-language-speaking children. Performance-deficit explanations of children's early inconsistent usage must therefore be invoked. Before turning to performance-deficit accounts, however, we consider various aspects of the Portuguese-speaking adults' use of subjects, and its possible influence on the children's development.

Adults' overall use of subjects in our study was 56% (range from 49 to 65%), a somewhat lower figure than the 65% reported by Lira (1982). Adults in our sample had pronouns as 80% of their overt subjects, compared to Lira's, who had 68%. When only pronouns and null subjects are considered, the adults used pronouns 52% of the time, a figure that compares well with Lira's figure of 56%, but is lower than Duarte's (1993) estimate of 61% and Tarallo's (1993) estimate of 66%. For these calculations lexical subjects are excluded.) Since details on previous calculations are lacking, it is impossible to sort out the discrepancies. Overall, our adults appear to be using subjects, and pronominal subjects, somewhat less than previous reports would indicate, but still at a relatively high rate.

Chomsky (1981) postulated the Avoid Pronoun Principle to reflect the expectation of a trade-off between null subjects and pronominal subjects: if a language allows null subjects, speakers will avoid the production of pronouns. Speakers of null subject languages are accordingly expected to use overt pronominal subjects sparingly. Adult speakers of Brazilian Portuguese contradict Avoid Pronoun: their usage of pronouns can be very high. Thus, contrary to Avoid Pronoun, high pronominal use is possible by speakers of null subject languages, perhaps when verb endings are non-unique. Other research indicates that, unlike informal reports about Italian speakers, Brazilian speakers do not use pronouns contrastively, nor less often as a discourse proceeds (Lira, 1982). Facts about Italian usage cannot be generalized to Portuguese usage.

Avoid Pronoun cannot be either a linguistic principle (Chomsky, 1981) or a psycholinguistic principle (Hyams, 1986), since it holds generally neither across null subject languages nor across null subject language speakers. It therefore cannot be a principle that a child could use to learn which type of

language the input represents. A child cannot infer, from the presence of a high percentage of pronominal subjects, that its language is a non-null subject language.

The pattern of our adults' use of subjects, taken together with previous reports, suggests that pronoun use among Portuguese speakers may fluctuate dramatically depending on the setting, the participants, and the conversational goals. We suggest that the variability from one sample to another reflects actual variability in adult usage. In our setting, adults were discussing pictures in a book with the children. They expressed 3ps as a pronoun on only 39% of the occasions on which they used either a pronoun or a null subject, despite the fact that the verb ending is ambiguous. In those cases where adults made a choice between a pronoun or null subject, they probably frequently took advantage of the contextual support provided by the book. The adults expressed 2ps 71% of the time, despite the fact that the children could be in no doubt that they were being addressed. The high usage there was probably a way of obtaining and keeping the child's attention. Finally, the adults overtly expressed the 1ps 41% of the time, even though it was unnecessary ever to use it, since the 1ps ending is unique. It is clear that grammatical factors alone do not explain adults' use of subjects.

Adult variability (taking into account both our adults and reports of adults in the literature) seems to be reflected in the speech of the Portuguese-speaking children we studied, who were considerably more variable in their use of subjects than were Valian's (1991) American children. For example, the range in subject use for the Portuguese-speaking children below MLUW 2 was from 8% to 59%; the range for the comparable American group was from 55% to 82%. Similarly, the range for the Portuguese-speaking children between MLUW 2 and MLUW 3 was from 20% to 72%; the range for the comparable American group was from 84% to 94%.

The variability in adults' use of subjects may actually help children who are learning Portuguese. The wide variation from occasion to occasion could be interpreted by the child's learning mechanism as evidence that null subjects are grammatically available, with frequency dependent on pragmatic factors. That, combined with the absence of expletives, weighs more heavily than the high use of pronouns in the input and the lack of unique verb endings in the language. At a minimum, our data show that children can correctly establish the status of subjects in their language even if the input contains a high percentage of subjects.

We turn now to a performance-deficit account of the crosslinguistic findings. What all children have in common is a limited performance system that becomes progressively less limited as development proceeds. On our analysis, sentence production entails costs to the tyro performance system. One example of a cost is that of filling out any node – whether by a lexical item or an empty category (Valian, 1992). We thus propose that, all other

things being equal, the child would prefer to say nothing, because that would place the smallest burden on the performance system. Since all other things are not equal, and the child has some messages to communicate that require verbalization, the child speaks. What is actually said is a product of the child's attempt to speak economically, to communicate a message, to obey language-universal constraints, to obey those language-specific constraints that are known, and to conform to the speech habits of the ambient linguistic community. The utterance is like a resultant vector of simultaneously acting forces.

Sentence subjects are one of many types of sentential elements (usually functional categories) that children fail to express. In the case of subjects, we propose that children's performance limitations result in violations of the Extended Projection Principle. The Extended Projection Principle is a universal condition on languages. It requires each clause to bear a subject, whether overt or covert. We suggest that the children have the Extended Projection Principle as a universal, but violate it by failing to insert any element, whether it be a lexical item, *pro*, or any other empty category, under the subject NP node.

For English-speaking children (and adults) utterances with missing subjects are simply that, utterances with no element inserted for a subject. For Portuguese-speaking children, there are two sources for missing subjects. Some are like the American child's, and reflect Extended Projection Principle violations. Some are *pro*. Thus, null subject language children will be expected to have more utterances with missing subjects than English-speaking children: both groups have missing subjects that are due to Extended Projection Principle violations, but null subject language children in addition have missing subjects that are *pro*.

Over the course of development, children of all language groups reduce their violations of the Extended Projection Principle. English-speaking children never eliminate them entirely. Some violations linger on, not for reasons of cognitive economy, but to serve pragmatic ends (such as producing a style of casual friendliness). In contrast, null subject language children eventually eliminate their Extended Projection Principle violations. Since their languages license *pro*, similar pragmatic ends can be served grammatically.

Additional evidence for our analysis comes from a comparison of immature and mature speakers in each language. For Valian's (1991) American English speakers, children below MLU 2 expressed about 60% of their non-lexical subject positions as overt pronouns, and children above MLU 3 expressed about 90% as overt pronouns. Thus, there is a gap of 30 percentage points between immature and mature use of pronouns. A similar pattern holds for our Portuguese speakers. Children below MLUW 2 expressed 20% of non-lexical positions as overt pronouns, and children above MLUW 3 (and

adults) expressed about 50% of non-lexical positions as overt pronouns. Here, too, there is a gap of 30 percentage points.

Those data confirm the suggestion that two processes operate for the null subject language child: some missing subjects are *pro*; an additional number are Extended Projection Principle violations. For the American child, none of the missing subjects is *pro*: they are all the result of Extended Projection Principle violations, and that number corresponds to the number of additional empty subjects for Brazilian Portuguese children. Relative to their eventual level of pronominal subject production, each group produces 30 percentage points less. The particular number is probably a coincidence, but the pattern suggests that performance pressures exert a similar limitation crosslinguistically. Data for three Korean children studied longitudinally (Kim, in press) show a similar pattern, but since the final adult level is only 17%, it would be impossible for immature children to produce 30 percentage points less.

We suggest that the trade-off between missing subjects and pronouns that is seen in both null and non-null subject languages has a pragmatic rather than a syntactic explanation. Children are especially likely to violate the Extended Projection Principle when the subject is easily recoverable from context, or when the verb phrase contains new information. Both cases are ones where the adult speaker would use a pronominal subject (see Hyams & Wexler, 1993).

In conclusion, our data demonstrate important differences and commonalities between Portuguese- and English-speaking children, and demonstrate the value of using the same measures in comparing children crosslinguistically. Among the important differences between the two groups of children are their initial rates of overt subject usage: American English children use subjects much more often than Portuguese-speaking children, even at the onset of combinatorial speech. The two groups also differ in their absolute levels of use of pronominal subjects. We take those differences to reflect the children's knowledge of the status of overt subjects in their languages.

The important commonality between the two language groups is the course of development. Both null and non-null language learners convert absent subjects to pronominal subjects as development proceeds. We attribute American children's absent subjects to violations of the Extended Projection Principle, brought about by performance limitations. We attribute the Portuguese-speaking children's absent subjects to two sources: some are *pro*, and some are violations of the Extended Projection Principle.

REFERENCES

- Bates, E. (1976). *Language and context*. New York: Academic Press.
- Bloom, L. (1970). *Language development: form and function in emerging grammars*. Cambridge, MA: M.I.T. Press.
- Bloom, P. (1990). Subjectless sentences in child language. *Linguistic Inquiry* 21, 491-504.
- (1993). Grammatical continuity in language development: the case of subjectless sentences. *Linguistic Inquiry* 24, 721-34.
- Brown, R. (1973). *A first language*. Cambridge, MA: Harvard University Press.
- Case, R., Kurland, M. & Goldberg, J. (1982). Operational efficiency and the growth of short-term memory. *Journal of Experimental Child Psychology* 33, 386-404.
- Chi, M. (1978). Knowledge structures and memory development. In R. S. Siegler (ed.), *Children's thinking: what develops?* Hillsdale, NJ: Erlbaum.
- Chomsky, N. (1981). *Lectures on government and binding*. Dordrecht, Holland: Foris.
- Duarte, M. E. L. (1993). Do pronome nulo ao pronome pleno: a trajetória do sujeito no português do Brasil. In I. Roberts & M. A. Kato (eds), *Português Brasileiro: uma viagem diacrônica*. Campinas, S.P.: Editora da Unicamp.
- Galves, C. (1987). A sintaxe do português brasileiro. *Ensaios de Estudos Linguísticos* 13, 13-50.
- Gerken, L. A. (1991). The metrical basis for children's subjectless sentences. *Journal of Memory and Language* 30, 431-51.
- (1994). Young children's representation of prosodic phonology: evidence from English-speakers' weak syllable productions. *Journal of Memory and Language* 33, 19-38.
- Guilfoyle, E. & Noonan, M. (1992). Functional categories and language acquisition. *Canadian Journal of Linguistics/Revue canadienne de Linguistique* 37, 241-72.
- Hyams, N. (1986). *Language acquisition and the theory of parameters*. Dordrecht: Reidel.
- Hyams, N. & Wexler, K. (1993). On the grammatical basis of null subjects in child language. *Linguistic Inquiry* 24, 421-59.
- Kim, Y.-J. (in press). The acquisition of Korean. In D. I. Slobin (ed.), *The crosslinguistic study of language acquisition*, Vol. 4. Hillsdale, NJ: Erlbaum.
- La Berge, D. & Samuels, S. J. (1974). Toward a theory of automatic information processing in reading. *Cognitive Psychology* 6, 293-323.
- Lillo-Martin, D. (1994). Setting the null argument parameters: evidence from American Sign Language and other languages. In B. Lust, G. Hermon & J. Kornfilt (eds), *Syntactic theory and first language acquisition: cross-linguistic perspectives*. Vol. 2: *Binding, dependencies, and learnability*. Hillsdale, NJ: Erlbaum.
- Lira, S. d. A. (1982). Nominal, pronominal and zero subject in Brazilian Portuguese. Unpublished doctoral dissertation, University of Pennsylvania, Pennsylvania.
- 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. Stanford.
- McGregor, K. K. & Leonard, L. B. (1994). Subject pronoun and article omissions in the speech of children with specific language impairment: a phonological interpretation. *Journal of Speech and Hearing Research* 37, 171-81.
- Núñez del Prado, Z., Foley, C., Proman, R. & Lust, B. (1993). Subordinate CP and pro-drop: evidence for degree-n learnability from an experimental study of Spanish and English. Paper presented at NELS, University of Massachusetts: Amherst.
- Radford, A. (1990). *Syntactic theory and the acquisition of English syntax*. Oxford: Blackwell.
- Rizzi, L. (1994). Early null subjects and root null subjects. In B. Lust, G. Hermon & J. Kornfilt (eds), *Syntactic theory and first language acquisition: crosslinguistic perspectives*. Vol. 2: *Binding, dependencies, and learnability*. Hillsdale, NJ: Erlbaum.
- Roeper, T. & Rohrbacher, B. (1995). Null subjects in early child English and the theory of economy of projection. In R. Izvorski & V. Tredinnick (eds), *University of Pennsylvania Working Papers in Linguistics* 2, 83-119.
- Schneider, W. & Shiffrin, R. M. (1977). Controlled and automatic human information processing. I. Detection, search, and attention. *Psychological Review* 84, 1-66.
- Tarallo, F. (1993). Sobre a alegada origem crioula do português brasileiro: mudanças

- sintáticas aleatórias. In I. Roberts & M. A. Kato (eds), *Portugues Brasileiro : uma viagem diacrônica*. Campinas, S.P.: Editora da Unicamp.
- Teixeira, R. F. (1986). Zero anaphora in Brazilian Portuguese subjects and objects: morphological and typological considerations. Ph.D. dissertation, University of California, Berkeley.
- Valian, V. (1990a). Null subjects: a problem for parameter setting models of language acquisition. *Cognition* 35, 105-22.
- (1990b). Logical and psychological constraints on the acquisition of syntax. In L. Frazier & J. de Villiers (eds), *Language processing and language acquisition*. Dordrecht: Kluwer.
- (1991). Syntactic subjects in the early speech of American and Italian children. *Cognition* 40, 21-81.
- (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.
- (1993). Parser failure and grammar change. *Cognition* 46, 195-202.
- (1994). Children's postulation of null subjects: parameter setting and language acquisition. In B. Lust, G. Hermon & J. Kornfilt (eds), *Syntactic theory and first language acquisition : crosslinguistic perspectives*. Vol. 2: *Binding, dependencies, and learnability*. Hillsdale, NJ; Erlbaum.
- Valian, V., Hoeffner, J. & Aubry, S. (in press). Young children's imitation of sentence subjects: evidence of processing limitations. *Developmental Psychology*.
- 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, 221-54.
- Wheeler, D. (1992). A' antecedents and empty subjects in Brazilian Portuguese. In D. P. Macedo & D. A. Koike (eds), *Romance linguistics : the Portuguese context*. Westport, CT: Bergin & Garvey.