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When opportunity knocks twice: two-year-olds' repetition of sentence subjects*

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ABSTRACT

Why are young children's utterances short? This elicited imitation study used a new task – double imitation – to investigate the factors that contribute to children's failure to lexicalize sentence subjects. Two-year-olds heard a triad of sentences singly and attempted to imitate each; they then again heard the same triad singly and again attempted to imitate each. Comparisons between the two attempts showed that children's second passes were more accurate than their first. In addition, independent of sentence length, children increased their inclusion of pronominal and expletive but not lexical subjects. Children included verbs more often from sentences with pronominal than lexical subjects, suggesting a trade-off. Children included subjects more often in short sentences than long ones, and increased subject inclusion only in short sentences. The results suggest that children's language production is similar to adults': a complex interaction of syntactic knowledge, limited cognitive resources, communicative goals, and conversational structure.

INTRODUCTION

Decades ago, Roger Brown (Brown & Fraser, 1963; Brown & Bellugi, 1964) characterized early child English as telegraphic, a term for the short utterances that resulted from children's many errors of omission. What gives rise to the lacunae in children's speech? Now, as then, we do not know why children's

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utterances are short, but it is likely that different constituents are absent for different reasons and that each lacuna is the product of several factors acting simultaneously (Bloom, Miller & Hood, 1975; Valian, 1994; Valian & Eisenberg, 1996; Allen, 2000). We use the term 'non-lexicalization' rather than 'omission' in order to avoid an implication that a speaker has a word or morpheme in mind and then deletes it. (True deletions may occur during pronunciation (Carter & Gerken, 1998), but some lacunae are likely to represent non-lexicalizations rather than omissions (Cote, 1996).) An understanding of the sources of children's lacunae will help delineate the content of the child's initial syntactic knowledge, the role of that knowledge in children's production and comprehension mechanisms, and parallels and divergences between children's and adults' language production processes (Gerken & Ohala, 2000).

Lacunae can reflect one or more of the following: lack of knowledge (a competence issue), factors influencing whether speakers fully deploy their knowledge (a performance issue), or, especially in the adult, pragmatic and discourse factors. Consider English-speaking children's use of subjects in clauses with tensed verbs – the empirical focus of the present research. English-speaking two-year-olds at the beginning of combinatorial speech include subjects about 50 to 70% of the time, even though English requires subjects for full grammaticality in non-imperative sentences. Adult usage is considerably higher, although adults also show subject lacunae in casual conversation, diary entries, and conditions where special discourse properties obtain (Cote, 1996; Haegeman, 2000).

There has been a plethora of competence-deficit accounts of subject lacunae, all based on analyses of spontaneous speech. Notably, there is Hyams's (1986) suggestion that children's default setting of the null subject parameter (which controls whether subjects are obligatory) is for a language like Italian, where subjects are optional, leading to apparently optional use of subjects in English. Later proposals have suggested (a) that the child's working grammar is immature, with some linguistic universals not yet in full operation (e.g. Radford, 1990; Guilfoyle & Noonan, 1992; Lillo-Martin, 1994; Rizzi, 1994), (b) that the grammar is deficient in some other way (e.g. Hyams & Wexler, 1993), or (c), that facts about the language that would inform the child about whether subjects are required take time to acquire (Vainikka & Levy, 1999; Levy & Vainnika, 1999/2000).

On competence-deficit accounts, then, the child's initial working concepts are either INCORRECT for their target language or FRAGMENTARY, and thus require correction or amplification through more input or more time. Absence of an overt subject is attributed to incomplete SYNTACTIC knowledge, not to incomplete morphological, phonological, or semantic knowledge and not to limited cognitive resources. The knowledge that will be acquired – that overt subjects are mandatory in tensed clauses – is syntactic and it is the

absence or underspecification of that knowledge that is responsible for the absence of overt subjects.

We argue, instead, that there are multiple reasons for subject absence in children's speech, none of which are lack of knowledge about the status of subjects, and one of which is limited cognitive resources. To produce and understand sentences, speakers need more than syntactic knowledge. They need phonological and semantic knowledge, a basic understanding of how conversations work, planning abilities, attention, and memory. Sentence production is a complex task that interweaves information from different domains and requires a variety of cognitive and linguistic skills, as Bloom and her colleagues early recognized (Bloom, Lightbown & Hood, 1975; Bloom *et al.*, 1975). To the extent that extra-syntactic systems are responsible for overt subjects, there is less reason to attribute a lack of syntactic knowledge to the child. That would suggest in turn that children acquire the basic syntax of subjects very quickly, before the onset of combinatorial speech. It would further suggest a rich initial starting point for syntax, such that limited data would be sufficient for acquisition. Finally, it would suggest continuity between child and adult production systems (Gerken & Ohala, 2000): both groups produce sentences through an interaction of processes in different domains.

How those domains interact to yield speech is a question that is best addressed experimentally. From spontaneous speech alone it is difficult to tease apart the different components of children's knowledge and determine the role of their cognitive resources. With experimental techniques, especially elicited imitation, it has been possible to demonstrate effects of non-syntactic factors. For example, the subjects that appear to increase as children mature are pronominal subjects like *I*, *she*, and *it* rather than lexical subjects like *ball*, *story*, and *girls* (Hyams & Wexler, 1993; Valian & Eisenberg, 1996). Elegantly-designed studies by Gerken (Gerken, 1991, 1994) varied the prosodic properties of sequences children were asked to imitate. Unstressed syllables were less likely to be pronounced if they were the first syllable of a prosodic foot than if they were the second syllable. The developmental increase in pronominal subjects in spontaneous speech might, then, be a joint consequence of the unstressed nature of pronouns and the child's use of a prosodic template that prefers trochaic to iambic feet. If so, a prosodic deficiency would masquerade as a syntactic deficiency, even though the child's syntactic competence with respect to subjects was complete and unimpaired. A faulty prosodic mechanism might also explain frequent early absence of determiners (which are often the leading, unstressed syllable, of an iambic foot) and the inclusion of pronominal objects (which are often the final syllable of a trochaic foot).

Elicited imitation allows systematic manipulation of variables that occur infrequently or in uncontrolled contexts in spontaneous speech. For example,

in Spanish but not in English, subjects are optional in embedded clauses; spontaneous speech is of little value here because young children produce very few tensed subordinate clauses. Nuñez del Prado, Foley, Proman & Lust (1993) compared English- and Spanish-speaking children's inclusion of subjects in tensed subordinate clauses via elicited imitation. They found that English-speaking children included subjects from subordinate clauses at a much higher rate than Spanish-speaking children did, suggesting that both groups of children understood the status of subjects in their language.

Elicited imitation also makes it possible to test a more representative and larger sample than spontaneous speech usually affords and to compare children with different levels of syntactic sophistication (as measured by their Mean Length of Utterance – MLU – measured in morphemes). Children whose MLUs are above 3 appear to be competent in their use of verbs, subjects, and inflections (Valian, 1991); for children below MLU 3 the data are sparser and less clear, but children between MLU 2 and MLU 3 also showed a high percentage of verbs and subjects. Valian, Hoeffner & Aubry (1996) argued that high-MLU children (defined by them as children with an MLU above 3) provide a necessary control for lower-MLU children. If the two groups' performance shows the same pattern, with only quantitative differences between them, it is difficult to claim differences in underlying knowledge.

For example, some competence-deficit accounts predict that young English-speaking children will be particularly deficient in expletive subjects – the nonreferential forms of the pronouns *it* and *there*, as in 'there are turtles in the lake'. All languages have referential subjects (both lexical and pronominal), but only non-null subject languages like English and French, which require overt subjects, have expletive subjects. Null subject languages like Italian, Portuguese, Japanese, Chinese, and Korean, neither require overt subjects and nor have expletive subjects. Young English-speaking children produce very few expletives, which might suggest that they treat their language as if it were a null subject language. But it is possible that even competent English speakers have a tendency not to lexicalize expletives, for extra-syntactic reasons. Only if there is an interaction – only if low-but not high-MLU children particularly fail to include expletives – can low-MLU children be considered deficient with respect to subjects. Such a hypothesis cannot be tested with spontaneous speech.

Valian *et al*. (1996) found that although high-MLU children imitated expletives more than did low-MLU children, both groups were less likely to include expletives than referential pronouns; there was no interaction. Expletives are particularly unlikely to be lexicalized, then, even by competent speakers. Since syntactic knowledge is not at issue for those speakers, the phenomenon lends weight to the hypothesis that extra-syntactic factors, such as (but not restricted to) cognitive resources, are behind low-MLU

children's depressed production of subjects. By including both types of pronouns, Valian *et al.* (1996) could also demonstrate limits to a prosodic account of unlexicalized constituents in children's speech. Metrically, the referential and expletive pronouns are similar, yet referential pronouns are included at a higher rate than expletives, thus requiring the invocation of other variables. Elicited imitation is a tool that helps determine the extent of different influences on production.

Valian *et al.*'s (1996) explanation for subject lacunae in children's speech focused on effects of performance limitations. Valian *et al.* predicted that low-MLU children would preferentially include subjects from short targets compared to long targets, on the grounds that short targets would require fewer cognitive resources to process. Confirming their prediction, Valian *et al.* found an interaction: low-MLU children repeated subjects more often from short sentences than long ones; higher-MLU children, in contrast, repeated subjects from both short and long sentences at the same high rate. That finding strongly suggests that low-MLU children have cognitive limitations that block full processing of long sentences, leading to greater failure to lexicalize subjects. When sentences are short, even low-MLU children can include subjects most of the time. Neither a competence-deficit account nor a prosodic account would predict such a finding.

The present experiment has several goals. The first is further to test the hypothesis, partially confirmed in Valian *et al.* (1996), that children's limited cognitive resources directly contribute to their failure to include sentence subjects. A larger goal is to understand the interrelations among the different influences on children's productions in order to build a comprehensive model of early syntactic acquisition and use which can be integrated with models of adult language production.

To test our hypothesis that limited resources play a role in children's inclusion of subjects, we have developed a novel extension of the elicited imitation technique which expands children's resources. If the result is an increase in children's use of subjects, the hypothesis will be confirmed. If, despite evidence of an overall increase in children's resources, there is no increase in children's inclusion of subjects, the hypothesis will be disconfirmed. Our method is to ask children to listen to and imitate a sentence twice, rather than once. DOUBLE IMITATION should allow the child to increase her effective resources. In elicited imitation a child has two tasks: to try to comprehend a target sentence in the absence of the rich context provided by normal conversation and to try to produce that same sentence. An increase in resources could benefit several components of listening and speaking.

On the first opportunity to imitate a target, the child should perform a partial analysis of the sentence – looking up the meanings of individual words, computing a syntactic representation of the sentence, building

a semantic representation, and so on – and reproduce some of the sentence in her imitation. On the second opportunity the child should benefit from the earlier analysis, and thus effectively have more resources at her disposal; she should analyse more of the sentence and produce a fuller repetition of the sentence as a whole. Earlier work on children's spontaneous speech has suggested that children produce longer utterances after having heard or produced part of the same sentence earlier (Bloom *et al.*, 1975), a phenomenon that supports our hypothesis.

We do not, however, propose that cognitive resources are the whole story behind lacunae. No single variable can be the whole story for either children or adults (Valian & Eisenberg, 1996; Allen, 2000). The complex tasks of speaking and listening require an integration of skills and knowledge from many domains. The postulation of multiple pressures acting simultaneously on the speaker is necessary to make sense of children's early speech, to draw conclusions about syntactic deficits, and to develop predictions about performance in the double imitation task.

In the case of subjects, systematic data on subject use among adult speakers are rare, but English and French speakers, for example, appear to use subjects much more often than do speakers of null subject languages. Data for two-year-olds are more extensive, and show that children differ appropriately from language to language in how often they include subjects, suggesting early knowledge of the status of subjects or, at least, great sensitivity to input frequency differences. For example, English-speaking two-year-olds use subjects more than their counterparts in null subject languages (Valian, 1991; Valian & Eisenberg, 1996; Kim, 1997). Hebrew-speaking children use subjects more in the person/tense combinations that require subjects than in the combinations that do not (Elisha, 1997; Elisha & Valian, 2002).

Cross-language comparisons reveal similarities in development as well as differences. Since the similarities cut across different language types, they suggest a common cognitive underpinning. For example, as they develop, children in all languages – non-null and null – include subjects more often (Bloom *et al.*, 1975; Valian, 1991; Valian & Eisenberg, 1996; Kim, 1997; Bavin, 2000). Since the target languages differ in their subject requirements, syntax cannot be the source for that commonality across children. We suggest that cognitive limitations ease as development proceeds, allowing children to include subjects more often (Bloom, 1990; Bloom, 1991;Valian, 1991;. Bloom, 1993; Nuñez del Prado *et al.*, 1993; Valian,1994; Valian & Eisenberg, 1996; Valian *et al.*, 1996).

When subject use has been separately tabulated for lexical and pronominal forms, the two types usually show different developmental trajectories. Children speaking English, Italian, Portuguese, and Korean – only the first of which is a non-null subject language – produce lexical subjects at

a relatively consistent rate over a fairly long developmental period. In contrast, use of pronominal subjects increases in both null and non-null languages (Bloom, 1970; Valian, 1991; Hyams & Wexler, 1993; Valian & Eisenberg, 1996; Kim, 1997). Thus, pronouns in particular, regardless of the target language, seem to increase with development.

The puzzle about pronominal and lexical subjects is that, on some measures, pronouns appear easier than lexical subjects: there are more pronouns than nouns as subjects in spontaneous speech and pronominal subjects have longer VPs than lexical subjects do (Bloom, 1990; Valian, 1991). On other measures, pronouns appear more difficult: they increase with development, unlike lexical NPs, and they are less likely to be imitated than lexical NPs. We suggest that the solution to the puzzle requires going beyond talk of 'ease' and 'difficulty' to a consideration of other factors – such as conversational structure – that influence the production, comprehension, and imitation of sentences.

Conversational structure – especially the cooperation between speaker and listener – favours the production of pronominal subjects over lexical subjects. Speakers tend to introduce new topics with a lexical NP (primarily in object position but also in subject position) so that the listener will know what the topic is. Subsequent referents to that topic in subject position tend to be pronouns. Once a referent has been established, repeated use of the lexical NP as a subject is not only unnecessary but inappropriately redundant. Pronominal subjects offer a link to the already-established topic and tell the listener to focus attention on the VP, where the new information is likely to be placed (Clark & Haviland, 1977; MacWhinney & Bates, 1978). And, of course, with first and second person subjects, only pronouns are available. Within a discourse, then, the conversationally competent speaker – child or adult – will use more pronouns as subjects than lexical NPs.

Children's limited resources compared to adults', however, interact with conversational structure and informativeness to yield lacunae where adults would use a pronoun. Our analysis of the role of cognitive limitations is that they interact with speakers' communicative goals, the information value of the different types of arguments, the nature of the conversation or discourse, task demands, and speakers' syntactic, semantic, and phonological knowledge. Those interactions explain the otherwise puzzling differences in the rates at which children produce or imitate different types of subjects. We suggest that the more informative a constituent is the more accessible it is to the production system, because highly informative constituents are closely connected to the meaning the child wishes to express. Under conditions of limited resources, more informative constituents, such as lexical NPs, are more likely to be lexicalized than less informative constituents, such as pronouns. As development proceeds and cognitive limitations are eased, pronouns will be increasingly included.

Several pieces of evidence point to the importance of informativeness in adult and child speech. We have already mentioned the sequencing of NPs in a sentence, with more informative NPs tending to occur as objects. In Inuktitut two-year-olds' spontaneous speech, highly informative subjects and objects are more likely to be lexicalized than less informative ones (Allen, 2000), supporting the hypothesis that information value is an important determinant of lexicalization. As resources expand the production system can lexicalize more sentence elements. In an elicited imitation task, pronouns are particularly uninformative compared to lexical NPs, leading to their lower rate of inclusion compared to lexical subjects. The latter may indeed be costly, but that disadvantage is neutralized by the accessibility and importance of the referent. Since expletive pronouns have no information value at all, they should be lexicalized least often, as Valian *et al.* (1996) found.

Our analysis of the different influences that come into play when children speak and imitate leads to several predictions about the specific benefits of giving children two opportunities to hear and imitate a target sentence. One is overall improvement: with a second opportunity, the child should succeed in reproducing more words of the target sentence correctly. The incomplete analysis that the child performs on the first opportunity will be fuller on the second opportunity. Our second prediction is greater improvement in including subjects of long sentences compared to short sentences. Since subjects of long sentences are particularly likely to be left out (Valian *et al.*, 1996), we expect them to benefit especially from increased resources.

Our third and most important prediction is that a second opportunity will lead to greater inclusion of pronominal subjects – both referential and expletive – but not lexical ones. With the increased resources available on the second opportunity, less informative items – such as pronominal subjects – should become more accessible and thus included at a higher rate. Lexical subjects, because their greater communicative value made them more accessible on the first opportunity, and hence more likely to be lexicalized, should show little benefit from a second opportunity. We further predict a consequence for verb inclusion as a function of the type of subject. Verbs should be included more often if the subject is pronominal than if it is lexical, because the verb is more informative than a pronominal subject but is more evenly balanced in informativeness with a lexical subject.

METHOD

Participants and settings

Data were collected from 35 (34 White and 1 Asian) monolingual English-speaking children, with middle- to upper-middle-class parents. Data from 28 of those 35 were tabulated for most analyses. The remaining 7 children

TABLE 1. *Descriptive age and MLU data on children*

Group	*N*	M Age	Range	M MLU	Range
1	13	2;3	1;10–2;6	2·04	1·49–2·46
2	15	2;4	2;1–2;7	3·05	2·53–4·59
3	7	2;5	1;10–2;8	3·42	2·35–4·28

Children in Group 1 had spontaneous MLUs $<2{\cdot}5$; children in Group 2 had MLUs $>2{\cdot}5$. Children in Group 3 scored $\geqslant 95\%$ subject repetition on Repetition 1 and were thus excluded from most analyses. See text for details.

performed at ceiling – 95% or above – in overall subject inclusion; their data were thus uninformative for most comparisons. (Data from an additional 67 children were excluded because of failure to complete the task or to provide enough responses for analysis.) Children were recruited through daycare centers, personal contacts, and mailing lists. They participated at home, at daycare, or in the laboratory.

The 28 children who formed the core of our analyses ranged in age from 1;10 to 2;7, with a mean of 2;3 (*S.D.* = 2·6). Their spontaneous speech MLUs (calculated following Brown's 1973 rules) ranged from 1·49 to 4·59, with a mean of 2·58 (*S.D.* = 0·72). The children were divided into two groups based on MLU as shown in Table 1. MLUs of Group 1 ($N=13$) were below 2·5 and averaged 2·04; MLUs of Group 2 ($N=15$) were above 2·5 and averaged 3·05. The remaining 7 children, Group 3, averaged 98% subject inclusion on Opportunity 1. Their data were scored to ensure that they experienced only normal regression to the mean on Opportunity 2. Their ages and MLUs are also shown in Table 1; one of the 7 children had an MLU of 2·35; the other 6 had MLUs over 3·0.

Our choice of 2·5 as a cut-off between low and high MLU differs from the 3·0 cut-off used by Valian *et al.* (1996). Children over MLU 3 in this experiment were of two types, those whose performance with subjects on Opportunities 1 and 2 was at ceiling and those whose performance was not. Once we removed the children at ceiling, there were only five children with MLUs over 3. Since subanalyses suggested that they did not differ from the 10 children with MLUs between 2·5 and 3, we combined them. That allowed a roughly equal distribution of children in the two MLU groups.

Procedure and stimuli

A session with a child lasted approximately 45–60 minutes. The session was audiotaped. The experimenter brought out a Richard Scarry book (*The best word book ever*, 1991) and used it to develop rapport with the child and gather spontaneous speech so that MLU could be calculated. After approximately 20 minutes of conversation, the experimenter introduced the

imitation task as a game in which the child was to say what the experimenter said.

The child heard 30 target sentences, twice each. The sentences, used earlier by Valian *et al*. (1996), are shown in the Appendix. They consisted of 6 tokens of 5 category types: Topic, Expletive, Infinitive, Modal, and Past Tense. The latter 4 types were used for analysis. Sentences varied in length from 3 morphemes ('I could leave') to 10 morphemes ('The girls loved those little dolls'). No proper names were used, only lexical subjects, referential pronominal subjects, and expletive pronominal subjects. For the Expletive category, 4 subjects were *it* and 2 were *there*. For Infinitive, Modal, and Past Tense categories, half the sentences had a lexical NP and half had a pronominal subject (*I*, *we*, *they*, *she*).

The 6 Topic sentences were presented first and served as practice items; they were excluded from all analyses. Topic sentences were accompanied by pictures and thus served as a bridge between the earlier activity of discussing scenes in the picture book and the later activity of imitating sentences without any pictorial support. The experimenter preceded each target Topic sentence by saying 'See the *x*?' and pointing to a line drawing which illustrated the subject but not the event in the target sentence. The experimenter then read the sentence about that topic. For example, the experimenter showed a drawing of a man's face and said, 'See the man?' After the child's nod, the experimenter said, 'The man plays games.' The first three sentences in the Topic category, randomly ordered, included subjects, and the second three, also randomly ordered, did not (e.g. 'See the bear? Eats honey'). In Valian *et al*. (1996), the latter 3 sentences were used to determine whether children would add a subject; they were included here for a similar reason but yielded no interesting data.

The remaining 24, experimental, sentences were presented in a different random order for each child. The experimenter presented the stimuli in repeated triads, as illustrated in (1) – (6). The child was asked to repeat each sentence as it was presented.

(1) Those boys should know your name
(2) We would have fun
(3) It's raining today
(4) Those boys should know your name
(5) We would have fun
(6) It's raining today

After a cycle of two triads, the experimenter moved on to the next triad, continuing until the child had completed the full set of sentences. Extensive pilot testing ($N=44$) had demonstrated the need for two intervening sentences before asking a child for a second repetition. Otherwise, the child tended to repeat her earlier attempt verbatim.

If a child did not imitate a target sentence, the experimenter said it again. If the child still did not imitate the sentence the experimenter moved on to the next one. Whether or not the child repeated a sentence from the first triad, the full second triad was presented.

Transcription

Session audiotapes were transcribed by one experimenter, usually the experimenter who had visited with the child. Each transcript was completely checked by at least one other person. The transcriber and checker then reviewed the transcript together to reach consensus on a final version, bringing in a third person if necessary. Transcripts of the session included at least 100 spontaneous utterances to compute MLU; transcripts included the entire experimental portion.

Scoring

In order to compare possible improvement from the first to second opportunity, we analysed only cases where the child produced a scorable repetition on both opportunities to imitate a given sentence. A scorable repetition was one that was identifiably related to the target sentence by the correct inclusion of at least one major constitutent. Children were included if at least 70% of their pairs were scorable and if they provided at least two usable pairs per sentence category.

Percent correctly repeated words per sentence. The percentage of words in each target sentence that the child repeated correctly was calculated for both opportunities and provided a measure of overall improvement. No substitutions were allowed. We used words rather than morphemes: a child could not repeat some morphemes (e.g. a plural marker or past tense marker) without also repeating the stem morpheme to which those morphemes were attached. To be counted as a correct word repetition, the child had to repeat the entire word, including affixes. For each sentence, the numerator was the number of words correctly repeated; the denominator was the number of words in the original target. A word was not scored as correctly repeated if inflections or affixes were missing.

Subject imitation rate. The percentage of subjects repeated was calculated out of the number of scorable repetitions for a given comparison. For lexical and referential pronominal subjects the maximum possible number of repetitions for each was 9 (3 each for Infinitive, Modal, and Past Tense); for expletive pronominal subjects the maximum was 6. We did not require inclusion of a Determiner, Adjective, or plural marker, only the Noun itself in sentences with lexical subjects or the Pronoun in sentences with pronominal subjects. We followed the scoring procedures in Valian *et al.*

(1996), allowing substitutions for subjects: if the child substituted a different subject for the target subject, the subject was scored as present, but only if a verb or object from the sentence was present in the imitation. That criterion was necessary in order to ensure that the substitution was for the subject and not for the object or adjunct in the sentence. On Opportunity 1 children made substitutions for subjects in 13% of their attempts; on Opportunity 2 substitutions were 9% of attempts.

A breakdown of children's substitutions on Opportunity 1 shows that 35% of the substitutions were for noun targets, 52% for referential pronominal targets, and 15% for expletive pronouns (rounding results in a total of 102%). The comparable percentages on Opportunity 2 were 26, 56, and 17%.

It was not possible to compare children's inclusion of subjects in imitated and spontaneous utterances. Especially for the low-MLU children, the number of utterances with verbs in the 100 utterances used for calculating MLU was too small to be meaningful.

Subject imitation rate as a function of sentence length. To investigate the relationship between sentence length and subject imitation rate, we compared the percentage of subjects in short sentences versus long sentences for Infinitive, Modal, and Past Tense. Sentence category was ignored. The seven short sentences were 3–5 morphemes long; 4 had pronominal subjects. The eleven long sentences were 6–10 morphemes long; 5 had pronominal subjects. Because of the distribution of sentence lengths (including 6 sentences that were 6 morphemes long), that short-long division best equalized the number of sentences in each group and the percentage of pronominal subjects in each group.

Imitation rate for other constituents. To investigate the effect of two opportunities on other constituents, we compared the percentage inclusion on Opportunity 1 with Opportunity 2 for Modals (6 sentences), the past tense morpheme *-ed* (6 sentences), subject Determiners (7 sentences), object Determiners (8 sentences), and direct objects (9 sentences).

RESULTS

As predicted, children repeated more words of the target sentence correctly on the second opportunity compared to the first. Contrary to expectations, children improved in including subjects for short sentences but not long ones. The main prediction, that children would improve on referential and expletive subjects but not lexical ones, was confirmed. That finding was accompanied by a trade-off between verbs and lexical, but not pronominal, subjects. Finally, not all sentence constituents were aided by a second repetition.

Overall benefit of two opportunities – percent correctly repeated words per sentence. Children benefited overall from hearing and repeating a sentence

TABLE 2. *Percent* (S.D.) *correctly repeated words per sentence*

Group	Opportunity 1	Opportunity 2	Mean
1	39 (9·8)	42 (9·9)	41
2	58 (7·5)	61 (9·4)	59
Mean	49 (12·7)	52 (13·5)	51

All 27 sentences with subjects were used for this analysis, without regard to sentence category. Standard deviations are in parentheses.

twice, as seen in Table 2. Recall that for each sentence the denominator was the number of words in the target and the numerator was the number of words that the child repeated correctly. The improvement in the percentage of correctly repeated words per sentence was small but reliable: children averaged 49% on Opportunity 1 and 52% on Opportunity 2 ($F(1, 26) = 6{\cdot}92$, $p < 0{\cdot}02$). In addition, low MLU children repeated less of the sentence (41%) than high MLU children (59%, $F(1, 26) = 31{\cdot}25$, $p < 0{\cdot}0001$). There was no interaction; children improved to the same degree regardless of their MLU.

Children's MLU on Opportunity 1 (3·50) was higher than their spontaneous MLU (2·58), $F(1, 27) = 69{\cdot}8$, $p < 0{\cdot}001$. Their MLU on Opportunity 2 (3·58) was slightly higher than their MLU on Opportunity 1 (3·50), $F(1, 27) = 3{\cdot}99$, $p < 0{\cdot}06$. Imitation MLU is a less useful measure than percentage of words correctly repeated: the former could increase without any accompanying fidelity to the target sentence. Children could simply produce more morphemes on the second opportunity.

Benefits for subjects of short and long sentences. To examine children's performance with subjects in sentences of different lengths, we performed an omnibus ANOVA and two planned comparisons. The omnibus analysis compared short and long sentences among the 18 sentences in Infinitive, Modal, and Past Tense categories. The second within-subjects factor was Opportunity (1 vs. 2); the between-subjects factor was MLU Group (below 2·5 vs. above 2·5). The white bars in Fig. 1 show percent subject inclusion on Opportunity 1. The black caps show the added inclusion for each sentence length on Opportunity 2. Children benefited significantly from two opportunities, including subjects 60% of the time on Opportunity 1 and 67% of the time on Opportunity 2 ($F(1, 26) = 8{\cdot}35$, $p = 0{\cdot}01$). They repeated subjects from short sentences more often (72%) than subjects from long ones (55%, $F(1, 26) = 25{\cdot}2$, $p < 0{\cdot}0001$). The low MLU group included fewer subjects (55%) than did the high MLU group (71%, $F(1, 26) = 5{\cdot}98$, $p < 0{\cdot}03$). There was also a tendency for an interaction between Opportunity and Length ($F(1, 26) = 3{\cdot}85$, $p < 0{\cdot}07$).

The results of the planned comparison with short sentences are shown in Table 3. Children included a subject more often on Opportunity 2 (77%) than Opportunity 1 (67%, $F(1, 26) = 11{\cdot}23$, $p < 0{\cdot}003$). There was a slight

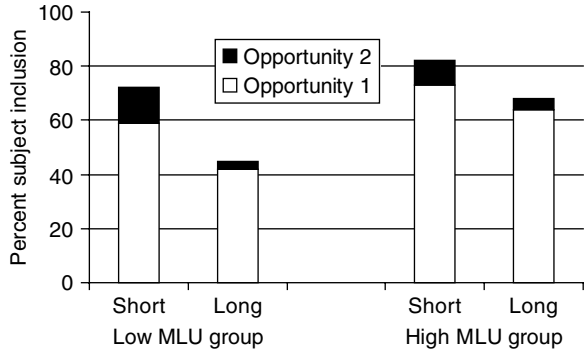

Fig. 1. Percent subjects included from short and long sentences by low and high MLU children on Opportunities 1 and 2.

trend for low MLU children to repeat fewer subjects (66%) compared to high MLU children (78%, $F(1, 26) = 2{\cdot}56$, $p < 0{\cdot}13$). There was no interaction between Opportunity and Group. The second comparison, displayed in Table 4, showed no improvement for long sentences from Opportunity 1 to Opportunity 2, but the low MLU children repeated subjects less often (44%) than the high MLU children (66%, $F(1, 26) = 7{\cdot}87$, $p < 0{\cdot}01$). There was no interaction between Opportunity and MLU Group.

Benefits for different types of subjects. To examine children's performance on different types of subjects, we performed an omnibus ANOVA and three planned comparisons. The omnibus comparison contrasted inclusion of subjects from (a) the nine LEXICAL sentences from the three sentence categories with equal numbers of lexical and pronominal subjects (Infinitive, Modal, and Past Tense), (b) the nine PRONOMINAL sentences from those same categories, and (c) the six EXPLETIVE subjects. The second within-subjects factor was Opportunity (1 vs. 2); the between-subjects factor was MLU Group (below 2·5 vs. above 2·5). The white bars in Fig. 2 show the percent subject inclusion for each subject type on Opportunity 1. The black caps show the additional inclusion on Opportunity 2. Children benefited significantly from two opportunities, including subjects 50% of the time on Opportunity 1 and 56% of the time on Opportunity 2 ($F(1, 26) = 11{\cdot}85$, $p = 0{\cdot}002$). They repeated lexical subjects most (76%), pronouns next most (49%) and expletives least (35%, $F(2, 52) = 44{\cdot}83$, $p < 0{\cdot}0001$). The low MLU group tended to include subjects less (45%) than the high MLU group (60%, $F(1, 26) = 3{\cdot}52$, $p < 0{\cdot}08$). There were no interactions.

The first planned comparison examined LEXICAL subjects. As shown in Table 5, children included lexical subjects an average of 76% of the time, with no change from the first to the second opportunity. Lower MLU

TABLE 3. *Percent* (S.D.) *subjects included from short sentences*

Group	Opportunity 1	Opportunity 2	Mean
1	59 (24)	72 (24·9)	65
2	73 (19·7)	82 (19·8)	78
Mean	67 (22·5)	77 (22·6)	72

Short sentences ($N=7$) had 3–5 morphemes; sentences were taken from the 18 sentences in Infinitive, Modal, and Past Tense categories. Standard deviations are in parentheses. See text for further explanation.

TABLE 4. *Percent* (S.D.) *subjects included from long sentences*

Group	Opportunity 1	Opportunity 2	Mean
1	42 (26·9)	45 (24·5)	44
2	64 (18·7)	68 (18·3)	66
Mean	54 (25)	57 (24)	55

Long sentences ($N=11$) had 6–10 morphemes; sentences were taken from the 18 sentences in Infinitive, Modal, and Past Tense categories. Standard deviations are in parentheses. See text for further explanation.

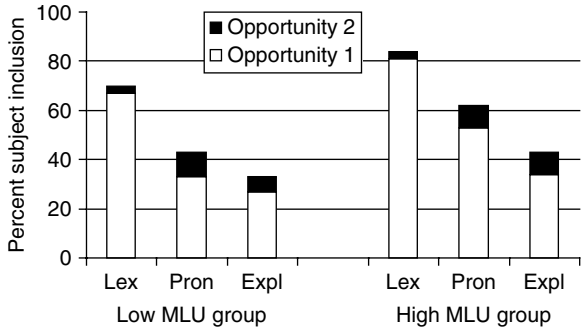

Fig. 2. Percent lexical, pronominal, and expletive subjects included by low and high MLU children on Opportunities 1 and 2.

children tended to produce fewer subjects (68%) than did higher MLU children (83%, $F(1, 26)=3{\cdot}22$, $p<0{\cdot}09$). There was no interaction.

As shown in Table 6, the second planned comparison, of REFERENTIAL PRONOMINAL subjects, revealed that children benefited strongly from Opportunity ($F(1, 26)=8{\cdot}10$, $p<0{\cdot}009$), increasing their inclusion of pronouns from 44% to 53%. Children also varied by Group ($F(1, 26)=4{\cdot}54$, $p=0{\cdot}05$), with low MLU children including subjects from pronominal sentences 38% of the time, compared to 58% for high MLU children. There was no interaction. The third comparison, shown in Table 7 for EXPLETIVE subjects, showed that children included subjects from expletive sentences

TABLE 5. *Percent* (S.D.) *subjects included from lexical sentences*

Group	Opportunity 1	Opportunity 2	Mean
1	67 (30·4)	70 (28·6)	68
2	81 (15·4)	84 (13·8)	83
Mean	75 (24·2)	77 (22·7)	76

The 9 sentences with lexical subjects from Infinitive, Modal, and Past Tense sentences were used for this analysis. Standard deviations are in parentheses.

TABLE 6. *Percent* (S.D.) *subjects included from referential pronominal sentences*

Group	Opportunity 1	Opportunity 2	Mean
1	33 (25)	43 (26·2)	38
2	54 (25·8)	62 (27)	58
Mean	44 (27)	53 (28)	49

The 9 sentences with referential pronominal subjects from Infinitive, Modal, and Past Tense sentences were used for this analysis. Standard deviations are in parentheses.

31% of the time on Opportunity 1 and 38% of the time on Opportunity 2 ($F(1, 26) = 3{\cdot}98$, $p < 0{\cdot}06$). There was no effect of MLU Group and no interaction.

To summarize, children improved in including subjects from referential and expletive pronominal sentences but did not improve in repeating subjects from lexical sentences.

Verbs. We predicted that children's use of verbs would be greater in the nine sentences with pronominal subjects than in the nine with lexical subjects, because of an expected trade-off between use of subjects and use of verbs. (Verbs from sentences with expletive subjects were not analysed because those verbs were primarily a form of *be*.) An omnibus ANOVA revealed no main effect of Opportunity; children included verbs as often on the first opportunity (82%) as on the second (84%). Children did, however, include verbs more often in sentences with pronominal (87%) than lexical (79%) subjects ($F(1, 26) = 10{\cdot}05$, $p < 0{\cdot}004$). Low-MLU children included fewer verbs (74%) than did high MLU children (91%, $F(1, 26) = 8{\cdot}67$, $p < 0{\cdot}01$). There were no interactions.

Collapsing across Opportunity and MLU, we note that in sentences with pronominal subjects, children included the subject 49% of the time and the verb 87% of the time. In sentences with lexical subjects, children included the subject 75% of the time and the verb 79% of the time.

Other sentence constituents. We examined two types of verbal inflectional elements: modals and the past tense. Children showed a tendency to increase their inclusion of Modals from Opportunity 1 (31%) to Opportunity 2 (37%),

TABLE 7. *Percent* (S.D.) *subjects included from expletive pronominal sentences*

Group	Opportunity 1	Opportunity 2	Mean
1	27 (30·1)	33 (25·2)	30
2	34 (24·8)	43 (33·3)	39
Mean	31 (27·1)	38 (29·7)	35

The 6 Expletive sentences were used for this analysis. Standard deviations are in parentheses.

as shown in Table 8 ($F(1,26)=3{\cdot}47$, $p<0{\cdot}08$). Low MLU children included fewer Modals (30%) than did high MLU children (36%, $F(1,26)=13{\cdot}67$, $p<0{\cdot}001$). There was no interaction. In contrast, children did not increase their inclusion of the past tense marker from Opportunity 1 (10%) to Opportunity 2 (8%). Low MLU children included the past tense less often (1·8%) than did high MLU children (14%, $F(1,25)=8{\cdot}27$, $p<0{\cdot}01$; one low MLU child never included the past tense). There was no interaction.

We also examined children's inclusion of Determiners, separately for subject and object positions. Children increased their inclusion of subject Determiners from Opportunity 1 (15%) to Opportunity 2 (23%), also as shown in Table 8, $F(1,26)=7{\cdot}06$, $p<0{\cdot}02$. Low MLU children used subject Determiners marginally less than did high MLU children (10% vs 27%, $F(1,26)=2{\cdot}99$, $p<0{\cdot}10$). There was no interaction. In contrast, children did not increase their inclusion of object Determiners from Opportunity 1 (58%) to Opportunity 2 (55%). Low MLU children used object Determiners considerably less than did high MLU children (33% vs. 76%, $F(1,26)=19{\cdot}34$, $p<0{\cdot}001$. There was no interaction.

Finally, we examined children's inclusion of direct objects, which decreased significantly, though slightly, from the first to second opportunity (96% to 94%, $F(1,26)=4{\cdot}65$, $p<0{\cdot}05$). That decrease probably represents regression to the mean. There was no difference in inclusion rate as a function of MLU (low group, 93%; high group, 97%). There was no interaction.

Group 3. Group 3 – the children with ceiling performance on subjects – significantly increased the percentage of sentence correctly repeated words per sentence from 81% to 84% ($F(1,6)=91{\cdot}13$, $p<0{\cdot}0001$). On both repetitions, Group 3 was at ceiling in inclusion of lexical subjects, referential pronominal subjects, and verbs. With expletives, Group 3 showed a slight tendency to decrease inclusion from 93 to 80% ($F(1,6)=3{\cdot}23$, $p<0{\cdot}13$).

DISCUSSION

Children in this experiment were given an opportunity to repeat a sentence twice. In our double imitation paradigm, children heard and repeated a triad of sentences one at a time, then again heard and repeated that same

TABLE 8. *Percent* (S.D.) *other constituents included*

Group	Opportunity 1	Opportunity 2	Mean
	Modals		
1	12 (15·3)	21 (18·9)	30
2	47 (31·2)	52 (30·3)	36
Mean	31 (30·4)	37 (29·8)	33

The 6 Modal sentences were used for this analysis. Standard deviations are in parentheses.

	Past Tense		
1	1·8 (6·0)	1·8 (6·0)	1·82
2	16 (18·5)	13 (15·2)	14·4
Mean	9·9 (16)	8·1(13·2)	8·1

The 6 Past Tense sentences were used for this analysis. Standard deviations are in parentheses.

	Subject Determiners		
1	3·9 (13·9)	17 (21·2)	10
2	25 (29·5)	29 (36·7)	27
Mean	15 (25·6)	23 (30·6)	19

triad one at a time. We reasoned that the cognitive limitations children experienced on their first attempt to imitate a sentence would be eased on the second try – not eliminated, but eased. Having already accomplished some of the work of understanding the sentence, the children would have more resources available on the second attempt. We examined four areas where increased effective resources could make a difference in children's imitations: overall accuracy in repeating the words of the sentence correctly, inclusion of subjects from sentences of different lengths, inclusion of different types of subjects, and inclusion of other sentence constituents. We found that children were more accurate on their second opportunity, increased their inclusion of subjects from short sentences more often than long sentences, and increased their inclusion of pronominal subjects but not lexical subjects (independent of length). Children did not improve equally on every sentence constituent: they did not increase their inclusion of verbs, past tense markers, direct objects, or determiners of direct objects. They did increase their inclusion of modals and determiners of subjects.

An important finding from our pilot studies was the necessity to present the sentences in triads rather than singly. Children did not improve if they were immediately presented with a second opportunity to repeat a sentence.

Instead, children tended to repeat their previous imitation. Our results imply that the benefits of double imitation are sensitive to a time window (Rovee-Collier, 1995). Most likely, the child's own representation of the sentence lingers in an easily accessed articulatory form. The accessibility of that representation leads to its retrieval; time and intervening interference are apparently required for that articulatory representation to dissipate. Once it has dissipated, what is left in memory is more abstract information which is brought into play when the child hears the target sentence again. In this experiment, two intervening targets were necessary before the child freshly parsed the target. We had not anticipated that the child would prefer to reuse her own prior representation rather than reparse the target because we had not appreciated the importance of features of the memory system that are independent of syntax.

Our current account is that memory and resource limitations interact: it is easier to reuse an already existing articulatory formulation than to create a new one. One way of testing that account is to have the child listen to a sentence twice but only repeat it once. In that format (assuming that the child attempts to understand the sentence both times), fewer or no intervening targets should be necessary.

Low and high MLU groups. Previous findings would lead to the prediction that low MLU children would particularly benefit from two opportunities to repeat a target. If, as Valian and her colleagues have claimed, lexicalization of subjects is reduced because of limited processing resources, then adding resources should help low MLU children more than high MLU children (Valian, 1991; Valian *et al*., 1996). That was not the case in any comparison here, despite the fact that the low MLU children indeed performed worse than the high MLU children on almost every measure and gave every indication of having fewer cognitive resources than high MLU children.

One way to account for the consistent lack of interaction is to invoke the decision to remove, from the high MLU group, children who were at ceiling with respect to subject inclusion on their first imitation of the sentence. We removed those children in order to have an appropriate variance range. Had they been included, we would have found interactions in which low MLU children benefited more from increased resources than did high MLU children (as several *post hoc* analyses demonstrated). But that interaction would be more apparent than real. Children at ceiling cannot improve further, they can only stay the same or regress.

As mentioned in the Methods, our two-year-olds with MLUs above 3 comprised two subgroups. One (Group 3) had ample resources (as shown by their initial level of 81% of words correctly repeated) to allow excellent performance on all types of subjects in sentences of all lengths. The other did not, despite their almost equivalent spontaneous MLU. That latter group was combined with children between MLUs 2·5–3·0. A more

straightforward conclusion to draw from of the lack of interaction in our data is that all children who can improve, will – but to a limited extent. The additional resources a second opportunity provides are limited. They will not turn a low MLU child into a high MLU child.

One caveat to keep in mind in considering our results is that only one-third of the children completed the experiment with enough data to provide meaningful analyses. We thus cannot be sure whether increased resources would help all children.

Overall improvement in reproducing the sentence. Our first focus was children's overall ability to reproduce the target sentence. As predicted, we found that on their second opportunity children were more successful in the percentage of the words of the target sentence that they correctly repeated. Simple reexposure to a sentence (after two intervening targets) led to additional and superior processing, even for children who were at ceiling in repeating subjects. One implication of the benefits from a second opportunity is that children actively process the sentences they attempt to imitate. Double imitation could not lead to improvement unless (a) the children completed some processing on the first repetition and (b) continued to process the sentence on the second repetition.

We note as well that in absolute terms double imitation led to only modest improvement; it eased but did not erase children's limitations. On our analysis of children's behavior as the vector of many simultaneously acting forces (Valian & Eisenberg, 1996), the modest improvement is understandable. No single factor is fully responsible for two-year-olds' comprehension and production of sentences. Nevertheless, the reliable improvement we found supports the conclusion that some lacunae in elicited imitation, and by extension spontaneous speech, are due to limitations in processing resources. Children's utterances are short *in part* because their limitations prevent full lexicalization.

Improvement with short and long sentences. Our second focus was short and long sentences. On both opportunities, children included subjects from short sentences (3–5 morphemes long) more often than from long (6–10 morphemes long) sentences, replicating Valian *et al*.'s (1996) findings with single imitation. Our prediction was that improvement would occur primarily with long sentences, but we found that children's improvement was limited to short sentences. The explanation, we suggest, lies in a combination of the child's limited resources and the odds of adding a subject. In essence, long sentences provide the child with many elements to choose among on the first opportunity and many elements to add on the second opportunity, only one of which is the subject. Short sentences provide fewer elements to choose among or to add.

Imagine an idealized case. On the first opportunity, the child's imitation is two morphemes long and does not include the subject. The second

opportunity with a short sentence would provide one to three additional morphemes, one of which would be the subject. If the child added a single morpheme, the odds of the subject appearing would range from 1 to 0·33, depending on the length of the sentence. In contrast, the second opportunity with a long sentence would provide four to eight additional morphemes. If the child added a single morpheme, the odds of the subject appearing would range from 0·25 to 0·12. In short, children with limited resources have a greater chance on each opportunity of including a subject from short sentences than from long ones, which in turn favours more improvement in subject inclusion on short sentences. That is what we found.

Improvement with different types of subjects. Our primary focus was improvement in children's imitation of different types of subjects. We had several predictions. We argued that children's tendency not to lexicalize subjects in elicited imitation tasks was a joint function of the information value of the subject and the children's cognitive limitations. On their first opportunity, children would tend not to lexicalize pronouns because of their low information value. Lexical subjects, in contrast, would draw the child's limited resources even on the first opportunity because of their higher information value. We found, as predicted and found in other studies (Gerken, 1991; Valian *et al.*, 1996) that children included fewer pronominal subjects than lexical subjects.

More importantly, we predicted selective improvement in subject inclusion: pronominal subjects, rather than lexical subjects, independent of length, were expected to improve. Lexical subjects, because of their higher information value, would be expected to draw considerable resources on the first opportunity, leaving little room for improvement on the second opportunity. Pronouns, however, would tend not to be lexicalized, leaving more room for improvement on the second opportunity. As predicted, children increased their inclusion of referential and expletive pronominal subjects but did not improve in their imitation of lexical subjects.

The increased inclusion of pronominal subjects with a second opportunity in elicited imitation suggests that increased inclusion of pronouns in spontaneous speech as development proceeds is also due to an increase in cognitive resources. Increased resources allow even relatively uninformative constituents to be lexicalized. Our verb results confirm the joint roles of informativeness and limited resources hypothesized in the introduction. There is now a sizable body of evidence that children's sentence production mechanism is influenced by informativeness. In addition to the selective improvement of pronominal subjects with a second opportunity, we obtained further evidence in the form of a pronoun-verb tradeoff. Children included verbs more often in sentences with pronominal than lexical subjects. In sentences with lexical subjects, inclusion rates for the subject and the verb were roughly equal (at 77·5%). But in sentences with

pronominal subjects, the inclusion rate for the verb (87%) was 175% greater than the inclusion rate for the subject (49%). An immature production system is more likely to lexicalize more informative constituents than less informative ones, leading to production of more verbs than pronouns. When constituents are equal in importance, an immature production system splits the difference, producing verbs and nouns at roughly equal rates.

Length did not play a role in the results for pronominal and lexical subjects. Sentences with referential pronominal subjects averaged 5·66 morphemes (ranging from 3 to 9), sentences with expletives averaged 5·83 morphemes (ranging from 4 to 7), and sentences with lexical subjects averaged 6·22 morphemes (ranging from 4 to 10). Although sentences with pronouns were slightly shorter, that did not lead to greater inclusion of pronouns on the first opportunity; instead, they were included markedly less often than lexical subjects and expletives were included less than referential pronouns. Thus, independent of length, children improve more with pronominal subjects than with lexical subjects.

We replicated our earlier finding that children use expletive subjects less often than referential pronominal subjects (Valian *et al.*, 1996). Given the phonological, metrical, and length similarities between the two types of subjects, the differences in repetition cannot be attributed to resource limitations or metrical status. We instead highlight the internal competition in most of the expletive sentences, where the nominal subject – the expletive – and the topic are different. Consider 'it's time for a nap' and 'there are turtles in the lake'. In each case, the subject is the expletive, but 'time' and 'turtles' are the information-bearing topics. Children thus include the topic more often than the expletive. The additional resources available on the second opportunity permit improvement in inclusion of expletive subjects.

In every sentence, multiple influences will shape the child's inclusion of subjects and other sentence constituents. Influences that play a major role in some sentences will play a minor role in others. When lengths are equated, for example, the effect of subject type is evident. When subject types are balanced, the effect of length is apparent. By manipulating sentence characteristics we can systematically examine the importance of different influences on the child's behavior. The present experiment suggests the need to look broadly at children's lexicalization of constituents, seeing each as a vector of forces – an important one of which is limited cognitive resources – that affect all constituents, to a greater or lesser extent in any particular sentence.

Improvement with other constituents. The pattern of results with other constituents demonstrates that not all constituents improved equally with a second opportunity. Since, however, the sentences were designed primarily to investigate subjects, rather than other constituents, we cannot confidently

interpret the pattern. We note that children did not increase their inclusion of verbs on their second opportunity. Our explanation is that, because of verbs' syntactic and semantic prominence, children are including them at close to their ceiling on the first opportunity. When verbs compete with lexical subjects, the two constituents are included equally often. We interpret that as an effect of informativeness: both constituents are highly informative. When verbs compete with pronominal subjects, on the other hand, verbs are preferred. That, too, is compatible with our informativeness interpretation.

The past tense marker, despite how seldom it was included overall – only 8% of the time – did not improve on the second opportunity. Modals, however, did. One possibility is that bound morphemes are less likely to improve than free morphemes; another is that the past tense carries less semantic weight than a Modal like *should* or *can*, or the two together. What is clear is that increased resources does not improve all constituents equally.

The contrast between subject and object Determiners demonstrates that not all free morphemes will increase. Children improved with subject Determiners but not with object Determiners. Subject Determiners occurred, of course, only with lexical subjects. Thus, although lexical subjects themselves did not increase, the Determiners for those subjects did. Again, the design of the present materials prevents our drawing a conclusion about why subject but not object Determiners increased. Future research could test the ideas that we have explored with subjects with other constituents.

The implications of this experiment are methodological and theoretical. On the methodological side, we can conclude that reliance on either observation or experimentation alone will give the wrong picture of children's syntactic competence and their production mechanism. Children's productions, like adults', are the outcome of cognitive as well as linguistic factors, necessitating multiple assessment methods to determine what speakers know and how they use their knowledge to sequence speech. Only by separately evaluating the roles of the different contributors to children's productions can we interpret the lacunae in children's speech.

On the theoretical side, we can conclude that, very early in acquisition, children know the status of subjects in their language, understand the difference between pronouns and nouns, have communicative intentions, and, because of their limited cognitive and memorial resources, preferentially lexicalize constituents with high information value.

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APPENDIX

TARGET SENTENCES ARRANGED BY TYPE

Topic

Each preceded by 'See the *x*?' (underlined in parentheses below), and accompanied by a line drawing depicting the subject but not the action or the context

with subject (drawing)	without subject (drawing)
The man plays games (man's face)	Like grass (3 cows)
They catch flies (3 frogs)	Eats honey (bear)
It needs water (tree in leaf)	Shines at night (crescent moon)

Expletive

It's time for a nap	It's hot outside
It seems quiet in here	There are kids in my school
It's raining today	There are turtles in the lake

Past tense

The girls loved those little dolls	We kicked the cans
The monkey peeled the banana	They cleaned the dishes
The cat licked the floor	I jumped over those big rocks

Modal

Those boys should know your name	They can fit in the window
The horse can run	We would have fun
The chair will break	I could leave

Infinitive

The dog needs to chew bones	She needs to go home early
Birds like to fly	I try to jump high
Fish get to swim every day	We want to walk fast