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Multiple Interrogatives in Child Language

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1. Introduction

The goal of this paper is to explore how children acquire the syntactic and semantic properties of multiple interrogatives. Consider the examples of multiple interrogatives from English in (1) and from Russian in (2).

(1) Who bought what?

(2) Kto čto   kupil?   [Russian]
    who what bought
    'Who bought what?'

Already we can see the syntactic differences between these two languages: in English, only one wh-phrase is fronted, while in Russian, as in all Slavic languages, all wh-phrases are fronted. Moreover, there are some semantic differences in multiple interrogatives across languages, which will be demonstrated in section 2. These language-specific properties must be acquired by the child from the available input. After examining the availability and the nature of the relevant cues in the input, I conclude that there is very little evidence in the input with respect to the syntax and semantics of multiple interrogatives. Therefore, this is an interesting area for the study of language acquisition, since we will be able to see what hypotheses the learners make in the absence of reliable evidence in the input.

In sections 3 and 4, I present my methodology for elicitation of multiple interrogatives and the results of the experiment where multiple interrogatives were elicited from English- and Russian-speaking children and adults. The contexts in which the subjects produced multiple interrogatives allowed me see what interpretation they assigned to those constructions and their utterances themselves allowed me to examine the syntactic structure they assigned to these

expressions. While no deviations in children's semantic knowledge of multiple interrogatives were found in either English or Russian, the syntactic behavior of Russian-speaking children was somewhat different from that of Russian-speaking adults. Unlike adults, Russian-speaking children (with the mean age 4;7) allowed for some wh-phrases to remain in situ in multiple interrogatives. To investigate this finding, I ran a follow-up study on Russian, described in section 5. In this experiment, the original finding was confirmed in a large variety of syntactic contexts.

In section 6, I make two proposals for the syntax that Russian children assign to multiple interrogatives. One is based on the syntax of contrastive focus and the other on the independent asymmetry between bare and complex wh-phrases in Slavic. I further discuss the implications of each of these analyses for the learning algorithm for multiple wh-questions in Russian.

2. Learnability issues in multiple interrogatives

There have been some studies done on the acquisition of interrogatives with a single wh-phrase, like the one in (3a). The parameter of crosslinguistic variation in these constructions has to do with the presence or absence of overt wh-movement to the left periphery of the clause. In English (3a), *what* must move from the position of the object of the verb *buy* to the clause initial position, known as Spec CP, leaving behind a trace *t*.[1] In other languages, like Japanese, such overt movement does not take place, as shown in (4).

(3) a. What did John buy *t*?

   b. *Did John buy what?

   c. *John bought what?   (as a non-echo question)

(4) John-wa nani-o   kaimasita ka?   [Japanese]
   John$_{NOM}$ what$_{ACC}$ bought   Q
   'What did John buy?'

The studies of Clahsen, Kurasawe and Penke (1995), Santelmann (1998) and Guasti (2000), among others, show that the parameter with respect to wh-movement in single wh-questions is set by the time the child begins producing wh-questions (by 1;6).

However, multiple wh-questions present additional layers of parameterization which present additional learnability issues. Languages employ one of the three syntactic strategies when it comes to multiple questions. In some languages, only one wh-phrase is fronted (e.g., English). In others, all wh-

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1. Whether wh-movement actually leaves a trace or a copy behind is not crucial for anything discussed in this paper.

phrases are fronted (e.g., Russian); and there are also languages in which none of the wh-phrases are fronted in multiple interrogatives (e.g., Japanese). This is demonstrated for all three varieties of languages in the examples (5)-(7).

(5) a. What did Smurf put *t* where?

    b. *What where did Smurf put?

(6) a. Čto kuda Ivan položil *t t*?   [Russian]
      what where Ivan put
      'What did Ivan put where?

    b. *Čto Ivan položil *t* kuda?

(7) Smurf-wa dokoni nani-o oitano?   [Japanese]
    Smurf   where what put-Q
    'What did Smurf put where?

    This presents learnability questions of how and when these language-specific properties are acquired by children. What kind of input and how much of that input is needed in order for this knowledge to be acquired?
    So far, we have examined syntactic variation in multiple interrogatives. Languages also vary in the semantics of these constructions. Multiple interrogatives can potentially have a *pair-list (PL)* or a *single-pair (SP)* reading. A question in (9) has the PL reading and is felicitous in a scenario in (8). An expected response to such a question involves listing propositions with ordered pairs as in (10).

(8) *PL Scenario:* John is at a formal dinner where there are diplomats and
                    journalists. Each journalist was invited by a different diplomat.
                    John wants to find out all the details, so he asks the host:

(9) Who invited who to the dinner?

(10) Mr. Smith invited Mr. Jones, Ms. Black invited Mr. Green, etc.

    A scenario corresponding to the SP reading is given in (11). English lacks SP readings in questions with bare wh-phrases as in (9), a fact first pointed out by Wachowicz (1974). English speakers either use a conjoined question in such situations (e.g., *Who invited somebody to the dinner and who did they invite?*) or they use a d-linked (discourse-linked) question, as in Pesetsky (1987), where the SP reading is available in English, (12). A felicitous response to a single-pair question is given in (13).

(11) *SP Scenario:* John knows that a very important diplomat invited a very important journalist to a private dinner. John wants to find out all the details, so he asks the caterer:

(12) Which diplomat invited which journalist to the dinner?

(13) Ms. Black invited Mr. Smith.

The distribution of PL/SP readings is subject to crosslinguistic variation, as reported by Hagstrom (1998), Bošković (2001) and Grebenyova (2004). Like in English (14a), the SP reading is unavailable in Bulgarian and Russian, as shown in (14b) and (14c). However, the SP reading is freely available in Serbo-Croatian and Japanese, as can be seen in (15a) and (15b) respectively. That is, unlike the questions in (14a-b), the questions in (15a-b) are felicitous in both PL and SP scenarios.

(14) a. PL/*SP
   Who invited who to the dinner?

   b. *PL/*SP*
   Koj kogo e   pokanil na večerjata?   [Bulgarian]
   who whom Aux invited to dinner
   'Who invited who to the dinner?'

   c. *PL/*SP*
   Kto kogo   priglasil na užin?   [Russian]
   who whom   invited   to dinner
   'Who invited who to the dinner?'

(15) a. *PL/SP*
   Ko   je   koga   pozvao   na   večeru?   [Serbo-Croatian]
   who aux whom   invited to   dinner
   'Who invited who to the dinner?

   b. *PL/SP*
   Dare-ga dare-o   syokuzi-ni manekimasita-ka?   [Japanese]
   who$_{NOM}$ who$_{ACC}$ dinner$_{DAT}$ invited-Q
   'Who invited who to the dinner?

This semantic variation raises its own questions of how and when these semantic properties are acquired by children. There are some studies on the acquisition of pair-list readings in questions containing a wh-phrase and a universal quantifier (Roeper and de Villiers 1991, Yamakoshi 2002). Such questions can be ambiguous between the PL reading and the *group* reading, as demonstrated in (16). These constructions are, however, different from multiple

wh-questions in that they contain only one wh-phrase and disallow single-pair readings due to an interfering factor, namely the presence of a universal quantifier.

(16) a. What did everyone take *t*? Group/PL
     b. Who *t* took every vegetable? Group/*PL

Thus, there are learnability issues with respect to the semantics of multiple interrogatives, independently of the issues involved in questions with a universal quantifier. It is the goal of this paper to investigate these issues.

   Before we turn to the experiments testing what children actually know, let us see how much evidence they get in the input. To find out how frequent multiple questions are in the adult speech, I conducted a search of the CHILDES database for single and multiple wh-questions in the parental speech. I searched the corpus for Varvara, a Russian-speaking child. There are seven sessions recorded between Varvara's ages 1;7 and 2;11. I found 138 single questions containing the wh-phrase *who* (*kto*), 412 questions containing *what* (*čto*) and 147 questions containing *how* (*kak*), with the total of 697. What about multiple interrogatives with any combination of those three wh-phrases? There is only one such multiple interrogative in the corpus for Varvara, given in (17).[2]

(17) Kto   tebe   čto   podaril *t*?
     who$_{NOM}$ you$_{DAT}$ what$_{ACC}$ gave
     'Who gave you what?

As we can see, the input provides much less evidence for the acquisition of multiple wh-questions, as compared to single wh-questions. This might then allow us to examine how the actual learning takes place. What hypotheses do children form about their target language? Are those hypotheses always consistent with the target grammar and, if not, what makes them form new hypotheses?

   Hence, we arrive at the following learnability questions, which we will address in the following sections.

(18) a. Do children know syntactic properties of multiple interrogatives in their
        language?

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2. In addition to wh-movement, the indirect object *tebe* in (17) has undergone movement, as an instance of scrambling, which is a common process in Russian. This raises a question of where the wh-phrase *čto* is located in the structure. Given that Russian is an SVO language, it is clear at least that *čto* has undergone some movement. Whether it is focus movement, as in Stepanov (1998), or an instance of scrambling or topicalization, is not crucial for our purposes. The relevant point is that *čto* is not in situ, as compared to its English counterpart in the translation of (17), and that is something a child has to learn.

b. Do children know semantic properties of multiple interrogatives in their language?

c. How do they come to know those, given the nature of the input?

3. Elicitation of Multiple Interrogatives

As we have concluded in the previous section, multiple questions are not very frequent in spontaneous speech. Therefore analyzing spontaneous speech of children would not be productive for our purposes. Likewise, Truth Value Judgment Task would not be useful here because truth values are properties of propositions and not interrogatives (which are the sets of propositions). That is why I arrived at the Elicited Production Task as a way to unveil children's competence with respect to multiple interrogatives.

The experimental schema is as follows. Kermit, the puppet, is learning how to be a magician and guess about what happened in a story without watching the story. The stories are acted out with toys. Kermit is blind-folded and hides under the table during the relevant parts of the stories. After each story, the experimenter gives a lead-in prompting the subject to ask Kermit a question about the story. There are stories with pair-list and single-pair contexts.

The stories were designed in such a way as to prompt a subject to produce questions that are felicitous in a given context and are of the syntactic form that is relevant to our study. I will demonstrate this on the example of a pair-list context for the elicitation of *Who hid what?*. In this context, we have three characters each hiding a different object, as in Figure 1.

Figure 1. Pair-list Context (*Who hid what?*)

However, besides the actual question we want to elicit (*Who hid what?*), there are other felicitous utterances for this context. One of the possibilities is that of d-linking: *Which x hid which y? / Who hid which x? / Which x hid what?*. In order to reduce the possibility of d-linking, it was important to choose the

characters and the objects that do not fall into some obvious category (e.g., all animals, all fruits, etc.).

Another felicitous utterance is with a single wh-phrase and a universal quantifier: *What did everyone hide?*. To avoid that, an extra character was added to the story, who does not hide anything. Moreover, it was pointed out in the lead-in that not everyone hid something.

To reduce the possibility of another interfering utterance, namely, the one using the pronoun *they*, as in *What did they hide?*, I made sure that the names of the characters are not mentioned in the lead-in, so that subjects could not easily refer to those with a 3rd person pronoun.

Another felicitous way to respond in such a context is by producing a single question, such as *What did Snow White hide?* or *Who hid the bike?*. To avoid that, the preceding story was targeting a single wh-question and the puppet gave a correct response to that question, so the experimenter and the child decide to ask a more difficult question this time. In addition, the lead-in was also prompting a multiple and not a single wh-question.

Now consider how the all of this worked together. The four characters and the objects to be hidden are introduced. The puppet is blindfolded and hides under the table. Three characters each hide a different object behind them. The fourth character considers hiding something but decides not to hide anything after all. The puppet comes back. The experimenter presents the lead-in, addressed to the puppet as a clue, as in (19).

(19) Kermit, we can tell you that the dog didn't hide anything. But the rest of them hid something and each hid a different thing. Now JOHNNY will ask you about it.

Note that the last sentence of the lead-in prompts the child to ask a question indirectly by informing the puppet that the child will ask him a question now. It was more effective than asking or instructing the child directly, which was attempted in the pilot study.

The pair-list contexts were interchanged with the single-pair contexts, where only one character hides one particular object. The lead-in in such contexts was of the form in (20). There were also two warm-up stories eliciting single wh-questions (one subject wh-question and one object wh-question). The fillers were also on single subject and object wh-questions.

(20) Kermit, we can tell you that someone hid something here. Now JOHNNY will ask you about it.

4. Results of Experiment 1.

The participants of the English part of the experiment were 20 English-speaking children (ages 3;7–6;2, mean 4;9) and 20 adult controls. The

participants of the Russian part of the experiment were 20 Russian-speaking children (ages 3;5–6;5 mean 4;7) and 20 adult controls.

There were 2 test stories per subject, 2 warm-up stories and a filler after each test story. The target test questions were: *Who hid what?* and *Who won what?*.

The first significant result was that we actually got quite a number of multiple interrogatives from children and adults, which suggests that the new methodology is on the right track. The distribution of multiple wh-questions between pair-list (PL) and single-pair (SP) contexts in children and adults is given in Tables 1 and 2 respectively. Neither adults nor children produced multiple interrogatives in single-pair contexts.[3]

Table 1. Production of multiple interrogatives (Children)

	PL	SP
ENG	32%	0
RUS	45%	0

Table 2. Production of multiple interrogatives (Adults)

	PL	SP
ENG	38%	0
RUS	50%	0

How have children acquired the semantic knowledge about the lack of the SP reading in English and Russian multiple questions? I propose that the PL reading is actually a default reading provided by Universal Grammar (UG). It is plausible for an independent reason that all languages seem to allow PL readings in multiple interrogatives. It is the SP reading which is available only in some languages (in addition to the PL reading). To put the proposal on a more formal ground, I adopt the syntax-semantic analysis of the PL/SP reading distinction in Japanese of Hagstrom (1998). On this analysis, the originating position of the Q-morpheme (the interrogative morpheme) distinguishes the two readings: merging the Q-morpheme with the lowest wh-phrase results in the PL reading, while merging it with IP results in the SP reading. This is due to the scope of the Q-morpheme with respect to the wh-phrases: only when it merges with IP, it takes the scope over both wh-phrases. For details of the compositional semantics of PL/SP readings, see Hagstrom (1998). In Grebenyova (2004, 2006), I extend

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3 . Children were uniformly producing single wh-questions in single-pair contexts (e.g., *What did Snow White hide?*). Adults produced some of those as well but they also produced some conjoined questions (e.g., *Who hid something and what did they hide?*).

Hagstrom's account of Japanese to other languages and argue that the Q-morpheme can have different selectional requirements across languages. That is. If a language has a Q-morpheme that only selects a wh-phrase (or a DP more generally) as its complement, the language will have no way of getting SP readings in multiple interrogatives. On this line of reasoning, the selectional specification [+wh/+D] is the default specification for a Q-morpheme.[4]

The results of this experiment show then that children undergo conservative learning of the selectional properties of the Q-morpheme: they never see the evidence for the SP reading in English or Russian bare multiple wh-questions, hence never hypothesize one.

As for the syntax of the multiple interrogatives produced by English-speaking children, it was adult like in all cases: the first wh-phrase is fronted, while the second one is in situ. Thus, we can conclude that by the age of 4;9, children's knowledge of the syntax of multiple questions in English is adult-like.[5]

Russian-speaking children, however, exhibited certain deviations from syntax of multiple interrogatives in adult Russian. Specifically, 15% of the time, children produced questions with only one wh-phrase fronted, the other wh-phrase remaining in situ, as in (21). This never occurred in adults' utterances and is unacceptable in Russian, as was discussed in section 2.

(21) *Kto sprjatal čto?
        who hid   what
        'Who hid what?'

This raises the following learnability questions. What syntax do Russian-speaking children assign to the wh-in-situ? Why is it different from the adult syntax? To find the answers, I conducted a follow-up experiment on Russian, which is described in the next section.

5. Experiment 2: Russian-speaking children and wh-in-situ

In this experiment, I added contexts with non-wh-subjects to determine where exactly the higher and the lower wh-phrases are located. I also added the argument/adjunct asymmetry with respect to the lower wh-phrase, since it is an important linguistic contrast, especially when we are dealing with wh-in-situ.

The participants were 20 Russian-speaking children (ages 4;1-6;3, mean 5;2) and 20 adult controls. The number and the type of target questions were as follows.

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4. However, see the alternative account of the PL/SP reading distribution across languages in Bošković (2001).
5. For certain interesting non-adult-like alternatives to multiple interrogatives produced by some English-speaking children and their analysis, see Grebenyova (In preparation).

(22) a. 1 subject-object question, as part of the warm up (*Who hid what?*)
    b. 2 indirect object – direct object questions (*Who did Lizard give what?)*
    c. 2 direct object – adjunct questions (*Who did the dog find where?*)

The number of multiple questions elicited from children vs. adults is given in Table 3 below. As we can see there is no significant difference here between the two groups.

Table 3. Children's and adults' multiple interrogatives

	Multiple Qs
Adults	(56) 56%
Children	(60) 60%

Let us now consider the distribution of wh-fronting in children's and adults' multiple interrogatives in Table 4.

Table 4. Distribution of wh-fronting in multiple interrogatives

	Multiple Wh-fronting	Wh-in-situ	Partial Wh-fronting
Adults	(37/56) 66%	(0) 0%	(19/56) 34%
Children	(33/60) 55%	(11/60) 18%	(16/60) 27%

In this experiment, Russian-speaking children again produced a number of questions with the second wh-phrase being in situ. In the previous experiment, they produced those 15% of the time and this time they did it 18% of the time. Thus, our finding from the first experiment is confirmed in this new experiment with a larger variety of syntactic contexts. I will propose some explanation of these results in the next section.[6]

In addition to producing wh-questions with fronting all wh-phrases or just one wh-phrase, children also produced questions where the first wh-phrase was fronted all the way to the left edge of the clause and the second wh-phrase was only fronted to the immediately preverbal position, as in (23). I call this pattern *Partial Wh-fronting*. This is an acceptable pattern of wh-movement in adult Russian, as we even saw in the example from the parental speech in (17). Therefore, this pattern will not be of our concern in this paper.

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6. There was no age correlation found in wh-in-situ among the children in this study. For specific data and graphs related to the age distribution in the first and second experiments, see Grebenyova (In preparation).

(23) Kogo   sobaka gde   našla?
     who$_{ACC}$ dog$_{NOM}$ where found
     'Who did the dog find where?'

6. Understanding Children's Wh-in-situ

I have two proposals about the syntactic representation Russian-speaking children assign to their wh-in-situ. The first proposal is that this is a result of the acquisition of contrastive focus in Russian.

Contrastively focused r-expressions cannot stay in situ in Slavic, as shown in (24).[7]

(24) a. IVANA ja uvidela
         Ivan$_{ACC}$ I saw
         'I saw IVAN'

      b. ??Ja uvidela IVANA

Bošković (1998) and Stjepanović (1998) analyze multiple wh-fronting in Slavic as a result of the wh-phrases being inherently focused and undergoing focus movement. Children's wh-in-situ is then a result of either not having acquired the fact that wh-words behave like focused r-expressions in Slavic or that contrastive focus in Slavic prohibits a focused expression from staying in situ.

An alternative source of child wh-in-situ is related to the asymmetry between complex and bare wh-phrases in Slavic. Unlike bare wh-phrases, complex wh-phrases are optionally multiply fronted in Slavic. Only one wh-phrase has to be fronted in this case:

(25) a. Kakoj student kupil   kakuju knigu?
         which student bought which book
         'Which student bought which book?'

      b. Kakoj student [kakuju knigu] kupil *t*?

Children's wh-in-situ may be then a result of "confusing" evidence they are getting in the input and having to learn which elements obligatorily front and which may remain in situ.

To conclude, we have seen that Russian- and English-speaking children exhibit semantic knowledge of PL/SP reading distinction in multiple questions. I proposed that this is due to the PL reading being the default and children are undergoing conservative learning. We have also seen that children exhibit near

7. The degree of badness of (24b) varies among Russian speakers, but most speakers get some contrast between (24a) and (24b).

perfect knowledge of syntax of multiple interrogatives, except for some lack of fronting of the lower wh-phrase by Russian-speaking children (18%). I presented 2 hypotheses about the nature of the wh-in-situ in Russian child language: one relating it to the acquisition of contrastive focus and the other relating it to the acquisition of the asymmetry between complex and bare wh-phrases in Russian. Which proposal is the right one remains to be determined.

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