

## The development of infinitives from three to five\*

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### ABSTRACT

This study investigated the form of infinitival sentences produced by young children and their knowledge of the control properties of this sentence form. Twenty-five children between the ages of 3;7 and 5;4 participated in a story completion task designed to elicit infinitive sentences and in an act-out comprehension task. Although the infinitive form was productive for even the youngest children in this study, development of this form was not complete even for the five-year-olds, nor did any child demonstrate adult knowledge of control. In addition, two competing claims regarding order of acquisition (that of Limber, 1973, and Hyams, 1985) were evaluated.

### INTRODUCTION

The acquisition of sentences with infinitival complements is interesting for a number of reasons. They are among the earliest complex sentences to enter the child's repertoire, and their interpretation requires knowledge of both verb and sentence structure. Limber (1973) reports that infinitives develop early, as do other object complements. However, Limber's data (on children from two to three years of age) include only infinitival sentences of the form [Noun-Verb-Noun-*to*-Verb] with one matrix verb, *want*, as in the sentence *I want you to read that book*. He does not report the use of a range of matrix verbs in infinitival constructions.

In a study by Bloom, Tackeff & Lahey (1984) of four children between the

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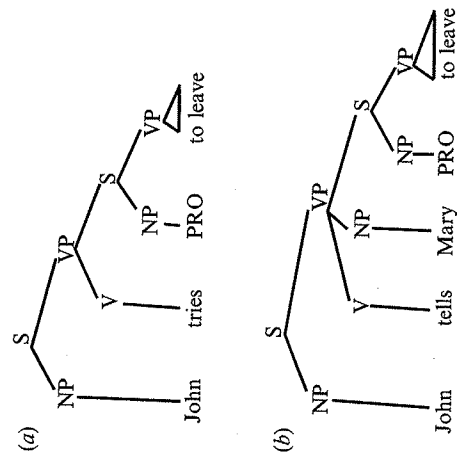


Fig. 1. Obligatory control infinitival complements.

ages of two and three years, all were producing infinitives with an intervening NP between the two verbs by the age of 2;5. However, for each child, infinitive productions were constrained with regard to both the particular sentence structure and the range of matrix verbs that were used in these infinitival sentences. It appears, then, that production of infinitives with an intervening NP emerges around three years of age but is limited in productivity. The present study sought to investigate children's productions of infinitives beyond this early emergence.

The infinitives in (1) and (2) have complements with a phonetically null subject, PRO:

- (1a) John tries to leave.  
 (b) John<sub>i</sub> tries [PRO<sub>i</sub> to leave].  
 (2a) John tells Mary to leave.  
 (b) John tells Mary<sub>i</sub> [PRO<sub>i</sub> to leave].

The antecedent of PRO is determined by a rule which coindexes PRO (indicating coreference) with a controlling NP (Chomsky, 1981).

A number of investigators (e.g. Goodluck, 1981; Hsu, Cairns & Fiengo, 1985; Cairns, McDaniel, Hsu & Rapp, 1990; McDaniel, Cairns & Hsu, 1991) have proposed the principle that PRO is controlled by (coindexed with) the closest NP that c-commands it. C-command is defined as in (3):

- (3) Node A c-commands node B if the first branching node that dominates A also dominates B and if neither A nor B dominate each other.

The trees in Fig. 1 illustrate the c-command principle. For the sentence in (a), the closest c-commanding NP of the complement subject (PRO) is the

matrix subject *John*. *John* thus controls PRO and, in fact, this sentence is interpreted to mean that John will leave. The infinitival complement in (b) is object-controlled since the object of the matrix sentence, *Mary*, is the closest c-commanding NP. In that sentence, Mary will leave.

For both of these infinitival complements, the subject of the complement clause must be coindexed with an NP within the matrix clause. Goodluck (1981) terms these 'obligatory-control complements'. These can be distinguished from sentences which do not require PRO to have internal reference. In such a case PRO is said to have arbitrary reference and it can refer to any element in the discourse. The sentence in (4) is an example. In this sentence, there is no c-commanding NP and so PRO can only be interpreted with contextual information.

- (4a) To ride a horse is fun.  
 (b) [PRO to ride a horse] is fun.

In general, infinitival complements in adult English grammar involve obligatory control. An exception to this is infinitival clauses attached to matrix verbs such as *say*, as in sentence (5). In this sentence, the referent for PRO is required to be external to the sentence, even though there is a c-commanding NP, *mother*.

- (5a) Mother<sub>i</sub> said to clean up the mess.  
 (b) Mother<sub>i</sub> said [PRO<sub>j</sub> to clean up the mess].

The infinitival sentences that have been included in comprehension studies of complex syntax have been obligatory-control structures of the form [NVNtoV] with the matrix verbs *tell* and *promise*. These studies include sentences such as those in (6) from Chomsky (1969):

- (6a) Bozo tells Mickey to go first in line.  
 (b) Bozo promises Mickey to go first in line.

The *tell* and *promise* sentences differ in their interpretations. The *tell* sentence in (6a) requires object control; it is the object, *Mickey*, who goes first in line. This follows the rule for interpreting [NVNtoV] sentences as stated above. In contrast, the *promise* sentence in (6b) requires subject control; it is the sentence subject, *Bozo*, who should go first in line. Verbs such as *promise* thus represent an exception to the general control rule. Presumably these verbs would be marked in the lexicon as requiring subject control.

Children have been shown to misinterpret sentences with *promise*. In Chomsky's study of five- to ten-year-olds, there were children up to almost nine years of age who interpreted both of the sentences in (6) above by having the object NP act out the complement verb and go first in line (Chomsky, 1969), in accordance with the general pattern for object control. Tavakolian

(1977) elicited interpretations of *tell* and *promise* infinitive sentences from younger children aged three to five years. Of the 21 children in her study, eight selected the second noun phrase as the complement verb actor, as in Chomsky's study. Eight other children, however, selected the sentence subject to act out the complement verb. This would yield a correct interpretation of *promise* sentences and an incorrect interpretation of *tell* sentences. Tavakolian accounted for this response pattern by positing that children use a conjoined clause analysis and misanalyse multi-clause sentences by linking each constituent simple sentence to a sentence node as shown in Fig. 2.

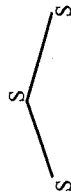


Fig. 2. Conjoined clause analysis.

These children thus do not show evidence of an analysis involving subordination of a complement sentence. This view is consistent with other researchers who have suggested that co-ordination precedes embedding (for instance Menyuk, 1969; Cairns *et al.* 1990; and McDaniel *et al.* 1991). The present study extended the work on children's knowledge of control for infinitival sentences by including additional matrix verbs.

In the current analysis of infinitival constructions, those [NVNtoV] forms with *want*-type verbs differ from *tell*-type verbs (illustrated in Fig. 1 b) in that they are not considered to be control structures. Rather than PRO, the second noun is considered to be the subject of the complement sentence (receiving its case by exceptional case marking). This structure is illustrated in Fig. 3. In this sentence, the subject of the complement clause is the lexical

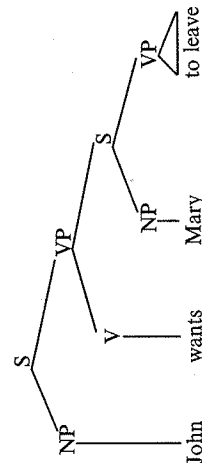


Fig. 3. Infinitival complement with lexical subject.

NP, *Mary*. There is, therefore, no PRO form to interpret based on rules for control.

Limber (1973) and Bloom *et al.* (1984) have reported studies in which they identified the earliest complementizing verbs used by children. Limber (1973), who studied twelve children under the age of three, found *want*-type

verbs among the children's first infinitives and suggested that these verbs might constitute a pattern for the child's early verb phrase complements. Bloom *et al.* (1984) studied four children under three and reported production of two other verbs, *like* and *need*, that, in addition to *want*, take infinitives with lexical subjects. Four of the matrix verbs reported by Bloom *et al.* take object NPs and infinitives with a PRO subject. These include *ask*, *get* and *help* for which the object NP is optional and *tell* for which the object NP is obligatory. Of these seven complement-taking verbs, *want* and *like* were the most commonly produced. The findings of Bloom *et al.* thus provide support for Limber's suggestion that lexical subject constructions are the earliest infinitives produced by English-speaking children.

In contrast, Hyams (1985) suggests that lexical subject constructions should be acquired later than infinitival complements with PRO subjects. This hypothesis is based on the government-binding theory of grammar (Chomsky, 1981) that distinguishes between 'core' and 'peripheral' aspects of grammar. Core properties include those that are predictable by the principles and parameters specified by universal grammar. Peripheral aspects include irregular language-specific properties. The exceptional structure of infinitives with verbs such as *want* is an example of a peripheral aspect of complementation.

Following the core-periphery distinction, Hyams (1985) predicted that peripheral aspects would take longer to acquire than core properties and would not be overgeneralized. Based on this prediction, we would expect infinitives with lexical subjects to be learned later than infinitives with the general structure of PRO subjects. We would also expect any overgeneralization errors to be in the direction of overgeneralizing the PRO subject analysis to exceptional cases with no overgeneralization of the lexical subject analysis. An aim of the present study was to examine the claims of Limber (1973) and Hyams (1985) regarding the course of development of sentences containing infinitive clauses.

The study reported here, thus, had three major aims. The foremost was to discover the types of infinitival sentences produced by young children. Secondly, we wanted to investigate children's knowledge of the control properties of infinitival sentences. Finally, we planned to evaluate two competing claims regarding the course of development of infinitival sentences.

To accomplish these aims, the present study extended the range of infinitive-taking verbs from the two that have been used in previous studies to a larger number of verbs with a variety of control properties. Included were obligatory-control complements that are object controlled (such as *tell*) and others that are subject-controlled (such as *promise*) in adult grammar. Also included were complements requiring external reference (such as *say*) and complements with lexical subjects (such as *want*).

## METHOD

*Subjects*

The study involved 27 monolingual English-speaking children between the ages of 3;7 and 5;4.

*Procedure*

Production and comprehension responses were elicited during separate interviews. The three interviews, one to elicit the production responses and two to elicit interpretive act-out responses, took place within a two-week time period. The production task always preceded the comprehension tasks so the former would not be influenced by the child's having previously heard the infinitive forms.

A vocabulary pretest, administered prior to the production task, checked the child's comprehension of the vocabulary and provided training on the procedures. Matrix verbs that were unfamiliar to a child were demonstrated and retested. A second vocabulary retest was administered prior to the first comprehension task to familiarize the child with the procedures for that task.

The production task employed a story completion task and comprised thirty brief stories. The examiner read and simultaneously acted out a story, after which the child was asked first to complete the story with a subject and matrix verb designated by the examiner and, second, to act out their utterance. An example is given in (7) below, designed to elicit the sentence *Ernie wants to stand up*:

- (7) *Ernie and Mickey sitting; Bert standing, facing them Ernie, Mickey and Bert are playing school. Bert is the teacher. Raise Ernie's hand Ernie raises his hand. Ernie to Bert: 'Can I stand up?' Ernie wants...you finish it. Ernie —*

A complete description of the task is given in Eisenberg (1989).

The first comprehension task elicited act-out responses to 24 sentences. The children were required to repeat each test sentence prior to acting it out. The second comprehension task comprised 12 items and provided the opportunity to introduce sentences that would be ungrammatical to adults. After repeating the test sentence, the children were required to judge the sentence as 'right' or 'wrong' and to act out only those sentences judged as right.

*Materials*

Matrix verbs were selected that differ according to whether they subcategorize for an object NP and according to their reference and control properties. In order to separate verbs into types based on these properties, infinitive sentence frames were developed and verbs were grouped according

to the combination of sentence frames in which they could appear. The sentence frames are listed below with examples.

- (i) NP<sub>i</sub>-V-[NP<sub>j</sub>-to-VP]  
The coach wanted the girl to join the team.
- (ii) NP<sub>i</sub>-V-[PRO<sub>i</sub>-to-VP]  
The boy tried to clean up the mess.
- (iii) NP<sub>i</sub>-V-NP<sub>j</sub>-[PRO<sub>i</sub>-to-VP]  
The waiter promised the patron to bring the food.
- (iv) NP<sub>i</sub>-V-NP<sub>j</sub>-[PRO<sub>j</sub>-to-VP]  
The teacher told the class to start the test.
- (v) NP<sub>i</sub>-V-[PRO<sub>j</sub>-to-VP]  
The mother said to play outside.

Sentence frame (i) is not a control structure but has a lexical complement subject. The remaining sentences have the non-lexical PRO as their complement subject. Sentence frames (ii)-(iv) are obligatory control structures. Of these, (ii) and (iii) require subject control of PRO and (iv) requires object control. The remaining sentence frame, (v), requires external reference for PRO.

With regard to subcategorization for an object NP in the matrix clause, only (iii) and (iv) can take object NPs. In (iii), the object does not control PRO. In (iv), the object must control PRO.

Verbs used in the study were of six different types. Table 1 gives the verbs and indicates which can appear in the five sentence frames.

Verbs such as *want* (Type I) can be used in (i) and (ii). Type II verbs, such as *tell*, require an object NP and can only appear in (iv). Type III verbs, such as *try*, are limited to (ii), without an object NP. *Promise* type verbs (Type V) take an object that is interpreted as in (iii) and can occur in (ii) without the object NP. *Ask* type verbs (Type IV) can appear without the object NP, as in (ii); they can also appear with an object, with the interpretation in either (iii) or (iv). *Ask* sentences with a direct object NP are, therefore, ambiguous. Finally, the verb *say* (Type VI) can only appear in (v).

Two verbs were selected for each of these verb types wherever possible and are indicated in Table 1. Only *force*, *beg*, *promise*, and *threaten* were not among the matrix verbs reported by Bloom *et al.* (1984) and Limber (1973) to be produced by young children. It was expected that these four verbs would be less familiar to the children and the vocabulary pretest was intended to ensure understanding of them.

Eight verbs to be used in the embedded complement clauses were selected from lists of early verbs found in Bloom (1970) and Bowerman (1973). Four were transitive verbs, including *hug*, *carry*, *find*, and *pick up*. Four were intransitive, including *swim*, *fall*, *sleep*, and *stand up*. Two transitive and two intransitive complement verbs were used with each matrix verb type.

was the subject of *want* and was also intended to do the standing. For the remaining 14 stories, the subject of the complement clause was intended to refer to someone other than the sentence subject, either a second noun (the matrix object or complement subject) or an external referent. In the example in (8), designed to elicit the sentence *Bert wants Mickey to find Ernie*, *Bert* was the subject of *want* and *Mickey* was intended to do the finding.

- (8) *Bert and Mickey standing; put Ernie under steps Ernie is hiding. Make Bert look for Ernie Bert can't find Ernie. Bert to Mickey: 'Please find Ernie for me.'* Bert wants... you finish the story. Bert —

Each of the 11 matrix verbs appeared in at least one referential context (as in 7 above) and one story context in which the complement verb actor is not coreferential with the main clause subject (as in 8).

On the first comprehension task, each of the matrix verbs appeared in two sentences; the verb *say* appeared in two additional sentences so that there would be an equal number of sentences with each verb type. The second comprehension task included one verb from each of the six verb types. Each verb was used in one [NVtoV] and one [NVNtoV] sentence, resulting in nine grammatical and three ungrammatical sentences.

The sentences from all three tasks are listed in the Appendix.

RESULTS

Utterances produced on the production task were separated into single and two-clause utterances. The two-clause utterances were divided into infinitival complements and other two-clause constructions. These included tensed complements, participial complements, co-ordinated sentences, quotation form utterances, and subordinated constructions. Infinitival complements were coded according to their surface form as [NVtoV] and [NVNtoV]. The enactments of the elicited utterances were coded to indicate the actor selected by the child to perform the complement verb action and whether this selected actor matched the intended actor for that story. Only responses which met the following criteria were included in the analysis: (1) the designated matrix verb was produced, and (2) the actor selected for the complement verb by the child was consistent with the story content.

On the comprehension tasks, the child's interpretations were coded according to the actor chosen for the complement verb. Only items that had been correctly repeated were included in the analysis. A repetition counted as correct if it included the sentence subject, matrix verb, and object NP (if there was one). The complement verb did not have to be exactly repeated as long as a semantically and structurally similar complement verb was produced. On the second comprehension task, only sentences judged as right were included in the analysis.

TABLE 1. *Verb type according to subcategorization for direct object and control properties*

Sentence frames	Verb types					
	I <i>want</i> <i>like</i>	II <i>tell</i> <i>force</i>	III <i>try</i> <i>pretend</i>	IV <i>ask</i> <i>beg</i>	V <i>promise</i> <i>threaten</i>	VI <i>say</i>
(i) NP <sub>i</sub> -V [NP <sub>j</sub> -to-VP]	+	-	-	-	-	-
(ii) NP <sub>i</sub> -V [PRO <sub>i</sub> -to-VP]	+	-	+	+	+	-
(iii) NP <sub>i</sub> -V-NP <sub>j</sub> [PRO <sub>i</sub> -to-VP]	-	-	-	+	+	-
(iv) NP <sub>i</sub> -V-NP <sub>j</sub> [PRO <sub>j</sub> -to-VP]	-	+	-	+	-	-
(v) NP <sub>i</sub> -V [PRO <sub>j</sub> -to-VP]	-	-	-	-	-	+

TABLE 2. *Number of infinitives produced with each verb type for each infinitive form and referent choice*

Sentence form & referent choice	Verb types						Total
	I <i>want</i> <i>like</i>	II <i>tell</i> <i>force</i>	III <i>try</i> <i>pretend</i>	IV <i>ask</i> <i>beg</i>	V <i>promise</i> <i>threaten</i>	VI <i>say</i>	
NVtoV							
Ns <sup>a</sup>	39	21	67	21	41	19	268
Ne <sup>b</sup>	4	8	5	5	2	14	38
Total	43	29	72	26	43	34	242
NVNtoV							
Ns	1	3	0	4	1	0	9
Nz <sup>c</sup>	28	59	0	17	8	1	113
Ne	0	1	0	0	1	0	2
Total	29	63	0	21	10	1	124
For Comp	2	7	2	7	1	3	22
Other	6	1	14	2	9	0	32
Total	80	100	88	56	63	37	424

<sup>a</sup> Ns: Subject noun performed the complement verb action.  
<sup>b</sup> Ne: Sentence external noun performed the complement verb action.  
<sup>c</sup> Nz: Second noun performed the complement verb action.

For the production task, story contexts were developed for each of two reference patterns. For 16 of the stories, the subject of the matrix clause was also intended to be coreferential with the subject of the complement clause. An example of this story type was given in (7) above. In that example, *Ernie*

In reporting the children's utterances, the following conventions have been used. Sentences that would be ungrammatical to an adult have been marked with an asterisk preceding the utterance. The complement verb actor has been italicized or, if a non-mentioned referent was selected by the child, has been indicated in parentheses following the utterance.

Infinitival complements have been assumed to be acquired early. However, in the present study, even five and a-half-year-olds made many errors. In presenting the results, we first report the infinitive forms produced by the children on the elicited production task. Following this, the children's knowledge of control is reported based both on their responses to the comprehension task items and on enactments of their own utterances on the production task. Finally, we present evidence from children regarding the developmental primacy of *want* and *tell* constructions in the development of infinitival complements.

#### Infinitive forms produced

As shown in Table 2, there were 424 infinitives produced out of 750 opportunities. Of these, 246 were [NVtoV] sentences, 124 were [NVNtoV] sentences, 22 were *for* complements, with 32 other infinitive forms.<sup>1</sup> The children produced more [NVtoV] forms than they did [NVNtoV] forms. This is the case overall and for each of the three verb types for which both forms are grammatical (Types I, IV and V).

Although the [NVtoV] form is grammatical with only five of the matrix verb types, there were children who produced this form with Type II (*tell*-type) verbs which require an object NP in adult grammar. Ungrammatical [NVtoV] sentences with *tell*, such as the sentences in (9), were only produced by children aged 4;6 or younger.

- (9a) \*Mickey tells to pick Bert up.  
 (b) \*Bert tells to pick Mickey up. (*Ernie*)

[1] Of these, 24 were causal constructions with an additional embedded clause within the infinitival complement. Twenty of these were grammatical sentences with the matrix verbs *try* (14), *threaten* (4), *force* (1), and *like* (1) such as the sentences in (12):

- (12a) Mickey threatens to make Ernie fall.  
 (b) Mickey likes to let him swim.  
 and four were ungrammatical negative sentences with *threaten*, as in (13):  
 (13) \*Bert threatens Ernie not make him fall.  
 There were an additional eight ungrammatical infinitives, including the three sentences with redundant NPs in (14):

- (14a) \*Bert threatens Bert to fall.  
 (b) \*Ernie wants Ernie to stand up.  
 (c) \*Ernie begs for...for Ernie to swim.

TABLE 3. Matrix verbs with which each infinitive form was produced

Subjects Name (age)	Infinitival sentence forms		
	[NVtoV]	[NVNtoV]	[NVforNtoV]
Chris (3;7)	want, *force, try & pretend, promise	like, tell & force, ask, promise	
Danny (3;8)	want & like, *force, try, ask & beg, threaten, say	want & like, tell & force, threaten	beg
Adira (3;8)	want & like, try, ask, promise, say	want & like	
Todd (3;8)	want, try & pretend	tell, ask	
Joel (3;9)	want, *force, try, beg, promise, say	want & like, tell, ask	
Jennifer (3;10)	want & like, *force, try & pretend, beg, promise & threaten	want & like, tell & force, threaten	
Jeri (3;10)	want & like, *tell & *force, try & pretend, ask & beg, promise & threaten, say	want	
Laura (3;10)	want, try, beg	want, tell, ask	
Noah (3;10)	want, *force, try & pretend, ask, say	want & like, tell, ask	
Alice (4;0)	like, *tell & *force, try, ask & beg, promise & threaten, say	want	*force, *try, beg
Donna (4;1)	want & like, *tell & *force, try & pretend, beg, promise & threaten, say	want & like, tell & force, threaten	
Kalman (4;1)	want & like, *tell & *force, try, ask, promise	want & like	*tell
Ron (4;2)	want, *tell & *force, try, ask & beg, promise, say	want, force, ask	
Sarah (4;2)	want, try, beg, say	tell & force, ask	
Sally (4;4)	like, *force, try, promise & threaten, say	tell & force, ask & beg, promise & threaten	
Paul (4;5)	want, *force, try, promise, say	tell & force, ask	
Robin (4;6)	want & like, try, threaten	want & like, tell & force, ask	
Kelly (4;6)	want & like, *tell & *force, try & pretend, ask & beg, promise, say	like	*force, *threaten
Debbie (4;8)	want & like, *force, try & pretend, beg, say	want & like, tell & force, ask & beg, threaten	say
Jeff (4;10)	want & like, *force, try & pretend, beg, promise, say	want, tell & force	beg
Bonnie (5;2)	like, try	want, tell & force, ask & beg	
Judy (5;2)	want & like, *force, try & pretend, promise	force, threaten	want & like, *force, beg
Colleen (5;3)	want & like, try & pretend, promise & threaten	want, tell & force, ask & beg	
Jack (5;3)	want & like, *force, try & pretend, beg, promise & threaten	want	*tell & *force, *try, ask, *threaten, say
Justin (5;4)	want & like, *force, try & pretend, beg, promise & threaten, say	tell & force	

In contrast, children across the entire age range sampled produced this form with the less familiar verb *force*, as in the sentences in (10).

- (10a) \*Ernie forces to go into the water.  
 (b) \*Bert forces to hug Ernie. (*Mickey*)

The [NVNtoV] form was produced, with one exception, only with the four matrix verb types that allow this form. No [NVNtoV] sentences were produced with Type III (*try*-type) verbs that cannot take either an object NP or a lexical complement subject. That is, there were no sentences of the type \**Bert tries Mickey to fall*. There was only one [NVNtoV] sentence produced with *say* (Type VI verb).

The matrix verbs used in [NVtoV], [NVNtoV], and *for* complements are listed for each child in Table 3.

All but two children produced [NVtoV] sentences with at least three matrix verb types. The children produced [NVNtoV] sentences with fewer verb types. Seven of the children produced [NVNtoV] sentences with only one matrix verb type. The children, particularly those under four years of age, produced fewer infinitives with the unfamiliar verbs.

*For* complements were produced by eight children, seven of whom were four years of age or older. *For* complements were produced as frequently with matrix verbs that cannot take this complementizer, as in the sentences in (11), as with matrix verbs that are subcategorized for the complementizer.

- (11a) Bert wants for *Mickey* to find Ernie.  
 (b) \*Ernie tells for *him* (*Bert*) to go to bed.  
 (c) \*Ernie tries for *him* (*Bert*) to fall.

#### Interpretations of infinitival complements

The data on children's knowledge of control, presented in Tables 4 and 5, include both the interpretations on the comprehension tasks and the meanings demonstrated for the children's own utterances on the production task.

Table 4 shows the complement subject reference allowed for each matrix verb type in [NVtoV] sentences. For adults, the only allowable referent in these sentences is the subject NP, with the exception of verb type VI (*say*) which requires an external referent. Only one child (Robin, aged 4;6) showed this adult response pattern. One child (Judy, aged 5;2) restricted reference to the subject NP for all matrix verb types, including *say*. All of the other children allowed arbitrary reference on [NVtoV] infinitive sentences with at least one matrix verb type. That is, they allowed either the subject NP or a non-mentioned referent to enact the complement verb action.

Table 5 shows complement subject reference allowed for each matrix verb type in [NVNtoV] sentences. For adults, the second noun must be selected to act out the complement verb for verb types I and II and the subject noun

TABLE 4. Complement subject reference allowed on [NVtoV] sentences for subjects according to age

Name	Subjects Age	Verb types					
		I <i>want/ like</i>	II <i>tell/ (force)</i>	III <i>try/ pretend</i>	IV <i>ask/ beg</i>	V <i>promise/ threaten</i>	VI <i>say</i>
Chris	3;7	Arb	Ns <sup>a</sup>	Ns	Ns	Ns	Ns
Danny	3;8	Ns	Ns	Ns	Ns	Ns	Arb <sup>b</sup>
Adira	3;8	Arb	— <sup>c</sup>	Ns	Ns	Arb	Arb
Todd	3;8	Ns	—	Arb	Arb	Ns	Arb
Joel	3;9	Ns	(Ns) <sup>d</sup>	Ns	Ns	Ns	Arb
Jennifer	3;10	Ns	Ns	Ns	Ns	Ns	Arb
Jeri	3;10	Ns	Arb	Arb	Arb	Arb	Arb
Laura	3;10	Ns	—	Ns	Arb	Ns	Ns
Noah	3;10	Ns	Ns	Arb	Ns	Ns	Arb
Alice	4;0	Ns	Arb	Ns	Arb	Arb	Arb
Donna	4;1	Ns	Ns	Ns	Ns	Ns	Arb
Kalman	4;1	Ns	Arb	Ns	Ns	Ns	Ns
Ron	4;2	Ns	Arb	Ns	Ns	Ns	Arb
Sarah	4;2	Ns	—	Ns	Ns	Ns	Arb
Sally	4;4	Ns	Ns	Arb	Arb	Ns	Ns
Paul	4;5	Ns	(Ns)	Ns	Ns	Ns	Arb
Robin	4;6	Ns	—	Ns	Ns	Ns	Ne <sup>e</sup>
Kelly	4;6	Ns	Arb	Ns	Arb	Arb	Arb
Debbie	4;8	Ns	Ns	Arb	Ns	Ns	Ns
Jessie	4;10	Ns	Arb	Ns	Ns	Ns	Arb
Bonnie	5;2	Ns	—	Ns	Ns	Ns	Arb
Judy	5;2	Ns	Ns	Ns	Ns	Ns	Ns
Colleen	5;3	Ns	(Ns)	Arb	Ns	Ns	Arb
Jack	5;3	Ns	(Ns)	Ns	Arb	Ns	Arb
Justin	5;4	Arb	Ns	Ns	Ns	Ns	Arb

<sup>a</sup> Ns: allowed only the sentence subject (the mentioned noun) as complement verb actor.  
<sup>b</sup> Arb: allowed either the mentioned noun or a non-mentioned entity as complement verb actor.

<sup>c</sup> —: no available data.

<sup>d</sup> ( ): produced [NVtoV] only with *force* and not with *tell*.

<sup>e</sup> Ne: allowed only a non-mentioned entity as complement verb actor.

for verb type V. Verb type IV allows either the subject or object NP to be the referent for the complement verb actor. None of the children showed this adult response pattern.

Seven children, all but one aged 4;2 or younger, allowed only the second noun to act out the complement verb for all verb types including Type V (*promise*). Twelve children, ranging in age from 3;9 to 5;2, allowed either mentioned noun, Ns or N2, to act out the complement verb on [NVNtoV] sentences for verb types other than *ask* (Type IV). In contrast to the [NVtoV] sentences, only two children (Danny, aged 3;8, and Ron, aged 4;2) allowed

TABLE 5. Complement subject reference allowed on [NVNtoV] sentences for subjects according to age

Name	Age	Verbs					
		I <i>want/ like</i>	II <i>tell/ (force)</i>	III <i>try/ pretend</i>	IV <i>ask/ beg</i>	V <i>promise/ threaten</i>	VI <i>say</i>
Chris	3;7	N2 <sup>a</sup>	N2	N2 <sup>b</sup>	MIX <sup>c</sup>	N2	— <sup>d</sup>
Danny	3;8	N2	N2	—	N2	Arb <sup>e</sup>	—
Adira	3;8	N2	N2	—	—	—	—
Todd	3;8	N2	N2	—	N2	N2	MIX
Joel	3;9	N2	N2	MIX	N2	MIX	MIX
Jennifer	3;10	N2	N2	—	N2	N2	N2
Jeri	3;10	N2	N2	—	N2	N2	—
Laura	3;10	MIX	MIX	—	MIX	—	—
Noah	3;10	N2	N2	N2	MIX	N2	N2
Alice	4;0	N2	N2	N2	N2	—	N2
Donna	4;1	N2	N2	—	MIX	N2	Ns
Kalman	4;1	MIX	MIX	—	N2	N2	Ns
Ron	4;2	MIX	Arb	—	N2	N2	—
Sarah	4;2	N2	N2	—	N2	N2	—
Sally	4;4	N2	MIX	N2	MIX	MIX	N2
Paul	4;5	N2	MIX	—	MIX	—	—
Robin	4;6	N2	N2	—	MIX	N2	—
Kelly	4;6	N2	N2	N2	MIX	MIX	—
Debbie	4;8	MIX	N2	N2	MIX	MIX	N2
Jessie	4;10	MIX	N2	—	N2	MIX	N2
Bonnie	5;2	MIX	MIX	—	MIX	MIX	—
Judy	5;2	N2	N2	—	N2	MIX	—
Colleen	5;3	N2	N2	N2	MIX	N2	—
Jack	5;3	N2	N2	—	MIX	N2	N2
Justin	5;4	N2	N2	N2	N2	N2	N2

<sup>a</sup> N2: allowed only the second noun as complement verb actor.  
<sup>b</sup> Ns: allowed only the sentence subject as complement verb actor.  
<sup>c</sup> MIX: allowed either Ns or N2 as complement verb actor.  
<sup>d</sup> —: no available data.  
<sup>e</sup> Arb: allowed either mentioned NP (Ns or N2) or a non-mentioned NP as complement verb actor only with *force* and *threaten*.

arbitrary reference on [NVNtoV] sentences, each for one sentence produced with an unfamiliar matrix verb.  
 There were three children who showed no evidence of control. Adira (3;8), Jeri (3;10), and Kelly (4;6) allowed arbitrary reference on [NVtoV] sentences. They did not produce any [NVNtoV] sentences with verb types that have a PRO complement subject. All of their [NVNtoV] sentences were with Type I verbs (*want* and/or *like*) for which N2 always performed the action of the complement verb. The oldest of the three, Kelly, produced ungrammatical for complements with *force* and *threaten*.

*Want* vs. *tell*

Two predictions have been proposed concerning the development of infinitival complements. Limber (1973) suggested that lexical subject constructions, that is [NVNtoV] infinitives with *want*, would become the prototype for infinitival sentences with other verbs. Conversely, Hyams (1985) has suggested that control verbs, such as *tell*, should have developmental primacy. The productions and interpretations of each child were examined for evidence that that child might be following a developmental path consistent with either prediction.

Interpretations that required a PRO complement subject with Type I verbs were taken as evidence that these verbs were being analysed as a control verb, consistent with Hyam's prediction. There were six children who allowed either Ns or N2 to act out the complement verb for *want*-type verbs (see Table 5). This is not consistent with an analysis of N2 as the lexical complement subject and suggests that infinitival clauses with *want*-type verbs are being analysed as having a PRO complement subject. These six children ranged in age from 3;10 up to 5;2, suggesting further that a reanalysis of these complements as lexical subject constructions occurs late in development.

On the other hand, there were four other children whose development appeared consistent with an earlier acquisition of *want*-type verbs, as suggested by Limber. There was no evidence that these children produced [NVNtoV] sentences with a PRO subject. Rather, these children produced [NVNtoV] sentences only with *want*-type verbs. Two of the children, Jeri (aged 3;10) and Alice (aged 4;0), produced [NVtoV] sentences with the matrix verb *tell* and allowed arbitrary reference for PRO. Adira (aged 3;8) produced quotation form utterances with *tell* that lacked an object NP and also allowed arbitrary reference on these sentences. Jack (aged 5;3) produced a *for* complement and a quotation form utterance without an object NP with the matrix verb *tell*. Furthermore, all four of these children consistently acted out [NVNtoV] sentences by having the second noun perform the complement verb action, consistent with a lexical subject analysis. The correct interpretation of the [NVNtoV] *tell* sentences would thus be based on a non-adult analysis. This hypothesis is consistent with the conclusions of previous investigators (for instance, Chomsky, 1969; Hsu *et al.* 1985; Tavakolian, 1977) who have found that earlier child grammars yield an apparently adult-like interpretation based on a non-adult analysis.

DISCUSSION

One aim of the current study was to investigate children's production and comprehension of infinitival complements. Previous researchers (for example Limber, 1973) had claimed that the infinitival complement is an early

developing form. In support of this claim, the elicited production data in the current study demonstrated that the infinitive form is established by the age of three-and-a-half years. That is, all of the children in the present study produced infinitives with at least four of the six verb types. Adult command of these structures, however, develops slowly and was not complete for the five-year-olds in our study.

Two major infinitive forms, [NVtoV] and [NVNtoV], were elicited in the present investigation. The children were not equally productive with these two forms. One way to view productivity is in terms of number of productions per verb type. Considering only those verb types for which each of these infinitive forms would be grammatical, there were more productions per verb type with the [NVtoV] form than with the [NVNtoV] form. An alternative way to define productivity is in terms of number of children who produced the form with at least half of the verb types for which that form would be allowable. Twenty-three of the 25 children met this productivity criterion for [NVtoV]; the other two produced the [NVtoV] form with only two of the five verbs for which this form is grammatical. In contrast, only 19 of the children met this productivity criterion for [NVNtoV]; the other six produced the [NVNtoV] form with only one of the four verb types for which this form would be grammatical. Thus, both productivity matrices identify the [NVtoV] form as more productive than the [NVNtoV] form.

The [NVtoV] form was produced with every verb type, including *tell*-type verbs which require an obligatory object NP. In contrast, the [NVNtoV] form was only produced with verb types that can take object NPs (*tell*-, *promise*-, and *ask*-type) or that can take complements with lexical subjects (*want*-type). Children who produced few [NVNtoV] forms produced, instead, either single clause utterances or [NVtoV] forms with an external referent for some of the verbs. There were no [NVNtoV] productions with verbs that cannot take object NPs (*try*-type). Thus the children did not overgeneralize object NPs to verbs that were not subcategorized for them; but they did show productions in which an object NP was not produced where required or allowed.

For complements were produced in equal numbers with verbs that cannot take a *for* complementizer and with verbs subcategorized for this complementizer. In contrast to the caution shown toward the use of direct objects, this shows excessive use of a complementizer type.

A second aim of this study was to investigate children's knowledge of the control properties of verbs in infinitival sentences. There was no child who demonstrated adult knowledge of control for all verb types and with both of the infinitive types. Several child patterns were notable.

One such pattern was to allow arbitrary reference in [NVtoV] infinitives. In adult grammar, [NVtoV] infinitives require obligatory subject control with the exception of the verb *say*, which requires external reference. Only

one child showed this adult control pattern and one other child showed obligatory subject control for all verbs with no external reference allowed. All of the other children showed a pattern in which they allowed external reference for at least one matrix verb but not obligatorily; that is, the children allowed arbitrary reference in which the referent could be either sentence internal or external. In response to this finding, Cairns & McDaniel and their co-workers included [NVtoV] sentences in a study of judgements of reference for complement and adverbial structures. They found that many children allowed both subject and external reference for [NVtoV] infinitives (Cairns, McDaniel, Hsu & Rapp, 1990).

With [NVNtoV] infinitives, there were children who showed the previously reported object control pattern for *promise*-type verbs (Chomsky, 1969). There were also children who showed a mixed subject/object pattern, previously reported as transitional (Chomsky, 1969; Hsu *et al.* 1985). In adult grammar, this pattern is allowable for *ask*-type verbs only. In the present study, there were children who showed this control pattern for other matrix verbs.

There were only two instances in which an external referent was allowed on an [NVNtoV] sentence. This contrasts with the widespread allowance of arbitrary reference on [NVtoV] sentences. However, children reported by McDaniel *et al.* (1991) did make judgements allowing external reference on [NVNtoV] sentences. The findings of the current study may thus reflect a strong preference for internal reference.

In the present study, we found three children who showed no evidence of control. This finding accords with the findings of McDaniel *et al.* (1991) and is consistent with the conjoined clause analysis originally proposed by Tavakolian (1977), which they adopt. That is, children initially misanalyse infinitive sentences as conjoined rather than subordinated. Given this analysis, there would be no c-commanding NP for PRO and reference would, therefore, be arbitrary.

Our third aim was to investigate two competing claims regarding order of acquisition. We found six children whose development was consistent with an earlier acquisition of *tell*-type verbs, as predicted by Hyams (1985), based on linguistic theory, that peripheral aspects of the grammar are acquired later than core properties. Four other children whose development was consistent with an earlier acquisition of *want*-type verbs, as suggested by Limber (1973), seem, however, to be pursuing a different developmental course.

Further comparison of these two groups of children revealed an interesting difference in the extent to which the [NVNtoV] form was produced. The *want* group produced fewer [NVNtoV] forms overall and produced this form with fewer matrix verbs than did the *tell* children. Children who acquired the general pattern of analysing [NVNtoV] as having a PRO subject showed productive use of the [NVNtoV] form and overgeneralized this form to *want*-

type verbs. Children who acquired the exceptional property of lexical subject first were less productive and had not generalized the [NVNtoV] form to other verbs.

It is not the case that linguistic theory should necessarily predict the course of language acquisition and that lexical subject verbs will thus be late in development. *Want*, though exceptional in its case marking, is very common in the speech that children hear. Goodluck (1986) has suggested that the ordering of syntax learning may follow the forms the child is exposed to rather than the sequence that follows from linguistic theory. As an example, she cites the earlier learning by English-speaking children of prepositional-final forms such as *John sees the donkey which the camel pushes the zebra* to than of prepositional-initial forms such as *John sees the donkey to which the camel pushes the zebra*. The earlier learning by some children of [NVNtoV] infinitives with the matrix verb *want* may also be an example of the impact of linguistic input on order of acquisition.

We noted above that the children showed 'errors' of producing infinitival sentences without a matrix object NP but did not overproduce an object NP where not allowed. We also noted that fewer infinitives were produced with the unfamiliar verbs. These findings demonstrate caution in producing complements with new verbs and suggest that acquisition proceeds verb-by-verb.

This pattern accords with learnability considerations in that the non-adult characteristic forms are capable of modification towards the adult grammar based only on positive evidence. Whereas ungrammatical inclusion of object NPs would require negative evidence to change, the lexical learning involved in learning subcategorization constraints for complements requires only positive input.

In the current study, an elicited production task was used to encourage the children to produce a complex structure that is produced infrequently in spontaneous speech and to produce that structure with a wider range of matrix verbs than is generally observed. In order to do this, the children were placed in a situation which would bias them to produce the infinitive form. It might be argued that the story contexts could have led the children to produce ungrammatical sentences. We think that this is unlikely since the situation did not uniquely require production of the infinitive form. That is, there were other constructions available to the children and these other forms were, in fact, produced by some of the children.

The acquisition of infinitival complements has not been widely studied. The assumption has been that this construction type is learned early. Previous researchers, starting with Chomsky (1969), had noted non-adult interpretations by older children with subject control verbs such as *promise*. The current study revealed additional non-adult patterns. Several key pieces to infinitive acquisition would seem to be acquired separately. These include

the basic [PRO to V] structure, exceptional lexical subject structure, inclusion of object NP complements in infinitival sentences, and interpretation of pronominal complement subjects. These properties must be learned as a lexical property for each verb. The acquisition of infinitival complements is thus a more complex phenomenon and develops more slowly than has previously been supposed.

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## APPENDIX

Experimental items and sample infinitive sentences on the production task

\* = ungrammatical in adult grammar;

† = unallowable reference in adult grammar.

(i) *Items in which the complement verb subject is the same as the main verb subject*

- Ernie wants – Ernie stands up  
 (Ernie wants to stand up)  
 Bert likes – Bert carries Mickey  
 (Bert likes to carry Mickey)  
 Ernie forces – Ernie falls  
 (\*Ernie forces to fall)  
 Mickey tells – Mickey picks up Bert  
 (\*Mickey tells to pick up Bert)  
 Mickey says – Mickey stands up  
 (†Mickey says to stand up)  
 Bert says – Bert picks up Ernie  
 (†Bert says to pick up Ernie)  
 Bert pretends – Bert sleeps  
 (Bert pretends to sleep)  
 Mickey pretends – Mickey carries Bert  
 (Mickey pretends to carry Bert)  
 Mickey tries – Mickey finds Bert  
 (Mickey tries to find Bert)  
 Bert tries – Bert falls  
 (Bert tries to fall)  
 Ernie begs – Ernie swims  
 (Ernie begs to swim)  
 Bert asks – Bert picks up Ernie  
 (Bert asks to pick up Ernie)  
 Mickey promises – Mickey sleeps  
 (Mickey promises to sleep)  
 Bert promises – Bert hugs Ernie  
 (Bert promises to hug Ernie)  
 Ernie threatens – Ernie finds Mickey  
 (Ernie threatens to find Mickey)  
 Bert threatens – Bert falls  
 (Bert threatens to fall)

(ii) *Items in which the complement verb subject is different from the main verb subject*

- Bert wants – Mickey finds Ernie  
 (Bert wants Mickey to find Ernie)

- Mickey likes – Ernie swims  
 (Mickey likes Ernie to swim)  
 Mickey forces – Bert falls  
 (Mickey forces Bert to fall)  
 Bert forces – Mickey hugs Ernie  
 (Bert forces Mickey to hug Ernie)  
 Bert tells – Ernie picks up Mickey  
 (Bert tells Ernie to pick up Mickey)  
 Ernie tells – Bert sleeps  
 (Ernie tells Bert to sleep)  
 Ernie says – Bert hugs Mickey  
 (Ernie says to hug Mickey)  
 Mickey says – Ernie swims  
 (Ernie says to swim)  
 Bert pretends – Ernie carries Mickey  
 (\*Bert pretends Ernie to carry Mickey)  
 Ernie tries – Bert falls  
 (\*Ernie tries Bert to fall)  
 Ernie begs – Mickey carries Bert  
 (Ernie begs Mickey to carry Bert)  
 Mickey asks – Ernie stands up  
 (Mickey asks Ernie to stand up)  
 Ernie promises – Mickey hugs Bert  
 (†Ernie promises Mickey to hug Bert)  
 Mickey threatens – Ernie falls  
 (†Mickey threatens Ernie to fall)

*Experimental sentences on the first comprehension task*

[NP-V-to-V] sentences

- Subject control (sf2) – 10 tokens  
 Mickey wants to sleep.  
 Bert likes to pick up Ernie.  
 Mickey pretends to swim.  
 Ernie pretends to hug Mickey.  
 Bert tries to pick up Mickey.  
 Mickey tries to stand up.  
 Ernie begs to sleep.  
 Bert asks to fall.  
 Bert promises to carry Mickey.  
 Ernie threatens to stand up.  
 Arbitrary reference (sf5) – 2 tokens  
 Ernie says to fall.  
 Ernie says to carry Bert.

## [NP-V-NP-to-V] sentences

Lexical complement subject (sf1) - 2 tokens

Ernie wants Mickey to hug Bert.

Mickey likes Bert to fall.

Object control (sf4) - 6 tokens

Ernie forces Bert to stand up.

Bert forces Mickey to carry Ernie.

Mickey tells Ernie to find Bert.

Ernie tells Mickey to swim.

Mickey says to Bert to find Ernie.

Bert says to Ernie to swim.

Subject control (sf3) - 2 tokens

Mickey promises Ernie to swim.

Ernie threatens Mickey to pick up Bert.

Ambiguous (sf3/sf4) - 2 tokens

Bert begs Ernie to find Mickey.

Mickey asks Bert to hug Ernie.

*Experimental sentences on second comprehension task*

## [NP-V-to-V] sentences

Subject control (sf2) - 4 tokens

Bert wants to stand up.

Ernie tries to stand up.

Mickey asks to swim.

Mickey promises to sleep.

Arbitrary reference (sf5) - 1 token

Ernie says to fall.

Ungrammatical - 1 token

\*Bert tells to fall.

## [NP-V-NP-to-V] sentences

Lexical subject (sf1) - 1 token

Ernie wants Bert to swim.

Object control (sf4) - 1 token

Bert tells Mickey to sleep.

Subject control (sf3) - 1 token

Mickey promises Bert to stand up.

Ambiguous (sf3/sf4) - 1 token

Mickey asks Ernie to fall.

Ungrammatical - 2 tokens

\*Bert says Ernie to sleep.

\*Ernie tries Mickey to swim.