What Do Children Know Without Learning?

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INTRODUCTION

This study investigated children's knowledge of parasitic gap constructions, as in (1).

(1)   That is the giraffe that Cookie Monster patted t_i before kissing e_i.[1]

In (1), t is the usual trace of movement, the "real gap", and e, which is coindexed to it, is the parasitic gap. Whereas movement out of an adverbial clause is not possible, in cases like this, the parasitic gap is licensed by the real gap. Most adult English-speakers find sentence (1) grammatical. The degree of grammaticality of parasitic gap constructions tends to vary depending on properties of the sentence. For some

1. Throughout the rest of this paper, we will suppress the subscripting, except where necessary for exposition.

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speakers, (2), with a tensed adverbial clause, is worse
than (1).

(2)   That is the giraffe that Cookie Monster patted t
       before Grover kissed e.

For some speakers (including the first author),
parasitic gap constructions like (3), where the gaps
are in prepositional phrases, are completely
ungrammatical.

(3)   This is the girl that Grover gave a picture of e
       to t.

In many accounts of parasitic gap constructions, such
as Chomsky (1982), sentences like (3) are considered to
have the same status as sentences like (1).   (This
corresponds to the intuition of the second author.)

Parasitic gap constructions seem to be subject to an
anti-c-command condition (Taraldsen, 1981) according to
which the parasitic gap must not be c-commanded by the
real gap, ruling out sentences like (4).

(4)   *That is the bear that t hit Grover before looking
       at e.

Since the parasitic gap is a variable, the anti-c-
command constraint could be considered to be a subcase
of Binding Principle C.[2]

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2. Actually, sentence (4) is additionally ruled out by the
fact that PRO (which is controlled by *t*) also c-commands *e*. If
the anti-c-command requirement is a case of Principle C, then this
sentence contains two Principle C violations. If the adverbial
clause were tensed, with PRO replaced by an overt NP subject, then
only the anti-c-command condition would be violated.
     Chomsky (1986) argues that parasitic gap constructions
must consist of two chains, since the parasitic gap obeys
Subjacency. (However, note that in sentences like "It is the type
of book that [no one who has read *e*] would give *t* to his mother",
Subjacency seems to be violated). He suggests that the
construction involves chain composition. The anti-c-command
condition would then be derived slightly differently (either by
Principle C holding of chain composition, or as a subcase of the
Chain Condition on maximal A-chains). Chomsky also discusses the
possibility of replacing the anti-c-command requirement (which has
been challenged empirically) with Subjacency (applying to chain
composition).

Another condition on parasitic gaps is that they must be licensed by a variable; they cannot be licensed by an NP-trace, as illustrated by the ungrammaticality of (5).

(5)   *Grover got hit t before Cookie Monster talked to
       e.

In this case, the parasitic gap would no longer be bound by an operator and would therefore be an illicit empty category (a variable with no operator, an object **pro** (not licensed in English), a trace of illicit NP-movement, or a governed PRO).

A further question concerning these constructions is whether resumptive pronouns can occur in either of the gap positions. For most English-speakers, replacing the real gap by a resumptive pronoun, as in (6), results in the same ungrammatical status as sentences like (7), in which a resumptive pronoun is in a position that a trace could easily occupy.

(6)   That's the girl that the dog kissed her before
      knocking e down.

(7)   That's the girl that Grover kissed her.

For some speakers, a resumptive pronoun sounds much better in the position of the parasitic gap, as in (8).

(8)   That's the cookie that Cookie Monster dropped t
      before eating it.

This is presumably because resumptive pronouns are marginally possible in most dialects of English in sites from which extraction is precluded (in this case, an adverbial clause). Interestingly, for some speakers (including the second author) the construction with resumptive pronouns occupying both the real gap and the parasitic gap positions, as in (9), is worse than (8), but better than (6).

(9)   That's the girl that Grover kissed her before
      patting her.

Languages and dialects of English (like that of the first author) in which resumptive pronouns are freely allowed, even in cases like (7), are of more interest regarding parasitic gaps. The question is whether a resumptive pronoun can license a parasitic gap. If not, a sentence like (6) would be ungrammatical even in

a dialect that otherwise allows resumptive pronouns.
Chomsky (1982) predicts that a resumptive pronoun could
not license a parasitic gap. Chomsky analyzes
resumptive pronouns as base-generated pronominals that
are interpreted as variables at LF, when they are
coindexed with an operator. Since he argues that the
parasitic gap must be coindexed with a variable at S-
structure (p. 44), the structure with a parasitic gap
coindexed with a resumptive pronoun would be illicit,
since the resumptive pronoun is not a variable at S-
structure. Engdahl (1985) gives data from Swedish
that falsify Chomsky's prediction. She suggests that
resumptive pronouns in Swedish are variables
(phonetically realized traces), and can therefore
license parasitic gaps. Whether a resumptive pronoun
can license a parasitic gap would then depend on its S-
structure status (pronominal or variable) in a
particular language. Sells (1986) cites additional
data, from Hebrew, showing that resumptive pronouns
can, in some languages which freely use them, license
parasitic gaps. The first author finds (6) completely
grammatical, which indicates that dialects of English
with free use of resumptive pronouns allow them to
license parasitic gaps.

Although parasitic gap constructions are extremely rare
in language use, people have intuitions about them.
These constructions are often used as illustrations in
arguing for the claim that much of linguistic knowledge
must be innate. It is claimed that, given the
ephemeral nature of the data, children must not have to
hear the particular construction in order to know about
its grammatical properties. For this reason, it is of
interest to examine the status of parasitic gap
constructions in the grammars of young children. The
innateness claim together with the Continuity
Hypothesis (claiming that children's grammars are
always possible adult grammars (Pinker, 1984)) makes
the prediction that children's grammars should not
differ from those of adults with respect to parasitic
gaps. In our study, we investigated the parasitic gap
constructions in (1) and (3), as well as the
constructions with resumptive pronouns, in children
aged 3;8 to 5;6. We also included a group of adults in
our study. We think that in any work on children's
grammars, it is important to conduct the same study on
adults to verify that the assumptions being made about
adult behavior are correct. In this way, the
children's and adults' behavior can be compared. In
the examination of parasitic gap constructions, the
inclusion of an adult group is especially important,

since not many adults have been asked about such
sentences, and dialectal variation is known to exist.

METHOD

We used two methods for assessing the status of
parasitic gap constructions in subjects' grammars. In
the first, subjects had to answer questions and in the
second, they had to judge the grammaticality of
sentences. Because of the complexity of the sentences
we were using, we also gave the subjects a pretest.

The Question Task: One experimenter, the story-teller,
staged an event, using small toys as props. A
rhinoceros puppet named Nelly, who was controlled by
the second experimenter, watched the event with the
subject. We told the subject that Nelly liked the
stories but had a bad memory. Immediately after each
story, Nelly asked the subject something about the
story that she had forgotten. The subject had to help
her by answering her question. Before the story-teller
staged each event, she named the props and the actions
that would be involved. She always used the gerundive
nominal forms of the verbs to avoid distinguishing
between intransitive and transitive verbs. In the
target items, Nelly's question was always ambiguous;
the verb of the adverbial clause could either be
transitive with a parasitic gap object or intransitive
(with an implied object). An example is given in (10).

(10)   Story-Teller: This is a story about a hungry
        camel and some French fries and a hotdog.
        There's gonna be some smelling and some eating in
        this story.
        [Camel smells hotdog and French fries; then eats
        hotdog.]
        Nelly: What did the camel smell t before eating
        (e)?

With the parasitic gap interpretation, the question is
asking which thing the camel smelled and then ate. The
answer would be just "the hotdog" (since the camel did
not eat the French fries). With the interpretation
where "eat" is intransitive, the question asks what the
camel smelled. The answer is "the hotdog and the
French fries". Both answers are correct, since the
question is ambiguous and both interpretations fit the
story. Therefore, if subjects do not interpret the
question as a parasitic gap construction, no
interesting conclusions can be drawn (except possibly
in conjunction with their grammaticality judgments).

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If they do give the parasitic gap response, on the
other hand, this suggests that the construction is
possible in their grammars.

We included two types of control items to insure that
the parasitic gap response ("hotdog") was not due to
factors other than a parasitic gap interpretation of
the question. The first control checked whether the
subject generally gives exhaustive answers to
questions. If one is asked what the camel smelled in
(10) (the intransitive verb interpretation), one could
theoretically answer with just a subset of the objects
("the hotdog" or "the French fries"), instead of giving
an exhaustive answer. To check for this, we included
items like (11).

(11)   [Grover kisses lion and bear.]
       Nelly: Who did Grover kiss?

As long as subjects generally gave exhaustive answers
to these control items ("the lion and the bear"), we
could assume that the answer "hotdog" to (10) was also
exhaustive and, therefore, reflected the parasitic gap
interpretation.

The other type of control item we used had an adverbial
clause that unambiguously contained no gap; the answer
related only to the first (matrix) verb. This was to
insure that subjects had not developed a pattern of
always giving the object of the final verb as an
answer, without attending to the beginning of the
sentences. An example is given in (12).

(12)   [Bert pushes house and boat, then climbs ladder.]
       Nelly: What did Bert push t before climbing up
       the ladder?

Grammaticality Judgments: In order to get a second
measure of the status of parasitic gap constructions
like (1) and to include more construction types, we
also directly asked subjects for judgments of
grammaticality. We first gave some explanation and
practice on judgments. (This type of methodology is
discussed in McDaniel and Cairns, in press). We told
the subjects that we were asking various people what
they thought about certain sentences of English,
because we wanted to find out more about language. We
said that they should tell us whether the sentences
sounded like English or whether they sounded funny. We
told them that the easiest way to answer these
questions would be to act as if we did not know English

very well and they were helping us learn English. Both
the practice session and the actual one proceeded in
the following way. We first staged an event with the
props, describing what was happening at the same time
(without using the constructions in question). We then
asked whether a certain sentence would be the right way
to say what happened in English. After the first few
practice sentences, we did not ask subjects to correct
the ungrammatical sentences. At this point, we also
stopped giving them feedback on their responses.

The Pretest: Many of the sentences we used in our
study, such as (1), contained both a relative clause
and an adverbial clause with a PRO subject. Before we
could use children as subjects, we had to insure that
they could correctly interpret relative clauses.
Whereas some researchers (Sheldon, 1974; Tavakolian,
1981) have found children having difficulty with
relative clauses, more recent work (Crain, McKee, and
Emiliani, 1990; Goodluck and Tavakolian, 1982;
Hamburger and Crain, 1984) has shown that their
performance can be greatly improved if the tasks are
modified. In this study, it was important that
subjects easily understood relative clause
constructions. We, therefore, had them act out one OS
relative clause (the type on which children have been
reported to make the consistent error of making the
matrix subject perform the action of the relative
clause). We followed Hamburger and Crain (1984) in
attempting to meet felicity conditions for relative
clauses.

Another property of many of the sentences we were using
was the adverbial clause construction with a PRO
subject. For most adults, PRO is controlled by the
subject of the matrix clause in such cases. (For some
adults, PRO can be controlled by either the subject or
the object.) In (13), for example, as in (1), the one
doing the kissing must be Cookie Monster.

(13)   Cookie Monster patted the giraffe before PRO
       kissing the dog.

It has been shown, however, that in some children's
grammars, PRO must be controlled by the object, so that
in (13), the giraffe would have to be doing the
kissing. For other children, PRO appears to have
arbitrary reference. For them, (13) could be
interpreted as meaning that anyone, including a
character not mentioned in the sentence, does the
kissing. (For discussion of these grammar types, see

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Goodluck, 1981; Hsu, Cairns, and Fiengo, 1985;
McDaniel, Cairns, and Hsu, forthcoming). In comparing
our child subjects' responses on parasitic gap
constructions to those of the adults, we did not want
to introduce the possibly confounding factor of grammar
type with respect to control. In addition, the
question task could not be conducted with a child whose
grammar had obligatory object control, since the
questions would be nonsensical and would no longer fit
the story. We therefore wanted to exclude children
with non-adult grammar types.[3]

In order to determine the subjects' grammar type with
respect to control, we gave them two sentences to act
out that contained PRO in an adverbial clause. Once
the subject had enacted the sentence, we asked whether
other enactments were also possible. Prior to this
task, we did the same thing with one very simple
sentence to insure that the subject was willing to give
both a "yes" response to an alternative enactment and a
"no" response to an impossible one.

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   3. A child with obligatory object control would presumably
interpret the question in (10), repeated here, as meaning that the
thing that the camel smelled ate something.
(i)   Nelly: What did the camel smell t_i before PRO_i eating
       (e_i)?
(At least, this is what would be predicted; sentences with a trace
in object position have not been used in investigations of control
in children's grammars.)
       Although the question task could not be conducted with
such children, their judgments would be highly interesting. This
grammar type has often been analyzed as having the adverbial
clause attached to the VP, like a complement. If this is correct,
such children should find parasitic gap constructions like (1)
ungrammatical, since, for them, the anti-c-command condition would
be violated. We would not have been able to investigate this
issue in this study, since we found no children with this grammar
type.
       It would be possible to conduct the question task on
children with the grammar type in which PRO has arbitrary
reference. Due to the context in which the question is asked,
they would interpret the referent of PRO as intended (i.e., as the
subject of the matrix). We did find three children with this
grammar type and conducted the entire experiment with them,
although we excluded them from consideration in the results. We
discuss their data in Appendix A.

SUBJECTS

The subjects were 13 children aged 3;8 to 5;6, with a
mean age of 4;10, and 13 adults. Five other children
were excluded because they did not pass the pretest.
(More will be said about the pretest in the Results
section.)   The child subjects were of mixed socio-
economic backgrounds and attended preschools in
Amherst, Massachusetts. The adult subjects were non-
linguists from the same area.

MATERIALS AND DESIGN

The study was conducted on two separate days for most
of the subjects. (One child subject and all the adult
subjects completed the study in one session, with a
break between the two parts.) The first part consisted
of the pretest, the question task, and practice on
giving judgments; the second part consisted of giving
judgments on the sentences of interest. The first part
lasted approximately 30 minutes; and the second part,
10 to 15 minutes. For all of the tasks, a variety of
toys were used as props, including Sesame Street
characters, plastic food items, and vehicles.

The Pretest: The first part of the pretest assessed
the subjects' grammar type with respect to control. It
included one practice sentence followed by two
sentences containing control structures. The subject
had to act out each sentence and then judge whether
other enactments would also fit the sentence. The
fourth sentence, which the subjects simply had to act
out, tested their ability to interpret relative
clauses. These sentences are given in Appendix B.

The Question Task: The task contained 17 items,
consisting of eight target items, four tokens of the
first type of control item (insuring that answers were
exhaustive), one token of the second type of control
item (insuring that subjects were attending to the
entire sentence), and four filler items. In two of the
control items and in two of the target items, the
exhaustive answer consisted of three objects; in the
other control and target items, the exhaustive answer
consisted of two objects. The embedded verbs of the
target sentences, which had to be optionally
intransitive, were "eat", "paint", "cook", and "clean"
(two tokens of each). The subordinator was "before" in
all of the target items. The fillers consisted of one-
clause questions of various types: two yes-no
questions, a "where" question, and a "how" question.
No two target items appeared in a row. All of the

items are given in Appendix B in the order in which
they were presented.

The Judgments: All of the sentences presented to
subjects for judgment are given in Table 1 in the order
in which they were presented.[4]

(i)	The lion water is drinking.
(ii)	The zebra fell down.
(iii)	The animals is drinking water.
(iv)	This is the camel that is jumping.
(v)	Grover Gumby is patting.
(vi)	That is the strawberry that Goofy is eating a banana and.
(vii)	This is the camel that Cookie Monster is patting.

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(14)	Ms. Piggy the elephant is petting.
(15)	This is the giraffe that Lucy is riding on.
(16)	Grover is talking to.
(17)	That is the camel that Grover hit Cookie Monster before licking.
(7)	That's the girl that Grover kissed her.
(1)	That is the giraffe that Cookie Monster patted before kissing.
(4)	That is the bear that hit Grover before looking at.
(6)	That's the girl that the dog kissed her before knocking down.
(18)	The elephant is climbing up the steps. / The elephant climbing is the steps up.
(5)	Grover got hit before Cookie Monster talked to.
(8)	That's the cookie that Cookie Monster dropped before eating it.
(9)	That's the girl that Grover kissed her before patting her.
(3)	This is the girl that Grover gave a picture of to.

Table 1
Sentences Presented for Judgement

At the end of the first day, we first introduced

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        4. In Table 1, we keep the same numbers to refer to the
sentences that we used in the above discussion. For this reason,
the numbering in the table is out of order.

subjects to the concept of grammaticality and then gave
them seven sentences to judge for practice. These
sentences, identified by Roman numerals, are listed at
the top of Table 1. Two of the grammatical sentences
were relative clauses, (iv) and (vii). The
ungrammatical sentences consisted of two word order
violations ((i) and (v)), one agreement error ((iii)),
and one violation of the Coordinate Structure
Constraint in a relative clause construction ((vi)).
The sentences given for judgment in the second part
were sentences (1), (4), (5), (7), (6), (8), (9), and
(3), discussed above, and five fillers. The session
began with four fillers: a word order violation
((14)), a grammatical relative clause ((15)), an
ungrammatical sentence missing an object of a
preposition ((16)), and a violation of the Temporal
Island Constraint ((17)). Another filler, (18), was
given toward the end of the session and had two
versions. If the subject had rejected the two
preceding sentences, the grammatical version was given;
otherwise the ungrammatical version, with scrambled
word order, was presented.

RESULTS

The Pretest: Recall that five children failed the
pretest. Two of them failed the relative clause part.
(One was sick and we found out later that the other had
been diagnosed as language-disordered.) The other
three passed the relative clause part, but appeared to
have grammar types in which PRO has arbitrary
reference. We did conduct the experiment on these
three children, and we discuss their data in Appendix
A. The 13 children that passed the pretest all had
grammar types in which the controller of PRO in
sentences containing an adverbial clause must be the
matrix subject. Similarly, for 12 of the 13 adults,
the subject of the matrix was the only possible
controller; and for one adult, the object could also
control PRO.

The Question Task: The results of the question task
are given in Table 2.

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	TARGET Parasitic Gaps	CONTROL ITEMS	
		TYPE 1 exhaustive	TYPE 2 correct
Children (N=13)	63	96	92
Adults (N=13)	25	100	100

Table 2
Question Task
% responses

Column 1 shows the percentage of parasitic gap
responses for the children and the adults; column 2
shows the percentage of exhaustive responses on the
first type of control item; and column 3 shows the
percentage of correct responses on the second type of
control item. Since the figures in columns 2 and 3
are high, it can be assumed that the parasitic gap
responses on the target items were not artifacts due
to non-exhaustive responses or inattentiveness to the
first part of the questions.

Most of the individual children gave a high number of
parasitic gap responses, and only two did not produce
any. The non-parasitic gap responses mostly
corresponded to the other possible interpretation of
the question, with the embedded verb intransitive.
Only six of the children's responses were incomplete,
in that they appeared to be an inexhaustive answer to
the non-parasitic gap interpretation of the question
(e.g., "French fries" as an answer in (10)).

The adults gave many fewer parasitic gap responses
than the children, only two adults giving primarily
such responses.[5] Most of their responses
corresponded to the other possible interpretation of
the question; 14 were incomplete (inexhaustive

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    5. We believe that the low number of parasitic gap responses
in the adults can be explained by their attempting to answer in
full sentences. The full sentence response to the parasitic gap
interpretation of the question is awkward, as illustrated in (i),
which would be the answer to (10).
        (i)   The camel smelled the hotdog before eating the
               hotdog.

answers to this interpretation).

Judgments: None of the subjects had difficulty giving judgments. By the third practice sentence, all of the subjects showed that they understood what we were asking of them, and no further feedback was necessary. The judgments of all of the sentences from the second session (except one filler[6]), as well as the violation of the Coordinate Structure Constraint from the practice session, are given in Table 3.

	ADULTS (N=13)			CHILDREN (N=13)		
Sent	GOOD	BAD	NOT SURE	GOOD	BAD	NOT SURE
(vi)	0	13	0	0	13	0
(14)	0	13	0	0	13	0
(15)	13	0	0	13	0	0
(16)	0	13	0	0	13	0
(17)	0	12	1	0	13	0
(7)	0	13	0	2	10	1
(1)	13	0	0	12	1	0
(4)	0	13	0	3	8	2
(6)	0	12	1	5	7	1
(5)	0	13	0	3	8	2
(8)	8	4	1	12	1	0
(9)	0	12	1	6	4	3
(3)	5	6	2	4	8	1

Table 3
Judgments

The judgments are categorized into three types: good (grammatical), bad (ungrammatical), and not sure. We use "not sure" to characterize any judgment that was not certain. This incorporates what would generally be referred to as "marginal" and "highly marginal", as well as "I don't know" responses.[7]

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6. We omit sentence (18), since, as discussed above, it was not given in the same version for all the subjects. The judgments on the sentence were all as expected.

7. When a subject showed uncertainty, we redid the sentence (using different lexical items) at the end of the session. In most cases, subjects showed the same uncertainty. In cases where they did change their response, we report this second response instead of the initial one only if they seemed very certain and it (continued...)

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All of the subjects accepted the relative clause
construction in (15) and rejected the Coordinate
Structure violation ((vi)) and the ungrammatical
fillers ((14) and (16)). All of the children and all
but one adult subject also rejected the Temporal Island
violation ((17)).

In general, the responses of the adults and the
children were similar. With the exception of one
child, they all accepted the basic parasitic gap
construction in (1). It should be noted that the child
who rejected it did give parasitic gap responses on the
question task on seven out of the eight target items.
The two parasitic gap constructions that violate
constraints, (4) and (5), were not accepted by any of
the adults and accepted by only three of the children.
The three children were not the same ones for the two
cases. In the case of (4), age may have been a factor,
although this cannot be determined with so few
subjects. Two of the three children who accepted this
sentence were among the youngest of our subjects, aged
3;8 and 4;2. However, the third child was aged 5;5,
and another young subject, aged 3;9, rejected the
sentence. The three children who accepted sentence (5)
were aged 3;8 (the same subject who accepted (4)), 4;9,
and 5;2. The construction with a parasitic gap in a
prepositional phrase, (3), was rejected by over half
the subjects (including the child who rejected (1)).

All of the adults rejected the simple relative clause
with a resumptive pronoun ((7)), but three of the
children, aged 4;2, 5;1, and 5;6, accepted it. These
three children also accepted the other three sentences
with resumptive pronouns, (6), (8), and (9). Sentence
(6) was given better status than (7) by our subjects;
one adult was unsure about this sentence and five
additional children (one of whom was unsure about (7))
accepted it. The adults responded the same way to
sentence (9), with a resumptive pronoun in both
clauses, as they did to sentence (6). The children
found sentence (9) somewhat better, with one additional
child accepting it and two more becoming unsure.
Sentence (8), with the resumptive pronoun in the
adverbial clause, was given the best status of the

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     7. (...continued)
was in the same direction as their first response (e.g., if the
first response was "not very good" and the second response was
"bad", we report the response as "bad"). There were only three
clear "I don't know" responses, given by two of the children.

resumptive pronoun sentences, with eight adults and 12
children accepting it.

DISCUSSION

The Basic Parasitic Gap Sentence ((1)): If our
subjects are representative of English-speakers, our
results show that this construction is widely accepted.
Even the child who rejected the sentence showed in the
question task that he will spontaneously interpret
sentences in this way.[8]

From the point of view of acquisition, the important
finding is that almost all of the children accepted
this parasitic gap construction. This is exactly what
is expected if children do not have to hear every
construction before they know about their grammatical
properties.

**Constraints on Parasitic Gap Constructions ((4) and
(5)):** Our study also shows that, as the theory
predicts, children know the constraints on parasitic
gap constructions. It is possible that the three
children who accepted (4) would not show knowledge of
Principle C in other constructions.[9] We cannot
determine this from our study, since it did not include
such sentences. This is an interesting question for
future research, since it would also shed light on the
issue of whether the constraint ruling out (4) is, in
fact, a subcase of Principle C.

The Questionable Parasitic Gap Construction ((3)): In
many discussions of parasitic gaps, (3) is considered
to have the same status as (1). Assuming that our
subjects are representative of English-speakers, our
results show that for many speakers, this is not the
case. Of the 13 adults who accepted sentence (1), only

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8.   We know one adult who, like this child, rejects all
sentences with parasitic gaps. When presented with items from our
question task, however, she interpreted the questions as
containing parasitic gaps.

9.   The Continuity Hypothesis predicts that children should
show knowledge of Principle C as soon as they have labeled R-
expressions in their lexicon, which presumably occurs very early.
The findings in the literature are not uniform, but in several
recent studies (Crain and McKee, 1985, 1987; Crain and Thornton,
1990; McDaniel, Cairns, and Hsu, 1990) children as young as age 3
have been shown to respect Principle C.

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five accepted (3) (six finding it ungrammatical, and
two unsure); of the 12 children who accepted (1), only
four accepted (3) (seven finding it ungrammatical, and
one unsure). Our study rules out two accounts that
would attribute the rejection of this sentence under
other circumstances to artifacts. One is that it is
(for some reason) difficult to find an appropriate
context in which such a sentence would be used. Since
we supplied the context (Grover giving a picture of a
girl to that same girl), this could not explain our
results. Second, it might be claimed that people are
influenced by rules of prescriptive grammar.
Preposition stranding is very obvious in this sentence,
since there are two of them. However, this would not
explain the responses of our child subjects, who
presumably have not yet been exposed to this rule. It
should also be noted that none of our adult subjects
had any difficulty accepting (15), which contained a
stranded preposition. The ungrammaticality of (3) for
some speakers is, then, a real phenomenon, in need of
an explanation. The existence of two dialects,
apparently from a very early age, also must be
accounted for.

Resumptive Pronouns ((7), (6), (8), (9)): Our results
seem to show that, while children's judgments regarding
resumptive pronouns are generally in the same direction
as those of adults, children are more likely than
adults to accept resumptive pronouns. However, we feel
that one should be cautious in drawing this conclusion,
due to the small number of subjects and the seemingly
wide variation in judgments regarding resumptive
pronouns. For example, none of the adult subjects gave
the same judgments as those of the first author (that
all four sentences are grammatical), and only one adult
subject responded like the second author (that (7) and
(6) are ungrammatical, (8) is grammatical, and (9) is
highly marginal).

Recall that sentence (6) is of particular interest for
the parasitic gap phenomenon, since a parasitic gap is
licensed by a resumptive pronoun. The two children who
accepted resumptive pronouns in the simple construction
((7)) also accepted (6), indicating that a resumptive
pronoun can license a parasitic gap.

**A Note on the Temporal Island and Coordinate Structure
Constraints ((17) and (vi)):** The fact that all of the
children rejected these two sentences comports with the

Continuity Hypothesis.[10] Since these are constraints on movement (possibly subcases of Subjacency), our results also indicate that relative clauses in the grammars of children of this age involve movement, as in the adult grammar.

It is also of interest that none of our subjects accepted the Temporal Island violation. In recent work in linguistic theory, sentences of this type are often given better status than they were given in the past. In Chomsky (1986), for example, such sentences are considered to be grammatical (weakly ruled out by Subjacency on p. 32, and not ruled out by anything on p. 66, after a modification was made in the theory). Our results on this sentence indicate that it may be preferable to use groups of non-linguists as informants.

CONCLUSION

This study provides more support for the concept of Universal Grammar and the Continuity Hypothesis. As this framework predicts, children have knowledge about parasitic gap constructions, although they may never have heard them. Children also were shown to form relative clauses by movement and to have judgments on resumptive pronouns similar to those of adults (although they may be freer for children, in general). The study also makes the methodological point that a good way of collecting data is to ask groups of children and adults for grammaticality judgments.

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10. Goodluck, Foley, and Sedivy (1989), using a type of question task, also found that young children obey the Temporal Island Constraint.

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APPENDIX A

Children with Arbitrary Reference for PRO
We excluded three children, aged 5;1, 5;3, and 5;4, who
indicated on the pretest that they allowed the
reference of PRO to be arbitrary. One of these
children said that any of the characters could perform
the action of the adverbial clause in the two sentences
we gave. The other two children seemed unfamiliar with
the construction and had difficulty interpreting it.
In attempting to act out the sentences, one of them
looked bewildered and asked us who should be performing
the action of the adverbial clause. The other child
acted out the adverbial clause with all three available
characters performing the action in sequence, and did
not act out the matrix clause action. Although we did
not want to include these three children as subjects in
the study, we were interested in their responses and
therefore conducted the study with them, considering it
as pilot work. As a group, their responses differed
from those of the other children and the adults.

McDaniel *et al*. (forthcoming) suggest that this grammar
type is the most immature, and analyze it as having the
adverbial clause conjoined with, rather than
subordinated to, the matrix. If this analysis is
correct, such children should find sentences like (1)
grammatical, since in their grammars, it would be a
case of across-the-board extraction, parallel to (19)
(cf. Williams, 1978).

(19)   That is the giraffe that Cookie Monster patted
        and (Grover) kissed.

In fact, for these children, the sentences on the
question task should unambiguously have this across-
the-board extraction interpretation (so that they would
give only the "parasitic gap" response type). The
interpretation with the lower verb intransitive should
be impossible for them, since it would consist of
extraction out of a conjunct (in violation of the
Coordinate Structure Constraint). This prediction was
borne out. In the question task, almost all of their
responses (92%) corresponded to the across-the-board
extraction interpretation, and in the judgment part,
two of the children accepted (1)and one was unsure.

These children would also be predicted to reject
sentences (4) and (5). Sentence (4) would be a

coordinate structure in which extraction was not
parallel, as in (20).

(20) *This is the bear that t hit Grover and Bert
        kissed t.

Sentence (5) should be analyzed by these children as
missing an object, parallel to (16). These children
should also reject the Temporal Island violation, (17),
which for them would be a case of extraction from a
conjunct, parallel to (vi). One of the three children
basically responded as predicted; he rejected (4) and
(vi), and was unsure about (5). The other two
children, however, accepted all three of these
sentences. In fact, they accepted every sentence
presented to them that contained an adverbial clause.
It cannot be said that they were unable to give
judgments, since they rejected other sentences,
including (vi) and (16). One of them also rejected the
simple resumptive pronoun sentence, (7). These two
children were the ones who, on the pretest, seemed
unfamiliar with the adverbial clause construction. We
suggest that it was due to this unfamiliarity that they
judged every sentence containing this construction as
good.

Due to the small number of children, not much can be
concluded from these results. With more subjects, the
parasitic gap constructions could shed light on
analyses of children's grammar types with respect to
control (see note 3).

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APPENDIX B

Sentences Used in Pretest and Question Task

```
Pre-test
  The camel is jumping.
  [Camel jumps; bear jumps]
  The camel hit the lion before jumping over the fence.
  [Camel, lion, or bear jumps]
  Grover pats Cookie Monster before climbing up the
  steps.
  [Grover, Cookie Monster, or Bert climbs steps]
  Grover kisses the camel that is eating the
  strawberry.
-----------------------------------------------------
Question Task: "In this story, X is going to be doing
                some Y-ing."
  [Grover kisses baby lion & baby bear]
  Who did Grover kiss?
  [Camel smells hot dog, french fries then eats hot
  dog]
  What did the camel smell before eating?
  [Bears riding in boat]
  Did the bears do three somersaults in the water?
  [Dinosaur touches house, table and steps then paints
  house]
  What did the dinosaur touch before painting?
  [Gumby, Grover and Goofy ride upside down on Pokey]
  Who rode upside down on Pokey?
  [Big Bird hits carrot & pepper, then puts carrot in
  pot]
  What did Big Bird hit before cooking?
  [Grover hides baby in pool]
  Where did Grover hide the baby.
  [Giraffe jumps on mat & ladder then cleans mat]
  What did the giraffe jump on before cleaning.
  [Pokey licks Ms. Piggy, baby and Pluto]
  Who did Pokey lick?
  [Gumby kicks banana & pear, then eats banana]
  What did Gumby kick before eating?
  [Lucy dances for lion family]
  Did Lucy dance on top of a baby lion?
  [Witch runs into gate, table & pool, then paints
  gate]
  What did the Witch run into before painting?
  [Minnie Mouse tickles baby & big dog]
  Who did Minnie Mouse tickle?
  [Bert pushes boat and house, then climbs ladder]
  What did Bert push before climbing up the ladder?
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[Goofy throws tomato & corn, then cooks tomato]
What did Goofy throw before cooking?
[Girl rides bike backwards]
How did the girl ride the bike?
[Big Bird turns around stove and table, then cleans
stove]
What did Big Bird turn around before cleaning?

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