

University of Massachusetts Occasional Papers in Linguistics

Volume 3 *Papers in the Structure and
Development of Child Language -- UMOP*
Volume 4

Article 4

1978

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Recommended Citation

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University of Massachusetts Occasional Papers in Linguistics: Vol. 3 , Article 4.
Available at: <https://scholarworks.umass.edu/umop/vol3/iss2/4>

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The Acquisition
of
Perception Verb Complements

Helen Goodluck
and
Thomas Roeper

There is a relationship between¹ the syntactic behavior of some words and their semantic properties. In this paper we examine how children learn this kind of relationship. Our results suggest that the child's early syntactic hypotheses for the constructions we tested are independent of semantic restrictions.

1. The Adult Grammar of Participial Phrases

Consider the contrast between sentences containing the main verb see and sentences with the verb hit,

- 1) John saw Bill sitting on the bench.
- 2) John hit Bill sitting on the bench.

Sentence (1) is ambiguous. It can mean that either John or Bill is the subject of the verb sitting. We will refer to the reading in which John (the subject NP of the main verb) is the subject of sitting as the subject controlled reading, and to the reading in which Bill (the object of the₂ main verb) is the subject of sitting as the object controlled reading. In adult grammar, the object controlled reading of sentences such as (1) is the preferred reading. Sentence (2), however, excludes the reading in which Bill is the subject of sitting; the subject of sitting must be John. There is a semantic basis for object control: all perception verbs (watch, look at, hear, etc.) allow it. Non-perception verbs (hit, kick, etc.) do not permit object control.³ As we have seen, both perception and non-perception verbs allow subject control.

Some speakers report an object controlled reading for non-perception verbs, particularly when the semantics of the sentence make a subject controlled reading highly implausible, as in John hit Fido having puppies. Other readers find such sentences totally anomalous, since their grammar requires that John be the subject of have puppies. In this paper we will be concerned with the acquisition of the grammar of these latter speakers. As we will see below, some of the older children in our experiment strictly held to the block on object control for non-perception verbs.

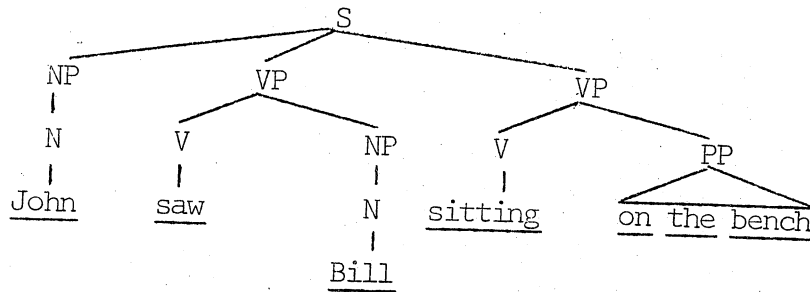
Our analysis of the distinction between perception and non-perception verbs with respect to object control is based in part on the work of Akmajian (1976) and Williams (1975).

Participial gerunds such as those in (1) and (2) can be analyzed as instances of VP; they have all the properties of verb phrases plus an -ing affix on the verb. We propose to generate such participial verb phrases directly in the base in two positions: as sentence modifiers or VP complements. The phrase structure rules in (3) will permit sentence (1) to have two structures, (4) and (5).

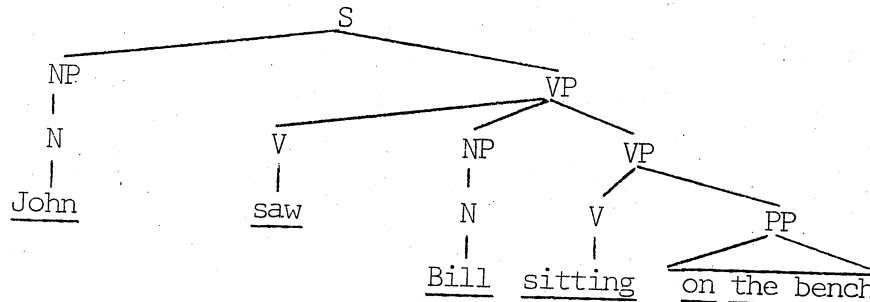
- 3) S → NP Aux VP (VP)
- VP → V (NP) (PP) (VP)

(We leave open the presence of an adverb node dominating a participial VP attached to the S node).

4)



5)



Our claim is that the structure in (4) corresponds to the subject controlled reading of sentence (1), and the structure in (5) corresponds to the object controlled reading.

Control in these constructions can therefore be defined in terms of phrase structure trees: S-node attachment entails subject control, and attachment to the VP entails object control. In effect this says that the verb of a participial complement phrase is controlled by the nearest NP (in terms of the number of intervening phrase nodes) on the phrase structure tree. Control by the nearest NP is not a universal, although it is the general case for English. Violations of this principle in English, such as the control of the infinitival complement of promise, are exceptions (in John promised Bill to go, John is the subject of go, not Bill). Edwin Williams has observed (Williams (1975), p. 256) that a verb in English can never be controlled by an NP that is lower on the phrase structure tree (where lower is defined in terms of a hierarchy of nodes dominating the controller and the subjectless verb; the VP node, and hence all nodes it dominates, is lower on the hierarchy than the matrix S node). We will assume this restriction to be a language universal.

The object controlled reading of sentences like (2), in which the main verb is not a verb of perception can be excluded in a straightforward way. The device of verb subcategorization (Chomsky (1965)) permits restrictions to be placed on the phrasal nodes that can be sister to a given verb. A phrase node may not occur in the VP unless the verb that heads the verb phrase is subcategorized for that node. In order to permit structures like (5) for sentences like (1), perception verbs must be subcategorized to optionally allow recursion of VP within the verb phrase. See, for example, will have the subcategorization frame (6) as part of its lexical entry,

6) see [_____ NP (VP)]_{VP}

If the subcategorization frame for non-perception verbs like hit does not include an optional VP,

7) hit [_____ NP]_{VP}

then such verbs will be blocked from being inserted into a phrase structure tree like (5). Given our assumption that object control requires VP attachment of the participial phrase, object control will be excluded in sentences like (2) if non-perception verbs have the subcategorization frame in (7).⁵ Subject control will be permitted, however; subcategorization restricts only the occurrence of nodes in the VP, and non-perception as well as perception verbs may be freely inserted into structures like (4), in which the adverbial VP is attached to the S node. As we have seen, both sentence (1) and sentence (2) have a subject controlled reading.

Notice that the structural distinction we use as the basis for subject and object control has independent syntactic support. If the participial phrase is preposed,

8) Sitting on the grass, John saw Bill

only the subject controlled reading is possible. This follows under the analysis we adopt, given that the preposing rule moves only phrases that are immediate constituents of the S node.

2. The Acquisition of Participial Phrases.

The work of Chomsky (1969) and Tavakolian (1975, 1977) lead us to make some predictions concerning the acquisition of participial phrases in sentences like (1) and (2).

Tavakolian (1975, 1977) has shown that at a very early stage of syntactic development (3-4 years) children interpret missing subjects in complex sentences as co-referential with the subject of the first verb they have processed. In conjoined sentences such as (9) and in order to clauses in sentences like (10), this strategy for interpreting subject will lead to a correct (adult) response,

9) John saw Bill and Δ picked up the box.

10) The lion jumped over the pig Δ to stand on the horse.

(Δ indicates the empty subject position in conjoined and complement clauses; for example, (9) has the structure, [_S[_S NP VP] and [_S[_{NP} Δ] VP]].)

In other constructions, such as the infinitival complements of verbs such as tell (11) and some types of relative clauses (12),

11) John told Bill Δ to go

12) John kicked the man that Δ hit Bill

the subject control strategy results in an incorrect response: John is chosen as the subject of the embedded verb in (11) and (12) by children in

Tavakolian's experiments. Overgeneralization of subject control in relative clauses was also found by Sheldon (1974a).

Tavakolian's discovery of this early stage in which the first subject controls all embedded verbs was an important and surprising result, since it had been widely assumed on the basis of the work of Carol Chomsky that the first principle used by children for interpreting missing subjects was one in which the matrix object is the controller. Control by the matrix object was in fact found to be the second stage in Tavakolian's results.

On the basis of Tavakolian's work, we predicted that very young children would interpret the subject of a participial phrase in sentences such as (1) and (2) as coreferential with the subject of the main verb. As in the case of conjoined sentences such as (9) and in order to clauses like (10), this would be a correct adult response. However, a child who showed only subject control for the participial complements of both perception and non-perception verbs would not have a fully adult grammar, since object control is also a possible, and indeed the preferred, reading for participial complements of perception verbs among adults. Assuming that the child knows that a subjectless verb may not be controlled by an NP lower on the phrase structure tree, control of a participial complement by the matrix subject in all cases will follow if the child's grammar permits participial₆ phrases to be attached only to the matrix S node, and not within the VP.

Regardless of whether our initial prediction is correct, we must consider how children will acquire object control. In order to acquire an adult grammar of object control in participial phrases a child must do two things. Firstly, he must add a participial VP option to his phrase structure rule for VP. Secondly, he must subcategorize the correct verbs (verbs of perception) for this option. We made two hypotheses about the way in which a child might acquire object control of participials.

HYPOTHESIS A: Semantically bounded innovation

Under this hypothesis, the child observes object control in sentences like (1). He changes his phrase structure rule to permit a participial VP option in the verb phrase, and subcategorizes see for this option. As he encounters more verbs with object controlled participial complements, he adds a participial VP option to each of their subcategorizations. At some point, he observes the semantic basis for object control, and changes the subcategorization of all perception verbs to include a participial VP.

This hypothesis makes the crucial assumption that the child only changes his grammar on the basis of positive evidence of object control. The only generalization he makes is the correct semantic one. Under Hypothesis A, the child never makes any mistakes; he never allows object control in participial phrases in the complement of non-perception verbs.

Hypothesis A leaves open the question of whether the child's initial addition of subcategorizations for a participial complement is semantically based (i.e. whether he at first adds a VP option to subcategorization frames on a verb by verb basis, given that the verb meets some semantic criterion, such as being in the class 'perception'). However, under Hypothesis A

the child must grasp the semantic basis for subcategorization before making a generalization with respect to VP attachment of a participial phrase.

HYPOTHESIS B: Structural innovation.

As under Hypothesis A, the child observes the possibility of object control and changes his phrase structure rule to permit a participial VP within the verb phrase. However, the child also makes an incorrect generalization, and subcategorizes all verbs for this option.

At this stage, object control of participial phrases will be possible for all verbs, including non-perception verbs. Only at a later stage will the child realize the semantic restriction on object control, and eliminate the subcategorization for a participial phrase from non-perception verbs.

The structural hypothesis is a plausible one in view of the considerable body of evidence that there is a stage in which object control becomes the predominant response. Chomsky (1969) found that the missing subject in the complement of promise in sentences like (13) is invariably interpreted by five year olds as coreferential with the matrix object,

13) John promised Bill Δ to go.

Object control of the infinitival complement of promise can be seen as an incorrect generalization from the interpretation of complement subjects of verbs like tell. For tell verbs, the complement subject and the matrix object are coreferential, and sentences with such verbs were correctly interpreted by Chomsky's five year old subjects,

14) John told Bill Δ to go.

Chomsky proposed that children at this stage interpret the missing subject of complement verbs by use of the Minimal Distance Principle. The MDP as used by Chomsky claims that the missing subject of a complement verb is interpreted as coreferential with the nearest NP to its left. Bill and not John will be the subject of go in both (13) and (14) by this principle.

The term MDP is open to two interpretations. It may refer to a linear surface interpretation of the notion "nearest." This is the way in which Chomsky used the term. Or the MDP may define "nearest" in terms of the number of intervening nodes on the phrase structure tree. This is the sense in which we will use the term (and in which Rosenbaum (1967) originally formulated it as the basis for a syntactic rule of coreferential NP deletion).

It is not clear from Chomsky's results, however, that overgeneralization of object control to the complement of promise is based purely on the overuse of a structural principle (the MDP). The basis for the overgeneralization could be semantic. Clark (1973, p. 97-98) suggests that verbs may be grouped by young children into general semantic classes on which a uniform syntactic analysis is imposed. Clark's hypothesis could be used to account for the overgeneralization of object control to promise. Promise is an illocutionary verb, and could plausibly be grouped by the child with verbs like say and tell, which require object control, by virtue of belonging to the same general semantic class. Chomsky's results are compatible with a theory of acquisition, therefore, in which structural overgeneralization only takes place when the child can identify some semantic

basis for the application of the structural principle.⁷

Our research was designed to determine the degree of independence from semantic restrictions of the child's capacity to make syntactic generalizations. If Hypothesis B is confirmed, then we have evidence that the child is insensitive to the semantic basis for permitting object control. Confirmation of the structural hypothesis would thus support a theory of acquisition in which very general hypotheses about structure play a role in the child's linguistic development.

3. Experimental Evidence.

We designed an experiment to test our hypotheses about the acquisition of the grammar of perception verb complements.

A. Materials and design.

Subjects acted out with dolls sentences like (15) and (16),

- 15) Bozo saw her carrying the basket.
- 16) Bozo kissed her wearing the watch.

The appropriate dolls (for (15) and (16) a clown doll and a girl doll) and props (a basket, a watch) were laid out before the subject, who acted out the sentence as soon as the experimenter had read it to him. Subject or object control of the participial phrase was determined by which doll was made to carry the basket (/wear the watch).

The test for the presence of a subcategorization for a participial phrase for a verb in adult grammar is object control of that phrase. If a child made the object of the main verb in sentences like (15) and (16) carry the basket (/wear the watch), then we had evidence that the matrix verb was subcategorized for a participial phrase in the verb phrase. However, failure to make the matrix object the subject of the participial phrase does not, for any one sentence, constitute evidence that the matrix verb was not subcategorized for a participial phrase. The child may subcategorize the verb for a participial phrase but have chosen to attach the participial phrase to the S node (with consequent subject control of the participial phrase) in acting out the sentence. For this reason, more than one presentation of each verb tested had to be made before a lack of object control could be asserted. Each verb tested was presented five times to each subject. Failure to respond with object control of the participial phrase for all five presentations of the verb was taken to establish lack of subcategorization of a verb for a participial phrase in the VP.

Subjects responded to sentences containing the perception verbs see and watch and the non-perception verbs kick and kiss. Five presentations of each test verb gave a total of 20 test sentences. The object of the main clause was always pronominal (as in (15) and (16)). Since the pronoun object referred to a doll previously identified in the experimental situation, a restrictive relative reading was excluded (see fn. 5 above). The sentences were read with a neutral intonation contour. The complete set of test materials is given in Appendix 1. The test sentences were presented to each child individually in four groups of five sentences. Each group

of five sentences was acted out using a different pair of dolls. Each verb (see, watch, kick, kiss) was contained once in three of the four groups of sentences and twice in one of the four groups. Two questionnaires were used (each being presented to half the total number of subjects). Each questionnaire contained a different random order of sentences within each group of five sentences, with the constraint that the same doll was never subject of more than two consecutive sentences. The matrix subject and object were reversed in the two questionnaires. These measures were designed to identify carry-over effects from one sentence to the next, and unpredicted effects of plausibility of the different dolls as subject or object of a matrix verb or participial phrase. A comparison of the results of the two questionnaires showed no systematic differences.

Before beginning the experiment, the subject was taught the name and sex of all the dolls, and the name of all the props used in the experiment. The experimenter then showed the subject how to act out sentences. The examples used were conjoined sentences in which dolls in the first five sentences presented used the props and were at the same time actor or recipient of the action of the verb in the first sentence (e.g., Bill hits Jane and he carries the basket; Jane hits Bill and he wears the watch). These example sentences, and the division of the materials into four sets, were intended to guard against the subject adopting a strategy in terms of one doll for the interpretation of the missing subject. Thirty-two subjects between the ages of 3.4 and 6.7 were tested.

B. Results.

Each child responded to sentences containing each of the four test verbs (kiss, kick, watch, see) five times. The following classifications were used in our analysis of the data for each subject.

I. S: Subject Control.

Subject control of the participial phrase for all five presentations of a verb.

II. O: Object Control.

Object control of the participial phrase for all five presentations of a verb.

III. PS: Preference for Subject Control.

Subject control for four out of five presentations of a verb.

IV. PO: Preference for Object Control.

Object control for four out of five presentations of a verb.

V. NoP: No Preference for Subject or Object Control.

Subject control in two or three of the five presentations of a verb.

Three examples of this classification of subjects' responses are given in Table I.

TABLE I.

<u>Subject No. 13.</u>									
VERB TYPE:	NON-PERCEPTION					PERCEPTION			
VERB:	kick		kiss		watch		see		
CONTROL:	SUB	OBJ	SUB	OBJ	SUB	OBJ	SUB	OBJ	
Number of responses:	2	3	4	1	5	0	4	1	
Response type:	NoP		PS		S		PS		
<u>Subject No. 16.</u>									
VERB TYPE:	NON-PERCEPTION					PERCEPTION			
VERB:	kick		kiss		watch		see		
CONTROL:	SUB	OBJ	SUB	OBJ	SUB	OBJ	SUB	OBJ	
Number of responses:	0	5	1	4	3	2	2	3	
Response type:	0		PO		NoP		NoP		
<u>Subject No. 21.</u>									
VERB TYPE:	NON-PERCEPTION					PERCEPTION			
VERB:	kick		kiss		watch		see		
CONTROL:	SUB	OBJ	SUB	OBJ	SUB	OBJ	SUB	OBJ	
Number of responses:	5	0	4	1	0	5	1	4	
Response type:	S		PS		0		PO		

- S : Subject Control (5/5 responses)
 O : Object Control (5/5 responses)
 PS : Preference for Subject Control (4/5 responses)
 PO : Preference for Object Control (4/5 responses)
 NoP : No Preference for Subject or Object Control (2,3/5 subject control).

The subjects were grouped into four classes on the basis of this classification of their responses.

I. Subject-oriented grammar.

Children in this category have an S, PS or NoP response pattern for all verbs (perception and non-perception), and have at least two S or PS responses. Subject No. 13 in Table I is an example of subject-oriented grammar.

II. Object-oriented grammar.

Children in this category have an O, PO or NoP response pattern for all verbs (perception and non-perception), and have at least two O or PO responses. Subject No. 16 in Table I is an example of an object oriented grammar.

III. Mixed grammar.

These children have NoP responses for all verbs except one, for which the response is either PS or PO.

IV. Adult grammar.

Children in this category have an S or PS response pattern for non-perception verbs, and an O or PO response pattern for perception verbs. Subject No. 21 in Table I is an example. This classification includes children whose grammar is strictly non-adult, since a PS response for non-perception verbs includes one object controlled response, which is ungrammatical for non-perception verbs in adult grammar. However, the overall response pattern is adult, in that a distinction is made between the two verb classes with respect to the possibility of object control.

The complete range of response patterns within these categories and the distribution of the categories by age is given in Table II on the following page. The largest category of responses is object controlled grammar (16/32 children). There are five children in each of the three remaining response categories.

Table II shows one very clear correlation between age and the child's grammar. The adult grammar of participial phrases does not appear before five years (the youngest subject in the adult grammar category in Table II is 5.5). No correlation between subject or object controlled grammar and age emerges from our data; children with subject and object oriented grammars are found across the complete age range of our subjects (the average ages of children with subject and object oriented grammars was 57.80 and 57.06 months respectively).

C. Discussion.

Our initial hypothesis was not supported by our results: although we did find that most of the subjects who had not yet mastered the adult grammar of participial phrases showed an overall preference for either subject control or object control, we did not find that children who favor a subject controlled reading of participial phrases were younger than children who favor an object controlled reading.

There are two ways of looking at our inconclusive results with respect to the ordering of subject and object controlled grammars. First, it may be that the subject controlled grammar is an earlier stage than the object controlled stage (as it is in Tavakolian's work with infinitival complements), but that our data is not extensive enough to tap this ordering of stages by the measure of average age of subjects in each group. Age is not always a good diagnostic of grammatical

TABLE II.

		VERB TYPE				AGE		
		NON-PERCEPTION		PERCEPTION		3.4 -	4.4 -	5.4 -
		kick	kiss	watch	see	4.3	5.3	6.7
I.	SUBJECT ORIENTED GRAMMAR	S	S	S	S	X	X	
		S	S	S	NoP			X
		PS	S	PS	S		X	
		NoP	PS	S	PS		X	
II.	OBJECT ORIENTED GRAMMAR	O	O	O	O	X	X	X
		O	O	O	PO		X	
		O	O	NoP	O		X	
		O	PO	O	O	X		X
		PO	O	PO	O			X
		PO	O	O	NoP		X	
		O	PO	NoP	NoP		X	
		O	NoP	PO	NoP	X		
		NoP	PO	O	O		X	
		NoP	PO	O	PO		X	
		PO	NoP	PO	O			X
		NoP	PO	PO	NoP	X		
		NoP	NoP	O	O			X
		III.	MIXED GRAMMAR	PS	NoP	NoP	NoP	
NoP	PS			NoP	NoP			X
NoP	NoP			NoP	PS		X	
NoP	NoP			PS	NoP	X		
NoP	NoP			NoP	PO	X		
IV.	ADULT GRAMMAR	S	S	O	O			X
		S	S	O	PO			X(2)
		S	PS	O	PO			X
		PS	PS	PO	O			X

X : one subject with response pattern. X(2) : two subjects with response pattern.

ability. It may be that older children with subject oriented grammar in our results are late in entering an object oriented stage, and younger children with object oriented grammar have entered this stage earlier than usual.

Alternatively, it may be that children do not pass through the same subject and object oriented stages for participial constructions as they do for infinitival complements. The individual child may adopt a subject oriented grammar for participial phrases that he uses until he refines his grammar to permit object control only for perception verbs. Or he may have a grammar in which object control is the predominant response.

The children with object oriented grammar form the largest group of subjects. Of the two hypotheses we made concerning the grammar of children who do not restrict control of a participial phrase to the subject NP, Hypothesis B rather than Hypothesis A is supported with respect to the data from these children. All the subjects with object oriented grammar in Table II (together with all the subjects with mixed grammar and two of the children with subject oriented grammar) showed overgeneralization of object control to participial phrases in sentences with non-perception verbs. Primacy of object control for some subjects in our sample provides support for the importance of semantically unrestricted hypotheses in the child's early grammar of control relationships. Our work thus supports Chomsky's interpretation of the overgeneralization of object control to the complement of promise as the result of overapplication of a non-semantic principle (the MDP).

At this point, let us sketch the grammars of the children in our sample who have not yet acquired the adult grammar of perception verbs. For each stage we will propose a grammar that is consistent with the principle that a controller is never lower on the phrase structure tree than the subjectless verb.

For the children with subject oriented grammars (I, Table II), a participial phrase must be generated as sister to the matrix NP and VP (as in (4)). Two children with subject oriented grammar permit only subject control; we can account for this by excluding a participial phrase from the VP in their grammars. Object control will thus be excluded by the block on control by a lower NP. The remaining subject oriented children allow some object control; a participial phrase is permitted within the VP for at least some verbs, but its occurrence is not governed by the distinction between perception and non-perception.

Three children with object oriented grammar permit only object control of a participial phrase. We can account for the grammar of these children by generating a participial phrase within the VP, but not as sister to the matrix NP and VP. All the verbs we tested will have the subcategorization frame for a participial phrase; the complement subject will be interpreted by the MDP. The remaining children with object oriented grammar permit subject control for some verbs. For example, one child with object oriented grammar had the response pattern in (17),

17)	NON-PERCEPTION		PERCEPTION	
	kick	kiss	watch	see
	PO	0	0	NoP

In this child's grammar, evidence for subject control was found only for kick and see. This type of grammar can be accounted for in one of two ways. We could assume that complements attach only to the VP, and that the subject may be interpreted as co-referential with any higher NP; at this stage, the MDP will determine the preferred interpretation. Alternatively, both VP and S node attachment of the complement may be permitted, and the complement always interpreted by the MDP; the predominance of object control would result from VP attachment being the preferred structural analysis.

With the exception of the last child with object oriented grammar in Table II, none of the object oriented children correlate the possibility of subject control with the semantic distinction between perception and non-perception verbs. Notice that this exceptional child, whose grammar we repeat here,

18)	NON-PERCEPTION		PERCEPTION	
	kick	kiss	watch	see
	NoP	NoP	0	0

is in our oldest age group. His grammar is adult, except that he does not favor subject control for non-perception verbs.

The children in Table II with mixed grammar may be at various transition stages: for example, the first and second child in this class, who show a preference for subject control for one non-perception verb may be at a stage immediately prior to adult grammar.

4. Conclusions

In our experiment, we found that the restriction of object control by verb class semantics does not appear before age five years. Children under five understand complement sentences, and they understand both perception and non-perception verbs, but they do not make a connection between these two aspects of their linguistic ability. They may restrict subject or object control, but they do not do so in terms of the semantic class of the matrix verb, at least for the small sample of verbs we tested. We must now ask the question: assuming that our results will hold for a wider range of verbs than those in our experiment, how do our results affect the theory of language acquisition?

Part of the goal of linguistic theory is to identify the common properties of all human languages, and to specify the devices that may be used by a grammar. These general properties of grammars constitute universal grammar (UG). Two possibilities for language acquisition can be considered: (1) It could be the case that every device of UG is reflected in the child's early syntactic hypotheses, or, (2) it could be the case that only some of the devices found in adult grammars are reflected in the child's earliest syntactic hypotheses.

We assume the following to be part of UG,

- A) A verb is never controlled by an NP lower on the phrase structure tree (=Williams' principle, p. 88, above).

(A) constrains the form of any rule of control in a language: to the extent that a language has control rules, the rules must be subject to (A). This type of universal is discussed by Chomsky in his treatment of language acquisition (Chomsky (1975), p. 29).

On a rather different level, UG will also specify powers that may be used in human languages, although a given language may fail to do so. (B) is such a device,

- B) Subcategorization frames may (but need not) be governed by semantic restrictions.

(B) is part of UG in the sense that it must be included in an account of the characteristics of a possible human language. (Thus it is analogous to a given member of the set of distinctive features specified in UG for the sound system of languages, members of which may or may not be utilized in a particular language.)

Let us first observe that our account of children's grammar in the pre-adult stages in our experiment never violates (A). This is consistent with an innateness hypothesis of language acquisition in which children never violate universal constraints (Chomsky (1975), p. 34). Chomsky expressed this claim in his assumption that learning is "instantaneous." The principal feature of this model is that adult universals limit the child's principles of hypothesis projection from the outset.

A second feature of the "instantaneous" hypothesis is the suggestion that children acquire the entire grammar at once. ¹⁰ As Chomsky observes (ibid., p. 119) this is clearly false: children do pass through a sequence of stages in their linguistic development. Our work begins to look at the question of identifying the properties of adult grammar that do not enter the child's earliest hypotheses about grammar. We found that children before age 5 show no evidence that they have the power to project a relationship between semantic verb classes and syntactic rules (subcategorization frames). This preliminary work suggests that the observed stages in the child's syntactic development may result in part from the relatively late entry of optional devices of human languages (such as (B) above) into the child's hypothesis formation.

Our claims require support from other experiments and other languages.¹¹ Nevertheless we can tentatively conclude that, during the early stages, certain grammatical powers are not used by the child. Does this simplify or complicate the "problem of acquisition"? We take the fundamental question for a theory of acquisition to be the determination of how a child selects one from among infinitely many possible grammars. Both the requirement that the child obeys obligatory principles of UG (such as (A)) and that the child initially does not explore possibilities resulting from optional devices of UG (such as (B)) serve to restrict the range of possible grammars during the early phases of syntactic development, and thus to reduce the number of initial hypotheses the child may consider.

Appendix 1. Materials.

A. SEE.

1. Pluto see him wearing the watch (Donald Duck)
2. Bill see her wearing the watch (Jane)
3. Bill see her carrying the red basket (Jane)
4. Bozo see her wearing the white beads (Jane)
5. Bozo see her carrying the red basket (Nancy)

B. WATCH.

1. Pluto watch him carrying the yellow basket (Donald Duck)
2. Pluto watch him wearing the blue beads (Donald Duck)
3. Bill watch her wearing the blue beads (Jane)
4. Bozo watch her carrying the red basket (Jane)
5. Bozo watch her wearing the white beads (Nancy)

C. KICK.

1. Pluto kick him wearing the watch (Donald Duck)
2. Bill kick her carrying the green basket (Jane)
3. Bill kick her wearing the blue beads (Jane)
4. Bozo kick her wearing the watch (Nancy)
5. Bozo kick her carrying the yellow basket (Nancy)

D. KISS.

1. Pluto kiss him wearing the white beads (Donald Duck)
2. Bill kiss her carrying the yellow basket (Jane)
3. Bozo kiss her wearing the watch (Jane)
4. Bozo kiss her carrying the green basket (Jane)
5. Bozo kiss her wearing the blue beads (Nancy)

All sentences were read in the frame "Can you make ___". Names in parentheses indicate the doll used as object NP in acting out the sentence. Each pair of dolls occurs once with three of the four verbs, and twice with one verb.

Footnotes

1. We would like to thank Edwin Williams for suggesting the relevance of the grammar of perception verbs to the issues in this paper, and for his help in the planning stages of our experimental work. Our thanks are also due to the members of the Research Seminar in Language Acquisition at the University of Massachusetts at Amherst in the summer of 1976, G. Carlson, S. J. Keyser, E. Matthei, L. Solan and S. Tavakolian, for much valuable discussion of this research topic. Susan Tavakolian and Jane Perlmutter also contributed time and expertise to the design of our experiment. In addition, we wish to gratefully acknowledge Charles Clifton and Barbara Partee for comments on an earlier draft of this paper. All errors are the authors' responsibility.

Our experimental work was made possible by the generous help of the staff and children of the Living and Learning School, Amherst, Ma., South Hadley Child Care Association, South Hadley, Ma., The Little Red Schoolhouse, Amherst, Ma., and the Bement School, Deerfield, Ma.

2. Perception verbs also allow bare infinitival complements with object control,

i) John saw Bill sit on the bench.

In our experimental work, we chose to test the acquisition of perception verb complements with ing complementizers because there are exactly parallel control sentences with non-perception verbs (i.e., (1) contrasts with (2); for John saw Bill sit on the bench there is no grammatical equivalent * John hit Bill sit on the bench).

3. Examples like

i) John disliked Bill sitting on the bench

would appear to suggest that "perception" is too narrow a characterization of the class of verbs taking object control. Note, however, that the syntax of sentences like (i) differs from that of sentences like (1), as a comparison of the passive forms shows,

1)' John was seen by Bill sitting on the bench

i)' * John was disliked by Bill sitting on the bench

These facts will be accounted for if Bill is not the direct object of the verb dislike; rather the whole complement sentence is the object of dislike,

ii) John disliked [_{NP} [_S Bill sitting on the bench]_S]_{NP}

4. The use of verb subcategorization to account for the selection of gerundive complements by perception verbs and the analysis of ing participials as instances of VP is derived from Akmajian. Our analysis of the principles governing control and the structural position of modifiers is based on Williams. Akmajian's account of the grammar of perception verb complements differs somewhat from that presented here. Specifically, Akmajian claims that gerundial complements of perception verbs are dominated by NP in deep structure, and that the structure (5) is a derived structure, the result of (vacuous) extraposition of a VP complement from NP. The question of whether (4) is a base structure for gerundial perception verb complements or only derived by extraposition from NP does not crucially affect the developmental issues discussed in this paper, although how and when the child learns that gerundial complements to perception verbs may behave like NP constituents is an interesting issue that our research leaves unexplored. See Gee (1976) for a detailed critique of Akmajian's analysis. In Akmajian's analysis, the subject controlled reading of sentences like (1) is correlated with the result of extraposition from the VP complement of a subject noun phrase, i.e. (1) will be derived from

1)' [_{NP} John, sitting on the grass] saw Bill.

While surface structures like (1) may result from extraposition, note that the preposing facts, (8), suggest that (5) should be an independently derived deep structure, since extraposed complements do not prepose,

- i) a. A review of a book about China will soon appear.
- b. A review will soon appear of a book about China.
- c.* Of a book about China, a review will soon appear.

5. The object controlled structure for participial phrases is distinct from that for both restrictive and non-restrictive relatives. For example, neither type of relative can have a pronominal head,

- i) a.* They all hate him, who ran away.
- b.* They all hate him who ran away.

Sentences such as the following, although somewhat archaic sounding, appear to be counterexamples to the block on pronominal heads of restrictive relatives,

- ii) He who runs away is guilty !

Notice, however, that the pronoun head of such constructions may not be referential,

- iii)a. John_i enjoys jogging. *He_i who runs is healthy.
- b. John_i enjoys jogging. I saw him_i running today.

In (iiiia), he must refer to a general class; the second sentence in (iiiia) is ungrammatical on a reading in which he refers exclusively to John. In (iiiib), he can refer to John.

See Akmajian (1976) for a number of further arguments that the object controlled reading for perception verb complements must be distinguished from both restrictive and non-restrictive relatives. Akmajian also presents evidence that participial complements of perception verbs must be distinguished from true gerunds (with possessive marking on the head NP), and may not be derived from (reduced) while/when clauses.

The object controlled reading that some speakers report for non-perception verb sentences (p. 87 above) may be the result of a relaxation by these speakers of the restriction that the head of a participial relative may not be a proper noun or a pronoun.

6. Tavakolian (1977) proposes an analysis of overuse of subject control in which complement clauses are analysed as conjoined sentences; Sheldon (1974a) suggests that the child's rules for interpreting missing subjects refer to functional relations such as subject and object. At this point, these differing approaches do not appear to bear significantly on the issues in this paper.

7. An interpretation of Chomsky's results based on the child's semantic classification of promise with say and tell as members of a general class of "illocutionary" verbs involves assuming a less developed understanding of the semantics of promise on the part of the child who overgeneralizes than that assumed by Chomsky. Chomsky points out (Chomsky (1969), p. 11-14) that illocutionary verbs like tell, order, require and command have the force of commands, and all have object control of infinitival complements. Promise does not share the property of being a command, and had subject control of infinitival complements. Thus the exceptional control properties of promise in adult grammar do have a semantic correlate. Support for this observation comes from verbs like ask and beg, that are semantically intermediate, according to Chomsky, between a request and a command, and can take either subject or object control of an infinitival complement (compare, The child asked the teacher (for permission) to leave the room, and The teacher asked the child to leave the room). If the children in Chomsky's experiment did fully understand the meaning of promise, it would be possible to say that they are making a structural generalization that ignores a semantic distinction that restricts the syntax of promise in adult grammar. Clark (1970) has pointed out, however, that Chomsky's claim that her subjects fully understand the meaning of promise is not necessarily borne out by the evidence that she presents for this understanding, based on the subjects' responses to questioning about promise. Chomsky established only that the child understood the obligation involved in a first person promise (I promise that . . .), but does not, as Clark observes, establish that the child understood that in third person promises (Bozo promises Bill to . . .) the subject of the matrix must perform the action of the embedded sentence.

8. An inspection of Table II shows that there is no correlation between response pattern and the individual verbs within the perception and non-perception classes (for example, it was not the case that kick, but not kiss, received object control at a particular stage for a number of children).

Only one of our 32 subjects responded in a way that does not fit one of the four response categories. This subject gave the following responses:

Subject No. 8 (age 4.2)

NON-PERCEPTION		PERCEPTION	
kick	kiss	watch	see
S	O	PO	NoP

It appears that this subject may have a lexically governed grammar of control, in which individual verbs are specified for exclusively subject, exclusively object, or either subject or object control of a participial phrase.

9. Notice that our point will hold even if it were to be argued that the child with object oriented grammar is attaching the participial phrase to the object NP rather than directly to the VP node.

10. See Roeper (1977) for a fuller discussion of the "instantaneous" model.

11. Slobin (1973, p. 205-206) reports that Gvozdev and Slovojeva have found the acquisition of distinct accusative case endings for animate and inanimate masculine nouns in Russian is a relatively late development. At first children use a single accusative form for all nouns. This late acquisition of a semantically governed distinction is in accordance with our findings. However, Slobin also reports (p. 207) that Kernan found choice of articles in Samoan, based on the distinction [+ human], is acquired very early (in the two-word stage). It may be that this early semantic-syntactic correlation is based on the child learning the article and noun as a unit. (We have not yet been able to consult Kernan's work). We expect that the interaction of semantic and syntactic factors in acquisition will be very complex; future research must be directed at finding principles that govern the possibility of an early syntactic-semantic correlation such as that found by Kernan, and which will distinguish a case of this type from the evidence presented in this paper.