CHILDREN'S DETECTION OF VIOLATIONS OF GRAMMAR AND TRUTH IN SIMPLE SENTENCES

by

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ABSTRACT

The research described in this thesis was designed to investigate the development of young children's ability to detect violations of grammar and truth in the speech of others.

The ability to detect truth violations in sentences was hypothesized to be related to the young child's early experience with the environment in general rather than to linguistic skills specifically. It was therefore judged to be an earlier, more primitive ability than the ability to detect grammatical errors. This latter ability was considered to be more directly related to the development of linguistic skills and to the development of "metalinguistic awareness", the ability to treat language as an "object of analysis and evaluation in its own right" (Cazden, 1976).

In order to investigate one aspect of the development of metalinguistic awareness in young school age children, an experiment was devised in which five, seven and nine year old

children were asked to make judgments about errors of subject-verb agreement, a structure they themselves never violated in spontaneous speech. It was reasoned that the ability to detect and object to grammatical violations requires both the mastery of linguistic structures and the awareness of their correct use.

Thirty-six children, 12 each from Kindergarten, Grade 2 and Grade 4 were asked to make judgments about sentences used to express the actions portrayed in photographs. An equal number of males and females were tested individually. Each child saw 12 photographs, each accompanied by a sentence which was either grammatical and truthful, ungrammatical and truthful, grammatical and untruthful, or ungrammatical and untruthful. Each child heard an equal number of each kind of sentence.

The child's responses to the question "Does this sound right to you?" were recorded as to whether objections were made on the basis of grammar or truth, and corrections were asked for. At the end of the testing session, the child was interviewed about his knowledge of the grammatical rule (subject-verb agreement) that was violated. Data were analyzed for grammar responses and truth responses by separate analyses of variance.

The results indicated clearly that while all the children were almost completely accurate in their judgments of the truthfulness of the sentences, only the Grade 4 children performed accurately in making judgments about grammar. It was further found that those children who were capable of identifying grammatical errors found this more difficult to do where a sentence was both ungrammatical and untruthful. In this case, even the oldest subjects ignored the grammatical errors, focusing instead on the more accessible truth aspect of the sentence. None of the Kindergarteners and few of the Grade 2 and Grade 4 children demonstrated a clear ability to state the rule for subject-verb agreement, though most of the Grade 4 children gave accurate explanations for their objections to individual ungrammatical sentences.

The results of this investigation were interpreted as being consistent with those found by DeVilliers and DeVilliers (1974) who suggested a developmental sequence for the ability to deal with a single syntactic structure in the language performances of production, comprehension, judgment and correction.

DEDICATION

To RAFAËL ADAM and ZOË

sources of inspiration

& experimental subjects

par excellence

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INTRODUCTION

The study of language acquisition in recent times has focused upon performance as a means of determining what underlying knowledge about language children have, and how that knowledge changes at various stages of development.

To Chomsky (1965) is owed the definition of competence as the underlying knowledge about language, and its distinction from performance, the actual use of language in real situations. Competence is further specified as the tacit or unconscious knowledge of the rules governing language use. Since in most cases speaking and hearing are spontaneous acts, the conscious awareness of grammatical rules would serve only to interrupt and distract from the sending and receiving of verbal messages. Furthermore, it is not thought to be necessary for the speaker/hearer to be able to formulate grammatical rules in order to demonstrate their psychological reality. Rather, the psychological reality of the rules can be demonstrated indirectly by the patterned, orderly behaviour of the speaker/hearer in various performances. DeVilliers and DeVilliers (1974), among others, have discussed this aspect of

psychological research among children, and have pointed out some of the problems associated with the indirect investigation of competence.

Making inferences from behaviour about unconscious knowledge is difficult to do, and as Chomsky has pointed out, the investigation "must be carried out in devious and clever ways, if any serious result is to be obtained." (1964, p.36) As will be discussed more fully later, the data from resarch carried out in these devious and clever ways with children provide clear evidence that even the youngest speaker/hearer uses language in a rule-bound way. But by and large these studies have failed to demonstrate that children "know the rules" in the same sense that they know the language. As Gleitman, Gleitman, and Shipley (1972) and DeVilliers and DeVilliers (1974) have pointed out, the ability of the speaker/hearer to reflect upon the rules of language provides the basis on which generative grammarians construct linguistic theories. As well, the ability to reflect upon one's behaviour is a singularly human ability, and is suggestively analogous to other metacognitive processes whereby humans are able to abstract and subject to scrutiny activities like remembering, and making judgments about space and number. This point has been made most forcefully by Gleitman et al. (1972).

Metalinguistic awareness, the ability not only to learn and use language, but also to "treat it as an object of analysis in its own right" (Cazden, 1976), is distinguished from spontaneous language performance by the metaphoric use of the terms "transparent" and "opaque" as aspects of language focused upon by the speaker/hearer. In using language to communicate thoughts or feelings the speaker concentrates primarily on her/his message rather than upon the speech units and their organization, thus treating language as though it were transparent. Similarly, the hearer "hears through" the language forms to get the message. But when the language forms themselves are the object of attention they become "opaque": they are not heard through but are attended to in and for themselves. Cazden (1976) sees this ability to treat language as though it were opaque as a later and less universal development than the primary language performances of speaking and hearing. As well, she suggests, like Gleitman et al. (1972), that metalinguistic awareness has much in common with other metacognitive or higher order cognitive acts, and must be taught via informal language games and more systematic methods in the school. Gleitman et al. (1972) have claimed that metalinguistic awareness emerges between the ages of 5 - 7 years, the same age at which other metacognitive processes typically appear.

The ability to hear through language to the message requires of the child that s/he be able to make sense of what is being said--that s/he be able to focus upon the truth value of the utterance as it corresponds to reality as s/he knows it. As Macnamara (1972, p.1) has argued, the young child learns language "by first determining, independent of language, the meaning which a speaker intends to convey", using what s/he knows about the world to decode the utterance. Thus, knowledge of what is being talked about precedes the acquisition of the rules for talking about things, and until the rules have been mastered, probably constitutes the primary focus for the young speaker/hearer.

Conscious awareness of the rules of language has been acknowledged to be unnecessary to the primary language performances of speaking and hearing. However, it can readily be seen that reading and writing are activities in which language forms must be focused upon in and for themselves, manipulated consciously rather than spontaneously, and that they require some degree of awareness of the rules which govern language use. Vygotsky (1962) has suggested the link between literacy--the acquisition of the derived or secondary language performances of reading and writing--and the making of formerly tacit knowledge explicit or conscious. This argument provides

further reason for investigating the development of metalinguistic awareness.

This thesis intends to show that metalinguistic awareness can be investigated directly rather than in difficult and devious ways, and will attempt to demonstrate, as other researchers have suggested, that there is a developmental sequence consisting of the abilities 1) to determine the truth of an utterance; 2) to detect grammatical violations and correct them, and 3) to reflect upon the rules of language.

Several recent studies will be examined, including studies that demonstrate that young children are able to make judgments about the truth of utterances, studies using the indirect method to investigate competence in young children, and studies that have as their method the direct questioning of children as to their knowledge of linguistic rules.

Finally, a study devised to investigate the sequence of development of linguistic competence, including awareness of linguistic rules themselves, will be presented.

Studies investigating children's ability to judge the truth value or appropriateness of meaning of sentences

Several studies have been carried out to determine children's ability to deal with the meaning of sentences as opposed to the syntactic structures used to convey the meaning. As Gleitman et al. (1972) have pointed out, one cannot separate the message from the medium. In other words "very much of what we mean by meaning is expressed through syntactic structures."(p.159) However, the qualitative difference between a sentence in which a syntactic structure is violated but whose semantic component is intact--"People is human beings"--and a syntactically well formed semantically incorrect sentence--"People are vegetables"--is indisputable. Young children seen to have little difficulty indentifying as incorrect sentences of the "People are vegetables" type.

Lloyd and Donaldson (1976) requested 3- to 5- year-olds to help a talking doll to "speak better". The talking doll produced sentences that included errors (e.g., called a cup a banana, or said of a drawing of four stickmen, two of which were wearing hats, that "None of the men are wearing hats"). None of the children had difficulties with this task: they identified and corrected the errors.

James and Miller (1973) found that even children under four could identify, correct, and provide explanations for correcting, sentences that were syntactically well formed but were semantically anomalous. (e.g., "The big spider skated across the room".)

Glass, Holyoak and Kossan (1977) investigated the ability of children in Grades 1, 3 and 5 to detect semantic contradictions in syntactically well formed sentences like "Some women are trees". By Grade 1, children were virtually perfect at identifying such anomalous sentences.

In a study by Shipley, Smith and Gleitman (1969), the more advanced (telegraphic) speakers were heard to repeat to themselves commands that included nonsense words in the place of subject and/or verb, whereas this was not so often the case when commands contained no nonsense words. This was interpreted by the authors as an indication of the ability of children under three years of age to detect non-English words and to repeat them as a way of "figuring out" their meaning.

Summary. The studies presented here demonstrate the ability of very young children to detect errors of meaning in syntactically well formed sentences.

Studies using indirect methods to investigate linguistic competence

In order to discover whether very young children discriminate between correct and incorrect word order in simple sentences or subject-verb-object construction, Starr (1974) had 18- to 30-month-old children indicate their listening preferences for sentences having either correct or incorrect word order. The children were taught how to activate one or the other of two tape recorders disguised as identical "talking" clowns. All the children spent more time listening to the clown who produced sentences with correct word order.

Another method to investigate young children's ability to discriminate between correct and incorrect constructions was employed by Shipley, et al.(1969). Children between 18 and 33 months of age were given commands to play with toys. These commands were either child forms (e.g., "Throw ball", or "Ball"), or full adult form (e.g, "Throw me the ball"). The effectiveness of the command forms was measured by the children's touch, reply or repetition responses. All the children discriminated between the forms; the older, more advanced children (MLU between 1 and 2) responded more frequently to full adult commands, and the less advanced children (MLU=1) responded more frequently to child forms.

Like Shipley et al. (1969), Scholl and Ryan (1975) attempted to measure children's ability to discriminate sentences in child form from sentences in adult form. Both kinds of sentences were spoken to children 5.5 and 7.5 years old who were required to point to a picture of an adult or child female as the "speaker" of the sentence. All the children attributed more of the adult forms to the adult "speaker".

A further indirect method to investigate discrimination was used by Fraser, Bellugi, and Brown (1963). By asking children to imitate pairs of correct sentences in which the only difference was the auxiliary verb "to be" (e.g., "The sheep is walking"; "The sheep are walking") the investigators hypothesized that correct production by the children of "is" or "are" would indicate ability to discriminate between these two forms. All the children were able to understand and carry out the task.

Keeney and Wolfe (1972) found that 4-year-olds repeated sentences with correct subject-verb agreement verbatim 81% of the time. Sentences having violations of subject-verb agreement were repeated verbatim only 49% of the time, thus demonstrating through indirect means that the children discriminated between the correct and incorrect forms. They also spontaneously corrected the sentences lacking subject-verb agreement. That is, in repeating incorrect sentences the children said them in

their correct form rather than in the form in which they had heard them. None of the children, however, were asked to correct incorrect forms, nor were they asked to explain their spontaneous corrections.

Another indirect method for investigatng the competence of young children is to have them act out sentences of varying degrees of syntactic complexity. Strohner and Nelson (1974) found that both 3- and 5-year-olds could correctly act out simple sentences (agent-action-object) using hand puppets, while only 5-year-olds could act out more complex (passive) sentences. These results were interpreted as a reflection of the ability of children to understand linguistic structures.

Another means of assessing comprehension indirectly is to ask children to match pictures and sentences. Fraser et al. (1963) found that their 37-to 43-month-old subjects were not as good at matching pictures having one or two subjects to sentences having singular and plural subjects as they were at correctly imitating contrasting pairs of sentences. Nelson (1976) required 6- to 9-year-olds to point to the picture best representing sentences of varying degrees of complexity (e.g., simple, active, declarative sentences vs. sentences having embeddings and passive voice verbs). The youngest children could perform correctly only in the case of simple sentences,

while the oldest subjects were between 80% and 95% correct in the case of both simple and complex sentences.

Finally, asking children to say sentences to match pictures is a means of assessing not only comprehension but also production abilities. Fraser et al. (1963) in their investigation of the sequence of development of imitation, comprehension and production abilities, had children from 37 to 43 months old produce the verb phrases for sentences begun by the experimenter to match pictures having one or two subjects (e.g., "The sheep are jumping" to match a picture of two sheep are jumping over a fence). On holding up the picture of the two sheep jumping over a fence, the experimenter said; "The sheep ...", paused, and waited for the subject to complete the sentence. Their subjects were less able to perform correctly on this task than on the imitation and comprehension tasks. Jean Berko (1958) used this method to investigate the ability of 4- and 5-year-olds to provide correct plurals, verb tenses, possessives, and derivations of nonsense words and of English words to match drawings of cartoon-like animals and figures. All the children performed correctly in at least some of the tasks, with the older children performing better than the younger. Berko's general conclusion was that children as young as 4 years old operate on the basis of morphological rules when speaking. That children operate on the basis of rules can also be determined by analyzing their spontaneous utterances (as

opposed to utterances elicited by an experimenter). Brown, Cazden, and Bellugi (1969) have analyzed the spontaneous utterances of young children (MLU Stages 1 to 3) and have discovered an orderly progression in their acquisition of linguistic structures.

Summary. 1. These studies have in common the fact that linguistic competence in children was assessed not by asking children direct questions about their knowledge of linguistic rules but by requiring them to perform tasks for which some degree of mastery of the rules for various linguistic structures was necessary. The methods that have been used are: listening preference; imitations of sentences; acting out of sentences; spontaneous productions; overt responses to commands; attibution of sentences to adult or child "speakers"; matching pictures and sentences, and saying sentences to match pictures.

2. Among the structures investigated were subject-verb agreement; formation of plurals, possessives and verb tenses; word order, and complexity.

3. Even the youngest (18 months) subject could perform with some degree of accuracy on at least some of the tasks.

Studies using direct methods to investigate children's linguistic competence

In Moravcsik's (1969) formulation of Chomsky's criteria for attributing unconscious or tacit knowledge of a rule to a speaker/hearer, he lists the following three: 1) the rule in question fits the aspect of conduct investigated; 2) the rule allows reliable predictions of the speaker/hearer's future conduct, and 3) the speaker/hearer has beliefs with regard to what does and does not constitute a violation of the rule. The subjects in the studies described in the previous section can be said to have fulfilled the first two criteria in that they demonstrated some degree of the relevant rule bound behaviour investigated. None of those subjects were asked, however, to make judgments about correct and incorrect use of language.

The following studies attempted to assess children's beliefs with regard to certain rules (Moravcsik's third criterion). The children studied were asked to identify sentences as correct or incorrect, and to provide corrections in the latter case. In only one study (Gleitman et al., 1972) were the subjects asked why the incorrect sentences were in fact incorrect. Here the children were required not only to operate on the basis of the rule, but also to reflect upon the rule, and therefore to know that they knew it. This ability to

reflect upon the rule system itself, to abstract and scrutinize language in its opacity, is what has been called metalinguistic awareness.

De Villiers and DeVilliers (1972) investigated the ability of 2- and 3-year-olds to judge the acceptability of correct and incorrect word order in simple imperatives in a game using hand puppets. Sentences judged to be incorrect were to be corrected. Of the eight children studied only four correctly identified more than 50% of the incorrect sentences (e.g.,"Cake the eat", "Teeth your brush"). These four subjects were the most advanced linguistically (MLU=more than 4). Linguistic development was assessed on the basis of spontaneous utterances of the children during the testing session, excluding those utterances that were produced during the games. Of these four children, three corrected all of the sentences they judged to be wrong, while the fourth corrected only 17%. Only one of the children (highest MLU) made direct word order corrections (e.g., "Cake the eat" to "Eat the cake") on more than 50% of his attempted corrections. The three other children more often made corrections that changed both semantics and word order (e.g., from "Doggie the find" to "Pat the doggie".) This suggests that while all four children demonstrated their beliefs with regard to the syntactic rule for word order, only

the most linguistically advanced was able to focus upon the violated structure alone in making his corrections.

A second task, conducted usually after the reversed or correct word order sentences, required the children to identify as "right" or "wrong", anomalous sentences having correct word order (e.g., "Ride a picture", "Drink the chair".) Both groups of children were equally good at identifying anomalous sentences, and six children were able to make direct semantic corrections (e.g., "Ride a picture" to "Draw a picture".)

After the word order game, all the subjects were asked to make the puppet say sentences to be judged. Only two children actually produced sentences for judgments. Neither child produced reversed word order sentences, and of the total of 22 sentences produced by both children, 8 were semantically anomalous (e.g., "Write the pencil", "Eat your mouth") even though both children had only played the judgment game using reversed word order sentences.

The results of the experiment show that while all of the children were able to judge semantic anomaly, only the most advanced could correctly judge syntactic violations, only the most advanced could correct word order reversed sentences, and none of the children was able to produce such a sentence. These findings suggest that young children focus on meaning in

sentences, whether in producing or responding to utterances, more easily and earlier than they are able to focus upon syntax.

To quote from the authors:

> "preservation of appropriate word order in spontaneous speech and the use of word order information in comprehension therefore occur well before the ability to make metalinguistic judgments of correct and reversed word order. Such judgments of grammatical acceptability cannot provide evidence for linguistic organization in the child before considerable grammatical complexity is already present in the child's spontaneous speech.
>
> The children's corrections of reversed order imperatives and the examples of "right" and "wrong" sentences given by two of the children after the word order game suggests that semantic factors played a significant part in their judgments and corrections. In this regard an interesting observation was made by the experimenters in the word order games with the two least verbally developed children in the study. These children "acted out" most of the imperatives, correct and reversed, if such an action was possible. For example, after the reversed word order imperatives "Teeth your brush" and "Door the open" both children performed the corresponding actions and then judged the sentence to be "right." Each of the reversed order imperatives used in the study was consistent with only a single proposition well known to the children and even the least developed child was able to extract this propositional content of the imperative sentence. This proposition he judged to be "right" and he was apparently unconcerned by the eccentric order of the words in the sentence. Only the more developed children were able to make judgments about the acceptability of the word order."(p.309)

In a paper dealing with young children's ability to "contemplate the structure of language" (p.142), Gleitman, Gleitman and Shipley (1972) reported two very different studies. The first study was concerned with the corrections three 2-year-olds made to sentences they judged to be "silly." The sentences were simple imperatives and were either well formed--"Bring me the ball"--or telegraphic--"Bring the ball." Half the well formed sentences were in correct word order, half reversed (e.g., "Ball me the bring.") The telegraphic sentences were similarly varied. Only one of the children judged fewer than 80% of the normal word order telegraphic sentences to be "good", while all three judged at least 80% of the normal word order well formed sentences to be "good". All three subjects rated significantly more of the reversed word order sentences, both well formed and telegraphic, to be "silly."

The children were asked to make corrections of the sentences judged as "silly." One child refused to do this. The other two subjects made word order changes alone in only three of 19 sentences; for the rest corrections included semantic changes (e.g,. "Cup find" to "Fill the cup", and "Box the open" to "Get in the box"), or some other rearrangement (e.g., "Sweeper the push" to "The sweeper push on the rug").

Again, the results suggest that while these 3-year-olds are beginning to focus upon syntax, and can discriminate between telegraphic and well formed sentences, they focus more readily upon meaning than upon word order.

As the second study in their paper on children's ability to contemplate the structure of language is a verbatim transcription of an interview carried on with a 7-year-old child characterized by the authors as "highly articulate." This child was explicitly asked to give her opinions on a number of sentences, some of which were syntactically deviant, some of which were semantically deviant, and some of which were well formed (as rated by adults). While the subject for whom a verbatim transcription was provided failed to notice some aspects of sentences judged to be deviant by the adults, she nevertheless demonstrated great willingness to contemplate and discuss the relative merits and meanings of sentences like "Two and two is four" versus "Two is four and two is four."

Data on the responses to 19 sentences by six other similarly articulate subjects (aged 5 to 8 years) are provided. The syntactic structures focused upon in the sentences included stative verbs, collective versus distributive uses of "and", and pronomial referents. In general, all the children tended to agree with adult judgments of well formed sentences, but in most cases of deviant sentences only the older subjects concurred with adult judgments of deviance. The authors point out that the children consistently focused upon meaning in explaining their judgments, even in cases where syntactically deviant sentences had been identified. As well, there was a tendency not to notice syntactic deviance where there was no semantic anomaly.

In discussing their findings, Gleitman et al. pointed to the change with age of their subjects' ability or willingness to focus upon syntax rather than upon meaning. While adults reject sentences like "I saw the queen and you saw one" and accept sentences like "The color green frightens George", young children have precisely the opposite reactions to the two sentences. The first makes sense, and the second one does not,

syntactic well-formedness notwithstanding. "[The] plausibility dimension seems highly salient for two year olds, is still sometimes apparent in five year olds, and becomes much less salient as the determinant of judgments among the older children and adults .... syntactic dimensions become more potent with age". (p.158) Thus, though all their subjects were willing to reflect upon the sentences, their focus tended to be less upon the way things were said than upon what was said.

DeVilliers and DeVilliers (1974) traced the course of the ability to deal with a single syntactic structure (word order) in four performances--production, comprehension, judgment and correction--in children from about 18 months to about 4 or 5 years. (Precise ages were not given except for one group of 4-year-olds. MLU was computed on utterances produced spontaneously by the subjects.) Data on judgments and comprehension alone were given for the youngest subjects (approximately 18-24 months) while a group of twelve 4-year-olds were assessed on their ability to comprehend, judge and correct deviant word order imperatives. All of these children were significantly better than chance at identifying as "wrong" reversed word order imperatives, and saying that correct imperatives were "right". As well, there was a strong positive correlation between individual subjects' accuracy of judgments and ability to make direct word order corrections. However,

there was still a marked tendency in some of the subjects to make more semantic corrections than word order corrections. The aim of the authors was to discover at what point children are able to focus upon the violated structure in making corrections of deviant sentences. When a child correctly identifies a syntactically deviant sentence, and then provides a semantic correction s/he can be said to know that a sentence violates the rules but not that a sentence violates a particular rule.

The Devilliers and DeVilliers data on children from 18 months to 4 or 5 years were interpreted by them to form a sequence in the development of the ability to operate on the basis of the rule for word order in English. The authors suggested that the ability to focus on a syntactic rule in making corrections follows the ability to deal with the rule in the performances of production, comprehension and judgment. When the ability to focus upon a syntactic rule in making corrections has been achieved, then full linguistic competence is evident.

The present study

The present study was designed to investigate whether the developmental sequence found by DeVilliers and DeVilliers (1974) applies to the syntactic structure of subject-verb agreement. As they have indicated, investigating the development of a number of different performances each concerned with the same syntactic rule is a particularly good method for approaching a true characterization of linguistic competence in the child. The present study differs from theirs in that it is concerned with subject- verb agreement rather than with word order. The present study also includes direct requests to the children to explain their corrections and to formulate a rule for subject-verb agreement. DeVilliers and DeVilliers (1974) asked only for corrections of incorrect sentences. A further contribution of the present study to the investigation of metalinguistic awareness is that it was carried out using unexceptional children. Gleitman et al. (1972) studied the ability of highly articulate children 4 to 8 years old to reflect upon the structure of language. The subjects in the present study were drawn from "average" pupils in a lower-middle class neighbourhood public school.

Subject-verb agreement, the syntactic structure investigated in the present study, has been demonstrated to have been mastered in production by the age of 4 years in the case of the verb "to be" (Keeney and Wolfe, 1972). It was therefore assumed that differences in ability to deal with it in other performances would not be attributable to unfamiliarity but would accurately reflect competence.

Besides the study by Keeney and Wolfe (1972), numerous other studies mentioned above indicate that very young children have some unconscious knowledge of linguistic rules, but are limited in their ability to make judgments and corrections of deviant sentences. The youngest subjects in the present study were 5 years old. Gleitman et al. (1972) have suggested that the emergence of metalinguistic awareness coincides with the development of other metacognitive processes in the 5 to 7 year age range. Thus, as well as 5-year-olds, 7- and 9-year-old subjects were included in the study.

The sentences used as stimuli were simple agent-action-object declarative sentences with verbs in the present progressive form. Strohner and Nelson (1974) have demonstrated that 3- and 5-year-olds understand agent-action-object word order, and Berko (1958) has provided evidence that children as young as 4 years old perform with accuracy on tasks requiring the production of the present progressive form of verbs.

In order to assess differences in ability to focus upon grammar as opposed to truth, the children were asked not only to judge and correct sentences having grammatical violations, but also to judge sentences having truth violations. It was decided to accompany the presentation of all the sentences with pictures against which to judge their appropriateness, so that all the children would be forced to use the same frame of reference and not depend on idiosyncratic experiences and preferences in making their judgments. The untruthful sentences were deviant with respect to the verbs purporting to refer to the activity in the picture.

The children's ability to understand the structure in question was measured by their ability to judge as "sounds right" sentences which were both grammatical and truthful. Sentences that were both ungrammatical and untruthful were included in order to investigate the suggestion by other researchers (Gleitman et al. 1972, among others) that for young children semantic deviance is more salient than syntactic deviance.

From the point of view of current researchers in the development of metalinguistic awareness in children, this awareness does not include conscious knowledge of specific syntactic rules, but is rather the ability to operate on the basis of syntactic rules when using language, and to reflect upon the structure of language generally. Vygotsky (1972) and Cazden (1976) share the view that as the child becomes increasingly the master of language s/he comes to make conscious formerly unconscious knowledge. In order to discover whether this includes the unconscious rules of competence, the children in the present study were encouraged by various means to produce verbal formulations of the syntactic rule in question.

The following hypotheses were made:

1. Subjects at all three ages will be equally accurate in their ability to detect violations of truth.

2. Older children will be better than younger children in their ability to detect and correct violations of grammar.

3. The ability to justify corrections of grammar violations, and to formulate a syntactic rule will appear last in the sequence.

METHOD

The task

The subject was presented with a picture accompanied by a sentence purporting to describe the picture. The sentence was either grammatical or ungrammatical, and either truthful or untruthful with respect to the picture. The subject was then asked to respond to the question "Does that sound right to you?" The four grammar by truth conditions are shown in Table 1. Each subject was presented with 12 sentence-picture pairs.

Subjects

Thirty-six elementary school children, six females and six males from each of Kindergarten, Grade 2 and Grade 4, were studied. Table 2 shows the arrangement of the 36 subjects into six groups. All the children attended the same school in a lower-middle class suburb of Vancouver. Not all the children from each grade came from the same classroom because at this school split classes are the rule, with two or more teachers from any grade sharing curriculum at that grade level. The school board for the district received and approved the research proposal prior to testing.

Table 1. Grammar x Truth Conditions

Truth	Grammar +	Grammar -
+	Grammatical and Truthful	Ungrammatical and Truthful
-	Grammatical and Untruthful	Ungrammatical and Untruthful

Table 2. Assignment of Subjects to Groups

	Males	Females
Kindergarten	Subjects 1 - 6	Subjects 1 - 6
Grade 2	Subjects 1 - 6	Subjects 1 - 6
Grade 4	Subjects 1 - 6	Subjects 1 - 6

Table 3. Mean and Range of Ages for each Sex and Grade Level

	Males	Females
Kindergarten	5 yrs.5 m. - 5 yrs.9 m. Mean = 5 yrs.7 m.	5 yrs.4 m. - 5 yrs.8 m. Mean = 5 yrs.7 m.
Grade 2	7 yrs.5 m. - 7 yrs.10 m. Mean = 7 yrs.8 m.	7 yrs.4 m. - 7 yrs.7 m. Mean = 7 yrs.6 m.
Grade 4	9 yrs.2 m. - 10 yrs.2 m. Mean = 9 yrs.6 m.	9 yrs.3 m. - 9 yrs.8 m. Mean = 9 yrs.5 m.

The following criteria were used to select the subjects: 1) that they were considered by their teachers to be "average" with respect to language development and academic performance; 2) that they were English-speaking monolinguals from homes where only English was spoken; and 3) that their ages were "correct" for their school grade level. One kindergarten boy was eliminated from the study because of his lack of cooperation in the task. He was replaced by another subject from the same grade. The mean and range of ages for each sex and grade level are given in Table 3.

Stimuli

Pictures. Fourteen colour magazine photographs ranging in size from 5" x 7" to 7.5" x 9.5" were glued to 8.5" x 11" pieces of white cardboard and covered with clear plastic. Each photograph pictured one or more children or adults engaged in a realistic activity easily expressible in a simple sentence of the form subject-verb-object or agent-action-object. Twelve of the photographs were labeled with letters from "A" to "L", and two of them were labeled "Sample" and "Probe" respectively.

Sentences. Twelve 6-word sentences of the form subject-verb-object or agent-action-object were used. All verbs were present continuous tense with "be" as the auxiliary -- singular (e.g., is touching) or plural (e.g., are touching) -- to agree with the subject noun. Six singular, four plural and two collective nouns were used as object nouns.

The 12 sentences, syntactically correct and semantically well formed, represented as exclusively as possible the actions portrayed in the 12 "A" to "L" pictures, and constituted the Grammatical and Truthful condition. For each of the 12 sentences, three variations were generated to fit the other three experimental conditions. The four conditions, each with an illustrative sentence, are presented in Table 4.

Two further sentences were generated. One, called the Sample, was used at the beginning of the testing session in a short training procedure and was in the Grammatical and Truthful condition. The other, called the Probe, in the Ungrammatical and Truthful condition, was used at the end of a testing session in those cases in which a subject had failed to make any grammatical objections. Each of these two sentences was accompanied by a picture. Table 5 lists the 14 sentences in all their forms. The corresponding pictures are shown in Appendix A.

Table 4. Conditions

Grammatical and Truthful Condition

An exclusive or nearly exclusive verbal representation of a discrete action, sematically meaningful and syntactically well-formed.
Example: The woman is feeding the baby

Ungrammatical and Truthful Condition

A semantically meaningful sentence lacking subject-verb agreement. The auxiliary of the verb disagrees in number with the subject-noun.
Example: The woman are feeding the baby

Grammatical and Untruthful Condition

A syntactically well-formed sentence in which the verb (plus auxiliary) expresses an action possible given the subject and object, but is distinctly different from that used in the grammatical and truthful condition.
Example: The woman is dresssing the baby

Ungrammatical and Untruthful Condition

A sentence combining the violations of both grammar and truth.
Example: The woman are dressing the baby

Table 5. Sentences

		Condition
(Sample:	The girl is holding the bottle	Grammatical & Truthful)
A	The woman is feeding the baby	Grammatical & Truthful
	The woman are feeding the baby	Ungrammatical & Truthful
	The woman is dressing the baby	Grammatical & Untruthful
	The woman are dressing the baby	Ungrammatical & Untruthfu
B	The man is kissing the baby	G & T
	The man are kissing the baby	UnG & T
	The man is washing the baby	G & UnT
	The man are washing the baby	UnG & UnT
C	The women are pulling the rope	G & T
	The women is pulling the rope	UnG & T
	The women are cutting the rope	G & UnT
	The women is cutting the rope	UnG & UnT
D	The girl is holding the toothbrush	G & T
	The girl are holding the toothbrush	UnG & T
	The girl is throwing the toothbrush	G & UnT
	The girl are throwing the toothbrush	UnG & UnT
E	The women are riding the horses	G & T
	The women is riding the horses	UnG & T
	The women are feeding the horses	G & UnT
	The women is feeding the horses	UnG & UnT
F	The baby is waving his hands	G & T
	The baby are waving his hands	UnG & T
	The baby is washing his hands	G & UnT
	The baby are washing his hands	UnG & UnT
G	The man is touching the cake	G & T
	The man are touching the cake	UnG & T
	The man is baking the cake	G & UnT
	The man are baking the cake	UnG & UnT
H	The people are reading the book	G & T
	The people is reading the book	UnG & T
	The people are tearing the book	G & UnT
	The people is tearing the book	UnG & UnT
I	The woman is washing her hair	G & T
	The woman are washing her hair	UnG & T
	The woman is drying her hair	G & UnT
	The woman are drying her hair	UnG & UnT

Table 5 continued

J	The men are holding the hats	G & T
	The men is holding the hats	UnG & T
	The men are wearing the hats	G & UnT
	The men is wearing the hats	UnG & UnT
K	The kids are riding the trikes	G & T
	The kids is riding the trikes	UnG & T
	The kids are fixing the trikes	G & UnT
	The kids is fixing the trikes	UnG & UnT
L	The people are eating the food	G & T
	The people is eating the food	UnG & T
	The people are cooking the food	G & UnT
	The people is cooking the food	UnG & UnT

(Probe: The man are lifting the glass UnG & T)

Pretest

Both the pictures and the sentences were pretested with Kindergarten and Grade 4 children in another public elementary school in a neighbourhood of comparably homogeneous low socio-economic status as that in which the experimental subjects lived.

Twenty-five pictures were shown to four male and five female Kindergarten children in order to select the 14 experimental stimuli. The pictures that were chosen were those to which all the children responded readily and fluently when asked "Can you tell me what's going on in this picture?" Pictures that elicited negative comments, and those on which there was disagreement about the action portrayed were eliminated. It was ascertained that each of the 14 pictures chosen included no objects or actions that were not spontaneously identified and labeled by the youngest children.

Both Kindergarten and Grade 4 children were asked to judge the relevance of the sentences to the pictures. None of the children disagreed with the form or content of the sentences presented. In some instances the sentences were modified to include words spontaneously produced by the subjects.

Three males and three females from each of Kindergarten and Grade 4 were interviewed to ascertain that the form of the task was 1) easily understandable by the younger children and 2) not so easy as to bore or irritate the older. It was apparent that both Kindergarten and Grade 4 children understood the task, were willing to participate in it, and showed no evidence of inappropriate responses.

Design

The 12 sentence-picture pairs were arranged in six different presentation sequences. Each of the six subjects within any grade x sex group was assigned a different one of those sequences. The sequences were constructed by dividing the 12 sentence-picture pairs into three consecutive sets of four each. The first pair within each set was always presented in the Grammatical and Truthful condition; thus, all subjects received stimuli in the Grammatical and Truthful condition on the first, fifth, and ninth trials. Assignment of the other three conditions was made so that each sequence contained three of the possible six arrangements of those three conditions, and so that across subjects within each grade x sex group each arrangement was presented equally often.

In order to satisfy the constraints that the subjects in all six presentation sequences see all 12 sentence-picture pairs in a different order, and that no sentence condition succeed itself within any presentation sequence, variations of Latin Square designs were used in constructing the sequences shown in Table 6.

Table 6. Sequence of Presentation of Sentences to each Subject in all six Groups
(Legend: G = Grammar; T = Truth; P = Picture S = Subject)

S	Position	Condition G	Condition T	P	Sentence
1	1	+	+	A	The woman is feeding the baby
	2	-	+	D	The girl are holding the toothbrush
	3	+	-	I	The woman is drying her hair
	4	-	-	H	The people is tearing the book
	5	+	+	B	The man is kissing the baby
	6	+	-	J	The men are wearing the hats
	7	-	+	E	The women is riding the horses
	8	-	-	K	The kids is fixing the trikes
	9	+	+	C	The women are pulling the rope
	10	-	-	G	The man are baking the cake
	11	-	+	F	The baby are waving his hands
	12	+	-	L	The people are cooking the food
2	1	+	+	D	The girl is holding the toothbrush
	2	-	+	B	The man are kissing the baby
	3	-	-	K	The kids is fixing the trikes
	4	+	-	C	The women are cutting the rope
	5	+	+	E	The women are riding the horses
	6	-	-	H	The people is tearing the book
	7	-	+	A	The women are feeding the baby
	8	+	-	G	The man is baking the cake
	9	+	+	I	The woman is washing her hair
	10	+	-	L	The people are cooking the food
	11	-	+	J	The men is holding the hats
	12	-	-	F	The baby are washing his hands
3	1	+	+	L	The people are eating the food
	2	+	-	I	The woman is drying her hair
	3	-	+	F	The baby are waving his hands
	4	-	-	D	The girl are throwing the toothbrush
	5	+	+	J	The men are holding the hats
	6	-	+	K	The kids is riding the trikes
	7	+	-	B	The man is washing the baby
	8	-	-	C	The women is cutting the rope
	9	+	+	H	The people are reading the book
	10	-	-	E	The women is feeding the horses
	11	+	-	A	The woman is dressing the baby
	12	-	+	G	The man are touching the cake

TABLE 6. continued

4	1	+	+	C	The women are pulling the rope
	2	+	-	J	The men are wearing the hats
	3	-	-	A	The woman are dressing the baby
	4	-	+	I	The woman are washing her hair
	5	+	+	G	The man is touching the cake
	6	-	-	L	The people is cooking the food
	7	+	-	K	The kids are fixing the trikes
	8	-	+	E	The women is riding the horses
	9	+	+	F	The baby is waving his hands
	10	-	+	H	The people is reading the book
	11	+	-	D	The girl is throwing the toothbrush
	12	-	-	B	The man are washing the baby
5	1	+	+	B	The man is kissing the baby
	2	-	-	F	The baby are washing his hands
	3	-	+	G	The man are touching the cake
	4	+	-	E	The women are feeding the horses
	5	+	+	K	The kids are riding the trikes
	6	-	+	D	The girl are holding the toothbrush
	7	-	-	I	The woman are drying her hair
	8	+	-	H	The people are tearing the book
	9	+	+	A	The woman is feeding the baby
	10	+	-	C	The women are cutting the rope
	11	-	-	L	The people is cooking the food
	12	-	+	J	The men is holding the hats
6	1	+	+	H	The people are reading the book
	2	-	-	A	The woman are dressing the baby
	3	+	-	B	The man is washing the baby
	4	-	+	K	The kids is riding the trikes
	5	+	+	F	The baby is waving his hands
	6	+	-	E	The women are feeding the horses
	7	-	-	G	The man are baking the cake
	8	-	+	L	The people is eating the food
	9	+	+	J	The men are holding the hats
	10	-	+	I	The woman are washing her hair
	11	-	-	C	The women is cutting the rope
	12	+	-	D	The girl is throwing the toothbrush

Procedure

All testing sessions took place in the school. The experimenter, who tested all 36 subjects, spent some time in each classroom and was introduced to the children by the teacher. The testing sessions took place in an unused classroom. Each subject was seen individually by the experimenter with the two seated across from each other at a small table. At the beginning of the session, which lasted approximately 20 minutes, the subject was told that what was to follow was not a test and that marks would not be assigned. The experimenter then said "I'm going to show you some pictures, and I'm going to say something about each one of them. I'd like you to tell me if what I say about each picture sounds right to you. For instance, if I show you this picture [the Sample was held up] and say 'The girl ... is holding ... the bottle', does that sound right to you?" If the answer was "yes", the subject was asked to indicate how s/he could tell. In all but two cases the subject responded by indicating that the girl was in fact holding the bottle. Two Kindergarten subjects seemed to be uncertain of the response required; in these cases the experimenter pointed out the match betwen the sentence and picture without, however, explicitly referring to the subject-verb agreement or any other aspect of the syntax of the sentence.

After this priming for the task, the experimenter held up the first test picture, saying "Here's another one", and spoke the six words of the sentence slowly and clearly in three groups of two, e.g., "The woman ... is feeding ... the baby." If the subject did not answer within a few seconds or seemed doubtful or asked for a repetition, the experimenter said the sentence again in the same manner. Each of the 12 test sentences was presented in the same manner. The subject's response to each sentence was scored as either "accept" or "object". In the case of a objection, the subject was asked to explain the objection, to express the sentence in her/his way, and to say why the corrected form was better. In the case of an acceptance, no further question was asked. It was decided not to challenge any clear acceptance of a sentence for several reasons: 1) young children, especially those in Kindergarten, would tend to be hesitant about disagreeing with an adult, and a challenge to a clear agreement might inhibit the child's subsequent disagreement; 2) challenging an agreement might set the child to look for something wrong with sentences that sounded right, and thus might produce irrelevant or bizarre responses.

After all 12 test sentences had been presented and responded to, the Probe sentence, in the Ungrammatical and Truthful condition, was presented to any child who had failed to make clear objections to grammatical violations during the

task. The child was asked to consider "The man ... are lifting ... the glass" as a match for the Probe picture. If that construction was accepted, the correct form was given in an attempt to direct the child's attention to the subject-verb agreement violation, and the child was asked to explain the difference between the two sentences and whether there was a way of deciding which one was correct. Any child who indicated by her/his responses that there was a difference between the two forms was asked whether s/he could think of a rule to use in deciding how to use "is" or "are" correctly in a sentence. Any child who could not formulate a rule, and any child who indicated that both forms of the sentence were correct was told the rule. Those children who had objected to grammar violations during the course of the test were asked at the end to "tell me if there's a rule for how to use 'is' and 'are' the right way." Their responses were noted, as well as the responses of those children who provided a formulation of the rule as an explanation for a correction during the course of the test. Seven of the Kindergarten and three of the Grade 4 children were reluctant to continue the testing session, and so were not presented with the Probe sentence or asked to formulate a rule.

The pace of the testing session and interview was sufficiently relaxed to allow the experimenter to transcribe each subject's responses verbatim in writing. A sample transcription is included in Appendix B.

RESULTS

Correct truth objections and correct grammar objections were anlayzed separately, using Program BMD08V from the Biomedical Library (Dixon, 1974). Both analyses were four way mixed analyses of variance (3 x 2 x 2 x 3). In each analysis, the two between-subjects factors were grade (G) and sex (X), while the two within subjects factors were condition (C) and trial (T). Subjects were random, while all other factors were fixed. In the analysis of correct truth objections, the two levels of the condition factor were 1) truth violations only, and 2) grammar violations as well as truth violations. In the analysis of correct grammar objections the two levels of the condition factor were 1) grammar violations only, and 2) truth violations as well as grammar violations. Tables 7 and 8 summarize the two analyses of variance.

Truth objections

There were no significant main effects or interactions. Figure 1 shows the means for both sexes at each grade level for both conditions over all trials, where 1 was the highest score

Table 7. Analysis of Variance Summary for Correct Truth Objections

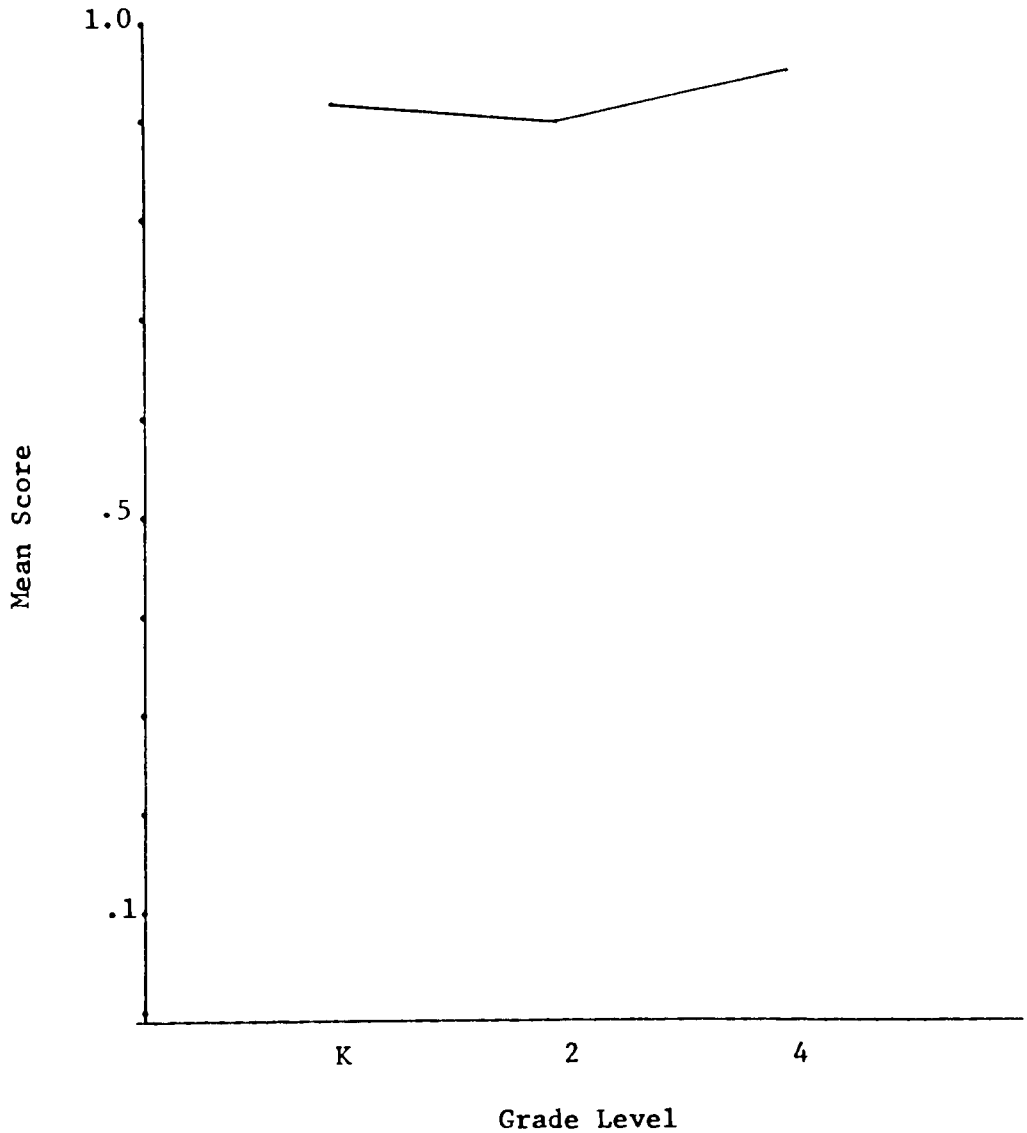
Source		df	MS	F	Error Term
Grade	(G)	2	.0602	.2731	S(GX)
Sex	(X)	1	.1667	.7563	S(GX)
Condition	(C)	1	.7407	1.2122	SC(GX)
Trials	(T)	2	.0602	1.9119	ST(GX)
GX		2	.2917	1.3235	S(GX)
GC		2	.3241	.5303	SC(GX)
XC		1	.0185	.3035	SC(GX)
GT		4	.0394	1.2501	ST(GX)
XT		2	.0417	1.3237	ST(GX)
CT		2	.0324	.7291	SCT(GX)
S(GX)		30	.2204		
GXC		2	.0046	.0758	SC(GX)
GXT		4	.0208	.6618	ST(GX)
GCT		4	.0116	.2604	SCT(GX)
XCT		2	.0870	1.9791	SCT(GX)
SC(GX)		30	.0611		
ST(GX)		60	.0315		
GXCT		4	.0116	.2604	SCT(GX)
SCT(GX)		60	.0444		

None of the F's are significant at the 5% level

Table 8. Analysis of Variance Summary for Correct Grammar Objections

Source		df	MS	F	P	Error Term
Grade	(G)	2	12.8750	33.8322	.001	S(GX)
Sex	(X)	1	.3750	.9854	n.s.	S(GX)
Condition	(C)	1	.5602	7.6583	.01	SC(GX)
Trials	(T)	2	.0139	.2174	n.s.	ST(GX)
GX		2	1.6250	4.2704	.025	S(GX)
GC		2	.0324	.4429	n.s.	SC(GX)
XC		1	.1157	1.5823	n.s.	SC(GX)
GT		4	.0972	1.5217	n.s.	ST(GX)
XT		2	.0972	1.5218	n.s.	ST(GX)
CT		2	.0880	1.7276	n.s.	SCT(GX)
S(GX)		30	.3806			
GXC		2	.1157	1.5823	n.s.	SC(GX)
GXT		4	.0556	.8696	n.s.	ST(GX)
GCT		4	.0185	.3639	n.s.	ST(GX)
XCT		2	.0046	.0909	n.s.	SCT(GX)
SC(GX)		30	.0731			
ST(GX)		60	.0639			
GXCT		4	.0046	.0908	n.s.	SCT(GX)
SCT(GX)		60	.0592			

FIGURE 1. Correct Truth Objections. Mean Scores at each Grade Level Across Conditions and Trials



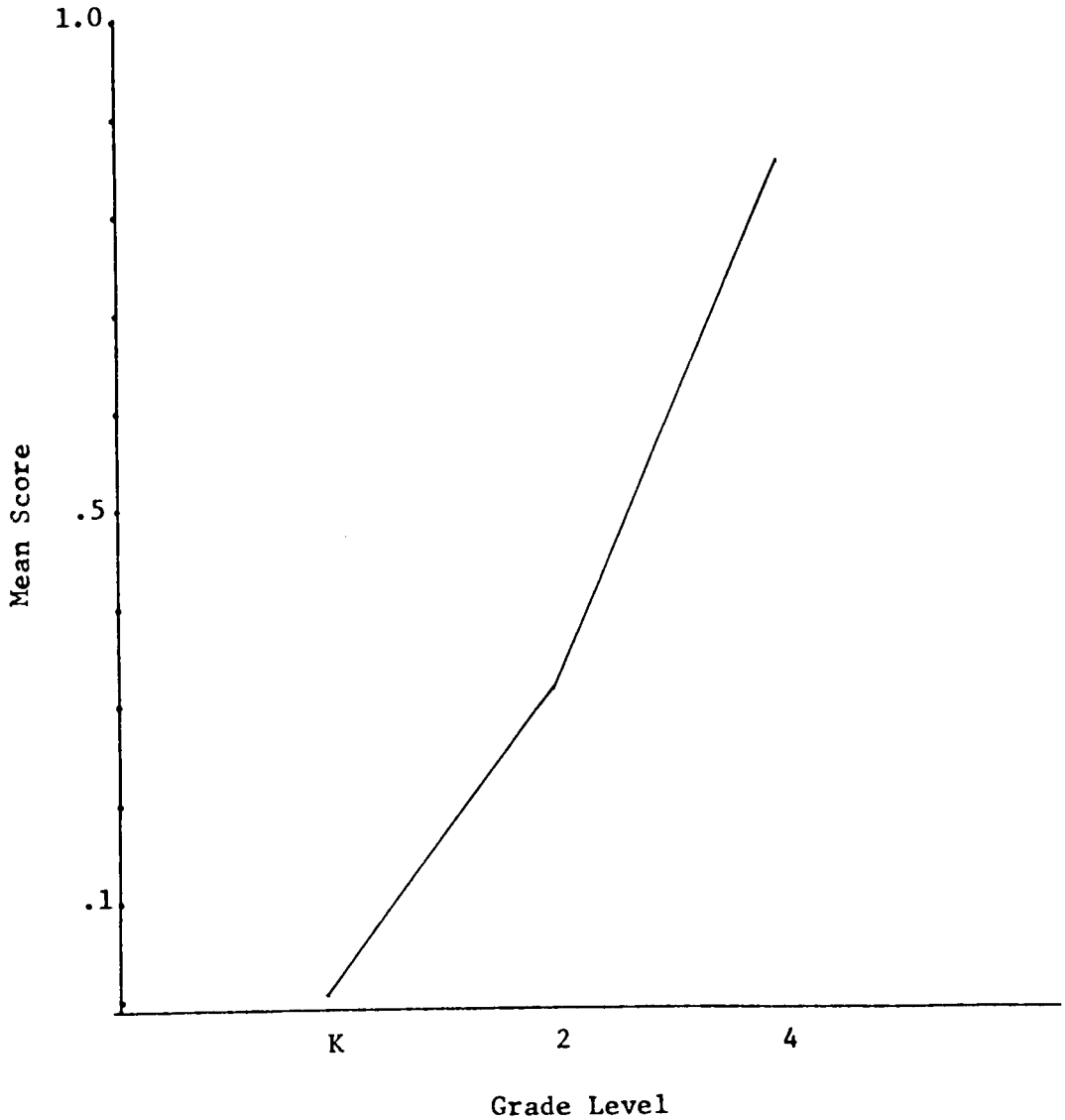
possible on any one trial. As is evident from the figure, and as was predicted, the ability to detect truth violations in sentences accompanying pictures is already fully present at age 5.

Grammar objections

There were no significant sex or trial main effects.

Grade main effect. The main effect for grade was significant at .001 (F=33.83, df=2,30). The means for Kindergarten, Grade 2 and Grade 4 were .03, .32, and .86. Individual comparisons between sets of means revealed that the difference between means for Kindergarten and Grade 2 was significant at .05, using a planned comparison that takes into account experiment-wise error rate (Myers, 1972, pp 358-363). Since this was the smallest of the three differences between means, all differences between means are significant at .05 or better. This finding confirmed the hypothesis that ability to make correct objections to grammar violations increases with age, as shown in Figure 2.

FIGURE 2. Correct Grammer Objections. Mean Scores at each Grade Level Across Conditions and Trials



Condition main effect. The condition main effect is attributable to the larger mean scores per trial obtained by all children in the Ungrammatical and Truthful Condition than in the Ungrammatical and Untruthful Condition. The means weree .45 for the Ungrammatical and Truthful Condition, and .36 for the Ungrammatical and untruthful Condition. Thus, where both aspects of the sentence were violated, children were less able to detect grammar violations.

Interactions. The grade x sex interaction was significant at .025 (F=4.27, df=2,30). Post hoc comparisons using the Tukey HSD (Myers, 1972, pp 364-366) on differences between the means for Grade 2 males and females , and between the Grade 4 males and females were not significant. The relevant means for this interaction are shown in Table 9. As a further attempt to identify differences randomization tests were also conducted. None of these gave significance. The results of the randomization tests showed that in the case of Grade 2 students, a difference equal to or greater than that observed would occur with a probability of .15. In the case of the Grade 4 students, a difference equal to or greater than that observed would occur with a probability of .38. Given these failures to

Table 9. Group Means (Grammar Objections) Across Conditions and Trials for Males and Females at each Grade Level

	K	2	4
M	.03	.53	.78
F	.03	.11	.94

identify specific differences, and the fact that the data contradict what is generally known about sex differences in language development (Maccoby & Jacklin, 1974), this grade x sex interaction was deemed insufficiently strong to support interpretation.

Summary of results of analyses of variance

1. As hypothesized, all children at three grade levels demonstrated the ability to detect correctly violations of truth in all sentences accompanying pictures.

2. As hypothesized, older children were better than younger children at detecting violations of grammar. Kindergarten children found this almost impossible to do, while the Grade 4 children demonstrated almost perfect ability to detect grammar violations correctly.

3. The ability to detect violations of grammar decreased for all children where sentences contained both violations of grammar and truth.

FURTHER RESULTS AND DISCUSSION

The ability to correct ungrammatical sentences and to provide explanations for those corrections was also investigated. Table 10 shows the number of times each child objected to and corrected sentences in both the Ungrammatical and Truthful, and Ungrammatical and Untruthful conditions. The first column shows the number of spontaneous corrections produced during the course of the test when the children repeated the incorrect sentences not verbatim but in their correct form. For example, on being asked whether "The woman...are feeding...the baby" sounded "right", the Kindergarten or Grade 2 subject typically said "Yes, the woman is feeding the baby."

The second column shows the number of times each child objected to any ungrammatical sentence.

The third column shows the number of times each child provided a direct subject-verb agreement correction for any ungrammatical sentence. For example, in response to the test sentence "The man are kissing the baby", a child might say "No, that doesn't sound right. You have to say 'The man is kissing the baby'."

Table 10. Objections, Corrections, Explanations, and Rules.

Number, out of six, of objections, (O), direct corrections, (DC), and explanations, (E), on the basis of grammar to all sentences containing grammatical violations. Number, out of six, of spontaneous corrections, (SC), is indicated in the first column. Presentation of Probe sentence, and formulation of Rule are indicated by (P) and (R) respectively.

						Explanations					
			SC	O	DC	E1	E2	E3	E4	P	R
K	M	1	5	o	o	o	o	o	o	p	-
		2	3	o	o	o	o	o	o	p	-
		3	3	o	o	o	o	o	o	p	-
		4	5	o	o	o	o	o	o	p	-
		5	5	o	o	o	o	o	o	p	-
		6	3	o	o	o	o	o	o	p	-
	F	1	3	1	1	o	o	1	o	p	-
		2	4	o	o	o	o	o	o	p	-
		3	1	o	o	o	o	o	o	p	-
		4	3	o	o	o	o	o	o	p	-
		5	6	o	o	o	o	o	o	p	-
		6	6	o	o	o	o	o	o	p	-
2	M	1	-	6	6	o	o	o	o	-	r
		2	-	6	6	o	o	o	o	-	-
		3	4	o	o	o	o	o	o	p	-
		4	2	4	4	1	1	1	o	p	-
		5	3	3	3	o	3	o	o	-	-
		6	3	o	o	o	o	o	o	p	-
	F	1	3	o	o	o	o	o	o	p	r
		2	1	4	4	o	4	o	o	-	-
		3	5	o	o	o	o	o	o	p	r
		4	4	o	o	o	o	o	o	p	r
		5	3	o	o	o	o	o	o	p	-
		6	3	o	o	o	o	o	o	p	r
4	M	1	2	3	3	o	o	o	o	p	-
		2	-	6	6	o	o	o	o	-	-
		3	-	6	6	o	5	o	o	-	-
		4	1	5	5	o	3	2	o	-	-
		5	-	6	6	o	4	o	2	-	r*
		6	2	2	2	1	1	o	o	p	-
F		1	-	6	6	o	1	1	4	-	r*
		2	1	5	5	o	4	o	o	-	-
		3	-	6	6	o	6	o	o	-	-
		4	1	5	5	o	5	o	o	-	-
		5	-	6	6	o	6	o	o	-	-
		6	-	6	6	o	5	o	1	-	r

r* = The rule was formulated during the test.

The next four columns headed Explanations 1, 2, 3 and 4 show the number of times each child gave any sort of explanation for a correction. Explanation 1 includes any vague expression of grammaticality that was not specifically focused on subject-verb agreement. The explanations "It sounds wrong" or "It's not good English" were included under this heading. Explanation 2 includes statements like "'Is' is wrong", or "'Women' sounds wrong". This sort of explanation focused specifically on only the subject or the verb, but not on both. Explanation 3 includes statements focused on both the subject and the verb, like "'Is' is wrong because it's women". Explanation 4 includes statements expressing all or part of a general rule for subject-verb agreement with the verb "to be": "When there's more than one thing you have to say 'are'". Explanations 3 and 4 were more explicitly focused on the syntactic structure than were Explanations 1 and 2.

The column headed Probe shows those children who were presented with the probe sentence, and Rule shows those children who actually formulated a rule for subject- verb agreement with the verb "to be".

The Objections column in Table 10 provides a measure of judgment (De Villiers & De Villiers, 1974). In objecting to ungrammatical sentences, the children demonstrated their ability to judge the correct use of the syntactic structure of subject-verb agreement. The data show that the older children were more likely than the younger to make objections to ungrammatical sentences. The number of children who made at least one objection to ungrammatical sentences are: 1 at Kindergarten; 5 at Grade 2, and 12 at Grade 4.

All the children made the same number of direct corrections as objections, so that the older children also made more direct corrections than the younger. The older children provided more explanations for their corrections. The number of children who provided at least one explanation for a direct correction are: 1 at Kindergarten; 5 at Grade 2, and 11 at Grade 4. Of the total of 17 children who provided explanations, just over a third made explanations at the two highest levels (Explanations 3 and 4).

Table 10 also shows the number of children who formulated a rule for subject-verb agreement. No Kindergarten child did so. Five of the Grade 2 children

formulated a rule, four of them doing so only after hearing the Probe sentence. All three of the Grade 4 children who formulated a rule had not heard the Probe sentence, and two of them formulated the rule in explaining their corrections during the course of the test.

The column headed Spontaneous Corrections provides a production measure for the younger children, but apparently not for the older children. The number of children who made at least one spontaneous correction (i.e., accepted an ungrammatical sentence as correct and then repeated it not verbatim but in its correct form) are: 12 at Kindergarten; 10 at Grade 2, and 5 at Grade 4. Although fewer of the older, more capable children made spontaneous corrections, more of them made direct corrections. The number of children who made at least one direct correction for ungrammatical sentences are: 1 at Kindergarten; 5 at Grade 2, and 12 at Grade 4. It was noted during the test that no child produced any sentence that violated subject- verb agreement, a further indication of the production abilities of the subjects in this study. Table 11 lists the objections made to sentences in the Grammatical and Truthful condition. Only four children made any, and these objections focused on nuances of meaning. The fact that so few children made such objections, and that no child misunderstood such a sentence provides a measure of comprehension of subject-verb agreement.

Table 11. Objections to Grammatical and Truthful Sentences

Gr	Sex	S	Sentence	Verbatim Objection
K	M	1	The woman is feeding the baby	"Feed and baby aren't the same." ie, don't rhyme
	M	6	The people are reading the book.	"I don't see lots of people. The lady is reading the book. The girl is sitting on the lap."
2	F	4	The man is touching the cake.	"He's frosting it."
4	F	2	The woman is washing her hair.	"She's washing herself."

All objections were on the basis of perceived truth. There were no other instances of objections to Grammatical and Truthful Sentences.

Table 12 shows the mean number of objections, out of three, made to sentences in the Ungrammatical and Truthful, Grammatical and Untruthful, and Ungrammatical and Untruthful conditions, by both males and females at each grade level. These data show the change from Kindergarten to Grade 4 from a focus on truth alone to a consideration of both truth and grammar in making corrections to violated sentences. The Kindergarten children focused on truth alone and made almost no corrections on the basis of grammar; the Grade 2 children focused primarily on truth, with few corrections of grammar, while the Grade 4 children focused on truth alone when only truth was violated, on grammar alone when only grammar was violated, and to some degree, on both truth and grammar where both were violated. Comparison of the means for truth objections alone to Ungrammatical and Untruthful sentences at Kindergarten, Grade 2 and Grade 4 (3, 2 and .5) yields support for the suggestion by Gleitman et al. (1972) that for young children semantic deviance is more salient than syntactic deviance. The individual data on which these means are based are shown in Table 13. Examination of Table 13 shows the means to be representative of the individual data.

The data in Tables 10 to 13 taken together with the results of the Analyses of Variance confirm the two major hypotheses of the study -- 1) that subjects at all three

Table 12. Mean objections to violated sentences

Mean number of objections out of three, to Ungrammatical and Truthful (G-T+); Grammatical and Untruthful (G+T-); and Ungrammatical and Untruthful (G-T-) sentences, on the basis of Truth only (T), Grammar only (G) or both Truth and Grammar (TG), for both sexes at each grade level.

		G-T+	G+T-	G-T-
K	T	0.2	3.0	3.0
	G	0.1	0.0	0.0
	TG	0.0	0.0	0.0
2	T	0.3	3.0	2.0
	G	1.0	0.0	0.3
	TG	0.0	0.0	0.4
4	T	0.0	3.0	0.5
	G	3.0	0.0	0.2
	TG	0.0	0.0	2.0

Table 13. Objections to violated sentences

Number of objections, out of three, to Ungrammatical and Truthful (G-T+); Grammatical and Untruthful (G+T-); and Ungrammatical and Untruthful (G-T-) sentences, on the basis of Truth only (T). Grammar only (G), or both Truth and Grammar (TG).

Subject:		1			2			3			4			5			6		
	G	-	+	-	-	+	-	-	+	-	-	+	-	-	+	-	-	+	-
	T	+	-	-	+	-	-	+	-	-	+	-	-	+	-	-	+	-	-
	T	1*3	3		o	3	3	o	2	2	o	3	3	o	3	3	o	3	3
M	G	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	TG	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
K																			
	T	o	3	3	o	1	3	1*3		1	o	3	3	0	3	3	o	3	3
F	G	o	o	o	1	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	TG	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	T	o	3	o	o	o	o	1*3		3	o	3	2	o	3	3	o	3	3
M	G	3	o	1	3	o	3	o	o	o	3	o	o	3	o	o	o	o	o
	TG	o	o	2	o	o	o	o	o	o	o	o	1	o	o	o	o	o	o
2																			
	T	o	3	3	o	3	1	2*3		3	o	3	3	o	3	3	o	3	3
F	G	o	o	o	2	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	TG	o	o	o	o	o	2	o	o	o	o	o	o	o	o	o	o	o	o
	T	o	3	1	o	3	o	o	3	o	o	3	1	o	3	o	o	3	2
M	G	2	o	o	3	o	o	3	o	o	3	o	o	3	o	o	1	o	1
	TG	o	o	2	o	o	3	o	o	3	o	o	2	o	o	3	o	o	o
4																			
	T	o	3	o	o	3	1	o	3	o	o	3	1	o	3	o	o	3	o
F	G	3	o	o	3	o	1	3	o	o	3	o	o	3	o	o	3	o	o
	TG	o	o	3	o	o	1	o	o	3	o	o	2	o	o	3	o	o	3

* = objections on the basis of perceived truth to Ungrammatical and Truthful sentences.

KM1 "Toothbrush doesn't rhyme with girl."
KF3 "They're not trikes, they're big wheels."
2M3 "They're not riding the trikes, they're sitting on them."
2F3 "They're not riding the trikes."
"The baby isn't waving."

All other objections on the basis of truth to Grammatical and Untruthful, and Ungrammatical and Untruthful sentences were appropriate.

grade levels would be equally accurate in detecting violations of truth, and 2) that the older children would be better than the younger at detecting and correcting violations of grammar. Measures of production and comprehension os subject-verb agreement indicated that all the children were fully competent in these performances. These results are consistent with the finding by De Villiers and De Villiers (1974) of a developmental sequence for the four performances -- production, comprehension, judgment and correction -- with respect to the syntactic structure of word order. While the results of the present study failed to establish a developmental sequence from production to comprehension, or from judgment to correction, it was nevertheless established that the acquisition of production and comprehension preceded the acquisition of judgment and correction. The ability to provide explanations for corrections was shown to be equal to the ability to make those corrections. The results with regard to rule formulation are inconclusive because it is likely that presenting the Probe sentence to only those subjects who did not object to ungrammatical sentences failed to facilitiate production of a rule for subject-verb agreement in some of the older subjects.

Conclusions

The development of the ability to reflect upon the structure of language was investigated with reference to one particular syntactic structure. It was shown that older children were significantly better than younger children at judging and correcting violations. The results were interpreted as being consistent with those found by De Villiers and De Villiers (1974), who suggested a developmental sequence for each of four language performances with respect to the syntactic rule for word order. They suggested also that the ability of children to focus specifically on a syntactic structure in correcting deviant sentences constitutes full linguistic competence and evidence of metalinguistic awareness, or the ability to reflect upon the structure of language.

APPENDIX A. Pictures.

A. The woman is feeding the baby.

B. The man is kissing the baby.

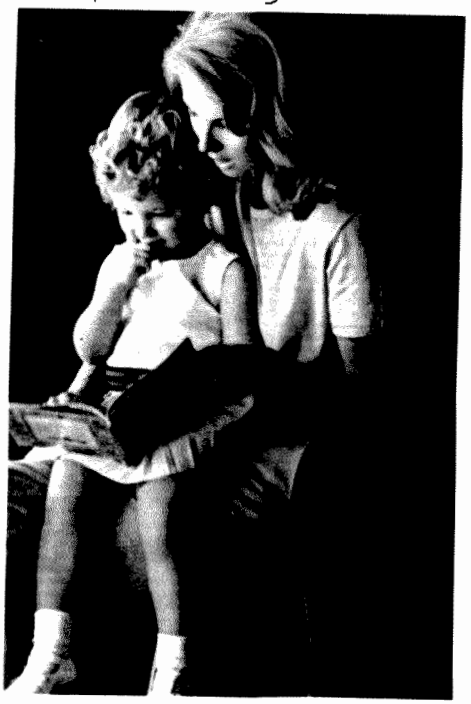
C. The women are pulling the rope.

D. The girl is holding the toothbrush.

E. The women are riding the horses.

F. The baby is waving his hands.

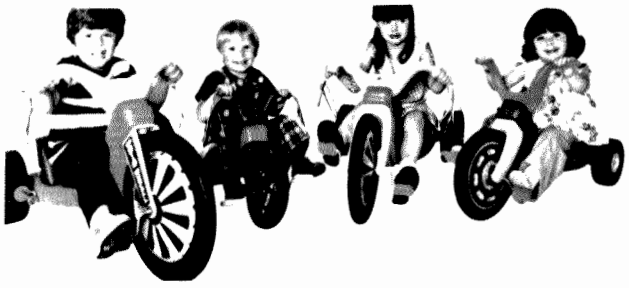
G. The man is touching the cake.



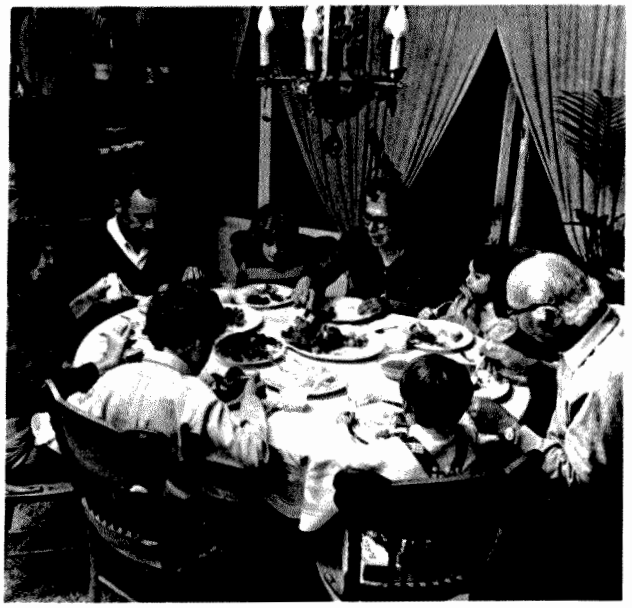
H. The people are reading the book.

I. The woman is washing her hair.

J. The men are holding the hats.



K. The kids are riding the trikes.



L. The people are eating the food.

Sample. The girl is holding the bottle.

Probe. The man is lifting the glass.

APPENDIX B. Sample Transcription.

Subject 1 Female Grade 2

Sentence	Accept/Object	Correction	Explanation
The woman is feeding the baby.	That's right		
The girl are holding the tooth brush.	That's right		
The woman is drying her hair.	That's not right	She's washing her hair and it's getting all wet.	
The people is tearing the book.	That's not right	They're reading the book.	
The man is kissing the baby.	That's right		
The men are wearing the hats.	That's wrong	They're holding their hats by their sides.	
The women is riding the horses.	That's right		
The kids is fixing the trikes.	Nope	They're riding them.	
The women are pulling the rope.	That's right		
The man are baking the cake.	That's wrong	He's going to take a piece of the cake, I think.	
The baby are waving his hands.	That's right		
The people are cooking the food.	No	They're eating it.	

APPENDIX B continued.

Sentence	Verbatim comments
Probe. The man are lifting the glass.	Ya, because he's holding it.
The man is holding the glass.	That would be better. Because you couldn't have that other word, because there's only one person, and if you used "are" there'd be the "men".
[Rule]	You can only use "are" for more than one one person, and "is" for only one person.
[How do you know the rule?]	Because our teacher told us.

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