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Children's Interpretation of Quantification: Their *wh*-Constructions*

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Abstract

The present article reports the results of the pilot experiments conducted to explore the nature of *wh*-constructions in child language. The results reported here are summarised as follows:

1. Pair-list answers to multiple *wh*-questions form a dominant pattern, and in this respect majority of the children observed in the present research exhibited the adult pattern.
2. Children's tendency to answer a *wh*-question using a list, more often than adults would, which was pointed out by RdV's experimental study, also prevailed in the present study.
3. The result of the interview presented in 4. 1 is suggestive of the quality of *wh*-phrases in child language having the universal quantificational force.
4. In all of the interviews testing multiple *wh*-questions, children's response answering only the object *wh* was observed.

Some discussion will be presented to show that these results are consistent with the hypothesis that *wh*-phrases in child grammar are interpreted as the universal quantifier.

*Research represented here owes to the assistance of Kyoko Yamakoshi and Satomi Narikiyo, both of whom actually conducted the experiments presented in this article.
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1. The Hypothesis

In Nishigauchi (1999a) and elsewhere, we pointed out the following ingredients that must be part of the linguistic knowledge relevant to multiple *wh* constructions and *wh* constructions involving quantifiers. We repeat the statement here.

(1)
1. The first *wh* (wh_1) serves as the generator, which has the quantificational force of the universal quantifier.
2. The second *wh* (wh_2) serves as a functional expression, with an empty category within it.
3. The empty category within wh_2 must be bound by the generator (wh_1, a strong quantifier, or its trace). If the c-command requirement fails, the violation is taken to be a case of Weak Crossover (WCO). Much of the Superiority effects, for which there have been attempts to subsume the relevant violations under a variety of syntactic principles such as ECP, follows from WCO in this approach.
4. The binding of the empty category within the functional expression is highly local. This takes place, most preferably within a single clause (the 'clausemate' condition).

We have little to say about (1–4) in the present discussion. The point (1–3) is relevant to Roeper and de Villiers' (1991) (henceforth RdV's) observation, which we sketched in the previous report, that there was no contrast between (2a–b) in child grammar.

(2) a. **Who did everyone pull?**

b. **Who pulled everyone?**

This point, in and of itself, is actually a complex consisting of a number of theoretical ingredients. The following is a list, by no means intended to be exhaustive, of such ingredients.

1. Sensitivity to c-command.
2. Sensitivity to WCO, which is itself a complex of a number of factors.

3. The roles that *wh* and quantifiers play with respect to the generator–functional structure in LF.

Each of these is a research topic which requires careful scrutiny, and it is beyond the scope of this paper to consider all of them, even in a cursory way.

In the present discussion, we focus on the point 3 of this list, which is (1–1) and (1–2). The hypothesis that we would like to suggest here is that the child grammar is insensitive to the heterogeneous character of *wh*-phrases. More specifically, we suggest the following hypothesis:

- All *wh*-phrases are universal quantifiers in child grammar.

where, by child grammar we mean the stage of linguistic development described by RdV's work. While we do not intend to provide any comprehensive theory of the phenomena under consideration, we are going to show that this supposition is at least not incompatible with the following facts observed by RdV.

1. Overgeneralization of the list interpretation.
2. The absence of the quantifier-*wh* asymmetry.

In what follows, we will present and discuss three pilot experiments that we performed in 2000.[1]

2. Pilot Experiment I

2.1 Design Description

Subjects: 6 children of three to four years old.

Method: Interviews, where children were individually shown a series of pictures and asked a question about those pictures.

[1] Pilot Experiments I and II were conducted by Kyoko Yamakoshi. Pilot Experiment III was conducted by Satomi Narikiyo.

INTERVIEW I

(3) Pictures: A picture of Mickey eating a banana, a picture of Pooh eating a banana, Donald eating a banana. Each picture was shown individually, in the same order.

Question: 誰が何を食べているのかな？

The following is a list of answers obtained in this session:

(4) Group A:	Satoshi:	ミッキーがバナナで、プーさんもバナナでドナルドもバナナ。
	Shunsuke:	プーさんとバナナ、ミッキーとバナナ、ドナルドまってる「nclear)
Group B:	Shota:	バナナ。(だれが？) ミッキーさんとドナルドとプーさん。
	Shun:	バナナ。(だれが？) プーさんとドナルドとミッキー。

Children of Group A responded with pair-list answers, while those of Group B started out with answers which consist only of the value for the object. This tendency for the children to answer in such a way to provide only the value of the object *wh*-phrase, when asked a question with multiple *wh*-phrases will be seen to prevail throughout the present study.

INTERVIEW II

(5) Pictures: A picture of Mickey eating an apple, a picture of Pooh eating grapes, Mickey eating a banana. Each picture was shown individually, in the same order.

Question: 誰が何を食べているのかな？

Answers obtained in this session:

(6) Group A:	Shun:	ミッキーがバナナ、プーさんぶどう、またミッキーがりんご。
	Satoshi:	プーさんはぶどうで、ミッキーがりんご。（これは？）ミッキーはね、バナナ。
	Rikako:	ミッキーがりんごたべてる。ドナルドバナナたべてる。（下は？）ミッキーがバナナ食べてる。
	Shunsuke:	バナナ、りんごとバナナ、ミッキーミッキーミッキー。これはプーさんのぶどう。
Group B:	Shota:	ぶどうとりんご。（だれが？）プーさんとミッキーさん。（これは？）ミッキーさんバナナ。
	Kazumasa:	ぶどう。（だれが？）プーさんのぶどう。（あとは？）ミッキー。（ミッキー何食べてる？）バナナ食べてる。（これは？）ミッキーりんご食べてるのミッキー。

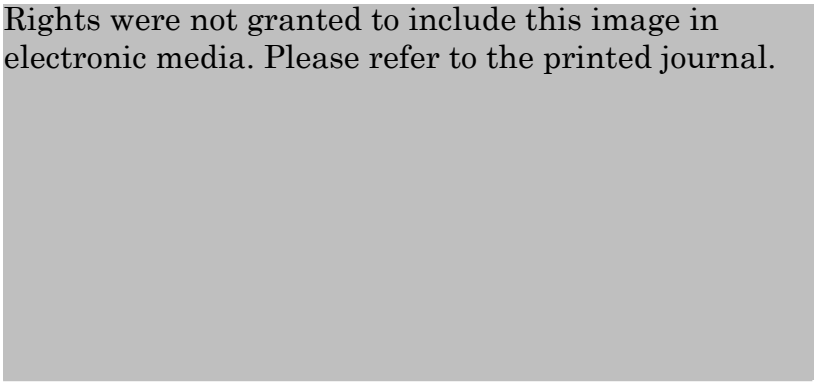
Here also, two of the six children answered the multiple *wh*-question providing value for the object *wh*-phrase (Group B).

Notice that none of the children answered with a conjunction for Mickey: 'Mickey is eating a banana, and an apple.' The four children of Group A stuck to the pair-list pattern.

INTERVIEW III

(7) Pictures: A picture of Mickey eating an apple, a picture of Pooh eating grapes, Donald eating a banana. Each picture was shown individually, in the same order.

Question: 誰が何を食べているのかな？



Answers obtained in this session:

(8) Group A: Rikako: プーさんがぶどうたべてる。バナナ食べてるドナルド。ミッキーりんご食べてる。

Satoshi: プーさんがバナナでね、ミッキーりんご、ドナルドバナナ。

Shun: ドナルドがバナナ食べてる、ミッキーがりんご、プーさんがぶどう。

Shunsuke: ドナルド、ミッキーとぶどうたべてます。これと、、りんごとバナナとぶどうとりんご。

Group B: Shota: ぶどうとりんごとバナナ。(だれが?) ドナルドとプーさんとミッキー。

Kazumasa: ドナルド。(何食べてるの?) バナナ。(他の人は?) りんご食べてる。プーさんぶどうたべてる。

While Shunsuke's reply is somewhat unclear, we interpreted his reply as a pair-list answer, for the first sentence mentions both the subjects and an object.

Kazumasa's reply is one of the few answers in which only the subject is mentioned. Shota's response exemplifies again the tendency of the children to supply only the value of the object *wh*.

2.2 Discussion

The interviews of the present pilot experiment reveal the two features of children's prevalent types of answers to multiple *wh*-questions.

1. Pair-list answers are dominant throughout.
2. Children tend to answer supplying only the value of the object *wh*-phrase, when both the subject and object *wh*-phrases are expected to be answered.

The first of these echoes the result of RdV's study, where it was shown that young children acquiring English tend to use list answers in a wide range of situations.

The second of the features is more interesting, and to my knowledge has never been noticed in the past study of the relevant phenomena.

But why do children tend to answer the object, rather than the subject *wh*-phrase in answering a multiple *wh*-question? We'll discuss this question in the final section.

3. Pilot Experiment II

3.1 Design Description

Subjects: 6 children of four to five years old.

Method: Interviews, where children were individually shown a series of pictures and asked a question about those pictures.

INTERVIEW I

(9) Pictures: A picture of Mickey eating an apple, a picture of Pooh eating a banana. Each picture was shown individually, in the same order.
Question: 誰が果物を食べているのかな？

Answers obtained in this session:

(10) Group A: はるか、かな、りく: ミッキーとプーさん。
けんいち: くまさん（プーさんのこと）とミッキーがたべてる。
Group B: はな: プーさんがバナナたべてミッキーがりんごたべてる。

While most of the children gave straightforward answers referring to the subject, one child, Hana, gave a list answer—this confirms RdV's findings that children tend to give list answers even when adult's speech does not require it.

INTERVIEW II

(11) Pictures: A picture of Mickey eating an apple, a picture of Pooh eating a banana. Each picture was shown individually, in the same order.
Question: 誰がどの果物を食べているの？

Answers obtained in this session:

(12) Group A: はな: プーさんとミッキーが、プーさんのぶどうたべて、ミッキーがりんごたべてる。
けんいち: くまさん（プーさんのこと）ぶどうたべてミッキーはりんごたべてる。
Group B: はるか、かな、りく: りんごとぶどう。

Three of the six children gave the object-only answer to the multiple *wh*-question.

INTERVIEW III

(13) Pictures: A picture of Mother eating grapes, a picture of Big Brother eating a banana. Each picture was shown individually, in the same order.
Question: この家族は何を食べているのかな？

Answers obtained in this session:

(14) Group A: はるか、かな、りく: ぶどうとバナナ。
はな: バナナとぶどうたべてるの。
Group B: けんいち: こどもはバナナとお母さんはぶどう。

One of the children gave a list answer while an answer supplying the value for the object is normally expected in adult speech.

INTERVIEW IV

(15) Pictures: A picture of Pooh playing with a wood blocks, a picture of Mickey playing with a doll. Each picture was shown individually, in the same order.
Question: だれがおもちゃで遊んでいるの？

Answers obtained in this session:

(16) Group A: かな、りく: プーさんとミッキー。
けんいち: ミッキーとくまさん（プーさんのこと）があそんでる。
Group B: はな: プーさんがつみきであそんでてミッキーがぬいぐるみであそんでる。

INTERVIEW V

(17) Pictures: A picture of Donald playing with a toy car, a picture of Mickey playing with wood blocks. Each picture was shown individually, in the same order.
Question: だれがどのおもちゃで遊んでいるの？

Answers obtained in this session:

(18) Group A: はるか、りく: つみきとお人形と絵の具。
けんいち: くまさん（プーさんのこと）とドナルドとミッキーがあそんでる。
Group B: かな、はな: ドナルドが積み木であそんでて、プーさんがお人形であそんでて、ミッキーが絵の具であそんでる。

Two of the six children gave object-only answers to the multiple *wh*-question.

3.2 Discussion

Children in this pilot experiment were about one year older than those in the previous experiment.

It was shown that the two features of the types of answers to multiple *wh*-questions observed in Pilot Experiment I were also prevalent in the children of this higher age group.

4. Pilot Experiment III

4.1 Design Description

Subjects: 6 children of three years old.[2]

Method: Interviews, where children were individually shown a series of pictures and asked a question about those pictures.

[2]The subjects of this experiment, conducted by Satomi Narikiyo, are her sister's son and his friends who happened to be with him on this particular day. The interview, therefore, was performed in a relaxed atmosphere, so that the children considered the interview as part of their game.

INTERVIEW I

(19) Pictures: A single picture of Donald, Mickey and Pooh, each carrying a bucket.
Question: 誰がバケツを持っているの?

(20) Pictures: A single picture of Donald carrying a bucket, Mickey and Pooh holding a doll.
Question: 誰がバケツを持っているの?

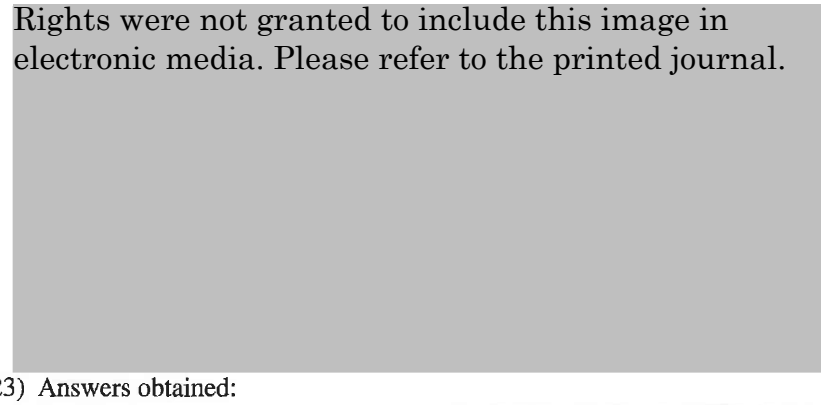
(21) Answers obtained:

Name	Age	(19)	(20)
てつろう	3.6	ミッキー　ドナルド　プーさん	ドナルド (ミッキーとプーさんを指して) なんかもってない
ひかる	3.6	プーさん　ドナルド　ミッキー	ドナルド
かずはる	3.4	プーさんとドナルドとミッキー	ミッキーとプーさんとドナルド 〈みんな持ってるの?〉 ドナルドだけバケツもってる
みか	3.2	(ミッキーとドナルドを指した)	(ミッキーとドナルドを指した)
たくみ	3.7	プーさんとドナルドとバケツもってる	ドナルド
ちせ	3.8	プーさんとドナルドさん	ドナルド

The point of this interview was to see if there is a way to tease out the quantificational nature of *wh*-phrases in child grammar. We take Tetsuro's answer and Kazuharu's answer as interesting and important. We'll discuss why in the discussion section.

INTERVIEW II

(22) Pictures: A single picture of a panda eating bamboo leaves, a rabbit eating a carrot, and a bear eating an apple.
Question: 誰が何を食べているのかな?



(23) Answers obtained:

Name	Age	(22) 誰が何を食べているのかな?
てつろう	3.6	(りんごを指して) これたべてる 〈ほかは?〉 にんじんたべてる 〈ほかは?〉 はっぱたべてる
ひかる	3.6	パンダ りんご うさぎさん パンダさんとくまさんとうさぎさん
かずはる	3.4	くまさんがりんごたべて うさぎさんがにんじんたべて 白と黒のパンダさんがささたべてる
みか	3.2	にんじん (パンダを指して) たべてる
たくみ	3.7	(りんごを指して) これ (うさぎを指して) これ
ちせ	3.8	これがささのはっぱで これがりんごで これがにんじん

Again, the tendency for the children to mention the object in a reply to multiple *wh*-questions is observed here. Tetsuro's answer exemplifies the tendency in question.

Mika's reply, which mentions only an apple, is also of this type. Chise's answer is somewhat unclear in the meaning — it may be a straightforward pair-list answer, or an answer mentioning the objects as a list.

4.2 Discussion

The point of Interview I was to see if there is a way to tease out the quantificational nature of *wh*-phrases in child grammar. Our expectation was, if there is a stage in child language in which *wh*-phrases have the nature of the universal quantifier, there may be some children who respond to (20), which is not truthful in light of their semantics of *wh*-constructions, for not everybody in the picture is holding a bucket, by pointing out the characters not fulfilling the truth condition.

Tetsuro's response to (20), pointing out the characters who do not hold a bucket, can be taken as exemplifying the type of response that we had expected. Also, Kazuharu's response, first mentioning all the three characters, and then after being prompted by the experimenter, replying "Only Donald holds (a bucket)", can be taken as another response suggesting the same point.

Notice that in adult grammar, it is the situation described in (20) that is more fitted to the question "Who holds a bucket," than (19), for in (20), there is one character fulfilling the truth condition, while in (19), everybody fulfills the truth condition, so the situation in (20) is appropriate given that the quantificational nature of *wh* is existential, as in adult grammar.

The result of the present interview shows, however, that children had no difficulty in answering the question in the situation (20), which is a little odd in adult grammar. Rather, children showed varying answers in (19), which fulfills the existential interpretation. We take this as a fact in favor of our hypothesis that *wh*-phrases in child grammar are universal quantifiers.

5. Why Object?

In the series of small pilot experiments conducted in the present study, the following features of child language in connection with *wh*-questions have suggested themselves:

1. Pair-list answers to multiple *wh*-questions form a dominant pattern, and in this respect majority of the children observed in the present research exhibited the adult pattern.

2. Children's tendency to answer a *wh*-question using a list, more often than adults would, which was pointed out by RdV's experimental study, also prevailed in the present study.

3. The result of the interview presented in 4. 1 is suggestive of the quality of *wh*-phrases in child language having the universal quantificational force.

4. In all of the interviews testing multiple *wh*-questions, children's response answering only the object *wh* was observed.

The last of these features is quite interesting and requires some careful thought.

Although I do not attempt to give a full answer to the puzzle posed by this response pattern in the present article, I suggest two points which may be relevant to it.

One point worth mentioning is that the first *wh*-phrase in multiple *wh*-questions in adult language is d-linked, so that the range of its value is dependent on the discourse context, and tends to be familiar to the speaker/hearer. Thus it might be inferred that children showing the response pattern in question may be overgeneralizing this point and may be using the strategy of omitting linguistic expressions denoting familiar objects.

The second possibility, which is by no means incompatible with the first point, is that children in question may be using an E-type pronoun in the subject position, which in Japanese is realized as a null pronoun. That is to say, these children may be interpreting the first *wh*-phrase in the multiple *wh*-question as a universal quantifier, and they may be referring to the set induced by this universal quantifier by means of the E-type pronoun. Thus, being asked 'Who is eating what?' their answer may be interpreted as '(They [referring to the characters referred to by *who*] are eating) a carrot, bamboo leaves, and an apple.' If this conjecture is not on a terribly wrong track, the type of response under consideration can be taken to be a piece of evidence for the hypothesis of the present work, that there is a stage in language development where *wh*-phrases have the quantificational force of the universal quantifier.

Needless to say, much work is needed even to upgrade the conjecture presented here to a theoretical hypothesis.

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