Who are you talking about? Children's Interpretation of Sentence Initial Indefinite Subjects in Sentences Containing Negation

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1. Introduction: "Specific" indefinite subject Noun Phrases in Dutch

In Dutch, indefinite subject NPs have an intuitively specific reading when they appear in sentence initial position, whereas in lower positions, this need not, sometimes cannot, be the case. Consider examples (1) and (2). (1) gives the impression of being about a particular man, and (2) about a particular girl.

(1)   Een man liep   op straat.
        a   man walked on street
        'A man was walking in the street.'

(2)   Een meisje is aan het dansen.
        a   girl   is PROGRESSIVE-dance
        'A girl is dancing.'

This paper investigates the acquisition of some aspects of the interpretation of nominal specificity, without a priori assigning more importance to any one of those aspects, or trying to isolate a factor underlying all of them. Hence, throughout the paper, I deliberately use the term "specific" in an intuitive, pre-theoretic sense (not to be equated with "referential", "strong", "presuppositional").

The paper argues that aspects of the interpretation of "specific" indefinite subjects that can be directly linked to their syntactic position are acquired early, whereas aspects for which the integration of information from the discourse is a necessary condition will exhibit a delay.

2. Aspects of the interpretation of Dutch specific indefinite subjects

A property of specific indefinites which draws immediate attention, and which is the hardest to define, is that their occurrence is somehow odd if the sentence is

presented out of context. This phenomenon is well beyond the scope of the present paper. For a discourse semantic treatment of specific indefinites, I refer the reader to Van Geenhoven (1998).

The first aspect of specific indefinites to be discussed, then, is the fact that they take wide scope with respect to operators like negation. In (3), the position of the indefinite indicates that it is specific. The existential interpretation of specific indefinites remains unaffected by the negation operator, as in the logical representation in (3i).[1] The sentence cannot have interpretation (3ii), in which the existential interpretation of the indefinite is affected by the negation operator.

(3)   Een meisje is niet aan het dansen
         a   girl   is not PROGRESSIVE-dance
         'A girl is not dancing.'
   i. $\exists x$ [girl (x) & ¬[dance (x)]]
   ii.   *¬$\exists x$ [girl (x) & dance (x)]

One may object that the interpretation of the subject out of the scope of negation is entirely due to the NP's higher position. However, it is well established that also specific indefinites in lower positions, such as the direct object, tend to escape the scope of higher operators (cf. Diesing (1992), Reuland (1988), ea.).

The second aspect of the interpretation of specific indefinite subjects concerns pragmatics: they take one of a range of "specific" interpretations (de Hoop (1992)). Whereas the indefinite subject NPs in (1a) and (2a) clearly have a referential interpretation (the speaker has a particular referent in mind), this is not the case for the interpretation of the indefinite NPs in (4) and (5). Rullmann (1989) has termed the interpretation in (4) a concealed partitive interpretation. The indefinite in (5) has a generic reading.

(4)   Ik zat te kijken hoe mijn buurvrouw haar huisdieren voerde.
         Een katje dronk zijn melk snel op. Hij leek het lekker te vinden.
         'I was watching my neighbour feed her pets. A kitten quickly drank its milk. It seemed to like it.'

(5)   Een hond heeft een staart.
         a   dog has a   tail
         'A dog has a tail.'

The third and last aspect of the interpretation of sentence initial indefinite subjects to be mentioned here is that they tend to be topics. This fact may well contribute strongly to the intuitive sense of specificity that sentence initial indefinite subjects invoke.

3. The specific interpretation of indefinites and acquisition

While the distinction between specific and non specific indefinites is claimed to be universal, at least two studies, Diesing (1992) and De Hoop (1992), also claim that the link between the position of the NP and its interpretation is due to universal syntactic mechanisms. A recent corpus study of Dutch literary texts (Schouten (1998)) corroborates the theoretical analyses in that indeed all sentence initial indefinite subjects have an interpretation that can be described as specific. Thus, the fact that the NP must have some kind of "specific" status, and accordingly take wide scope (added to in the case of example (3) by the low position of negation) can be, as it were, "read off" the syntax.

Since the link between the indefinite subject's initial position and its specific status may be due to universal principles, and since the input is likely to be reliable, we should expect that it is acquired early. This view finds some support in studies in children's production of object NPs (Schaeffer (1997), Eisenbeiss (1994)). At age two, children begin to place object NPs that seem to have a specific interpretation, and/or take wide scope with respect to negation, in the position that is appropriate to such NPs.

The above considerations lead to the following hypothesis regarding the acquisition of the configurational aspect of sentence initial indefinite subjects:

Hypothesis 1:
The fact that a sentence initial indefinite subject takes wide scope in Dutch is acquired early.

The other aspects of the interpretation of the specific indefinite, i.e. the questions which of the potential specific interpretations to assign, and whether or not to assign a topic role to the NP, require more than knowledge of this link between syntax and semantics. In order to be able to answer these questions, a hearer must be aware of the fact that a sentence is part of a cohesive discourse, and use information that the discourse provides. This is where we may expect a delay in acquisition.

Extensive work by Karmiloff-Smith (1985) and Hickmann (1982) in children's production of narratives shows that children under age six make very little use of linguistic devices to express discourse cohesion. Rather, they seem to treat their utterances one-by-one. This lack of discourse cohesion is manifest, among other things, in the children's non-anaphoric use of definites and pronouns. The children's pronouns and definites do not necessarily refer to previously introduced entities. In stead, the children seem to use what I will call "straight reference".[2] They select, at will, an entity from the visual context to serve as a referent for the

NP, not bothering to disambiguate the reference of a pronoun when several objects are present that could be referred to in the same manner.

These considerations lead to Hypothesis 2, which pertains to the pragmatic and information structural aspects of a specific indefinite's interpretation:

Hypothesis 2:
The acquisition of discourse-related properties of sentence initial indefinite subjects is delayed.

The experiment in the following section takes as a starting point children's verification of sentences containing a VP negation, like (3) above.

4. Main experiment: sentence initial indefinite subjects and VP negation

The experiment's main focus is to investigate whether for children from about age four, sentence initial indefinites as in (3), repeated below, take wide scope with respect to the negation operator, as Hypothesis 1 predicts. Of course the different aspects of interpretation can never be isolated. It will become clear to the reader presently that, for this reason, the experiment consists of two parts, a main experiment and a follow-up experiment.

(3)   Een meisje is niet aan het dansen.
      i. $\exists x$ [girl (x) & $\neg$[dance (x)]]]
      ii.   *$\neg\exists x$ [girl (x) & dance (x)]

4.1   *Method*

On reading (3i), (3) is true if there is a girl who is not dancing, and false if there is no girl who is dancing. On reading (3ii), the sentence is true if there is no girl who is dancing, and false if there is a girl who is dancing. Adults and children were invited to judge whether sentences of this type matched a picture which, for (3), contained a girl who is dancing, and a girl who is not dancing, but swinging. On interpretation (3i), in which the indefinite subject is out of the scope of negation, the sentence is true of this picture. On interpretation (3ii), the sentence is false.

Since sentences like (3) are often judged infelicitous in the absence of a matching context, the experiment tries to provide one. The test picture contains, besides the two girls, a boy who is dancing — this was needed for a felicitous occurrence

of the full NP *een meisje*. The three persons were introduced in a picture preceding the test picture, as the protagonists of a short story.

The test items are presented to the child as follows: A puppet (Sesame Street's Ernie) is asleep while the experimenter and the child are watching the pictures. After they finish carefully looking at each picture, the child wakes up the puppet, (played by the experimenter) who is then allowed to have a look and make a remark about what he sees. The child is invited by the puppet to tell him whether he "saw it right". The puppet is employed for two reasons: to reduce anxiety for the child, so that she will feel free to correct the sentences, and once more to increase felicity, since sentences containing a sentence initial indefinite subject tend to occur when a speaker describes objects or events in a scene that she is watching (Schouten 1998).

This first picture and the story for sentence (3) are shown below:[3]
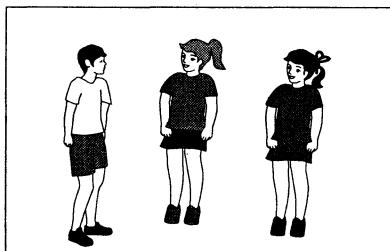
Experimenter: Here you see children: a boy, and a girl, and another girl (experimenter points). They want to do something, but they are not yet sure what. They might go and dance, but then again, they might do something else. And what they will do, is underneath here:

At this point, the experimenter reveals the test picture, which is below the first picture on the same page. Picture and accompanying text are below:
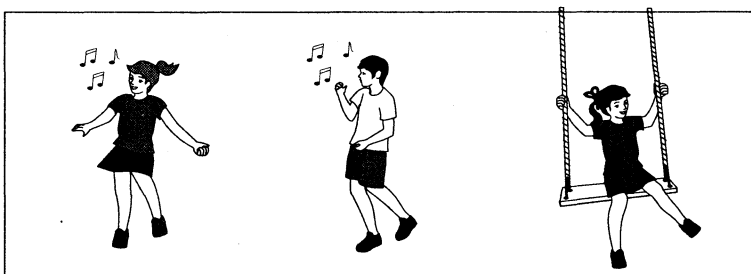
Experimenter.: Look, this girl is dancing (points), and this boy is dancing, and this girl is swinging. (Then the child "wakes up" the puppet, and the puppet says:) I see what happens: *Een meisje is niet aan het dansen. Heb ik dat goed gezien?* 'a girl is not dancing. Did I see this right?'

The expected answer on an adult-like wide scope reading of the subject NP is "Yes".

4.2   *Subjects and procedure*

Experimental subjects were 70 Dutch children, and an adult control group consisting of 10 subjects. The children were divided into age groups I, 4;0 to 5;6, containing 27 children, II, 5;6 to 6;8, containing 24 children, and III, 6;10 to 8;3, containing 19 children.

The experiment contained 5 test items. The verbs used in these items were, besides dance, *schommelen* 'swing', *slapen* 'sleep', *zwemmen* 'swim', and *voetballen* 'play soccer'.

Training items preceded the experimental items. The experimenter would give explicit feedback whenever a child made mistakes on these items. In an initial 5 single pictures, the "rules of the game" were introduced, first by using affirmative sentences for the child to judge, then, negated sentences. Four training items with negated sentences followed. These were completely similar to the test items except for the fact that they were unambiguously either true, or false, on interpretation (3i) as well as (3ii).

The experiment also contained four control items. On reading (3i) as well as (3ii), two of these items were true, and two were false. Both "true" control items were placed in between the test items. The "false" control items were placed at the end. They also served to control for yet another factor, to which I will return in section 6 below.

An effort was made to keep the intonation pattern of the test sentences constant: there are two main stresses in the sentence, one on the subject and one on the predicate, including the negation. The stress on the subject is a flat one, appropriate for topical elements.

4.3   *Results*

Four children from age group I were excluded, because their behavior during the training period or failures on two or more control items indicated insufficient understanding of the task.

As can be seen in Table 1, children often rejected the test sentences, whereas

adults uniformly accepted them. The subjects are classified according to response pattern. Whenever a subject accepted all or all but one of the test sentences, this was scored as an acceptance pattern. Whenever a subject rejected all, or all-but-one of the sentences, this was scored as a rejection pattern. The remaining response patterns are classified as "mixed". One child from age group III could not be classified, since her judgments were very indecisive.

Table 1. *Indefinite Subjects and Negation, Response Patterns of Children and Adults*

	acceptance pattern	mixed pattern	rejection pattern
4;0–5;6	6 (26%)	6 (26%)	11 (48%)
5;6–6;7	16 (67%)	2 (8%)	6 (25%)
6;10–8;3	15 (83%)	1 (6%)	2 (11%)
adults	10 (100%)	0	0

Table 1 shows a gradual development toward adult-like response from the youngest to the oldest age group — in the youngest age group, only 6 (26%) of the children consistently respond like adults, in the second age group 16 children have adult-like performance (67%), and in the third age group, 15 children have adult-like performance (83%).

The difference between the child age groups is significant $p<.05$: Chi-square 14.47699, df=4, 2–tailed testing. The difference between each of the two youngest age groups and the adults was significant, Fisher's Exact test, $p<.05$, 2–tailed testing. The difference between age group III and the adults was not significant.

4.4   Discussion of the main experiment

Whenever a child rejected the test sentence, the puppet asked the child to explain exactly what it was he had seen wrong, and always obtained a response. In about 90% of the cases, the children motivated their rejection of *een meisje is niet aan het dansen* by referring to the girl who *was* dancing. The remaining 10% of motivations are unclear or not to the point. Thus, for many children, sentence (3) can only apply to the scene presented in the experiment if there is no girl who is dancing. For these children, the indefinite subject NP would seem to be in the scope of the negation operator. This in turn would mean that children of age four and beyond, contrary to hypothesis, have non adult-like scope of negation, and non specific sentence initial indefinite subjects, in spite of the fact that syntax should lead them to the adult-like interpretation.

Rather than immediately accepting this explanation, let us consider whether the deviation of the children's responses might not originate with some other aspect of the indefinite's interpretation. Consider the procedure that an adult must apply to a sentence like (3) in order to verify it. Presumably, the procedure starts by the construction of a set of relevant objects that match the descriptive value "girl". Such relevant objects are identified by preceding discourse and context. The adult can then proceed to check each of these referents until she finds a referent that matches the description "not dance". Should an adult start this procedure with the dancing girl, she will move on to check whether the next referent in the set provides a match.

Children may not act in this way. If indeed children until the age of six, or later, prefer not to take information from the discourse or context into account to determine the interpretation of the test sentence, they may fail to construe a contextually relevant set of referents in order to verify the sentence. In stead, they may prefer straight reference, and select some girl in the picture as the referent of the indefinite. If the child happens to select the girl who is swinging as the referent of the indefinite subject NP, she will judge the sentence true. If the child selects the girl who is dancing, she will judge the sentence false, because the selected referent is a mismatch to the descriptive value "not dance". The child may not, as adults do, proceed to check whether the second girl matches this description.[4] Such a straight reference approach would be entirely compatible with a specific status of the indefinite NP, and accordingly, its taking wide scope. The mistake of the child would be a pragmatic one, in assigning a referential, rather than a concealed partitive interpretation,[5] in accordance with Hypothesis 2. If this is so, the following prediction should hold:
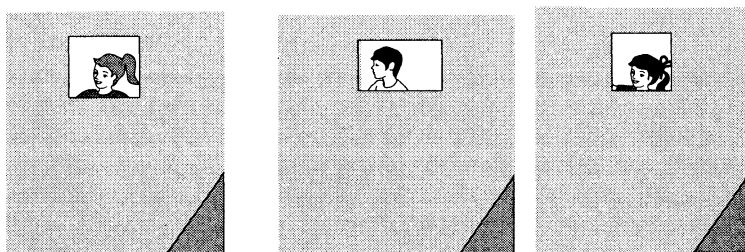
Prediction 1:
Children may consider only their one selected referent for an NP relevant to verification of a sentence.

5. The follow-up experiment: Who are you talking about?

5.1   *Method*

The experiment is a modification of the main experiment. The test sentences, pictures and stories remain the same. The difference is that now, in the bottom picture, little doors cover the referents. This picture for our example sentence (3) is shown below.

In order to verify (3), the experimental subject will need to open the doors in order to make out what each person is doing. In doing so, the subjects may reveal how they verify the sentence. For adults, the prediction is that whenever the first door that an adult opens reveals a mismatch, i.e. the girl who is dancing, she will proceed to open the door behind which is the other member of the relevant set. Only then will she make a truth value judgment. For children, the prediction is that many of them will fail to proceed to a second door because they do not feel the need to check an entire set. They interpret the indefinite by straight reference.

The puppet employed in this experiment was Sesame Street's Cookie Monster. This puppet has big, bulgy eyes. The child was told that Cookie Monster's eyes were so big, that he could look right through the doors if he really tried. The puppet tells the child what he "sees", and the child's role is to check whether the puppet got it right, by looking behind the doors.

5.2   Subjects and procedure

Experimental subjects were 30 Dutch children and 10 adults, none of whom had taken part in the main experiment. The children were divided into age groups I, 4;0 to 5;6, containing 16 children, and II, 5;6 to 6;8, containing 14 children.
The procedure of the follow-up experiment was much like the main experiment. Since we are mainly interested in those occasions on which the subject will first open the door that reveals a mismatch to the predicate description, 3 of 6 test items were manipulated such that both potential referents for the subject NP were mismatches.

At two of the training items preceding the follow-up experiment, the children were asked to open some doors that the experimenter indicated. This was meant to ensure that children would have performed the act of opening more than one door before they arrive at the test items, so that they would feel free to do so when necessary.

5.3   Results

Four children from age group I were excluded since they failed two control items. As in the main experiment, the subjects were classified according to their response patterns. Classification took place on the basis of only those responses in which the subject encounters a mismatch behind the first door that she opens. If a subject in all, or all but one of these cases opens at least as many doors as is logically required, this is classified as an "at-least-as-many-as-needed" pattern. If in none of the cases in which the subject first encountered a mismatch, she proceeded to open another door, this was scored as a 1–pattern. The remaining subjects have a mixed pattern: they all failed at least twice to open a second door when required.

Table 2. *Follow-up experiment, Response Patterns of Children and Adults*

	at least as many as needed	mixed pattern	1–pattern
4;0–5;6	1 (8%)	4 (33%)	7 (58%)
5;6–6;8	4 (29%)	1 (7%)	9 (64%)
adults	10 (100%)	0	0

Table 2 clearly shows the difference between the adult and child groups: whereas all adults consistently open at least as many doors as is logically required, the children generally do not.[6] The increase of adult-like response patterns between age groups I and II is not significant. Of all children, then, 16 (62%) have a 1–pattern, 5 (19%) have a mixed pattern, and only 5 (19%) have an adult-like response pattern. The difference between the adult and child response patterns is significant, $p < .05$, Chi-square 19.38462, df=2, two-tailed testing.

The results of the follow-up experiment are as we would expect if children do not check an entire contextually relevant set of objects that match the noun description, but rather assign straight reference to one of these objects. The children only open one door to check one of the objects, and they rarely move on to the second door. They produce a truth value judgment based on checking only this one object, "true" if the object matches the predicate description, "false" if the object is a mismatch. The results are thus according to Prediction 1, and Hypothesis 2.

6. Topicality and the indefinite subject NP: What are you talking about?

6.1   *The role of topichood in verification*

The information structural aspect of topicality of the subject NP was not the focus of the experiment. Nevertheless, it is of importance to the results, since a non adult-like information structure of the sentence may lead to an adult-like response, through a different approach to verification.

   Note that verification of a sentence like (3) need not start with the construction of a set of objects that match the noun description 'girls', it may also start with the construction of a set that matches the predicate description 'non-dancers'. One checks whether the objects in the set one starts with, also belong to the second set. Verification normally starts with the set denoted by the topic (cf. Strawson (1964)). This means that the reason for adults to start verification by construing a set of girls, depends on the fact that the subject NP is the topic. Were the predicate to have the status of topic, and accordingly, the predicate set of non-dancers to be construed first, in the main experiment this set would always only contain one object, since there is only one non-dancer, one non-sleeper, etc. In the experimental items, this one object is always part of the set that is construed on the basis of the noun denotation, i.e. the non-dancer is a girl. Hence, the judgment of the sentence would always come out "true". In other words, a different information structure of the sentence leads to the same response.

   It seemed impossible to suppress this factor, other than by making the subject NP maximally topic-like by providing human referents and a clear topic intonation. This is the reason why two control conditions were added to the end of the experiment. Consider (10), a test sentence in one of the control items.

(10)   Een jongen staat   niet op zijn kop.
          a   boy   stands not on his head
          'A boy is not standing on his head.'

This sentence accompanies a picture in which there is one boy who is standing on his head, a girl who is doing the same, and a girl who is standing straight. If one starts the verification procedure by construing a set of boys, the sentence is false because the one boy *does* in fact stand on his head. If one starts by construing a set of objects who are not standing on their heads, the sentence is also false, because the one object in this set is a *girl*, rather than a boy.

   The item is useful as a control condition because the puppet asks for a motivation of the rejection. If an experimental subject answers the question "what did I see

wrong?" by saying: "he *is* standing on his head", this indicates that the subject NP is the topic. Should the subject say: "it's a *girl*", this indicates that the predicate, including negation, is the topic. I will term the former the subject approach, the latter the non-verb approach.

6.2   *Results*

The experimental subjects who had previously been classified according to their response patterns on the test items were now classified according to their motivations on the control items. Four subjects for who there was doubt as to the interpretation of the motivation of their responses were excluded.

All 10 adults displayed a subject approach to the control items. Of the 61 classifiable child subjects, 10 (16%) displayed a non-verb approach to the control items. It is likely that these children had been using this approach at the test items, as well. If this is so, these children should never reject the test sentence, and this is indeed what we find. These 10 children always accept the test sentences. The difference between children with a subject approach and children with a non-verb approach with respect to adult-like response patterns is significant: Chi-square = 8.885154, p<0.05, df = 2, two-tailed testing.

7. Conclusion

In section 2, I listed three aspects of the interpretation of specific indefinite subjects: the configurational, semantic aspect of scope, the pragmatic aspect of selecting a proper "specific" interpretation, and the aspect of information structure. Children's non adult-like understanding of (3) seems to be a deviation of the second aspect. This is to be expected given the fact that a necessary condition for adult-like interpretations is that the children integrate information that is provided by the discourse. The children's behavior on this point is compatible with a straight reference interpretation of the NP, and thus with what has been observed for children's' production of discourse.

The first aspect, the syntax-semantics mapping, is adult-like, the sentence initial indefinite subject taking wide scope with respect to negation. This aspect of the mapping of syntax to semantics has been acquired by age four. The results must remain inconclusive as to whether this interpretation is forced by a specific status of the NP, or merely its position higher than the negation operator. Straight reference can be applied to non specific, as well as specific indefinites.

The third aspect, information structure, is non adult-like for a number of

children. The subject is not always interpreted as a topic. In fact, these children's adult-like responses originate in a non adult-like interpretation of the sentence initial indefinite subject.

Clearly, the present results must be regarded with caution. The advantage of using sentences like (3), and verification tasks, is that they allow us an attempt at tracing verification procedures. The disadvantages are obvious: the sentence does not sound very natural and the experimental situation is far removed from everyday language use. Thus, the task itself, especially since it includes judging a negation, may constitute a considerable processing load to the child. Therefore, the data presented in this paper need to be supplemented by results obtained from different tasks, that involve different or no overt operators (cf. Krämer (1998) for one such attempt).

Nevertheless, the results presented can only be taken as pointing in the predicted direction: whereas properties of specific indefinites that can be read off of the syntax seem to be present by age four, properties that require the integration of information from the discourse show a delay.

Acknowledgement

Notes

1. The facts that negation is rarely felicitous when used out of the blue, and that specific indefinites require a matching context, seem to have a cumulative effect. Even when provided with a context, some native speakers continue to find this type of sentence infelicitous.

2. Karmiloff-Smith and Hickmann use the term "deictic".

3. The entire experiment is in Dutch, but for reasons of exposition only the translation is presented.

4. I leave open the question whether the proposed verification procedure involves no set formation, or formation of a 1–membered set.

5. The relatively high proportion of rejections, rather than chance level, does not contradict this possibility: Considering that the child is entirely free to select any girl as a referent, she may well decide to select the one that seems most relevant in light of the sentence to be judged, i.e. the one that is at least something to do with dancing.

6. Neither adults, nor children open the door concealing the mismatch to the noun description (the boy for the example item). The only exception is the youngest child in the sample, who on three occasions, opens all three doors.

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