Negation in Children's Questions: The Case of English

Maria Teresa Guasti, University of Geneva
Rosalind Thornton, University of Maryland
Kenneth Wexler, MIT

1. Introduction

In a recent elicited production study investigating children's use of negation in question structures, we discovered that children acquiring English use a number of non-adult question forms. Adult negative questions are generally of the form in (1a), with the auxiliary verb in Comp hosting the clitic form of negation. In certain pragmatic contexts, the full form of negation shown in (1b) is also natural:

(1) a. What don't you like?
b. What do you not like?

Children's four non-adult structures are illustrated in (2-5) with examples from the children's transcripts. The most frequently used structure, 'Aux-Doubling' features two auxiliary verbs; one in Comp and one in the IP, as in (2). In a less common variant shown in (3), both negation and the auxiliary verb are doubled. In other questions, children failed to raise Infl to Comp, although their comparable positive questions expressed I to C movement. Finally, some children preferred use the full form of negation *not*, in situations where adults would clearly have preferred the clitic form *n't* - hence our proposal that questions like (5) are 'non-adult'.[1]

(2) Aux-Doubling
a. What did he didn't wanna bring to school? (Darrell 4;1)
b. What kind of bread do you don't like? (Rosy 3;10)
c. Why could Snoopy couldn't fit in the boat? (Kathy 4;0)
d. How can Ernie can't sit? (Emily 4;2)

(3) Neg & Aux Doubling
a. Why can't she can't go underneath? (Kathy 4;0)
b. What didn't Miss Piggy don't like to do? (Matt 4;3)

(4) No I to C Raising
a. Where he couldn't eat the raisins? (Kathy 4;0)
b. What she doesn't want for her witch's brew? (Alice 3;8)

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(5) Not-Stucture
a. Why can you not eat chocolate? (Darrell 4;1)

The non-adult forms appeared when extraction of the wh-phrase was from object or adjunct position, and in yes/no questions. By contrast, children's how-come questions, and their subject extraction questions were grammatical, as shown in the examples in (6) and (7).

(6) a. Which one doesn't like his hair messed up? (Kathy 4;0)
b. Which troll didn't like his hair brushed? (Darrell 4;1)

(7) a. How come the dentist couldn't brush the two dinosaurs' heads' teeth? (Kirsty 4;7)
b. How come the dentist can't brush all the teeth? (Emily 4;2)

It has been observed previously that children tend to perform Subject-Aux Inversion (i.e. raising of I to C) with less regularity in negative questions (Bellugi 1967; 1971, Stromswold 1990) but to our knowledge, no study has documented a range of non-adult forms (but see Thornton 1993). Our claim is that the non-adult negative question forms, including the form that fails to raise I to C, reveal a stage of grammatical development. These non-adult question structures have one property in common; negation stays inside the IP projection.

If, as we suggest, children's non-adult question forms represent a grammatical stage, Universal Grammar predicts that we should expect to find a similar phenomenon in another language or languages. Our examination of cross-linguistic data revealed a language with a comparable array of facts. In Paduan (a dialect of Italian), verbs raise to C in positive questions, but in negative questions, raising of negation along with the verb is ungrammatical (Poletto 1993). In our view, the parallel is no accident. Taking the lead from cross-linguistic data, we propose that the projection in which well-formedness conditions on negation are satisfied is a matter of parametric variation. Some languages, like Paduan (and child English) require that the condition on negation (the Neg-Criterion) be satisfied inside the IP. Other languages, such as standard Italian and adult English, allow well-formedness conditions on negation to be satisfied even when negation is positioned in the CP. Our proposal is outlined in more detail in Section 7.

2. The Experiment

Our study investigated children's negative questions using the methodology of elicited production. This experimental technique puts children in situations uniquely felicitous for production of a target structure. In this way, children are

called upon to produce structures that may not appear in their spontaneous speech, either because the appropriate situation is infrequent, or because a simpler form of expression is available.

Children's productions of negative questions were elicited during the course of a game with a puppet. Two experimenters were present. One experimenter played the role of a snail puppet who was shy of 'grown-ups' but not of 'kids'. The second experimenter played the 'grown-up' who was curious about the snail but unable to communicate with him. Since the snail would only talk to children, the experimenter asked the children to pose questions to the snail questions about himself, and about different scenarios that the experimenter staged with toys and props.

Ten monolingual English speaking children aged between 3;8 and 4;7 participated in the study. The children were tested individually at their daycare center (in Arlington, MA). The target questions were evoked over a period of three months, in four sessions of about twenty minutes.

The target questions included yes/no questions and wh-questions with the extraction site varied from object to adjunct to subject. Questions with main verbs that required do-support, questions with modals, and auxiliary *be* also comprised part of the test battery.[2] Positive questions and declaratives containing negation were elicited as controls.

Sample lead-ins for some of the question types elicited are given in (8) - (11) below. These lead-ins often followed a more complex story about the characters involved. For example, in (10), the scenario involved 3 characters from outer-space who try earth food, cheese, hamburgers and french fries. They all like earth food except for one of the characters who doesn't like the cheese.

(8) Wh-object extraction:
Exp: I heard the snail doesn't like some things to eat. Ask himwhat.
Target: What don't you like to eat?

(9) Wh-adjunct extraction:
Exp: There was one place Gummi Bear couldn't eat the raisin. snail where.
Target: Where couldn't Gummi Bear eat the raisin?

(10) Wh-subject extraction:
Exp: One of these guys doesn't like cheese. Ask the snail who.
Target: Who doesn't like cheese?

(11) Yes/no question:
Exp: I heard that the snail doesn't like potato chips. Could you *ask* him if he doesn't?
Target: Don't you like potato chips?

3. Experimental Results

Children's positive questions were, for the most part, grammatical. Calculating across object and adjunct extraction questions, 88% of children's wh-questions featured I to C raising, as did 96% of their yes/no questions. The exception to the high rate of I to C raising was the youngest child, whose positive questions demonstrated I to C movement just 42% of the time.

Children's negative declaratives were adult in form. Without exception, the children under investigation used do-support in their negative, and the clitic form of negation *n't* in their declaratives, rather than the form *not*.

A breakdown of children's non-adult question structures in (2) -(5) is given in Table 1 below:

Structure	Aux-Doubling		Neg & Aux Doubling		No I to C		Not		Adult	
Subject	No	(%)	No	(%)	No	(%)	No	(%)	No	(%)
Kirsty 4;7 (tot=36)	25	(69)	0		2	(6)	5	(14)	4	(11)
Lizzy 4;5 (tot=42)	9	(21)	0		6	(14)	3	(7)	24	(57)
Anna (4;3) (tot=24)	10	(42)	3	(13)	5	(21)	5	(21)	1	(4)
Matt 4;3 (tot=45)	29	(64)	6	(13)	1	(2)	1	(2)	8	(18)
Emily 4;2 (tot=21)	6	(29)	3	(14)	1	(5)	2	(10)	9	(43)
Darrell 4;1 (tot=47)	21	(45)	0		3	(6)	23	(49)	0	
Kathy 4;0 (tot=40)	11	(28)	12	(30)	10	(25)	0		7	(18)
Rosy 3;11 (tot=58)	37	(64)	0		21	(36)	0		0	
Chris 3;10 (tot=55)	13	(24)	7	(13)	7	(13)	2	(4)	26	(47)
Alice 3;8 (tot=46)	5	(11)	0		41	(89)	0		0	

Table 1
Children's Negative wh- and yes/no questions
Number and Percentage using different structures

The table shows children's questions requiring do-support, and questions with modals. The data for the verb *be* are excluded form the table because contraction of this auxiliary may have given rise to different proportions of the structures.[3,4]

Three of the 10 children (Lizzy, Chris and Emily) produced adult-like forms for about half of their questions, and progressed to the adult grammar in the course of the experiment. Examples of their adult questions are given in (12).

(12) a. What didn't the cowboy take home just now? (Lizzy 4;5)
b. What doesn't Baby Bear wanna take to school? (Chris 3;10)
c. Why couldn't she go through the arch? (Chris 3;10)

The remaining 7 children produced very few adult-like forms. Darrell, Rosy and Alice, for example, did not produce a single question of the form *What don't you like?*, with movement of the clitic *n't* into Comp.

4. Theoretical Background

4.1. The Wh-Criterion

We follow Rizzi (1991) concerning the well-formedness conditions that constrain question formation and structures with negation. Rizzi formulates the constraint on questions as the Wh-Criterion:

(13) a. A wh-operator must be in a spec-head relation with a [+wh] head
b. A [+wh] head must be in a spec-head relation with a wh-operator.

The Wh-Criterion requires that a wh-element must be in the SpecCP at the appropriate level of representation, and that an interrogative CP must have an operator in its specifier position. Consider the object question:

(14) a. [IP you I [eat what]]?
[+wh]

b. [CP what do [IP you t eat t]]?
[+wh]

In Rizzi's theory, the wh-features that are responsible for the interpretation of a sentence as a question are generated in I, as in (14a). The dummy auxiliary *do* is inserted in the representation to carry the inflectional and wh-features to C. The wh-operator is also moved to SpecCP, giving the configuration required by the Wh-Criterion, illustrated in (14b).

Subject questions are assumed not to involve I to C movement, however:

(15) a. [CP who [t eats the apple]
[+wh]

In subject questions, the +wh I(nfl) does not raise to C. The Wh-Criterion is not satisfied in the CP, but between the wh-operator in SpecCP and the chain containing the head carrying the wh-features. The I marked +wh is coindexed with the trace of the moved subject and consequently with the Wh-operator. In subject extraction questions do-support is ruled out by the ECP.[5]

4.2. The Neg-Criterion

We assume sentential negation to be expressed by a negative projection, NegP, which is part of the articulated inflection. Both *not* and *n't* are assumed to be heads of NegP, with *n't* as a syntactic clitic that requires an overt morphological host. Negative sentences are governed the *Neg-Criterion*, a condition analogous to the Wh-Criterion (see Rizzi, 1991; Haegeman & Zanuttini, 1991):

(16) a. A Neg-operator must be in a spec-head relation with a [+neg] head
b. A [+neg] head must be in a spec-head relation with a neg-operator.

(17)a. John doesn't drink milk
b John doesn'tt_i [$_{NegP}$ OP t_i [$_{VP}$ like milk]]

In (17a) the presence of negation triggers the insertion of the dummy auxiliary *do* to support the inflectional features. Example (17b) shows that the clitic *n't* has moved and cliticized to *do*. The Neg-Criterion is satisfied in the IP by the null operator in SpecNegP and the chain formed by the raised *n't* in I and its trace in Neg. In the sentence *John does not drink milk*, by contrast, the Neg-Criterion is satisfied within the NegP projection.

4.3. The Neg-Criterion and the Wh-Criterion Interact

Questions containing negation are subject to both the Wh-Criterion and the Neg-Criterion. Let us consider how these conditions apply to object extraction questions. An example using clitic negation, is given in (18).

(18) a. What doesn't he like?
b. [$_{CP}$ what doesn't$_{j/j}$ [$_{IP}$ he $t_{i/j}$ [$_{NegP}$ OP t_j [$_{VP}$ like]]]

In (18), *do* is inserted to support the inflectional features and to host the clitic *n't*. *Do* raises to Comp with the inflectional and wh-features, and the Wh-

Criterion is satisfied in the CP. Since negation has raised to C along with *do*, a chain is formed between the negated verb in C and its traces in I and Neg. The Neg-Criterion is satisfied between the null operator in NegP and the chain headed by the negation in C.

Turning to subject extraction questions, the auxiliary verb *do* is still required to host the inflectional features and the clitic *n't*, but it does not move out of the IP.

(19) a. Who doesn't like milk?
b. $[_{CP}$ Who$_i$ C$_i$ $[_{IP}$ t$_i$ doesn't$_{i/j}$ $[_{NegP}$ OP t$_j$ like milk]]?

The Wh-criterion is satisfied as in positive questions. The Neg-Criterion is satisfied between the null negative operator and the chain headed by the negation in I, as in declarative sentences. Let us turn now to examine the facts of Paduan.

5. Paduan

In Paduan, the verb raises to C in positive questions to satisfy the Wh-Criterion. The movement is shown in (20) by the form of the auxiliary verb *ze* preceding the subject clitic. When the auxiliary is not raised, the sentence violates the Wh-Criterion.

(20) Cosa galo fato?
What has-she done?
'What has he done?'

In negative questions also, failure to raise the verb to Comp yields ungrammaticality. In (21), negation and the auxiliary *ga* (has) have not moved; the subject clitic, *l*, has been cliticized to the negation *no*, resulting in *nol*. Placed in this position, negation blocks movement the verb to C, yet this movement is required by the Wh-Criterion.

(21) *Cosa nol ga fato?
What NEG-he has done?
'What hasn't he done?'

When negation piggybacks with the auxiliary verb to C, the result is still ungrammatical, however. In (22) negation is a preverbal clitic adjoined to the verb *ga* (has) which has moved to C, as proven by the fact that the verb precedes the subject clitic *lo*. Apparently, the auxiliary verb must be in Comp to satisfy the Wh-Criterion, but negation apparently may not raise to C. To satisfy these conflicting demands, Paduan uses a cleft structure, shown in (23).

(22) *Cosa no galo fato?
What NEG has-he done?
'What hasn't he done?'

(23) Cosa ze che nol ga fato?
What is that NEG-he has done?
'What hasn't he done?'

In (23), an additional verb *ze* (is) that bears the inflectional features appears in C to satisfy the Wh-Criterion, and the Neg-Criterion is satisfied within the IP. Paduan, like the grammar of many English speaking children, apparently does not allow the Neg-Criterion to be satisfied outside the IP.

6. Children's Negative Questions

Children's well-formed positive questions demonstrate their knowledge of the Wh-Criterion, and their well-formed negative declaratives are in keeping with the requirements of the Neg-Criterion. Their initial hypothesis is that the Neg-Criterion must be satisfied inside the IP, however. This hypothesis gives rise to grammatical negative declaratives, subject extraction questions and how-come questions, since in all of these structures, negation does not raise out of the IP. The same hypothesis yields *non-adult* questions when extraction is from object or adjunct position, or when the question is a yes/no question, however. We demonstrate now children satisfy the Neg-Criterion in each structure below.

6.1. Questions using 'Not'

Questions containing the full form of negation represent a solution to satisfying both the Wh-Criterion and the Neg-Criterion that is most in keeping with the adult grammar. I to C movement takes place, fulfilling the Wh-Criterion. *Not* does not raise to C with the auxiliary verb, so the Neg-Criterion is satisfied inside the IP.

6.2. Questions with no I to C movement

Questions with no I to C movement always appeared with the clitic *n't*. Having chosen to use the clitic, children must provide it with an auxiliary verb as a host, with the consequence that I cannot raise to C. Although I does not raise to C, we suggest that these questions do not violate the Wh-Criterion. Instead, the Wh-Criterion is satisfied with dynamic agreement; a UG-option that is grammatical for some languages (e.g. French), but not for English. Under dynamic agreement, the head in Comp receives wh-features from the wh-operator

instead of from the inflection which is raised to C. An example from French is given in (24).

(24) Quand elle est venu?
when she is come?
'When did she come?'

6.3. Aux-Doubling

Like questions in which children fail to raise I to C, children use the clitic form of negation in Aux-Doubling questions. Choice of the clitic form *n't* necessitates having a host for the clitic in the IP. Retaining the auxiliary verb in the IP is problematic, however, since in English, the Wh-Criterion requires the auxiliary verb to be raised to C. Instead of satisfying the Wh-Criterion using dynamic agreement, these children choose to satisfy the Wh-Criterion as in adult English, correctly moving the auxiliary verb into C. The problem is how to provide a host for the clitic form of negation in the IP. Our proposal is that these children provide a host by spelling-out the trace of the raised Inflection. This solution does not violate any principles of UG, but neither is the result grammatical in adult English.

UG predicts that we would expect to find other languages which can spell-out of the trace of Inflection, or perhaps some features of Inflection. We saw in Paduan that the cleft structure inserts a dummy auxiliary verb in Comp and the main verb stays in the IP. Among children's productions also, there were some questions which fi ta similar profile. In some of children's productions with a modal verb, the modal was not doubled (as in 2c,d). Instead, the dummy auxiliary *do* appeared in Comp, and the modal verb remained in the IP, to provide a host for negation (e.g. in questions like *What do you can't eat?*).

6.4. The Neg & Aux Doubling Structure

In this structure alone, negation appears outside the IP projection, as well as retaining its position inside the IP. At this point we cannot explain why negation should appear twice in this structure. It has the character of a transition structure, however, in the sense that it satisfies the Neg-criterion inside the IP and outside it simultaneously. The data from Chris are suggestive in this regard. Chris is one of the children who moved rapidly to the adult grammar in the course of the experiment, yet his productions account for a third (=7/21) of the Neg & Aux Doubling structures in the transcripts.

7. A Proposal

Putting the Paduan facts together with the child data, we suggest that the Neg-Criterion is subject to parametric variation. Broadly speaking, in some languages, such as Paduan and child English, it must be satisfied in the IP; in others it may be satisfied in the CP, as in adult English and standard Italian. Children learning English initially adopt the most restrictive hypothesis. That is, they asume that the Neg-Criterion must be satisfied in the IP, hence the prolonged period of non-adult questions observed in their negative questions

A recent experiment by Guasti found no errors in Italian speaking children's productions of negative questions, however (Guasti 1994). Italian speaking children willingly raise negation to C, leading Guasti to suggest that children's initial hypothesis is not that the Neg-Criterion must be satisfied in the IP, but in the *V-related projection*. The V-related projection is the projection in which the verb checks its features, including the neg feature. As a language without generalized verb raising, the V-related projection for English is IP, hence the non-adult productions. Positive evidence informs children that the Neg-Criterion may, in fact, be satisfied outside the V-related projection, as it is in adults' negative questions. In Italian, on the other hand, main verbs may raise and the V-related projection is the CP. Thus, Italian speaking children assume from the start that the Neg-Criterion may be satisfied in the CP[6,7].

7.1. Moving to the Adult Grammar

We have shown that the four non-adult structures all retain negation in the IP. Examination of individual subject data shows them to be a mixed bag, however. Most children produced several non-adult structures, though they may have had a preference for one structure or other (See Table 1 for more details). How do children rid their grammars of this mix of non-adult questions and progress to the adult grammar? The input that is relevant to bring about change in children's grammars is simple - adult negative structures with the clitic *n't* outside the V-related projection, in Comp. These structures should be sufficient for children to modify their initial hypothesis, and it follows that all of the non-adult structures should simultaneously disappear. Despite the abundance of the evidence, children appear to ignore the input for some months or even years. We offer two suggestions for why children do not master these facts early in the course of acquisition.

The first suggestion is that movement of negation to Comp in English is not motivated by core principles of UG. The clitic *n't* moves along with the auxiliary verb by virtue of needing an overt host. It is not forced to move to Comp to satisfy a UG principle, such as the Neg-Criterion, for example.

Children's failure to raise the clitic to Comp in their productions is a puzzle because children understand negative questions with the clitic in Comp perfectly

well (see Thornton 1994 for evidence). Another possible reason for the delay may be because children have to produce a structure with some regularity before it is tagged as being a candidate for the final grammar, and in their spontaneous speech, children produce few negative questions. This would explain why some children progress so rapidly to the adult grammar once put in an experimental situation where they are invited to produce many consecutive negative questions. The fifteen or so questions children produce in any given session is presumably enough to alert the grammar to relevant data.

Notes

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[1] Children only used the not structure in object and adjunct extraction questions. If questions with *no*t simply represented a preference for this form of negation, we would expect children to use *not* to the same extent in their subject extraction questions. This did not happen, suggesting it is used to fulfill the requirements of the child's current grammar. In addition, children's use of *not* always followed a lead-in using the clitic form suggesting that chidlren were going out of their way to avoid the clitic.

[2] Tense and agreement were also investigated. For lack of room, these data are not presented here.

[3] Yes/no questions evoked a high proportion of Aux-Doubling structures. This may depend on the fact that in yes/no questions the operator in SpecCP is non-overt and needs to be licensed by the appropriate wh-feature raised to C.

[4] Questions with *be* in which the children used the negative form *not* were much more frequently. This is not surprising, since with a contracted form of *be*, use of *not* is more natural than use of the clitic *n't*.

[5] The ungrammaticality of a subject extraction question with do-support follows from the ECP: I(nflection), supported by *do*, moves to C.The subject trace in SpecIP is governed by I, but not within its immediate projection I', thereby failing to satisfy the proper government requirement of the ECP (Rizzi 1990).

[6] Paduan is a problem for the scenario we have outlined. As a dialect of Italian, main verbs raise to C (in positive questions), suggesting that the V-related projection is the CP. If so, on the story we have outlined, children should allow the Neg-Criterion to be satisfied in the CP right from the start. But as we have seen, negation must remain inside the IP in Paduan. One way to avoid this dilemma is to say that all children initially assume that the V-related projection is the IP. Because verb raising data are abundant, children acquiring standard Italian soon realize that the verbal features are checked in the CP. Children learning Paduan, on the other hand, might be expected to be slower to acquire the verb raising facts, since one verbal feature, negation, always appears in the IP.

[7] Our proposal may be related to Prgovac's recent proposal about negation and negative polarity items. Progovac claims that IP is the minimal domain of negation and she makes a principled distinction between negation in the IP and in the CP (or outside IP).

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