INTERPRETING INDEFINITES

AN EXPERIMENTAL STUDY OF CHILDREN'S LANGUAGE COMPREHENSION

Cover Design: Linda van den Akker, Inge Doehring
Cover Illustration: Inge Doehring
Printed and bound by: Ponsen & Looijen bv, Wageningen

INTERPRETING INDEFINITES

AN EXPERIMENTAL STUDY OF CHILDREN'S LANGUAGE COMPREHENSION

Het interpreteren van indefinieten:
een experimenteel onderzoek naar taalbegrip van kinderen
(met een samenvatting in het Nederlands)

Proefschrift

ter verkrijging van de graad van doctor
aan de Universiteit Utrecht
op gezag van de Rector Magnificus, Prof. Dr. H.O. Voorma,
ingevolge het besluit van het College voor Promoties
in het openbaar te verdedigen op woensdag 4 oktober 2000,
des middags te 12.45 uur

door

Irene Maria Krämer

geboren op 21 augustus 1968, te Bensberg, Duitsland

Promotoren: Prof. Dr. P.H.A. Coopmans, Universiteit Utrecht
Prof. Dr. W. Klein, Universiteit Heidelberg
Prof. Dr. E.J. Reuland, Universiteit Utrecht

Dit proefschrift werd mede mogelijk gemaakt met financiële steun van de Max Planck Gesellschaft zur Förderung der Wissenschaften te München, Duitsland.

Aan Ria en Silvia

DANKWOORD

Veel mensen hebben bijgedragen aan dit proefschrift, zowel aan het onderzoek en de verwerking ervan tot een boek, als aan het aan de gang houden van de schrijfster. Dit voorwoord geeft mij de gelegenheid al deze mensen te bedanken.

Allereerst Peter Coopmans, omdat hij vanaf het begin belangstelling toonde voor mijn gedachten over NP-interpretatie door kinderen. Hij nam mijn ideeën serieus, dacht mee, wees op relaties met ander werk. Niets is zo bemoedigend als dat. Bovendien heeft hij zeer nauwgezet verschillende versies van het manuscript gelezen, waarbij zijn oog viel op alles, van type-fout tot denkfout, en hij ook oog had voor datgene wat juist goed geslaagd was. Ook mijn andere twee promotoren wil ik bedanken voor het lezen van versies van het manuscript en voor gesprekken over de (toekomstige) inhoud. Wolfgang Klein bedank ik er ook voor dat hij me de gelegenheid heeft gegeven om te werken aan het Max Planck Instituut voor Psycholinguïstiek in Nijmegen, en dat hij me de vrijheid heeft gegeven mijn eigen beslissingen te nemen over het onderwerp en de richting van mijn onderzoek. Eric Reuland bedank ik ervoor dat hij onmiddelijk "ja" zei toen ik vroeg of hij promotor wilde worden, waardoor dit proefschrift een soort Planck-Utrecht joint venture kon worden. Bovendien straalde hij voortdurend uit dat linguïstiek, inclusief mijn eigen werk, vooral *leuk* is. Het is wel eens goed om daaraan herinnerd te worden.

Veerle Van Geenhoven werd pas een deel van de begeleidingscommissie toen het werk al in een gevorderd stadium was. Haar bedank ik voor de vele uren die zij heeft besteed aan het lezen van verschillende versies van, met name, de eerste hoofdstukken, het geven van gedetailleerd commentaar, en het bespreken van allerlei kwesties betreffende de semantiek van NPs. Ken Drozd bedank ik voor het aannemen van de uitnodiging deel te zijn van de begeleidinscommissie in de beginperiode.

De leden van de manuscriptcommissie, Anne Baker, Helen de Hoop, Tanya Reinhart, Veerle Van Geenhoven en Jürgen Weissenborn bedank ik voor het lezen van het manuscript en hun nuttige commentaren.

Ik ben de volgende mensen dankbaar voor hun aandacht en feedback: Judith Borst, Melissa Bowerman, Leontien Dekwaadsteniet, Helen de Hoop, Angeliek van Hout, Tom Roeper, Jeannette Schaeffer, Rob van der Sandt, Angelika Wittek, en mijn gehoor bij presentaties van mijn werk op het Max Planck Instituut en elders. Veel van hun suggesties hebben een plaats gekregen in dit proefschrift. Judith en

Leontien hebben bovendien enorm veel werk verzet tijdens hun stage, door te helpen bij het vervaardigen van materialen, bekijken van bandopnamen, verwerken van gegevens en niet te vergeten het uitvoeren van experimenten. Jules Ellis verdient dank voor het zeer duidelijke advies en commentaar met betrekking tot de statistische analyses.

Hierboven heb ik alleen diegenen genoemd die op één of andere manier hebben bijgedragen aan de wetenschappelijke inhoud van dit proefschrift – maar er zijn nog veel meer mensen die hebben bijgedragen aan de totstandkoming ervan. Van hen wil ik allereerst de vele honderden kinderen bedanken die hebben deelgenomen aan het onderzoek. Een enkele keer viel het hen tegen ("Moeten we àl die plaatjes nog?"), maar vaak deden ze mee met grote overtuiging ("Oh, domoor Koekiemonster! Dáár moet je kijken!") en het resultaat was meestal tevredenheid van beide partijen ("Ik wil wel nog een keer"). Dus: hartelijk dank aan de leerlingen en leerkrachten van Kampus, Montessorischool Lindenholt, de Sterredans en de Vossenburcht in Nijmegen, de Regenboog in Malden, de Franciscus Xaveriusschool in Bladel, en bovenal Laurentiushof in Vierlingsbeek.

Peter van Rijswijk en Hans Gerrits wil ik hartelijk bedankten voor de vele malen dat zij mij met de auto hebben vervoerd als ik, bewapend met pakken formulieren, een videocamera met statief, een beplakte kartonnen doos, windmolentjes, autootjes, blokken, een jodelbaan en nog veel meer, van of naar een school moest zien te komen.

De bijdrage van de mensen van de Technische Groep, de administratie en de bibliotheek van het Max Planck Instituut mag ook niet vergeten worden: zij houden de boel draaiende. Dankjullie wel! Reiner Dirksmeier en Ad Verbunt, bedankt voor advies, trouble-shooting en het razendsnel installeren van programma's, Rick van Viersen, bedankt voor het verzorgen van de apparatuur. Eén TG-lid komt extra veel dank toe: Inge Doehring. Zij voorzag me van vele plaatjes die ik naar believen mocht omvormen (het werd vaak *mis*vormen) om dienst te doen als experimenteel materiaal. Bovendien heeft ze het omslag en de uitnodiging gemaakt, en veel tijd gestoken in het maken van precies zo'n tekening als ik daarvoor in gedachten had.

Als laatste in deze categorie bedank ik Marc Floris, die weken hard werk en stress heeft gestoken in de lay-out, de plaatjes, de grafieken, helaas nog eens de plaatjes, en nog eens de grafieken, en die het hele manuscript heeft proefgelezen.

Voor gezelschap, gesprekken en praatjes op de gang dank ik veel Max Planckers, waaronder natuurlijk Paul, Mariska en Leontine van de receptie, veel mede-promovendi, en de acquisitiegroep. De laatsten waren de afgelopen jaren goede collega's, van Shanley Allen en Ursula Brinkmann via de rest van het alfabet tot Angelika Wittek. Een aantal van hen zijn verbonden met herinneringen die heel bepalend zijn voor mijn tijd aan het Planck: Angelika was mijn office-mate, Ann Kelly mijn collega in de nachtploeg, Marlene heeft meermalen mijn dag goedgemaakt door net dat beetje extra aandacht en hulp, en met Wenda, mijn

collega-Utrecht-Planck-Acquisitie-Scope-promovenda, ben ik in Potsdam met veel plezier naar de GALA-conferentie gefietst.

Ik ben mijn paranimfen Wenda Bergsma en Hans Drexler heel dankbaar voor hun steun tijdens de fase voor de promotie – ik was er zelf inmiddels tussenuit geknepen – en ook de tijd daarvoor. Ze hebben daarin elk een tegengestelde stijl: Wenda toont belangstelling en begrip, Hans toont belangstelling en onbegrip. Naar zijn mening moet je een proefschrift zo snel mogelijk afhandelen en het vooral niet te goed willen doen; naar de bioscoop gaan is belangrijker. Ik weet niet of ik het helemaal met hem eens ben, maar dat van de bioscoop is natuurlijk waar.

De persoonlijke noten uit de beginperiode van mijn promotie-onderzoek, Annick de Vries, Leonore Biegstraaten, Heike Schröder en Marianne Starren, zijn gaandeweg het onderzoek steeds meer een achtergrondmuziekje geworden. Ik ben blij te merken, nu ik uit het moeras van mijn proefschrift begin te kruipen en de modder uit mijn oren spoelt, dat er nog muziek te horen is.

Het laatste stukje is altijd voor de familie. Misschien zou ik Opa moeten bedanken, als dat nog kon. Hij vond immers: "Dat intellectuele, die belangstelling voor boeken en studie, dat hebben ze van mij". "Ja, ja" dacht of zei Oma dan. Maar het is vast ook wel een beetje waar.

Mijn vader Hans bedank ik omdat hij zo trots op me is, mijn moeder Ria en mijn zusje Silvia omdat ze altijd meer vertrouwen in me hadden dan ikzelf.

Als laatste bedank ik Marc Floris, de beste Marc van de wereld, voor zijn onmetelijke liefde en toewijding tijdens deze jaren.

CONTENTS

List of abbreviations

PART	particle
INTERJ	interjection
PROGR	progressive
NARROW	narrow scope reading
INTERM	intermediate scope reading
WIDE	wide scope reading
Ctxt.	nonverbal context
Exp.	experimenter
NP	Noun Phrase
VP	Verb Phrase

THE TOPIC OF THIS DISSERTATION

CHAPTER 1

1. Two interpretations of indefinite Noun Phrases

The following sequence describes an imaginary session of a teacher and a child engaged in a Montessori language exercise[1]. Teacher and child are sitting close to a toy farmhouse which contains a number of farm animals, among which are a few horses. The horses are of different colors.

(1) Teacher: I would like to have a horse. Would you give me a horse, please?
Child takes a brown horse, and hands it to the teacher.
Teacher: No, that's not what I want. I think you should put it back. Let's try again.
Child puts horse back.
Teacher: I would like to have a horse.
Child takes another brown horse, and hands it to the teacher.
Teacher: No, that's not what I want, either. Let's try again.
Child puts horse back.
Teacher: I would like to have the white horse. I would like to have that white horse over there.
Child takes the white horse, and hands it to the teacher.
Teacher: Yes, that's the horse I wanted to have.

In the sequence in (1), the child does not seem to be aware that the teacher has a specific horse in mind: The child initially assumes that a horse is used in a nonspecific manner. This is a legal interpretation of the teacher's request, but not the one the teacher intends. Of course, the teacher is not very co-operative, but that is in the interest of the exercise. It is also possible that the child is aware that the teacher has a specific horse in mind, but initially identifies the wrong horse.

[1] Thanks to Marijn Floris for pointing me to this example. The example sequence is an adaptation of examples provided in the Montessori Materiaalboek, version (1995).

Previous studies in children's interpretation of indefinite Noun Phrases (NPs) have mainly (though not exclusively) focused on an opposition of definite and indefinite articles (Maratsos (1976), Karmiloff-Smith (1979)). The present study aims at extending the area of investigation to the distinction between "specific" indefinites on the one, and "nonspecific" indefinites on the other hand.

In this introductory chapter I will sketch a picture of a distinction between two kinds of indefinite interpretations. Besides the difference between "specific" and "nonspecific" readings, this distinction involves several more interpretive differences, such as wide and narrow scope readings for "specific" and "non-specific" indefinite NPs, respectively. In subtle interaction, syntax, semantics and pragmatics together determine the interpretation of an indefinite NP, and it is the language learner's task to learn to appreciate the contributions of each of these different modules. Having read the exchange in (1), the reader will suspect that this is a challenging task, which makes children's interpretations of indefinites an interesting topic of investigation.

In this dissertation, I also intend to attain two goals that go beyond the topic of the acquisition of indefinite NPs. First, to present and support the view that children's ability to integrate utterances into a connected whole is an important factor in the acquisition of sentence level interpretation. Secondly, to promote an interest in the acquisition of non-lexical semantics. Notwithstanding a number of interesting studies, this area still remains largely unexplored. I hope that the findings that I present will encourage those who consider venturing into this area to explore it further.

The experiments that I present are guided by a hypothesis concerning the distinction between the two indefinite interpretations. I argue that discourse integration, which is a prerequisite for the interpretation of "specific", wide scope indefinites, is often insufficient in children's comprehension. This hypothesis will be presented briefly in section 2 of this chapter. In addition, in Dutch, the semantic distinction largely correlates with a syntactic distinction between so-called "high" and "low" NP positions. I will therefore outline the syntactic distinction correlating with the different interpretations of indefinites in section 3. In section 4 I will point out a number of dinstinct interpretive characteristics of "high" indefinite NPs on the one, and "low" indefinite NPs on the other hand. In sections 5 and 6, I address the way in which a study of children's comprehension of indefinites may contribute to child language acquisition research, and to theoretical research in NP interpretation. Finally, in section 7, I address the definitional question of which NPs I consider to be indefinite. Section 8 contains a brief overview of the structure of this dissertation.

2. The non-integration hypothesis

As a theoretical background, I will assume Van Geenhoven's (1998) analysis of indefinites. According to that analysis, a so-called "free variable indefinite" gives rise to the specific reading in example (1), whereas a "predicative indefinite" gives rise to the non-specific reading. A question that might be asked with respect to language acquisition is whether one of these interpretations would pose particular difficulty in children's language. In this study, I propose the following hypothesis as an answer to this question:

> **Non-integration hypothesis:**
> Children acquire the predicative interpretation of indefinites early.
> The free variable interpretation is acquired later because it requires discourse integration.

This hypothesis was developed on the basis of studies of children's development of discourse. It predicts an asymmetry in the acquisition of predicative and free variable interpretations. The non-integration hypothesis is formulated here so as to apply specifically to indefinite NPs. However, it is the reflection of a view on NP reference that also concerns different kinds of NPs, relating the acquisition of "specific" indefinite NPs to that of pronouns, anaphoric definites and universally quantified NPs. These NPs have in common that some element located in prior discourse is required for their interpretation, be it an antecedent, the restriction of the domain of quantification, or, as we will see in the case of high indefinite NPs, an accommodation site. These different kinds of NPs are related to elements in the context in different ways, but they all have in common that the hearer of an utterance must integrate separate sentences into a larger whole: a discourse.

An interesting fact about Dutch, as well as a number of other languages, is that an indefinite's syntactic position may indicate whether it has a predicative or a free variable interpretation. This enables us to identify contexts in which a free variable interpretation should be assigned by adult standards, as well as enabling the investigation of whether the predicted difficulty with the free variable interpretation of indefinites is such that children may ignore the syntactic position of such an NP. The correlation of NP interpretation and NP position is illustrated in the next section.

3. High and low Noun Phrase positions in Dutch

In Dutch, as well as for instance German, the syntactic position of a NP may help determine its interpretation. Had the teacher in example (1) been speaking Dutch,

the syntax of her request might have helped the child realize that she in fact wanted to have a particular horse. Consider (2):

(2) a. Ik wil een paard even vasthouden.
I want a horse PART hold
"I want to hold a (particular) horse for a minute".
b. Ik wil even een paard vasthouden.
I want PART a horse hold
"I want to hold a horse for a minute".

The position of *een paard* 'a horse' to the left of the particle *even* 'involving little time or effort' in (2a) implies that the speaker has a particular, or "specific", horse in mind. In contrast, the position of *een paard* 'a horse' to the right of the particle in (2b) indicates that the speaker will most likely be satisfied with any horse. I will refer to indefinite NPs that appear to the left of an adverbial or other element intervening between the object NP and the position of the non-finite verb as "high NPs", and to the ones appearing to the right of such elements as "low NPs", following the assumption that the positions that appear more to the left are higher up in a syntactic tree representation[2].

Whether some adverbs allow for more than one (covert) position to their right or to their left is a question that I will not address in this study. Schaeffer (1997) distinguishes two "high" positions, one that is discourse related, and one that is not. Such fine-grained distinctions are beyond the scope of the present work. I will only distinguish between a low object position that is adjacent to the non-finite verb and to the right of some adverb or other intervening element, and a high position to the left of such an element. When no adverb or other potentially intervening element is present, the high and low object positions cannot be distinguished. In these cases, it may be possible to distinguish the two kinds of indefinites on the basis of intonation (Neeleman and Reinhart (1998)). In the acquisition experiments that I will present, I only considered utterances in which the NP positions could be distinguished syntactically[3].

A distinction similar to that between high and low indefinite object NPs can be found between sentence initial indefinite subjects and postverbal subjects in existential constructions (Reuland (1988), Rullmann (1989)). Consider (3):

---

[2] The term "specific" as I use it here is an intuitive term. A high NP's exact interpretation, including its degree of intuitive specificity is dependent on the context of utterance and the choice of lexical items. This issue will be addressed briefly in section 4 below, and more extensively in Chapter 2.

[3] I will not consider sentences in which an indefinite object NP which appears to the left of an adverb or operator receives contrastive stress, such as i. and ii.:

i. Ik wil een PAARD even vasthouden.
ii. Een PAARD wil ik even vasthouden.

This intonation pattern is appropriate when a speaker wants to contradict a previous utterance or implication according to which she wants to hold, e.g., a COW, rather than a HORSE.

(3) a. Een oude vrouw liep op straat.
an old woman walked on street
"A (particular) old woman was walking in the street."
b. Er liep een oude vrouw op straat.
there walked an old woman on street
"A (just some) old woman was walking in the street."

In English, both sentences in (3) could be translated as "An old woman was walking in the street", but in Dutch (3a) conveys the interpretation that some particular woman is intended. For the less marked, nonspecific interpretation the existential construction must be used.

Since a definiteness restriction obtains for the existential construction in (3b), the difference between the high and low subject positions is not exactly equivalent to the difference between the high and low object positions as discussed above. This becomes apparent in the case of NPs with a definite article as well as quantified NPs like *iedere oude vrouw* "every old woman". Whereas such NPs may appear in either object position, as shown in (4), they do not normally appear in the low subject position of the existential construction in (5b).

(4) a. Ik wil het / ieder paard even vasthouden.
I want the / every horse PART hold
"I want to hold the / every horse for a minute."
b. Ik wil even het / ieder paard vasthouden.
I want PART the / every horse hold
"I want to hold the / every horse for a minute."

(5) a. De / iedere oude vrouw liep op straat.
the / every old woman walked on street
"The / every old woman was walking in the street."
b. * Er liep de / iedere oude vrouw op straat.
there walked the / every old woman on street

Thus, we see that the low subject position poses more severe restrictions on NPs occurring in this position than the low object position. However, this study will not be concerned with definite or quantified NPs, and it will only concentrate on sentences like (2a-b) and (3a).

The correlation of "specific" and "non-specific" readings with the high and low NP positions of Dutch adds another dimension to the acquisition problem. In the previous section, I asked the question of whether either the predicative, or the free variable interpretation of indefinites would pose particular difficulties to children. My hypothetical answer is, according to the non-integration hypothesis, that the latter interpretation may be delayed.

Now we may also ask whether the relation between the position and the interpretation of indefinites is the same for children as it is for adults. These combined questions constitute the research question of this study:

Research question:
How do children interpret high and low indefinite Noun Phrases compared to the adult interpretation?

The next section presents a number of interpretive characteristics that adult language attaches to indefinite NPs depending on whether they appear in a high or a low NP position.

4. The interpretive characteristics of high and low indefinite Noun Phrases

We can determine more fine-grained interpretive characteristics of high and low indefinite NPs than what is captured by the rather intuitive labels of "specific" and "nonspecific". The differences that I am concerned with in the present study are presented below.

4.1 Scope differences

We must keep in mind that there is no truth-functional opposition between (2a) and (2b). After all, if sentence (2a), expressing that the teacher wants to hold a particular horse, is true, sentence (2b), expressing that the teacher wants to hold something that matches the description "horse", is also true. In contrast, if the teacher wants something matching the description "horse", it is not necessarily the case that she has a particular horse in mind. Thus, we see that (2a) expresses more information than (2b). The teacher may choose not to convey this additional information. So, even in Dutch, there is no guarantee that the child will find an easy task in the Montessori farm game.

The difference between high and low indefinite NPs results in truth-functional differences only when scope taking elements appear in the utterance, as in (6):

(6) a. Die pestkop heeft een kind twee keer geslagen.
that bully has a child two time beaten
"That bully has beaten a (particular) child twice."

b. Die pestkop heeft twee keer een kind geslagen.
that bully has two time a child beaten
"That bully has beaten a (potentially different) child twice."

In (6a), *een kind* 'a child' is out of the scope of *twee keer* 'twice', such that for the sentence to be true, there must be a child that was beaten twice. In (6b), *een kind* 'a child' is in the scope of *twee keer*, such that the bully need not have hit the same child on both occasions. A number of experiments in this study investigate the interpretation of such scope differences as in (6)[4].

High indefinite NPs can also be out of the scope of higher operators, whereas this is impossible for low indefinite NPs:

(7) a. Het is onmogelijk dat Wenda een marsmannetje gister gezien heeft.
it is impossible that Wenda a martian yesterday seen has
"It is impossible that Wenda saw a Martian yesterday."

b. Het is onmogelijk dat Wenda gister een marsmannetje gezien heeft.
it is impossible that Wenda yesterday a martian seen has
"It is impossible that Wenda saw a (any) Martian yesterday."

From (7a) we can infer that the speaker believes in the existence of Martians: what she finds impossible to believe is that one was seen yesterday. This shows that *een marsmannetje* 'a Martian' is out of the scope of *onmogelijk* 'impossible'. From (7b), we cannot infer that the speaker believes in the existence of Martians. This shows that the low indefinite NP is in the scope of *onmogelijk* 'impossible'.

The focus of the present study is on the scope of indefinites in children's comprehension. However, scope properties are not the only distinctions between high and low indefinite NPs that play a role in their interpretation. The following sections describe non-truthfunctional characteristics of high indefinite NPs that must also be taken into account.

4.2 Interpretive guises for high indefinite Noun Phrases

Following de Hoop (1992) and Rullmann (1989), I distinguish several readings of high indefinites. These readings, which are salient for high indefinite NPs, are far less salient for low indefinites, or even absent. It is difficult to capture the readings of high indefinites in one common meaning component. The characterizations of high indefinites as "referential" in Fodor and Sag (1982), "presuppositional" in Diesing (1992), or "specific" in Enç (1991) does not capture all of the readings that high indefinites take. To my intuitions, Fodor and Sag's (1982) characterization comes closest to capturing them. In their analysis, some indefinites are insensitive to being in the syntactic scope of other elements by virtue of being referential.

[4] If the indefinite NP in (6a) receives a contrastive focus intonation, and the utterance is interpreted as a "correction" of a preceding utterance or interpretation, some adults may also sometimes accept a reading on which the high indefinite is in the scope of the operator to its right.

Fodor and Sag describe referential indefinites as follows (Fodor and Sag (1982:384)):

> "...Its [the referential indefinite's, I.K.] denotation will be the individual the speaker 'has in mind', as long as the descriptive content is true of that individual. Thus a referential indefinite can be regarded as an indexical phrase, where the function that determines its referent depends both on its descriptive content and on its context of use, and the latter is taken to include the psychological state of the speaker (...)."

However, I do not use this characterization for all wide scope indefinites, because it does not capture all readings of high indefinites, and because it has been observed that high indefinites may take intermediate scope (Farkas (1981), Ruys (1992), Abusch (1994)). Intermediate scope readings are incompatible with the notion of referentiality.

I distinguish three interpretations, which I call interpretive guises. A high indefinite may appear in a **specific guise**, in which case it refers to an individual that the speaker can identify. This description of the specific guise is based on Fodor and Sag's description of "referential" indefinites. High indefinite NPs fitting the label "specific" were already introduced at the beginning of the chapter: the teacher who asks for 'a horse' in (1) and (2a) has a particular horse in mind, namely the white one. The low counterpart in (2b) is nonspecific.

High indefinites may also appear in a **generic guise**, as in (8):

(8) Een dame drinkt niet.
"A lady does not drink."

In this study, the generic reading will be mostly ignored, as I consider the issue of genericity beyond the scope of this dissertation.

The third reading is the **source-set guise** (similar to, but not the same as, Rullmann's "concealed partitive" or de Hoop's "partitive").

(9) Mijn buren hebben verschrikkelijke huisdieren. Een hond heeft vannacht onze vuilnisbak leeggegeten.
"My neighbors have horrible pets. A dog emptied out our trash can last night."

On a source-set guise, the high indefinite NP is interpreted as referring to an individual that is part of a previously introduced set. In the case of (9), *een hond* 'a dog' is interpreted as being part of the set of the neighbors' pets. This particular example cannot be captured by Fodor and Sag's (1982) definition of referentiality: in the likely case that the neighbors have more than one dog, nobody, not even the speaker, will be able to identify the individual that emptied out the trash can. An additional example of a source-set guise appears in (10).

(10) De honden in dit asiel zijn vals. Twee honden hebben vandaag geprobeerd me te bijten.
"The dogs in this animal home are vicious. Two dogs tried to bite me today."

I do not consider the readings of the sentence initial indefinite subjects in (9) and (10) as fundamentally distinct, even if the latter is intuitively closer to the label "partitive" than the former.

With the source-set guise, we arrive at an important point: it is not the case that low indefinite NPs can never take readings that resemble those of high indefinite NPs. Like high indefinites, low indefinite NPs may also be interpreted as referring to individuals from previously introduced sets. However, such readings are less forceful in the case of low indefinites. Consider (11):

(11) a. Silvia was dolenthousiast over de jonge katjes bij de buren. Nu wil ze een klein lapjeskatje zo snel mogelijk kopen.
"Silvia was very excited about the neighbors' kittens. Now she wants to buy a small calico kitten as soon as possible."

?? Ze gaat er morgen één halen bij de dierenwinkel op de hoek.
"She is going to get one tomorrow from the petshop at the corner".

b. Silvia was dolenthousiast over de jonge katjes bij de buren. Nu wil ze zo snel mogelijk een klein lapjeskatje kopen.
"Silvia was very excited about the neighbors' kittens. Now she wants to buy a small calico kitten as soon as possible."

Ze gaat er morgen één halen bij de dierenwinkel op de hoek.
"She is going to get one tomorrow from the petshop at the corner".

The extension sentence in (11a) is incongruous, because one interprets the high indefinite NP *een klein lapjeskatje* 'a small calico kitten' as a member of the source set consisting of the neighbors' kittens. The sequence is not entirely ungrammatical, because it is possible to interpret the high indefinite *een klein lapjeskatje* in its specific guise, but this is dispreferred. In (11b) it is of course also possible that *een klein lapjeskatje* 'a small calico kitten' is one of the aforementioned pets. This is in fact a likely interpretation, since a hearer will try to interpret the sequence as a coherent text. However, interpreting the indefinite object NP as one of the set of kittens previously mentioned is far less compelling when the indefinite appears in the low position. Thus, although the sequence in (11b) may cause a few raised eyebrows, those eyebrows will not be raised nearly as high as in the case of the sequence in (11a). The difference between the source-set

guise for high indefinite NPs and a source-set reading for low indefinite NPs lies in the force with which the hearer is drawn to this reading.

The three interpretive guises that I have labeled here, specific, generic, and source-set, cover nearly all of the possible interpretations of high indefinites, but a few examples defy classification into these categories. I will return to this in Chapter 2.

4.3 The context requirement

Schouten, in her (1998) study on high indefinite subject NPs in Dutch literary texts, argues that these NPs must be related to the context. If a text does not provide the opportunity to link the indefinite subject to the linguistic context, the sentence initial position is not appropriate. I label this requirement on high indefinite NPs the "context requirement". As shown in examples (12) and (13), the context requirement also holds of high indefinite object NPs. Consider the sequence in (12). *Twee cakejes* 'two sponge cakes' is in a high position, to the left of both a temporal adverbial phrase and the particle *al* 'already'. It is interpreted in a source-set guise.

(12) ctxt. We gingen op verjaarsvisite bij mijn oma. Ze had *cakejes* gekocht.
"We went to visit my grandmother on her birthday. She had bought *sponge cakes*."

Jan had twee cakejes nog geen minuut nadat hij binnenkwam al verorberd.
"Within a minute after his arrival Jan had devoured two sponge cakes."

Now consider what happens when the source set is removed from the context:

(13) ctxt. We gingen op verjaarsvisite bij mijn oma.
"We went to visit my grandmother on her birthday."

a?? Jan had twee cakejes nog geen minuut nadat hij binnenkwam al verorberd.
"Within a minute after his arrival Jan had devoured two sponge cakes."

b. Jan had nog geen minuut nadat hij binnenkwam al twee cakejes verorberd.
"Within a minute after his arrival Jan had devoured two sponge cakes."

The sequence in (13a) is only marginally felicitous. In the same context, (13b), which contains a low rather than a high indefinite NP, is perfectly acceptable.

Due to the context requirement, sentences containing high indefinite NPs are sometimes judged only marginally felicitous when presented out of context (note that they are never straightforwardly judged ungrammatical). However, in spoken language the context requirement is less strict as compared to written texts. Broadcast news items constitute probably the most obvious exception:

(14) Een groep werknemers van NS Cargo op de Maasvlakte heeft vanochtend het werk neergelegd.
"A group of employees of NS Cargo at the Maasvlakte industrial area went on strike this morning."

The news item in (14) is perfectly felicitous, and similar sentences are very common. This shows that the context requirement is not absolute. On the contrary, felicity judgments of contextless sentences containing high indefinites vary from sentence to sentence, between speakers as well as within speakers. Judgments of the same sentence may vary even within one speaker. However, the intuition that high indefinite NPs are more felicitous when they appear with a context is salient and widespread, and therefore cannot be ignored in a study of children's interpretations.

The very existence of the context requirement on indefinite NPs is puzzling, because indefinite NPs are employed to convey information that is new to the hearer, and one would therefore not expect them to require a context. This requirement is not felt for low indefinite NPs, nor for definite NPs like *de oude vrouw* 'the old woman'. It would have been less surprising, in fact, had we found that the context requirement held of definite NPs, as these generally require an antecedent. However, only the high indefinite NPs, that do not have an antecedent, are often found infelicitous in the absence of context.

In this section, I have presented a number of semantic and pragmatic characteristics of the interpretation of high and low indefinites. The next section relates the investigation of these characteristics in child language to previous studies in language acquisition and to theoretical analyses of indefinites.

5. The study of indefinites in child language

In section 3, the research question underlying this study was formulated as follows: How do children interpret high and low indefinite Noun Phrases compared to the adult interpretation? The preceding sections have shown that the adult

interpretation of high and low indefinites involves the interaction of semantic, pragmatic, and, in Dutch, clearly also syntactic factors.

In seeking an answer to the research question, the present study may contribute to two areas of research: First, the acquisition of scope relations, in particular the question of whether and when NPs take wide or narrow scope relative to other elements. Second, the acquisition of the "specific/nonspecific" distinction of NPs as related to syntactic positions, also known as scrambling. The first area has not yet received much attention in the study of child language, particularly if we consider the large body of literature that this topic has inspired in theoretical linguistics – although, as we will see, there are exceptions. The correlation of syntactic positions and scope taking in Dutch provides an excellent opportunity to investigate scope taking in children's grammar.

The second area, that of the "specific/non-specific" distinction, is closely related to the first – as "specific" indefinites take wide, and "non-specific" indefinites take narrow scope. Schaeffer (1995, 1997) and in a smaller study also Eisenbeiss (1994) have studied the relation between NP interpretation and NP placement for object NPs in Dutch and German child language. These studies show that the pattern of placement of definite and indefinite NPs in children's language production is similar to that of adults by age 3 or 4. However, in production studies it is difficult to tell whether the children really intend the high NPs to have a "specific" interpretation. The present study aims at providing more insight into this issue by studying children's comprehension.

6. The study of child language in relation to theoretical analyses of indefinites

The non-integration hypothesis is in the first place a hypothesis about the relation of children's development of discourse and sentence-level interpretation. However, its predictions differ depending on which analysis of indefinite NPs one assumes. The results of the investigations in child language will therefore not only be evaluated with respect to Van Geenhoven's analysis of indefinites, but also with respect to Diesing (1992), de Hoop (1992), and the analysis underlying Schaeffer (1997).

In Van Geenhoven (1998), the indefinite NPs that typically appear in the low position are predicates, while the indefinites that typically appear in the high position are predicates that are accompanied by a free variable. This is crucially different from two other analyses of the same semantic distinction, proposed by Diesing (1992) and de Hoop (1992). According to the latter authors, high indefinite NPs are quantifiers. The authors differ in their views on low indefinite NPs. Diesing considers them narrow scope indefinites, introducing a variable that is bound by an existential closure operation. De Hoop considers them parts of the predicate, hence not full-fledged arguments.

These three analysis make different predictions for language acquisition, as they propose different relations between the syntactic position and interpretation of NPs. I will argue that neither Diesing's nor de Hoop's analyses predict the asymmetry in the acquisition of high and low indefinites that I predict on the basis of Van Geenhoven (1998). In addition, I will argue that Van Geenhoven (1998), and in principle also de Hoop (1992), can capture the findings in children's comprehension that I will present. Diesing (1992) cannot capture the findings, or only at a very high cost.

I hope that the discussion of the three semantic analyses, and the analysis of the pragmatic effects that will follow it, will provide the reader with an understanding of the subtle interplay of syntax, semantics and pragmatics of indefinites which the child acquiring Dutch needs to master.

Before ending this introductory chapter, I still need to settle a definitional matter.

7. Which NPs are indefinite?

The examples presented in this study mainly contain NPs with the indefinite article *een* 'a(n)' [5]. Although they are the only NPs whose interpretation is investigated in the experimental chapters, they are generally considered part of a larger class of indefinites. This larger class of indefinites contains roughly the NPs that are accompanied by a determiner that can appear in an existential sentence, as in (15).

(15) Er lopen veel/een paar/twee/drie/enkele vrouwen op straat.
(lit.) There walk many /a couple/two/three/some women in the street

All of these indefinites are sensitive to the distinction between the high and low NP position, although interpretations and preferences are not exactly the same. Bare NPs like *vrouwen* 'women' can also appear in existential sentences. They constitute a separate category that will not play a role in this study.

Indefinite NPs contrast with NPs that cannot appear in existential constructions:

(16) Er lopen/loopt *iedere/*alle/*de meeste/*sommige/*de vrouwen op straat.
(lit.) There walk(s) every/all/most/some/the women in the street.

I will use the term "strongly determined NPs" for NPs containing the determiners in (16), and sometimes "quantified NPs" for all of these NPs except those containing the definite article. This contrasts with the term "weakly determined",

[5] Although the spelling of the indefinite article *een* (containing schwa) is similar to that of the numeral *één* 'one', these words are pronounced differently.

which I will use for the indefinites in (15). I merely use these terms to denote combinations of lexical items, and do not want to enter into the discussion on the nature of the "strong-weak" distinction, nor do I a priori want to commit myself to any one of the definitions of "strong" and 'weak" (for an overview of the discussion on the strong-weak distinction, see Reuland and ter Meulen (1987), McNally and Van Geenhoven (1997)). I further assume that only strongly determined NPs translate as "quantifiers" in the sense of Barwise and Cooper (1981).

I also assume that indefinites are not anaphoric, in the sense that they cannot refer to a previously mentioned referent, and that they cannot trigger presuppositions (Kamp and Reyle (1993), Van Geenhoven (1998)). Their lack of anaphoricity is illustrated in (17).

(17) a. Ulrike had received a letter$_i$ from Petra. The letter$_i$ was sent from Germany.
b. * Ulrike had received a letter$_i$ from Petra. A letter$_i$ was sent from Germany.

The definite NP in (17a) is anaphoric to the NP introduced in the preceding sentence. This relation is not possible for the indefinite in (17b), in which the reference of the NP *a letter* in the second sentence cannot be set equal to the reference of *a letter* in the first.

8. Overview

Chapter 2 contains the background to this dissertation, addressing the question of which aspects relevant to the interpretation of indefinites children must master. Chapter 3 relates the acquisition of the distinction between high and low indefinites to the development of discourse in children. Chapter 4 presents the non-integration hypothesis, the core idea that guides the research in subsequent chapters, and an initial experiment investigating children's interpretation of high indefinites in a narrative context. Chapters 5 and 6 contain experimental investigations of children's wide and narrow scope interpretations of indefinites. Chapter 7 presents a summary of the dissertation and the conclusions, and some final remarks.

SEMANTICS AND PRAGMATICS OF INDEFINITES

CHAPTER 2

1. Introduction

This chapter presents three semantic proposals of mechanisms that underlie the distinction between high, wide scope indefinites, and low, narrow scope indefinites, as well as a pragmatic account of the context requirement and interpretive guises. In the first part, sections 2 to 5, I present the formal semantic analyses of Diesing (1992), de Hoop (1992) and Van Geenhoven (1998). The focus of these three analyses is not entirely similar: Diesing (1992) and de Hoop (1992) put more weight on the relation between syntax and semantics than Van Geenhoven (1998). They also put more weight on what I have labeled the non-truthfunctional characteristics of high indefinites: interpretive guises and the context requirement. This is especially true of de Hoop (1992), who takes the different interpretive guises of high indefinite NPs as a starting point. Van Geenhoven's main concern is to account for the scope properties of high and low indefinite NPs. All three approaches have in common that they attempt to provide a semantic characterization of high and low indefinites that explains, or is compatible with, all of the interpretive characteristics mentioned in Chapter 1.

The analysis presented by Van Geenhoven (1998) constitutes the background to the hypothesis formation and experimentation regarding children's comprehension in subsequent chapters. There are two related reasons for choosing this analysis. First, it is able to capture data that the other analyses cannot capture, and secondly, it does not draw a direct parallel between the high-low indefinite distinction and that between strongly and weakly determined NPs. In recent literature, objections have been formulated against drawing this parallel (Ruys (1992), Abusch (1994), Reinhart (1995, 1997)).

Why then, the reader may ask, present Diesing's and de Hoop's "quantificational" analyses at all? There are several reasons. One is that I will argue that the quantifier approaches and Van Geenhoven's approach lead to

different predictions for language acquisition. The outcomes of the experiments in Chapters 4 and 5 may thus provide support or fail to provide support for one or the other approach, or perhaps point to a direction in which the analyses might be extended. Another reason for presenting three approaches rather than just Van Geenhoven's is that in order to interpret the results in the experimental chapters, the reader must appreciate the distinction that children have to acquire. A comparison of the different approaches may prove helpful to native speakers of Dutch and especially to those who do not have native speaker intuitions to guide them. Furthermore, I hope that the presentation of different analyses will help those who may normally be less concerned with NP semantics to put the issue of the different interpretations of indefinites into perspective.

The final part of this chapter provides an account of the context requirement and the interpretive guises. Van Geenhoven's analysis does not provide this, as it is strictly an account of truthfunctional differences. I believe that an account of the non-truthfunctional characteristics should also be part of this study. First of all, because such characteristics play a role in any occurrence of a high indefinite NP, and thus co-determine the children's interpretations in the experiments. Secondly, because leaving out an account of these characteristics is unsatisfactory, as they are very salient. I propose that the context requirement and the interpretive guises are pragmatic effects. They are the result of an interaction of the inferential process of "bridging" (Clark (1977)) and the mechanism that Van Geenhoven proposes to account for the non-narrow scope interpretations of high indefinites.

This chapter is set up as follows: section 2 presents Diesing's (1992) analysis of indefinites, as well as some data that it fails to capture. Section 3 presents de Hoop's (1992) analysis, as well as some problematic data. Section 4 gives an overview of Van Geenhoven's analysis of indefinites. Section 5 briefly discusses some differences between the analyses. Section 6 presents an analysis of the context requirement and the interpretive guises of high indefinite NPs. Section 7 contains a summary of the chapter.

2. Diesing (1992)

Diesing's proposal has two main components. First, she proposes that indefinite NPs can be divided into cardinal NPs, which receive an existential interpretation, and quantifiers. Secondly, she proposes that there is direct mapping from the syntactic position of an NP to its interpretation as either a quantifier, or an existential. In what follows, I present the two main parts of Diesing's proposal, followed by some Dutch data that are problematic for the Mapping Hypothesis.

2.1 The proposal

According to Diesing (1992), indefinite NPs are ambiguous between variables and quantifiers. The variables are existentially bound through Heim's existential closure operation, which binds the so-called nuclear scope of the sentence. Following Heim (1982), sentence (18a) consists only of a nuclear scope, as we see in (18b).

(18) a. A woman stroked a cat.
b. $\exists$x, y [woman (x) & cat (y) & x stroked y]

Only sentences containing weakly determined NPs can be represented in this way. Sentences that contain strongly determined NPs require a more complicated structure, a so-called tripartite structure. As the strong determiner *every* in (19a) must apply to a set that is restricted to women, and not to the intersection set containing women who stroke cats, it gives rise to restrictive clause formation. The Heimian tripartite structure in (19b) translates as the predicate logical formula in (19c).

(19) a. Every woman stroked a cat.
b. $\forall x_{\text{Quantifier}}$ [woman (x)]$_{\text{Restrictive Clause}}$ $\exists$y [cat (y) & x stroked y]
Nuclear Scope
c. $\forall x$ [woman (x) $\rightarrow$ $\exists$y [cat (y) & x stroked y]]

Diesing's main goal is to analyze how a Heimian tripartite structure can be derived on the basis of a syntactic representation. The first part of her proposal is that indefinites may also be quantifiers, like the strongly determined *every woman* in (19). Diesing argues that some indefinite NPs have an existential presupposition, presenting generic and partitive interpretations of indefinites as examples of presuppositional interpretations. She argues that presuppositionality is an indication of restrictive clause formation, hence an indication of quantifierhood. According to this analysis, all presuppositional NPs are quantifiers, so this includes both strongly quantified NPs and "quantificational" indefinites. Diesing (1992) is not concerned with definite NPs. I assume that she considers them variables, as in Heim (1982), however, following the argument that presuppositional NPs are quantifiers, definite NPs should be analyzed as quantifiers too.

Quantificational indefinites give rise to projection of a restrictive clause and presuppose their domain just like strongly quantified NPs. If the object NP *a cat* in sentence (20a) were analyzed as a quantified NP, while the subject NP were interpreted as a non-quantificational indefinite, the representation would look like (20b).

(20) a. A woman stroked a cat.

b. $\exists y$ $_{\text{Quantifier}}$ [cat (y)] $_{\text{Restrictive Clause}}$ $\exists x$ [woman (x) & x stroked y]$_{\text{Nuclear Scope}}$

In (20), the indefinite *a cat* is outside the nuclear scope because it is a quantifier. The subject NP remains in the nuclear scope. In spite of the different status of the indefinite NP, representation (20b) does not result in a meaning different than (18b), in which the indefinite object NP is not a quantifier. The sentence means that there is a woman and there is a cat such that the woman stroked the cat. However, due to the proposed quantifier status of the indefinite object NP, we can derive a difference for a sentence like (21) if we assume that both NPs are quantifiers:

(21) a. Every woman stroked a cat.

b. $\exists y$ $_{\text{Quantifier}}$ [cat (y)] $_{\text{Restrictive Clause}}$ [$\forall x$ $_{\text{Quantifier}}$ [woman (x)] $_{\text{Restrictive Clause}}$ [x stroked y] $_{\text{Nuclear Scope}}$]

c. $\forall x$ $_{\text{Quantifier}}$ [woman (x)] $_{\text{Restrictive Clause}}$ [$\exists y$ $_{\text{Quantifier}}$ [cat (y)] $_{\text{Restrictive Clause}}$ [x stroked y] $_{\text{Nuclear Scope}}$]

Since both the subject and the object NPs are analyzed as quantifiers, they both move out of the VP and adjoin to IP. Thus, there are two IP layers. As material in IP is mapped into a restrictive clause, there is a restrictive clause embedded under the highest restrictive clause in either representation. There are two possible orders of the quantifiers, such that in (21b) we derive the object wide scope reading that there is a cat such that all women stroke it, and in (21c) we derive the subject wide scope reading that all women stroke a cat.

The second part of Diesing's proposal is that the status of an NP as either a quantifier or an existential can be directly read off of the syntax, guided by the Mapping Hypothesis:

(22) **Mapping Hypothesis**
Material from VP is mapped into the Nuclear Scope.
Material from IP is mapped into a Restrictive Clause.

This would explain the interpretive characteristics that are associated with the high and low NP positions in German. Diesing presents the following example:

(23) a. ... weil ja doch Kinder auf der Strasse spielen.
... since PART PART children on the street play
".. since there are children playing in the street"
b. ... weil Kinder ja doch auf der Strasse spielen.
... since children PART PART on the street play
".. since in general, children are playing in the street"

The bare plural *Kinder* 'children' in (23a) has an existential reading, as evidenced, according to Diesing, by the fact that it can be paraphrased by an existential construction. The bare plural indefinite NP in (23b) has a generic reading, which she assumes to be quantificational, and it can be paraphrased by a sentence containing *in general*. Diesing assumes that the low subject position is VP-internal and that the high subject position is in IP. According to the Mapping Hypothesis, the low indefinites in VP map into the nuclear scope, and the high indefinites in IP map into a restrictive clause, the determiners of the latter moving to a higher quantifier position at the covert interpretive level of Logical Form (LF), from which they bind a variable in the restrictive clause.

Diesing argues that in German, as would be the case for Dutch, the distinction between quantificational and non-quantificational indefinites must be visible at S-structure, hence the distinct positions for the subject NPs in (23). Other languages, like English, rely on movement of the NPs at LF. In this manner, the Mapping Hypothesis would explain why different interpretations of indefinites are associated with distinct syntactic positions.

Although Diesing (1992) focuses on the distinction between high and low subject NPs rather than object NPs, the analysis makes predictions about the latter category as well. On the assumption that the high object position is VP-external, the Mapping Hypothesis successfully predicts that the low object NP *een kat* 'a cat' in (24) always takes narrow scope with respect to *iedere vrouw* 'every woman' and that its high counterpart in (25) may take wide scope.

(24) a. ...[$_{CP}$ dat [$_{IP}$ iedere vrouw [$_{VP}$ voorzichtig een kat geaaid heeft.]]]
"...that every woman carefully stroked a (just any) cat."
b. $\forall x$ $_{\text{Quantifier}}$ [woman (x)] $_{\text{Restrictive Clause}}$ $\exists y$ [cat (y) & x carefully stroked y] $_{\text{Nuclear Scope}}$

According to the Mapping Hypothesis, the low position object indefinite in (24a) must map into the nuclear scope and is bound by existential closure, hence it cannot take scope outside the VP. In (25a), on the other hand, the object NP's high position ensures that it maps into the restrictive clause and is interpreted as a quantifier. This results in the separate representations (25b) and (25c), since, following May (1977), Diesing assumes that multiple quantifier positions are available. Either quantifier may end up in the higher position, and, accordingly, take wide scope.

(25) a. ... [$_{CP}$ dat [$_{IP}$ iedere vrouw een kat$_i$ [$_{VP}$ voorzichtig t$_i$ geaaid heeft.]]]
"...that every woman carefully stroked a (particular) cat."

b. $\exists y$ $_{Quantifier}$ [cat (y)] $_{Restrictive\ Clause}$ [$\forall x$ $_{Quantifier}$ [woman (x)] $_{Restrictive\ Clause}$ [x carefully stroked y] $_{Nuclear\ Scope}$]

c. $\forall x$ $_{Quantifier}$ [woman (x)] $_{Restrictive\ Clause}$ [$\exists y$ $_{Quantifier}$ [cat (y)] $_{Restrictive\ Clause}$ [x carefully stroked y] $_{Nuclear\ Scope}$]

If *een kat* 'a cat' ends up in the higher quantifier position, (25b) is derived: there is a particular cat such that every woman stroked it. If *iedere vrouw* 'every woman' ends up higher than the existential quantifier, (25c) is derived: for every woman there is a cat that she stroked. Diesing argues that (25c) represents a separate reading that is not the same as (24b). On the reading corresponding to (25c), *een kat* 'a cat' is perceived as intuitively "specific" or "a cat specific to each of the women". However, the truth conditions for (24b) and (25c) are the same, and Van Geenhoven (1998) argues that this so-called "narrow presuppositional" reading is not a separate reading.

2.2 Some problematic data

Different aspects of the Mapping Hypothesis have been criticized, for different reasons (see de Hoop (1992), Reinhart (1995), Pinto (1997), Van Geenhoven (1998)). Here I focus on some Dutch facts. I will conclude, following de Hoop (1992), that the Mapping Hypothesis can only explain the Dutch facts about indefinite NPs at the cost of making wrong predictions about definite NPs, overt partitives and strongly quantified NPs.

The Mapping Hypothesis predicts that all presuppositional NPs appear in IP, rather than VP. In German, this requirement holds at S-structure, and I assume that the same should hold for Dutch. Thus, the Mapping Hypothesis predicts that presuppositional NPs only occur in the high argument positions, never in the low ones. De Hoop (1992) shows that this is not in accordance with the data. While it is certainly true that presuppositional NPs appear more often in the high positions, they are by no means excluded from the low positions. De Hoop presents examples like the one in (26):

(26) Q Is Gaby alle honden aan het uitlaten?
Is Gaby walking all dogs?

A Nee hoor, er lopen twee van de honden in de tuin.
no INTERJ there walk two of the dogs in the garden
"No, two of the dogs are walking in the garden."

In this example, the overt partitive NP *twee van de honden* appears in the low subject position, contrary to the prediction of the Mapping Hypothesis (Diesing argues that partitive interpretations are typical of high, quantificational NPs). In addition, the partitive NP comes with an existential presupposition due to the definite article *de* 'the', whereas according to the Mapping Hypothesis, presuppositional NPs must be in the high position (in IP, on the syntactic assumptions underlying Diesing (1992)).[6]

The Mapping Hypothesis seems to fit the pattern of object placement in Dutch even less than that of subject placement. Consider the examples in (27), which contain presuppositional object NPs in the low position:

(27) a. ... dat Silvia gisteren de hond geaaid heeft.
"... that Silvia stroked the dog yesterday."
b. ... dat Silvia gisteren twee van de honden geaaid heeft.
"... that Silvia stroked two of the dogs yesterday."
c. ...dat Silvia gisteren alle honden geaaid heeft.
"...that Silvia stroked all dogs yesterday."

Contrary to what we would expect if presuppositional objects should be mapped to a high position, Dutch allows a definite NP (27a), an overt partitive (27b) and even a strongly quantified NP (27c) in the low object position. When discussing English examples, Diesing mentions that presuppositional object NPs may be raised to IP at LF. However, if LF-raising were the explanation of the examples in (27), an additional explanation would be needed for the optionality of S-structure raising in Dutch. I conclude that the Mapping Hypothesis can in principle explain the interpretations of most Dutch indefinite NPs, but that it makes incorrect predictions about other kinds of NPs.

3. De Hoop (1992)

Like Diesing (1992), de Hoop (1992) proposes that high indefinite NPs are quantifiers, while low indefinite NPs are not. The differences between the two approaches are numerous, however. De Hoop takes a modular approach, seeking an explanation for the relation between interpretation and position in the interaction of independent principles of syntax and semantics. In de Hoop's account, high

[6] In addition, Diesing (1992) argues that subjects of individual-level predicates must be in IP. De Hoop provides an example which shows that this does not hold of Dutch, given the acceptability of i.:

i. Els zegt dat er twee eenhoorns intelligent zijn.
"Els says that two unicorns are intelligent."

The subject NP of the embedded sentence, *twee eenhoorns* 'two unicorns' is VP-internal, as indicated by its position to the right of existential *er*. Nevertheless, it felicitously combines with the individual-level predicate *intelligent zijn* 'be intelligent'.

indefinite NPs do not appear in a high position in order to be able to receive a quantificational interpretation, but rather, quantificational NPs receive a kind of Case that allows them to appear in a high position, unlike non-quantificational NPs. Thus, the analysis captures the fact that quantificational NPs appear in both high and low positions, whereas non-quantificational NPs may appear only in the low position. Another difference between de Hoop's and Diesing's approaches is that de Hoop rejects Diesing's proposal that strongly determined NPs and high indefinite NPs all share the interpretive characteristic of "presuppositionality". Rather, she distinguishes several interpretations that occur both with strongly determined NPs and high indefinite NPs, arguing that these interpretations have in common that they require the projection of a restrictive clause.

3.1 The proposal

De Hoop (1992) argues that high indefinite NPs always have one of three interpretations: referential, partitive, or generic[7]. To illustrate the interpretations of high indefinite subject NPs, de Hoop presents English sentences with individual-level predicates, which force readings on the sentence initial subject NPs similar to those of Dutch high indefinite subjects. For object NPs, she provides Dutch sentences with high indefinite object NPs. Both sets of examples are presented below (de Hoop (1992), p. 50).

(28) a. A friend of mine is a paleontologist. (referential)
b. Two fishes are black. (partitive)
c. Fishes are vertebrates. (generic)

(29) a. ...dat de politie een kraker gisteren opgepakt heeft. (referential)
"...that the police arrested a squatter yesterday."
b. ...dat de politie twee krakers gisteren opgepakt heeft. (partitive [8])
"...that the police arrested two squatters yesterday."
c. ...dat de politie krakers altijd oppakt. (generic)
"...that the police always arrest squatters."

De Hoop calls the readings of the indefinites in (28) and (29) "strong" readings and argues that they are Generalized Quantifiers (Barwise and Cooper (1981)). These "strong" readings are typical of strongly quantified NPs *every N*, *most N*, etc., and they contrast with "weak" readings, which are typical of low indefinite NPs. NPs with "weak" readings are either modifiers of the verbal predicate or

[7] De Hoop also distinguishes between generic and generic collective, which makes in effect four interpretations.

[8] In de Hoop's examples, "partitive" readings always contain determiners like *many*, *some*, or numerals. Thus, the "source-set guise" that I presented in the previous chapter is covered only partly by de Hoop's "partitive" reading. Simple indefinites that I labeled "source-set guise" must be labeled "referential" according to de Hoop's classification.

referential. Consider first (30) (de Hoop (1992) p. 108), in which the NP *enkele kilometers* 'some kilometers' in (30) is not a real object, but rather functions as a predicate modifier (see also van Hout (1996)):

(30) Ik heb gisteren enkele kilometers gereisd.
"I traveled some kilometers yesterday."

Now consider (31), in which the object NP *enkele artikelen* 'some articles' has a referential reading according to de Hoop (De Hoop (1992) p. 108)).

(31) ...omdat een krant meestal enkele artikelen bevat.
"...because a newspaper usually contains some articles."

De Hoop argues that the object NP *enkele artikelen* 'some articles' in (31) is not a full-fledged argument, but part of the predicate just like the NP *enkele kilometers* in (30). This is supported by the fact that neither object NP can be the subject of passivization, as (32) shows.

(32) a. *...omdat enkele kilometers gisteren door mij gereisd zijn.
"...because some kilometers were traveled by me yesterday."
b. *...omdat enkele artikelen meestal door een krant bevat worden.
"...because some articles are usually contained by a newspaper."

In this light, de Hoop's account of the fact that individual-level predicates trigger "strong" readings of indefinite subject NPs is of interest. Consider the following example. For *two cats* in (33a), which contains the stage-level predicate *pur*, both a "weak", existential reading and a "strong" reading are allowed, the latter of which is characterized by de Hoop as partitive. For (33b), which contains the individual-level predicate *be black*, only the "strong", partitive reading is available (de Hoop (1992) p. 128).

(33) a. Two cats are purring.
b. Two cats are black.

According to de Hoop's analysis, NPs on their weak reading are part of the predicate and thus cannot serve as arguments of the predicate. It is then expected that the subject NP in (33b) cannot receive a weak interpretation, because in that case the subject NP could not be an argument of the predicate *be black*, and the sentence would be empty of predication. The subject NP in (33a), on the other hand, can receive a weak interpretation, because stage-level predicates come with an additional implicit argument (de Hoop follows Kratzer (1989)). Thus, the implicit argument provides the necessary ingredient for a predication relation, so

that *two cats* in (33a) does not need to be an argument and may have a weak, part-of-the-predicate interpretation.

In fact, then, de Hoop (1992) distinguishes NPs in two ways: as quantifiers versus non-quantifiers, and as full-fledged arguments versus non full-fledged arguments. In my opinion, the latter distinction is not necessarily dependent on the first. The intuition behind it is akin to the one underlying Van Geenhoven's (1998) analysis, which will be presented in section 4.

The next step is to consider the second part of de Hoop's proposal, which deals with the relation between NP position and interpretation. De Hoop proposes that quantificational NPs, which have "strong" readings, must receive strong structural Case. This Case is assigned at S-structure, unlike the weak structural Case of non-quantificational NPs. Weak Case is licensed in the D-structure subject and object positions, and as a result NPs with a "weak" reading are confined to their D-structure, i.e. low, positions. NPs that receive strong Case, on the other hand, may move to another position, because strong Case can be licensed in either position. The analysis thus predicts that "strong" interpretations occur both in high and low NP positions, and that "weak" interpretations only occur in low positions.

3.2 Some problematic data

As noted in de Hoop (1992), contrary to what one might expect on the Case analysis, indefinite object NPs cannot appear in a high position in all sentences. Note the contrast in (34):

(34) a. ...omdat ik een kat altijd liefheb.
"...because I always love a cat"
b. *...omdat ik een kat altijd heb.
"...because I always have a cat"

In (34a), the indefinite *een kat* 'a cat' may appear in the high object position, whereas in (34b), which contains the verb *hebben* 'have' rather than *liefhebben* 'love', this is not possible. De Hoop (1992) accounts for the infelicity of (34b) by a Principle of Contrastiveness, which states the context should raise at least one possible alternative for the predicate of a quantificational NP. The predicate is then marked by contrastive stress. (34b) is ruled out because no alternatives to the predicate *hebben* 'have' are available. However, Reinhart (1995) points out that this wrongly predicts that strongly quantified NPs can only appear with verbs that are contrastive. (35), read with a contrastive stress on *glazen* 'glasses' shows that this prediction is not borne out.

(35) ...dat ik alle GLAZEN pak.
"...that I take all glasses."

Pak 'take' is not contrastive. In spite of this, the quantifier *alle glazen* can appear with this predicate. De Hoop (1997) tackles this problem in a different way, abandoning the Principle of Constrastiveness and adopting the analysis of low indefinite NPs of Van Geenhoven (1998). On that analysis, low indefinites are property arguments that are semantically incorporated by the verb. Some verbs, like *hebben* 'have' in (36), are obligatorily incorporating. A sentence like (36b) is ruled out because the verb must combine with a property argument, while the indefinite NP's high position indicates that the indefinite is not a property argument.

(36) a. Ze wenste dat ze vroeger een opa had gehad.
she wished that she in-the-past a grandfather had had
"She wished that she had had a grandfather when she was little."
b. *Ze wenste dat ze een opa vroeger had gehad.
she wished that she a grandfather in-the-past had had

(34b) is ruled out for the same reason as (36b).

Another piece of problematic data is the lack of partitive interpretations for low indefinites that are in the scope of negation. De Hoop (1992) predicts that "strong" interpretations occur both in high and low argument positions. The following sentence pair is presented as evidence that partitive interpretations occur in both the low position (37a) and the high position (37b).

(37) a. ...omdat Jan-Wouter altijd twee films mooi vindt.
"...since Jan-Wouter always likes two movies."
b. ...omdat Jan-Wouter twee films altijd mooi vindt.
"...since Jan-Wouter always likes two movies."

According to de Hoop, both the low object NP in (37a) and the high NP in (37b) may refer to two movies of a previously mentioned set, hence she characterizes both as partitive interpretations. However, when the intervening element is a VP negator as in (38), the low NP cannot have a partitive interpretation, contrary to de Hoop's prediction:

(38) a. ...omdat Silvia nooit twee honden aait.
"...because Silvia never strokes two dogs."
b. ...omdat Silvia twee honden nooit aait.
"...because Silvia never strokes two dogs."

Twee honden 'two dogs' can only have a partitive reading in its high position in (38b), while in (38a) such a reading is excluded. If the object NP *twee honden* in (38a) were a quantifier, it should be able to escape from the scope of the negation.

De Hoop's analysis cannot account for this interaction between the scope of the negation operator and the partitive interpretation.

Unlike de Hoop, I believe that the high and low object NPs in (37) and (38) do not both share the same "partitive" interpretation, and that their similarity is really a pragmatic effect. One need not assume that the tendency to interpret the low indefinite *twee films* 'two movies' in (37a) as part of some previously introduced set is due to some structural property of the NP. Rather, it is the result of the general tendency of language users to interpret utterances as connected to preceding discourse. This tendency has no effect in (38a), because the existential operator binding the indefinite is embedded under negation. Van Geenhoven, whose analysis captures the facts in (37) and (38), also makes this point (Van Geenhoven (1998) p. 237). According to the latter analysis, only high indefinites can be true partitives, because they come with a variable that may trigger the membership relation between the indefinite and a source set. Low indefinites are analyzed as predicative expressions, which lack a variable that might trigger this membership relation. Only predicative expressions that are overtly marked as partitive, such as *one of the N* can have a partitive interpretation, since the embedded presupposition *the N* translates as a variable.

4. Van Geenhoven (1998)

As I pointed out in section 3, de Hoop (1992) proposed that low indefinite NPs, as parts of the predicate, stand in a different relation to the verb than high indefinite NPs. Object NPs may be predicate modifiers, in which case the object NP is not a real argument at the semantic level even though the verb is syntactically transitive. Van Geenhoven (1998) takes this idea one step further, distinguishing between indefinites that are interpreted as properties and indefinites that are interpreted as free variables. Property denoting NPs typically appear in low subject and object positions, and these property arguments are semantically incorporated into the verb. Thus, verbs combining with low indefinite NPs have in fact an intransitive argument structure, whereas verbs combining with a high indefinite NP are truly transitive. On this view, most verbs have two separate entries in the lexicon.

Before proceeding to an overview of how Van Geenhoven's analysis accounts for the interpretations associated with high and low indefinites in Dutch, I make a digression to draw attention to the intermediate scope readings of indefinites. Van Geenhoven's analysis was in part motivated by the observation that such readings exist.

4.1 Intermediate scope readings of indefinites

The observation made by Farkas (1981) (see also Ruys (1992) and Abusch (1994)) that indefinites may take intermediate scope readings has played a major role in Van Geenhoven's rejection of a characterization of high indefinites as quantifiers

of the same type as *most N*, or *all N* [9]. High indefinites may take non-narrow scope even if they are in positions in which strongly quantified NPs can only be interpreted *in situ*. (39) contains the translation into Dutch of an example from Abusch (1994), which illustrates that the high indefinite may escape a scope island.

(39) Iedere auteur in deze kamer veracht iedere uitgever die een boek dat als pornografisch was bestempeld niet wilde uitgeven.
every author in this room despises every publisher who a book that as pornographic was stamped not wanted publish
"Every author in this room despises every publisher who would not publish a book that was deemed pornographic."

Three readings exist for the high indefinite object NP *een boek dat als pornografisch was bestempeld* 'a book that was deemed pornographic': a narrow, intermediate and wide scope reading:

NARROW: For each publisher *p* for whom there is a book that was deemed pornographic it is the case that each author in this room despises *p*.

INTERM: For each author *a* in this room there is a book *b* that was deemed pornographic such that *a* despises every publisher who would not publish *b*.

WIDE: There is a book *b* that was deemed pornographic and each author in this room despises every publisher who would not publish *b*.

The crucial point of this observation is that strongly quantified NPs cannot take scope outside the relative clause. (40) illustrates this point.[10]

(40) Iedere auteur in deze kamer veracht iedere uitgever die haast ieder boek dat als pornografisch bestempeld was niet wilde uitgeven.
every author in this room despises every publisher who nearly every book that as pornographic stamped was not wanted publish
"Every author in this room despises every publisher who would not publish nearly every book that was deemed pornographic".

For *haast ieder boek* 'nearly every book' in (40), only the in situ reading exists:

[9] For a discussion of other objections raised against equaling wide scope indefinites to strongly quantified NPs, see Krämer (1999).

[10] I follow Abusch' suggestion of using *haast ieder boek* 'nearly every book', rather than 'every book'. The reason for this is that many people, including me, can only have set-readings of *ieder boek* 'every book', which makes it impossible for us to even imagine the readings that are ruled out.

NARROW:	Every author *a* despises every publisher who refused nearly every book that was deemed pornographic.
*INTERM:	For every author *a* in this room it is the case that for nearly every book that was deemed pornographic *b*, *a* despises every publisher who would not publish *b*.
*WIDE:	For nearly every book *b* that was deemed pornographic it is the case that every author in this room despises every publisher who would not publish *b*.

We see that the quantified NP *haast ieder boek* 'nearly every book' must take scope inside the relative clause. Unlike the high indefinite in (39), it cannot move out of the scope island. This shows that the scope properties of high indefinites are not the same as those of strongly quantified NPs. Van Geenhoven concluded that an analysis of narrow and non-narrow scope indefinites (low and high indefinites) must be able to capture intermediate readings, and that a characterization of high indefinites as quantifiers cannot capture the data.[11]

4.2 Indefinites as property arguments and semantic incorporation

Van Geenhoven takes as a starting point the view of Kamp (1981) and Heim (1982) that indefinites are variables. Her account differs from the Kamp-Heim view in that she argues that indefinite NPs do not themselves *introduce* a variable. She distinguishes indefinite NPs that denote a property and indefinite NPs that denote an open proposition. Van Geenhoven proposes that property-denoting NPs receive their existential interpretation through the verb (adopting and extending the analysis of bare plurals in Carlson (1977)). They are interpreted as predicates of a variable that is introduced by the verb. The indefinites that denote an open proposition carry both predicative content and a free variable. The latter are interpreted through accommodation.

Consider the following sentence pair:

[11] Like Van Geenhoven (1998), Reinhart's (1997) analysis of the derivation of non-narrow scope of indefinite NPs is also designed to capture intermediate readings. Another similarity between these analyses is that both authors reject analyzing indefinites as ambiguous between strong quantifiers and "true", weak, indefinites. In Chapter 4, I will argue that different predictions arise for language acquisition depending on whether one assumes the analyses of Diesing (1992) and de Hoop (1992), which assume such an ambiguity, or the analysis proposed by Van Geenhoven. For Reinhart's approach, predictions should pattern along with those for Van Geenhoven, although the hypothesis would have to be couched in very different terms.

(41) a. Wenda heeft marsmannetjes gezien.
"Wenda saw Martians."
b. Wenda heeft allevier de marsmannetjes gezien.
"Wenda saw all four Martians."

The bare plural *marsmannetjes* 'Martians' in (41a) denotes a predicate. This NP combines with the verb *zien* 'see', which in this case is not a "true" transitive, but rather it incorporates the property *marsmannetjes*. Roughly, we can say that the occurrence of *zien* 'see' entails that there is something that is seen: this is how the verb introduces a variable for its internal argument. *Marsmannetjes* is interpreted as a predicate over this variable. The mechanism by which verbs are able to combine with property arguments is called "semantic incorporation". Note that semantic incorporation applies to nominals that are morphologically incorporated as in, for instance, West-Greenlandic, but also to nominals that are not morphologically incorporated, of which (41a) is an example. For (41a), semantic incorporation causes the formation of a predicate which denotes: "to see Martians". In contrast, the verb in (41b) denotes a relation between the arguments *Wenda* and *allevier de marsmannetjes*. In this case, *zien* is truly transitive.

For (41a) and (41b), the facts are relatively clear, since a bare plural NP must incorporate, whereas a strongly determined NP does not normally incorporate into the verb[12]. NPs that have a weak determiner, however, can both have an interpretation as a property and as a free variable indefinite. Consider (42):

(42) Wenda heeft een marsmannetje gezien.
"Wenda saw a Martian."

The indefinite in (42) is potentially ambiguous, however, Van Geenhoven claims that object indefinites are interpreted as predicates unless there is some signal that this should not be the case. Placing the object to the left of an intervening element as in (43) serves as such a signal in Dutch.

(43) Wenda heeft een marsmannetje gisteren gezien.
"Wenda saw a Martian yesterday."

Van Geenhoven (1998) regards the high placement of object NPs as a language-specific means of marking a non-incorporating argument. Other means of marking the same distinction are Case marking in the languages that have the overt "strong" and "weak" Case marking that de Hoop (1992) discusses (e.g., Turkish, Finnish), as well as overt incorporation of arguments in, for instance, West Greenlandic.

[12] For an analysis of incorporating definite NPs as in *de mazelen hebben* 'to have the measles', see de Hoop and van der Does (1998).

The "decision" in favor of a property or a free variable interpretation of indefinite object NPs is made in the lexicon, by selection of either a transitive, or an intransitive lexical entry of a verb. The situation with respect to indefinite subject NPs is different. On the assumption that verbs do not subcategorize for subject arguments, the "decision" in favor of a property or free variable interpretation of the indefinite subject NP cannot be made in the lexicon. Van Geenhoven suggests that indefinite subject NPs can only incorporate if the VP is turned into an incorporating construction. She suggests that an existential expletive element may enable the VP to incorporate the indefinite subject NP. This expletive element is overt in Dutch (*er* 'there'), and may be implicit in a language like English.

4.3 Deriving the narrow scope properties of predicative indefinites

Van Geenhoven (1998) elaborates upon Carlson's (1977) proposal that the existential interpretation of bare plurals derives from the verb. She presents the following example from Carlson (1977):

(44) a. John didn't see spots on the floor.
b. It is not the case that John saw spots on the floor.
c. * There were spots on the floor that John didn't see.

(44a) only has the reading in (44b). The bare plural *spots* depends on the verb for its existential interpretation, because it is absorbed by the verb as a predicate of its internal argument's variable. Informally, we can say that semantic incorporation leads to the formation of the complex predicate "see spots". It follows from semantic incorporation that *spots* cannot escape from the scope of negation, since, if the verb is embedded under negation, the semantically incorporated indefinite will be, too. Let us now consider a Dutch example:

(45) Marianne heeft geen marsmannetje gezien.
Marianne has no Martian seen
"Marianne did not see a Martian."

When an indefinite NP is in the scope of negation in Dutch, it takes the negative indefinite article *geen*. On Van Geenhoven's analysis, the low indefinite NP *(g)een marsmannetje* 'a Martian' must be in the scope of negation, because it is incorporated by the verbal predicate *zien* 'see'.[13] A similar line of reasoning holds for (46):

[13] I do not assume that 'geen marsmannetje' incorporates into the verb as a negative indefinite, but that both verb and indefinite are in the scope of a higher negation operator. As pointed out be H. de Hoop

(46) Wenda heeft twee keer een marsmannetje gezien.
"Wenda twice saw a Martian."

For (46) to be true, seeing must have taken place twice, such that at each seeing event a Martian must have been involved. It need not be the same Martian on both occasions, hence (46) is true if two Martians were involved.

4.4 Indefinites as free variables and accommodation

The occurrence of an indefinite in a high position indicates that it denotes an open proposition. Indefinites that denote open propositions cannot be incorporated, because they represent a variable as well as a predicate, which blocks their interpretation as a property. The variable remains free, which would mean that the utterance containing such an indefinite would be uninterpretable. However, Van Geenhoven proposes that these free variable indefinites receive an existential interpretation through a repair mechanism as in Lewis (1979), i.e. through acommodation. The particular mechanism that Van Geenhoven proposes is based on van der Sandt (1992). I follow the example of Van Geenhoven, who, in order to explain how accommodation of indefinites works, first examines examples from van der Sandt (1992).

Van der Sandt proposed an accommodation mechanism for the resolution of the presuppositions triggered by definite NPs on the assumption that these are anaphoric. If no antecedent is available, the presupposition is accommodated by adding an antecedent to the context. Consider the sentence in (47a) from van der Sandt (1992):

(47) a. If Jack is bald, all of Jack's children are bald.

The definite expression *Jack's children* raises the presupposition that Jack has children. Accommodation adds the information *Jack has children* to the context, as represented informally in (47b) (Van der Sandt's and Van Geenhoven's proposals are set in the framework of Discourse Representation Theory):

(47) b. [There are children x of Jack's] $_{\text{addition}}$ If Jack is bald, x are bald.

In this manner, presupposition accommodation allows speaker and hearer to treat (47) in the same way as they would if an antecedent for *Jack's children* had been explicitly introduced prior to the utterance. Presuppositions are accommodated at the highest level by default ("top-level" or "global" accommodation). This means

(p.c.), because the negation is part of the NP in (45), it does not separate different NP positions in the same way as *twee keer* 'twice' in (46).

that the required information is added to the context of the utterance, i.e. the information that speaker and hearer share prior to the utterance.

Van Geenhoven draws a parallel between the accommodation of presuppositions and the interpretation of free variable indefinites. The element that is missing in the case of a free variable indefinite is not an antecedent, but the introduction of the indefinite's variable into the discourse. The utterance is made interpretable by adding the introduction of the variable to the context. (48a) repeats sentence (43), (48b) shows the result of accommodation:

(48) a. Wenda heeft een marsmannetje gisteren gezien.
"Wenda saw a Martian yesterday."
b. [Er is een marsmannetje x] $_{\text{addition}}$ Wenda heeft x gisteren gezien.
"[There is a Martian x] $_{\text{addition}}$ Wenda saw x yesterday."

As in (47b), accommodation adds information to the context. This allows the discourse participants to treat the indefinite's variable the same as if it had been properly introduced. The same holds for (49a), which contains a high indefinite subject NP. Accommodation renders the utterance interpretable by transforming it into (49b) :

(49) a. Een oude vrouw liep op straat.
"An old woman was walking in the street."
(49) b. [Er is een oude vrouw x] $_{\text{addition}}$ x liep op straat.
"[There is an old woman x] $_{\text{addition}}$ x was walking in the street."

We see that accommodation shifts the descriptive content of the high indefinite to a higher position beyond the clause. Locating the indefinite's variable in the context has the effect of adding an existential operator that binds the variable. In the following subsection, I will illustrate how the introduction of the indefinite's variable in the discourse universe accounts for the scope behavior of high indefinite NPs.

4.5 Deriving the non-narrow scope properties of free variable indefinites

We will see in this section how Van Geenhoven's analysis accounts for wide scope readings of indefinites as the result of top-level accommodation. However, there may be different acommodation sites, such that intermediate readings may occur. Intermediate accommodation is caused by restrictions on accommodation, namely trapping and implicit trapping.

Accommodation may cause non-narrow scope if the indefinite's variable is not bound in the position in which the indefinite appears at the syntactic surface, but rather at a higher level. Consider (50) and (51):

(50) Marianne heeft een marsmannetje niet gezien.
"Marianne did not see a (particular) Martian."

(51) Wenda heeft een marsmannetje twee keer gezien.
"Wenda saw a (particular) Martian twice."

We find that the high indefinites in (50) and (51) are out of the scope of the VP operators: from (50) we can infer that there exists at least one Martian, which Marianne didn't see. The statement in (51) is about only one Martian. This is expected, since free variable indefinites are not absorbed by the verb, and may be bound at a higher level.

As was shown in section 4.1, some sentences also allow for intermediate readings of indefinites. These intermediate readings can be accounted for by van der Sandt's trapping restriction, which Van Geenhoven adopts. I will first explain this restriction by an example containing an overt anaphor as in van der Sandt (1992). Consider (52):

(52) a. Everyone$_i$ rewards her$_i$ child if she has good grades.
b. Everyone *who has a child y* rewards y if y has good grades.

The preferred reading of (52a), following the co-indexation that I have provided, is (52b). The anaphor *her* in *her child* does not allow this NP to accommodate to an accommodation site any higher than its binder. This restriction is called "trapping". In this example, the NP *her child* ends up in the restrictive clause of the quantifier *everyone*, causing the quantifier *everyone* to be interpreted as "everyone who has a child" rather than "everyone in the model".

Van Geenhoven argues that indefinites may be trapped below top-level as well, for instance if they contain an anaphoric element, as in (53).

(53) Every teacher is considered prejudiced if she assigns a child of hers good grades.

The indefinite object NP *a child of hers* in (53)[14] has a narrow, a wide, and an intermediate reading:

[14] Thanks to V. Van Geenhoven, p.c.

NARROW: Every teacher *t* is considered prejudiced if *t* assigns a child of hers good grades.

INTERM: For every teacher *t* there is a child *c* of *t* and *t* is considered prejudiced if she assigns good grades to *c*.

WIDE: There is a child *c* of somebody's such that for every teacher *t*, if *t* assigns good grades to *c*, *t* is considered prejudiced.

The narrow scope reading is the result of semantic incorporation of the indefinite *a child of hers* on its property interpretation. The intermediate reading is the result of trapping of *a child of hers* below the binder of the pronoun, *every teacher*. On this reading, each teacher may have several children, but she will only be considered prejudiced if she assigns good grades to a particular one of these children[15]. Finally, if *a child of hers* is not bound by *every teacher*, it may be accommodated at top level. This reading could occur if there is one child, say, the principal's daughter, for whom it is the case that if a teacher assigns this child good grades, people believe that the teacher is prejudiced.

In (53), trapping is enabled by an overt anaphoric element that is contained in the indefinite NP. Van Geenhoven argues that trapping may also take place when no overt anaphoric element is present. This happens when the psychological mechanism of bridging creates a conceptual link between the indefinite NP and another NP in the sentence. Through this conceptual link, bridging provides a covert anaphoric element. In Van Geenhoven (1998), bridging equals implicit trapping – strictly, the conceptual link provided by the psychological mechanism of bridging is what allows the semantic trapping mechanism to take place. I will from now on refer to this interaction of conceptual linking and trapping as implicit trapping (also Van Geenhoven's term). The term "bridging" in the remainder of the present work refers to a mechanism of drawing conversational implicatures as in Clark (1977), which will be discussed in section 6. Implicit trapping is illustrated in (54).

(54) Every teacher is considered prejudiced if she assigns a well-mannered child good grades.

(54) has three readings:

[15] The trapped indefinite NP may also remain in situ, which would result in a narrow reading.

NARROW: Every teacher *t* is considered prejudiced if *t* assigns good grades to a well-mannered child.
INTERM: For every teacher *t* there is a well-mannered child *c* and *t* is considered prejudiced if *t* assigns good grades to *c*.
WIDE: There is a well-mannered child *c* and every teacher *t* is considered prejudiced if *t* assigns good grades to *c*.

The narrow reading of the indefinite *a child* is the result of semantic incorporation, and the wide scope reading is the result of top-level accommodation. The intermediate reading is the result of implicit trapping, due to a conceptual link between *every teacher* and *a child* that provides a covert anaphoric element. The free variable indefinite is trapped below *every teacher*, the binder of the covert anaphor. An interesting point that Van Geenhoven does not mention is the relative vagueness of this covert anaphoric element, which is not surprising given that a covert element must be underspecified. The indefinite *a well-mannered child* in (54) can be interpreted as: "a child in her (the teacher's) class", "a child that she once tutored", or "a child that she is grading at the request of one of her colleagues". Each of these conceptual links may give rise to the intermediate reading of (54). This means that context and world knowledge play a role in enabling intermediate readings. Van Geenhoven illustrates this with the following example (Van Geenhoven (1998) p. 214.)

(55) a. Each author in this room despises everyone who laughs about a book that was deemed pornographic.
b. Each cleaning lady in this building despises everyone who laughs about a book that was deemed pornographic.

In (55a) it is quite easy to get the intermediate reading in which the books vary with the authors: for each author *a* in this room, there is a book *b* that was deemed pornographic, and *a* despises everyone who laughs about *b*. The hearer or reader construes a conceptual link between *author* and *a book* that enables this reading: the book that each author cares about could for instance be one that she wrote herself, or a book that she uses as a splendid example for her own writing. For (55b), it is much more difficult to obtain such an intermediate reading, the reason being that there is no obvious conceptual link between *cleaning lady* and *a book*. No covert anaphoric element is introduced, and the indefinite *a book that was deemed pornographic* is simply accommodated at top level, or interpreted in situ.

In section 4, I have presented the distinction that Van Geenhoven draws between free variable and predicative indefinites, and I have shown how the different scope properties of high and low indefinites can be derived from this distinction. In section 5, I briefly compare this analysis to the quantificational approaches described in sections 2 and 3.

5. Summary: Comparing the analyses

Van Geenhoven (1998) can account for the data presented in sections 2.2 and 3.2 that was problematic to the analyses in Diesing (1992) and de Hoop (1992). Hence, this is the analysis that I adopt as a background to the acquisition work in the remainder of this dissertation. In this section I compare the different analyses with respect to their characterization of high indefinite NPs, and with respect to the relation between syntax and NP interpretation that they propose.

5.1 The semantic characterization of high and low indefinite NPs

I believe that both Diesing's and de Hoop's analyses fail to capture some of the data because they predict that strongly quantified NPs and "quantificational" indefinites behave the same. Diesing's Mapping Hypothesis predicts that NPs that carry an existential presupposition do not appear in a low position in surface syntax. This may be true of indefinites, but as we saw, this prediction is falsified by strongly quantified NPs and other "presuppositional" NPs appearing in the low object position, and overtly partitive indefinite NPs appearing in existential constructions. De Hoop's analysis predicts that "strong" interpretations of indefinites occur both in the high and low object positions, as it equals high indefinites to strongly quantified NPs, which may appear in either position. We saw that this prediction is falsified by the absence of the typically "strong" partitive interpretation for indefinite object NPs that appear to the right of negation.

Van Geenhoven's analysis does not face these problems. Since in her analysis the interpretation that typically occurs with high indefinite NPs is that of a free variable indefinite rather than a quantifier, the analysis does not predict that "high" or "strong" indefinite NPs behave exactly like quantifiers. Besides, Van Geenhoven does not assume that there is something about the "specific" or "source-set" readings of indefinite NPs that forces these NPs to be interpreted as free variable indefinites. Hence, contrary to Diesing, she does not predict that NPs containing an existential presupposition appear in the high syntactic position. Contrary to de Hoop, she *does* predict the absence of a partitive interpretation for low indefinite NPs that are not overtly marked as partitives. An additional advantage of Van Geenhoven's characterization of high indefinite NPs as free variable indefinites is that it provides a way to derive precisely those readings that show that high indefinites are not quantifiers, namely intermediate readings.

5.2 Syntax and NP interpretation

The analyses that I have presented also differ with respect to their view on the relation between syntax and semantics. As we will see in Chapter 3, this difference will turn out to be important for the study of language acquisition. I presented the three analyses in a descending order with respect to the strength, or directness, of

the link between syntactic position and interpretation. Diesing's analysis presents the strongest link in the form of a direct mapping from syntax to semantics. In that analysis, the interpretive property "presuppositionality" is part of an NP's semantics. Whenever NPs have this property, they must appear in the high NP position. Conversely, the high NP position must lead to a presuppositional interpretation. Whenever NPs are not presuppositional (i.e., whenever they do not have an interpretation that is typical of high position NPs), they must appear in the low position.

The relation of syntax and semantics in de Hoop (1992) is not as direct, as it results from the interaction of independent principles of syntax and semantics. De Hoop rejects Diesing's notion of presuppositionality on the grounds that it is not well defined. Instead, she identifies a number of "strong" interpretations: referential, generic, and partitive. NPs with "strong" interpretations may appear both in the high and low positions, while NPs with "weak" interpretations are confined to the low position because it is the only position in which they can be assigned the weak Case they require. Although there is no one-to-one mapping between syntax and semantics in de Hoop (1992), the relation between position and interpretation is still quite strong: whenever one encounters a high indefinite, it must have a "strong" interpretation.

For Van Geenhoven, the link between NP position and interpretation is not tight at all. The distinction between high and low NP positions in Dutch is only one of the ways of indicating the relevant semantic distinction of which languages may avail themselves. Case marking as discussed in de Hoop (1992) is another. In Van Geenhoven's analysis, interpretive properties like "presuppositionality", "specificity" or "source-set / partitive reading" play no role in deriving the predicate-free variable distinction. In the next section, I will propose to account for them as pragmatic effects, in terms of demands placed upon the context by the accommodation mechanism.

6. Fitting high indefinites to the context

In Chapter 1, I mentioned two salient characteristics of the interpretation of high indefinites: the interpretive guises and the context requirement. Both will turn out to be important in considering the non-adultlike interpretations of indefinites by Dutch children that I present in Chapters 4 to 6. For this reason, and because the non-truth functional characteristics are very salient, I devote the present section to discussing them.

I propose to regard the difference between the specific and source-set guises of high indefinites as a result of the context requirement, and the context requirement, in turn, as a result of the need for "bridging" (based on Clark (1977)). The bridging process takes place because the hearer needs to identify the accommodation site of the free variable indefinite. When engaging in the bridging process, a hearer is guided by principles of conversation. Bridging is necessitated by the hearer's need

to identify the accommodation site for free variable indefinites. Thus, the interpretive guises and the context requirement are both manifestations of an interaction of the accommodation mechanism and a principle of conversation.

6.1 Interpretive guises

In Chapter 1 I described a number of interpretive guises in which high indefinite NPs may appear: specific, generic, and source-set. They are illustrated in (3a-c).

(56) a. Een oude vrouw liep op straat. (specific)
"A (particular) old woman was walking in the street."

b. Een dame drinkt niet. (generic)
"A lady does not drink."

c. Mijn buren hebben verschrikkelijke huisdieren. Een hond heeft vannacht onze vuilnisbak leeggegeten. (source-set)
"My neighbors have horrible pets. A dog emptied out our trash can last night."

Another example from Chapter 1, repeated in (57), shows that the different guises are not equally available. Whenever the context provides a source set to which the high indefinite can be related, it is nearly impossible to interpret the indefinite in a specific or a generic guise.

(57) a. Silvia was dolenthousiast over de jonge katjes bij de buren. Nu wil ze een klein lapjeskatje zo snel mogelijk kopen.
"Silvia was very excited about the neighbors' kittens. Now she wants to buy a small calico kitten as soon as possible."

?? Ze gaat er morgen één halen bij de dierenwinkel op de hoek.
"She is going to get one tomorrow from the petshop at the corner".

In this sequence, the hearer is strongly drawn to assigning a source-set guise to the high object NP *een klein lapjeskatje* 'a calico kitten'. The sequence is incongruous, because Silvia is apparently not going to buy a calico kitten from the neighbors, but rather is planning to get one at a pet shop. If *een klein lapjeskatje* 'a small calico kitten' were interpreted in a specific guise, there would be no incongruity. However, this reading is very hard to obtain. Conversely, when no source set is provided by the context, source-set guises do not seem to occur: omitting the first sentence of (57) would result in a specific guise. Thus, there is no true ambiguity, but rather, the specific guise seems to be a default interpretation.

Not all high indefinites are classified as easily as the examples above. Consider (58):

(58) Een blaffende hond heeft me de hele nacht uit mijn slaap gehouden.
"A barking dog kept me awake all night."

Although *een blaffende hond* 'a barking dog' is intuitively specific to many native speakers of Dutch, it does not fit the definition of specificity ("the indefinite refers to an individual that the speaker can identify"), as it is highly unlikely that the speaker or anyone else is able to identify the referent. The high indefinite subject NP in (59) also defies classification:

(59) ctxt: De drie inbraken verliepen volgens hetzelfde patroon:
"The three burglaries showed the same pattern:"

Een waakhond blafte een paar maal alvorens door een slaapmiddel verdoofd te worden.
"A watchdog barked a few times before being sedated by a drug."

Een waakhond 'a watchdog' cannot take a specific guise, because there is no one watchdog that someone can identify. Nor does *een waakhond* take a source-set guise. The indefinite NP is perhaps best labeled by the intuitive term "relatively specific" [16], since there are three dogs, each specific in the context of one particular burglary.

I believe that the different interpretive guises should be analyzed as the result of the context requirement, so that they are no more, and no less, than ways in which to establish a relation between the indefinite and the context. I will discuss this further in the next section.

6.2 The context requirement

In the absence of a context, sentences containing high indefinite NPs are often found less felicitous than sentences containing low indefinite NPs. I formulate this requirement as follows:

(60) **Context Requirement**
A high indefinite NP is only felicitous if the context provides some element to which it can be related.

I will argue that the relation between the high indefinite and the context is of a conceptual rather than a grammatical nature. My formulation of the context

[16] This intuitive term does not correspond to the notion of relative specificity in Ruys (1992).

requirement is based on the observations that Schouten (1998) presents in her study of sentence initial indefinites in Dutch literary texts, and on observation of examples like those in (61) to (13) below. Schouten argues that high indefinite subject NPs must be related to the context. She presents examples in which the elements to which the high indefinite subject NPs can be related are removed from the context. In this manner, it becomes clear that these indefinite NPs can only appear without a relation to the context if they can be assigned a generic interpretation. As this is often not possible, the occurrence of the high indefinite subjects becomes infelicitous. Schouten's observation holds of non-literary examples as well. Consider the sentence pair in (61). (61a) is judged felicitous more readily than (61b).

(61) a. Een dame drinkt niet.
"A lady does not drink."
b (?) Een dame is niet aan het drinken.
"A lady is not drinking."

Nothing blocks a generic interpretation of (61a), whereas the *aan-het* construction in (61) forces an interpretation of an ongoing action, which is not very well compatible with a generic reading.

The context requirement also holds of high indefinite object NPs. In (12), it is possible to relate the high indefinite NP *twee gebakjes* 'two sponge cakes' to a source set in the context.

(62) ctxt. We gingen op verjaarsvisite bij mijn oma. Ze had gebakjes gekocht.
"We went to visit my grandmother on her birthday. She had bought sponge cakes."

Jan had twee gebakjes nog geen minuut nadat hij binnenkwam al verorberd.
"Within a minute after his arrival, Jan had devoured two sponge cakes."

Now consider what happens when the source set is removed from the context:

(63) ctxt. We gingen op verjaarsvisite bij mijn oma.
"We went to visit my grandmother on her birthday."

a. ?? Jan had twee gebakjes nog geen minuut nadat hij binnenkwam al verorberd.
"Within a minute after his arrival, Jan had devoured two sponge cakes."

b. Jan had nog geen minuut nadat hij binnenkwam al twee gebakjes verorberd.
"Within a minute after his arrival, Jan had devoured two sponge cakes."

The sequel in (13a) is only marginally felicitous in the reduced context. In contrast, the low indefinite object NP in (13b) is perfectly acceptable in the reduced context.

Schouten argues that the relationships between the high indefinite and the context are not of a grammatical or even a more general linguistic nature. They are relations between the denotation of the indefinite NP and entities or situations present or implied in the context, based on general knowledge of the NP denotations and these entities or situations. Schouten calls these relations "knowledge frames".

Schouten has observed numerous relationships between the indefinites and the context, some of which occur very frequently, such as the relationship between the denotation of the indefinite NP and an observer (79% of all of the high indefinites in Schouten's corpus appeared in such a context), or the relationship between an indefinite and a source set. In the former case, the high indefinite subject appeared in a specific guise, in the latter, a source-set guise. Other relations are very specific to the lexical content of a particular indefinite NP, as in the case of Schouten's example "mother-daughter": the presence of "mother" in the context renders the occurrence of *een dochter* 'a daughter' as a high indefinite subject felicitous. The relation between these two nominals consists in the reader's (or hearer's) knowledge of the fact that mothers and daughters are related in a particular way.

I propose that we consider the interpretive guises of high indefinites as the result of the context requirement. The interpretive guises are determined by the knowledge frame that relates the high indefinite to the context. There is no need to assume that high indefinites have any meanings or readings in common on a structural level. It is through their use in a context that they acquire this "coloring", taking on a specific or source-set guise, or some different appearance as in (58) and (59). For example, it is irrelevant whether the speaker in example (58) can identify the dog that kept him awake – all that matters is the observation relation. On this view, it is not surprising that the majority of high indefinites seem to fall into a limited number of categories, as it is to be expected that conversational participants tend to employ a fairly standardized palette when fitting high indefinites to the

context. At the same time, idiosyncratic relationships can be accounted for, such as that between watchdogs and burglaries in (59), which are based on our knowledge of a potential relation between places that are likely to be burgled and watchdogs that guard these places. On this approach, it is irrelevant that there is no one reading that characterizes all high indefinites.

This is a different approach than the one Diesing (1992) takes, who claims that all "high" NP interpretations have a common meaning component, namely an existential presupposition. The approach proposed here is closer to de Hoop (1992), who argues that the readings of high indefinites can be classified as a number of distinct interpretations that have in common that they require projection of a restrictive clause. In both my proposal, and de Hoop's approach, context plays a role. In the latter approach, it co-determines the restriction of the quantifier, while in my proposal, it plays a different role, as will become clear in the following sections.

The question to ask next is: Why do the context requirement and the interpretive guises exist? I will try to answer this question in the following sections. Before continuing, let me first point out a few peculiarities of the context requirement that will have to be accounted for.

One point which an account of the context requirement must capture has been mentioned already: the specific interpretive guise seems to be the default interpretation in the absence of additional information. A second, important, point is the difference between naturalistic language data and written texts. In written texts, it is usually possible, and even, as we saw, required, that an element in the context can be identified to which the indefinite NP can be related. In the following naturalistic examples, it is not so easy to identify such elements.

(64) (context: campsite)
Een man zei dat kampeerders de keuken wel mogen gebruiken.
"A man said that campers may use the kitchen."

(65) (context: kitchen. Speaker A is washing up.)[17]
A: Zoek je wat?
'Are you looking for something?'
B: Ik kan een lepeltje niet vinden (...)
'I cannot find a spoon.'
A: Hier heb ik er één.
'I've got one here.'
ctxt: A takes a spoon out of the soapy water.
B: Nee, die bedoel ik niet. Ah, daar is 'ie!
'No, that's not the one I mean. Ah, there it is!'

[17] Thanks to Helen de Hoop for this example.

In (64), *een man* 'a man' could be regarded as related to the speaker through an observation relation. For (65) we may assume that there is some relation between specific *een lepel* 'a spoon' and the speaker, as well, but the context provides no clue as to what this relation consists in. Nevertheless, B's utterance is correct. Consider also (66):

(66) Een groep werknemers van NS Cargo op de Maasvlakte heeft vanochtend het werk neergelegd.
"A group of employees of NS Cargo went on strike this morning."

In broadcast news items such as (66), there is no context at all. Nevertheless, such news items are very common and their felicity is never questioned.

The reader might perhaps assume that there is nothing unexpected about the occurrence of the context requirement for high indefinites, as the assignment of a free variable interpretation crucially depends on the fact that utterances are embedded in a context. However, a final peculiarity of the context requirement shows that this reasoning does not hold without qualification. Consider (67):

(67) De dame is niet aan het drinken.
"The lady is not drinking."

Native speakers do not generally judge that there is somethinig odd about this sentence or similar examples, even though definite NPs depend on the context for their interpretation. Apparently, the fact that native speakers are sometimes reluctant to judge contextless sentences felicitous if they contain a high indefinite, is not caused merely by the fact that the context is involved in the free variable interpretation.

The felicity judgments of high indefinites differ between sentences, between and within native speakers, and between contexts. This suggests that the context requirement is not a part of grammar as such, but a pragmatic phenomenon. An account of the context requirement should leave room for this variability, as well as the range of contexts that fulfill the context requirement.

In the next section, I turn to Clark's (1977) account of the contextual requirements on pronouns and definite NPs. Extending this account to free variable indefinites may not give us the final answer to the interpretation of free variable indefinites in context, but it offers an economical approach to the facts presented above.

6.3 Clark (1977): Bridging

In what follows, I will propose that the source of the context requirement lies in the fact that the context must provide input for "bridging". Clark (1977) proposed the

term "bridging" for the construction of an inferential chain by the hearer, with the purpose of understanding the speaker's message if that message contains a definite or pronominal NP.

Clark points out that whenever a pronoun or definite NP is used in a conversation, it is the hearer's task to identify the antecedent that the speaker intends. In doing so, the speaker takes care to provide her with sufficient information to reach this goal. This is possible because both speaker and hearer are aware of the Given-New contract, part of which is provided in (68).

(68) **Given-New Contract** (Clark (1977), p. 413)
The speaker agrees to try to construct the Given and New information of each utterance in context so that the listener is able to compute from memory the unique Antecedent that was intended for the Given information (...)

Clark describes how a hearer arrives at the intended antecedent through a process of drawing inferences on the basis of the Given-New contract, which he calls "bridging". Consider (69), an example from Clark (1977).

(69) I walked into the room. The chandeliers sparkled brightly.

In order to identify the antecedent for *the chandeliers*, the hearer must draw the following inferences: (1) the speaker expects me to construct an antecedent for *the chandeliers*, (2) the only information I have is that there is a room, so this information must suffice, (3) the chandeliers must be related to the room, because the former tend to hang from ceilings of the latter. The final inference provides the outcome of the inferential chain, namely that the antecedent must be: chandeliers that served to light the room mentioned in the previous sentence. One such inferential chain can be regarded as a "bridge" across the gap between speaker and hearer knowledge. Note that Clark does not distinguish between cases in which an overt antecedent is present and instances of accommodation as in (69). For Clark's analysis to be compatible with the view that there *is* no antecedent whenever the discourse representation does not contain a referent that may serve as such, we should say that in the latter case, bridging takes place in order to identify the intended accommodation site rather than the intended antecedent.

Whenever an overt antecedent is present, as in (70), bridging also takes place.

(70) I met a man yesterday. He told me a story.

In order to arrive at a reading on which *he* is co-referent with *a man* in the first sentence, a hearer must draw the inference that *a man* is the antecedent from the fact that it is mentioned, and that no other potential antecedent is mentioned. Had the speaker intended another antecedent, she would have provided information pointing to such an intention. Thus it follows from the Given-New contract that an

overt antecedent provided by the speaker cannot be ignored by the hearer. If the speaker mentions an NP, this is considered such a strong pointer to this NP's being the intended antecedent, that the hearer need not draw any (or hardly any) additional inferences.

The relative ease of bridging to an overt antecedent versus bridging to an accommodation site becomes evident whenever the anaphoric element follows an improper context:

(71) a. I was rowing a little boat. It said to me.....
b. I was rowing a little boat. The chandeliers sparkled brightly.

Neither of the sequences in (71) allow the hearer to draw an inference that the speaker could plausibly have intended him to draw. Note, however, that *a little boat* is immediately identified as the antecedent of *it* in (71a). This interpretation is improper as far as world knowledge is concerned, and the hearer may ask herself the question: Why does the speaker believe that I believe that boats can speak? However, communicative breakdown is limited to this puzzlement only. Consider in contrast (71b). The two sentences in (71b) seem more disconnected than those in (71a). As in (71a), the sequence will lead to communicative breakdown, but the question that the hearer may now ask is: Where did these chandeliers come from all of a sudden? The communicative breakdown is felt more strongly, and the sentence can only be interpreted if the hearer imagines some context in which there is a source for these chandeliers. Such a context cannot be formed on the basis of the first sentence, in contrast to (71a), in which the antecedent is found in that very sentence.

This example shows that, whenever a potential antecedent is present, it will be interpreted as the antecedent, no matter how implausible the resulting interpretation. Accommodation, on the other hand, cannot take place, or takes place only with difficulty, if the context does not allow drawing inferences about what may plausibly be the speaker's intention.

The importance of bridging for understanding a speaker's message becomes clear when there is a potential ambiguity. Consider (72):

(72) a. All rooms had period furniture. The ballroom was the only room that was done up in a modern fashion. The chandeliers sparkled brightly.
b. All rooms were furnished according to the latest fashion. The ballroom was the only room with period furniture. The chandeliers sparkled brightly.

In (72a), *the chandeliers* is not easily bridged to *the ballroom*, since the modern style of this room is not likely to include chandeliers. Rooms that have period furniture, on the other hand, are much more likely to have chandeliers. *The*

chandeliers in (72a) is thus bridged to "all rooms that have period furniture", so that there are as many chandeliers (or sets of chandeliers) as there are rooms with period furniture. In (72b), on the other hand, there is only one room with period furniture, to which *the chandeliers* is accordingly bridged. This results in a reading in which there is only one set of chandeliers in the house.

Next, I propose to extend Clark's notion of bridging to free variable indefinites. However, for the sake of clarity, I feel that a small digression is in place. In the following section, I will point out the difference between the view of bridging that I take and the one in Heim (1982).

6.4 A note on bridging in Heim (1982)

The distinction between accommodation as in Lewis (1979) and psycholinguistic "bridging" as in Clark (1977) is crucial to my argument. It is also crucial to the interpretation of the findings in child language acquisition in subsequent chapters, as deviations from adult interpretations may concern either process, but not necessarily both. As the terms "accommodation" and "bridging" are often treated as if they referred to the same process, I devote this section to making explicit the difference between them.

An influential study that collapses the notions of accommodation and bridging is Heim's (1982) theory of file change semantics. Heim assumes that accommodation/bridging takes place only when definite or otherwise presuppositional NPs appear without an antecedent. She accounts for the relations between accommodated definites and the context by formulating a requirement that conceptual links ("cross-references") must be constructed between the accommodated NP and discourse referents ("file cards" in Heim's theory) that have been introduced previously. The question of why this requirement exists remains unanswered.

Heim notes that in many cases, such as *the dog* in *Look out, the dog is going to bite you!* or *the sun* in most contexts of utterance, there is actually no link to a previous discourse referent. She observes that in these cases, cross-references appear between the accommodated NP and the utterance situation. This forces her to suggest that a "file" (the discourse representation) may contain a "file card" for the utterance situation. This utterance situation file card constitutes an exception in the theory that Heim proposes, in which files otherwise only contain file cards corresponding to discourse referents.

If we keep the notions of accommodation and bridging separate, the need to formulate the cross-reference requirement does not arise. Lewis introduced the term "accommodation" to describe the property of human discourse that information that is required for the interpretation of an utterance automatically becomes part of the discourse, even if it has not been introduced explicitly. The context is thus updated not only with the contents of a particular utterance, but also with material that the utterance presupposes. Accommodation can therefore be considered a repair mechanism that allows us to assign an interpretation to

elements that would otherwise not be interpretable. It is driven by *grammatical requirements*. As we saw in section 4.4, accommodation repairs the context of antecedentless definite NPs so that an antecedent becomes available.

Bridging, in contrast, is driven by *communicative requirements*, i.e. the hearer's wish to reconstruct the message that the speaker tries to communicate. Bridging refers to the psychological process of drawing inferences by which a hearer identifies the antecedent of a definite NP or pronoun. It is important to keep in mind that the bridging process is *always* executed when a hearer encounters an anaphoric NP, regardless of whether the semantic interpretive mechanism is accommodation or discourse binding to an overt antecedent. In the case of accommodation, the bridging process may be more complicated, as the hearer needs to decide on the accommodation site by drawing inferences from often implicit information in the context, whereas the mere appearance of an antecedent is often sufficient for its identification as *the* antecedent in cases of binding. It is bridging, not accommodation, which requires that the context allows for some conceptual relation between the context and an antecedentless indefinite. Such relations are the pragmatic reflections of language users' efforts to meet the demands of a psychological process.

In sum, if we keep accommodation and bridging separate in the way that I propose, there is no need to add to the grammar a separate requirement that accommodated NPs should be "cross-referenced" to other NPs, nor is there a need to add a separate "utterance situation" file card, whose only purpose is to allow cross-referencing of accommodated NPs that do not relate to information in any of the other file cards. As I described in the previous section, if we follow Clark's reasoning, the occurrence of conceptual links between accommodated NPs and elements in the context follows directly from the inferential process that bridging consists in, and the co-operation between speaker and hearer.

6.5 Bridging and free variable indefinites

I propose that, as in the case of accommodating definite expressions, the hearer needs bridging in order to identify the *accommodation site* of free variable indefinites. The context requirement is a direct result of the Given-New contract, which requires that the speaker commits herself to providing sufficient information for the hearer to achieve this goal. (73) presents the definition of bridging as applied to free variable indefinites.

(73) **Bridging of free variable indefinites**
Bridging is a process of drawing inferences on the basis of the Given-New contract, with the goal of identifying the unique accommodation site of the free variable indefinite.

The need to identify the intended accommodation site becomes evident whenever intermediate accommodation is an option. In example (74), previously presented in

section 4.5 of this chapter, an intermediate scope reading of the indefinite *a book* is possible. It is caused by implicit trapping, which is enabled by the conceptual link between *a book* and *each author*.

(74) Each author in this room is angry with everyone who laughs about a book that was deemed pornographic.

In (74), the intermediate reading, on which *a book* is related to *each author*, is easily available, and accordingly the number of books may vary with the number of authors. However, it is possible to embed this sentence in a context that makes a wide reading far more likely, as in (75):

(75) ctxt: I will tell you why the atmosphere is so tense: there has been a heated discussion in the media about the literary qualities of the work of the famous author X.

Now, each author in this room is angry with everyone who laughs about a book that was deemed pornographic.

Given the context in (75), a hearer will infer that the speaker intends an accommodation site above *each author*. As a result, the scope of the indefinite changes. On this view, the need for bridging, and hence the context requirement for free variable indefinites, arises from the fact that accommodation of free variable indefinites can take place at several levels. For an understanding of the message, it is crucial to know which scope the indefinite takes, and this is dependent on its accommodation site[18].

The account that I provided of the context requirement on free variable indefinites is not complete. It raises certain questions, such as: what exactly is the definition of "accommodation site"? However, it is beyond the scope of the present work to try to provide a definitive account of bridging in the case of accommodation. As it stands, the application of Clark's "bridging" analysis to free variable indefinites accounts for the characteristics of the context requirement that I presented in sections 6.1 and 6.2, as I will now show:

An analysis of the interpretive guises in terms of bridging explains why a hearer usually cannot choose freely to assign a specific guise when the context enables a source-set guise, as in the example that I repeat in (76).

[18] If one assumed a different analysis of indefinites, an analysis similar to the bridging analysis could still be in place. If we assumed, for instance, that wide scope or "specific" indefinites must refer uniquely in some domain, the context must guide the hearer towards the correct domain restriction.

(76) Mijn buren hebben verschrikkelijke huisdieren. Een hond heeft vannacht onze vuilnisbak leeggegeten.
"My neighbors have horrible pets. A dog emptied out our trash can last night."

The Given-New contract ensures that the hearer knows that the speaker will provide the information that is relevant to the identification of the intended accommodation site. In addition, the hearer is aware that the speaker knows that she knows this, and accordingly, the hearer may safely assume that she will not be provided with redundant or potentially misleading information. Therefore, if the hearer encounters a potential source set in the context of a free variable indefinite, she knows that she should use this information.

By the same reasoning, it is possible to explain why the specific guise is the default option. In the absence of information leading the hearer to a particular accommodation site, as in (77), the hearer must assume that it is the speaker's opinion that the information that the hearer already possesses will suffice.

(77) Een hond heeft vannacht onze vuilnisbak leeggegeten.
"A dog emptied out our trash can last night."

The hearer must make do with what she has, which in the case of (77) is the utterance situation containing the speaker, the hearer herself, and the physical surroundings[19]. It is not possible to relate *een hond* 'a dog' in (77) to the hearer, because if the hearer had had some relation to a dog that the speaker knew about, the speaker would have had to use a definite NP *de hond* 'the dog'. If the physical surroundings do not offer any additional clues, the hearer can only infer that *een hond* is in some way related to the speaker. In this manner, the hearer's effort to bridge to the intended accommodation site leads to a "classical" specific interpretation of the indefinite *een hond* 'a dog', i.e., a reading on which the speaker has a referent in mind that is unknown to the hearer. This automatically leads to accommodation higher than the sentence and hence wide scope readings. We can regard this as a pragmatic explanation of Van der Sandt's observation that top-level accommodation is the default (for a different but related approach, see Geurts (1999)).

If we pursue this reasoning a little further, it is not surprising that the presence of an appropriate context is required more strongly in written texts compared to naturalistic settings. While in the latter the hearer always has the option to construe a relation between the free variable indefinite and speaker knowledge, no speaker is present in written language. Perhaps the observational contexts that Schouten (1998) found to be frequent in literary texts serve the purpose of providing a relation between the indefinite and a character in the text that is similar to the

[19] Whether and to what extent elements from the physical surroundings can actually be used in bridging, I will leave an open question.

relation between a high indefinite and a speaker in conversation. Such a relation would enable a specific guise at the text level, paralleling the classical "specific" interpretation.

With Clark's analysis in hand, we can now also explain the peculiarity that contextless high indefinites may evoke infelicity judgments, whereas definite NPs or pronouns generally do not. Compare the examples repeated in (78):

(78) a.(?) Een dame is niet aan het drinken.
"A lady is not drinking."
b. De dame is niet aan het drinken.
"The lady is not drinking."

The difference between (78a) and (78b) can be explained as a reflection of the hearers' knowledge of the distinction between identifying an overt antecedent and accommodation. We saw in section 6.3 that anaphoric NPs always establish an anaphoric relation to a potential antecedent if no other antecedent is present. This happens even if an anaphoric relation to that antecedent is implausible. If a native speaker of Dutch knows this, it will be no problem for her to judge (78b) felicitous, since she knows that the sentence can be felicitously used in any context that contains an antecedent conforming to the description "lady".

Free variable indefinites, on the other hand, are only felicitously used if the speaker makes sure that a certain amount of information is present in the context. The nature and required amount of this information differ from situation to situation. Thus, in order to judge a contextless sentence containing a free variable indefinite felicitous, one has to abstract away from the lack of context of the actual sentence, and imagine a specific context that would render the sentence felicitous. Hearers who do not take this additional step have no choice but to judge the sentence less than fully felicitous. It is to be expected, then, that felicity judgments vary across and within speakers, as the judgment as to whether or not the speaker (or writer) is sufficiently co-operative will depend on the content of the sentences and on the judges' personal standards.

7. Summary

In this chapter, I have presented three analyses of indefinites. The analysis of Van Geenhoven (1998) is to serve as the background to the study of children's indefinites in the next chapters, complemented by an account of the interpretive guises and the context requirement in terms of bridging as in Clark (1977). Here, I present a summary of the most relevant features of the analyses.

Indefinite NPs that appear in the low argument positions are normally interpreted as predicates. Predicative indefinites receive their existential interpretation through

a mechanism of semantic incorporation. By semantic incorporation, they are absorbed by the verb as a restriction on a variable that the verb itself introduces into the discourse. For instance, in the sentence *Silvia strokes a dog*, the verb *stroke* introduces a variable into the discourse for its internal argument. The predicative NP *a dog* restricts the possible referents of this object to those that have the property of being a dog. Predicative indefinites must take narrow scope with respect to operators that affect the verb.

Indefinite NPs that appear in the high argument positions are normally interpreted as free variable indefinites. Free variable indefinites, unlike predicative indefinites, have a variable that must be bound through an accommodation mechanism. Accommodation locates the indefinite's variable in the context, shifting the lexical content of the indefinite to a higher position in which it can be interpreted. This accounts for the fact that free variable indefinites are generally insensitive to operators that affect the verb, and that they can be insensitive even to operators that appear in a higher position in overt syntax than the indefinite itself: although the lexical content of the indefinite appears in this low position, it may be bound at a level higher than the operator.

As the accommodation site of the indefinite NP may be of real importance to the interpretation of the speaker's message, it must be identified by the hearer. A hearer does this by bridging: constructing a series of inferences on the basis of the information that the discourse provides. The speaker co-operates by ensuring that the hearer receives sufficient information – hence the context requirement. The interpretive guises are the result of the construction of inferences that guide the hearer to the accommodation site that the speaker intends.

After having presented the way in which the interaction of syntax, semantics and pragmatics determines the interpretation of indefinite NPs in adult Dutch, we can now proceed to the following chapter, which asks the question: Is this the same for children?

INDEFINITES AND THE DEVELOPMENT OF DISCOURSE

CHAPTER 3

1. Introduction

In this chapter I will relate children's interpretation of indefinite NPs to the development of discourse, mainly by presenting findings of previous research in child language acquisition. These findings will eventually lead to the formulation of the non-integration hypothesis in the next chapter.

I approach the research question "How do children interpret high and low indefinite Noun Phrases compared to the adult interpretation?" by asking whether children acquire mastery of the syntax, semantics and pragmatics of the predicate/free variable distinction all at the same time. If one of the components involved in this distinction is adultlike in a child's language, does this mean that the child also performs like an adult with respect to the other components? I start my investigation of this question by examining previous research of high and low NP placement and the interpretation of indefinite NPs in language development. The first studies that I discuss (Eisenbeiss (1994), Schaeffer (1995, 1997)) show that children use the high and low NP positions at an early age. Other studies show that the narrow scope interpretation of indefinites seems to be present very early (Boysson-Bardiès and Bacri (1977)), but that children have far fewer wide scope interpretations of indefinites than adults (Bergsma-Klein (1996), Musolino (1998)). As the non-adultlike responses reported in these studies continue at least until age 6, this suggests that the predicative interpretation is acquired early, while the free variable interpretation somehow causes difficulty in comprehension.

This first part of the chapter is followed by a section in which I consider, step by step, the nature and interpretive mechanisms of predicative and free variable indefinites. The purpose of that section is to examine whether some difference between the interpretive mechanisms underlying predicative and free variable interpretations might cause the difference between the two interpretations in children's language development. I conclude from this examination that the relevant difference may lie in the fact that the accommodation of a free variable

indefinites requires discourse integration: connecting separate utterances into a larger whole, a discourse, as well as using the discourse in the structural interpretation of elements of a given utterance. The semantic incorporation mechanism that is involved in predicative interpretations does not require discourse integration.

To investigate discourse integration in language acquisition, I review a number of studies in children's production of discourse, which show that discourse cohesion is very limited until age six, and develops only gradually after that age. In addition, I examine the results of a number of experiments concerning children's comprehension of anaphoric elements, which show that even seven-year-old children often fail to integrate information provided by the discourse in their interpretation of the anaphors. On the basis of these findings, I will argue that discourse integration in language comprehension may also initially be limited. Since discourse integration is a necessary condition for successful interpretation of free variable indefinites, children may fail at the interpretation of high indefinites. If there is indeed an effect of limited discourse integration, it might have an effect long after the age at which the high and low NP positions occur in children's language production. This effect of limited discourse integration should continue to exist after age four, as the studies of children's discourse show levels of cohesion or integration that are below the adult level until well after that age.

At the end of the chapter, I dedicate some words to the possible causes of limited discourse integration, to the role that a limitation of discourse integration may play in children's language acquisition, and to the ways in which it may affect the interpretation of free variable indefinites.

This chapter is set up as follows: section 2 examines findings of previous studies of children's high and low NP placement and of children's interpretation of indefinite NPs. Section 3 presents a step-by-step comparison of the nature and interpretive mechanisms of predicative and free variable indefinites. Section 4 examines studies that show that children's discourse integration is initially limited. The chapter ends with a summary in section 5.

2. Children's NP interpretations

A first step in answering the question of whether children are able to understand high and low indefinite Noun Phrases in an adultlike manner is to examine previous studies. In this section I mainly present findings from previous research concerning children's use of the high and low NP positions and scope taking of indefinites in children's comprehension.

2.1 High and low NPs in children's language production

Two studies of children's spontaneous speech, Eisenbeiss (1994) and Schaeffer (1995), show that the high and low object positions of Dutch and German are present at the age of two. Although children initially place NPs in the low position more frequently than adults, the pattern of placement of definite and indefinite NPs resembles that of adults even at a very young age.

Eisenbeiss (1994) studied the placement of object NPs with respect to VP negation in German. In her sample, she found two phases in the development of object placement with respect to negation. During phase I (ages between 1;10 and 2;2[20]), the children placed the majority of definite NPs, including pronouns and proper names, to the left of negation, however, some definite NPs appeared in the lower position. During phase II (ages between 2;4 and 3;3), the children moved definite NPs to the high position consistently. This shows that there is a relation between definiteness marking on the NP and its placement in VP-external position. Eisenbeiss also suggested that the children's high NPs have a presuppositional interpretation. This was especially clear in the early data of the youngest child. Between 1;10 and 2;0.23, this child placed a number of determinerless nouns in the high position. Eisenbeiss labeled their interpretations as presuppositional, because they always referred to entities that had been previously identified in the context.

The pattern that Schaeffer (1995) found in the spontaneous speech data of two Dutch children, aged 2;7–3;11 and 1;9–5;4, agrees with Eisenbeiss' findings. Although both definite and indefinite NPs appeared to the right of negation and adverbial elements that differentiate the high and low object positions, definite NPs were more likely to appear in the high position than indefinites. There were a very small number of indefinites in the high object position, whereas nearly all indefinites appeared in the low position. The pattern of these findings corresponds to adult preferences. The children also sometimes placed deictic pronominal NPs in the low position, which is strongly dispreferred in adult Dutch. (79a) contains one of Schaeffer's examples of a low pronoun in one of the children's utterances, (79b) contains the corresponding adult utterance.

(79) a. Mag even dit dicht? (Child N. 3;6.0)
may for-a-minute this closed?
"Could this be closed for a minute?"
b. Mag dit even dicht?
may this for-a-minute closed?

However, high placement of such pronominal object NPs was far more frequent, most obviously so after about age 3;6.

[20] A child aged for example 2;7.22 is two years, seven months and twenty-two days old. The time span 1;10 to 2;2 includes 1;10.0 and all older ages up to, but not including, 2;2.0.

A third study in the production of high and low object NPs is Schaeffer (1997). In an experimental setting, Schaeffer elicited Dutch sentences containing direct object NPs and a negation or adverbial phrase. Children initially placed both definite and indefinite object NPs in the low position significantly more often than adults. However, by age three, children placed nearly as many indefinite object NPs to the left of negation as adults (the difference between children and adults was no longer significant). By age four, children also placed definite NPs to the left of negation nearly as often as adults.

Eisenbeiss' and Schaeffer's production data show that children have the high and low object positions at age two. Eisenbeiss' analysis suggests that a notion of presuppositionality underlies the placement of NPs in the high position, which is in accordance with both Eisenbeiss' and Schaeffer's findings that definite NPs more often appear in the high position, and indefinites in the low position. By age four, the children's responses pattern like the adults' in elicited production.

High indefinite NPs are very rare in the spontaneous speech data, and we do not know what meaning the children attach to these indefinites. Schaeffer's elicited production data suggests that three-year old children are able to use "specific" indefinite NPs that take wide scope with respect to negation. However, these production data do not allow us to determine which interpretations the children really intended when they used indefinite NPs.

In the next section, I will examine early indefinite NPs in children's language production in order to determine whether there is any evidence of the predicative and the free variable interpretation at a very young age.

2.2 Predicative nominals in children's spontaneous language production

I assume that children demonstrate knowledge of the predicative content of an indefinite when they use the same word to correctly refer to different tokens, e.g., not referring to just "Pluto" but to any dog by the nominal *dog*. On this reasoning, children show that they can use predicative NPs when they adequately name objects. This happens at a very young age, when their caregivers ask them "what is this called?", or when the children are "reading" picture books. (80) presents such a picture book sequence, from a child in the Utrecht corpus (Elbers and Wijnen (1992)) in the Childes database (MacWhinney and Snow (1985)).

(80)	Child:	Leeuw.	(Hein, 2;7.22)
		'Lion.'	
	Mother:	Ja. Of een poes.	
		'Yes. Or a cat.'	
	Child:	Ja.	
		'Yes.'	

Mother:	Vind 't meer op een poes lijken.
	'Looks more like a cat to me.'
Child:	Dat tijger.
	'That tiger.'
Mother:	Ja. Een tijger.
	'Yes. A tiger.'
Mother:	Een kleine tijger kan 't ook wel zijn.
	'It could also be a small tiger.'
Child:	Een zon.
	'A sun.'
Mother:	Ja.
	'Yes.'
Child:	Een - een gekke maan.
	'A - a funny moon.'
Mother:	Nee hoor. Dat is een lamp.
	'No it's not. It's a lamp.'

Hein's naming of the objects in the pictures as 'lion', 'a sun' and 'a funny moon' involves a predicative use of the NP (although, theoretically, it is possible that Hein does not intend these words as predicates but, for instance, always refers to this one particular picture of a sun by 'a sun'). Also *dat tijger*, consisting of the deictic 'that' and the determinerless noun 'tiger' can be regarded as a statement that the referent referred to by 'that' has the property of being a tiger, as if a copula had been present. Thus it is likely that a predicative interpretation of indefinite NPs and determinerless nouns is present in this child's language. The many determinerless nouns that are found in children's early utterances (e.g., Schaeffer (1995)) are also suggestive of a predicative interpretation. In Van Geenhoven's (1998) analysis of adult indefinites, bare plurals, virtually the only determinerless NPs that are grammatical in adult Dutch, are analysed as predicates. The morphological similarity suggests a similar analysis for some part of children's bare nouns.

I conclude that the predicative interpretation of indefinites is acquired early. Whether children can also use or understand free variable indefinites at this young age cannot be determined on the basis of this type of data. Not only are high indefinite NPs very rare, as I mentioned above, production data are not very suitable to investigate interpretations. However, for children at an older age it is possible to investigate the interpretation of indefinites experimentally. In the next section I present findings from previous research that investigated the scope of indefinites in language acquisition.

2.3 The scope of indefinites in children's language comprehension

In this section I discuss a number of comprehension studies. The results of Boysson-Bardiès and Bacri (1977) suggest that children initially have a tendency to interpret indefinite objects in the scope of negation when the adult grammar allows this. Bergsma-Klein's (1996) study of Dutch children found a tendency towards narrow scope interpretations of indefinite object, not subject, NPs. Musolino (1998) found the same pattern with English speaking children. The latter's account of these findings makes clear predictions for children's interpretation of Dutch high indefinites.

2.3.1 Boysson-Bardiès and Bacri (1977)

Boysson-Bardiès and Bacri (1977) investigated the comprehension of the scope of negation with respect to definite and indefinite NPs by French children aged 4;0 to 10;0. The children were asked to draw a picture to accompany sentences that contained either a definite or an indefinite object NP to the right of negation. Examples of the sentences are given in (81):

(81) a. Le lapin ne mange pas la carotte.
"The rabbit is not eating the carrot."
b. Le lapin ne mange pas une carotte.
"The rabbit is not eating a carrot."

Most children drew both a rabbit and a carrot for (81a). Since no sign of eating was included in the children's drawings, the authors conclude that negation is applied only to the verb[21]. For (81b), the younger children omitted both a representation of *eating*, and of *carrot*. At age eight, children would still suppress reference to *eating* in their drawings, but they would include reference to the indefinite object NP, i.e. they drew a carrot both for (81a) and (81b). Thus, as the authors remark, especially the youngest children apply negation to the maximum extent, suppressing both reference to the verb and the object if the object is an indefinite.
Apparently, the children under age eight generally have a predicative interpretation of the indefinite object NPs, so that the existence of the indefinite is cancelled along with the existence of the action represented by the verb. The fact that the older children do not always suppress reference to the object may be an indication that they do not always interpret the indefinite as a predicate, although these children may have some other reason for drawing a referent for the object NP in the pictures. Boysson-Bardiès and Bacri also found that definite NPs are always represented in the pictures. This shows that the children's grammar, in spite of the

[21] Affirmative sentences were also included in the experiment, and although they are not reported, the paper leads us to assume that the verb was included in the pictures for those sentences.

tendency to apply negation maximally, is restricted by the presence of definite morphology.

Boysson-Bardiès and Bacri's findings tell us that children readily have predicative interpretations of indefinite object NPs. They do not tell us whether the high position of indefinite NPs in Dutch will have the effect of restricting children's tendency to maximize the scope of negation. However, their findings do show that children are sensitive to at least some grammatical restriction on the scope of the negation operator.

2.3.2 Bergsma-Klein (1996)

Bergsma-Klein (1996) found that Dutch children (age range 4;5–8;0) tend to assign narrow scope to high as well as low indefinites. She asked children aged four to seven to judge whether sentences like those in (82) matched a picture. Four sentence types were investigated: the double object construction; verbal small clause complements; the scrambled object construction; sentences with high indefinite subjects.

(82) a. (double object)
De vader heeft een meisje drie ballonnen gegeven.
the father has a girl three balloons given
"The father gave a girl three balloons."

b. (verbal small clause complement)
De vader laat een meisje twee boterhammen opeten.
the father lets a girl two slices of bread eat
"The father makes a girl eat two slices of bread and butter."

c. (scrambled object)
De jongen heeft een vis twee keer nagetekend.
The boy has a fish twice after-drawn
"The boy copied a (particular) fish twice."

d. (high indefinite subject)
Een meisje gleed twee keer uit.
a girl slid two times out
"A (particular) girl slipped twice."

In all of the examples in (82), the indefinite is in a high position, and must, for adults, take wide scope with respect to the NPs *drie ballonnen* and *twee boterhammen* in (82a) and (82b), or with respect to *twee keer* 'twice' in (82c) and (82d). For most examples, a counterpart containing an indefinite in low position was also tested. (83) shows the low (narrow-scope) counterpart of (82c):

(83) Het meisje heeft twee keer een boom nagetekend.
the girl has two time a tree after-drawn
"The girl copied a tree twice"

Bergsma-Klein's results must be interpreted with caution, since the number of variables in the study was rather large as compared to the number of subjects. Nevertheless, some trends emerge. The children tended, correctly, to accept narrow scope readings of low indefinites, but, incorrectly, they also accepted narrow scope readings for high indefinites like the ones in (82). For instance, children would consider a picture in which a father gives each of three girls a different balloon a match for (82a). Many children also rejected the correct picture for (82a), of a father giving three balloons to one particular girl. In general, the children provided fewer adultlike responses to high indefinites than to low indefinites.

The responses suggest a developmental trend for the double object construction and the small clause construction. The percentage of adultlike responses for the double object construction rose from 50% at age four to 79% at age seven, and the percentage of adultlike responses for the verbal small clause construction rose from 56% at age four to 76% at age seven. In contrast, adultlike performance for high indefinite objects in Bergsma-Klein's "scrambled" condition remained at a low 50% for ages four through seven: all of the children in the sample incorrectly accepted (82c) as a description of a picture that shows a boy who has drawn two different fish. The sentences with a sentence-initial indefinite subject evoke a high percentage of adultlike wide scope responses already at age four (80%), the percentage remaining at around the 80% level until age six (subjects age seven were excluded from this analysis).

These results show that the free variable interpretation is initially not assigned in all cases in which this interpretation is obligatory for adults. They also suggest that the free variable interpretation is available for subject NPs much earlier than for object NPs. This possibility is supported by findings of Avrutin and Coopmans (in press). They show that Dutch three-year-olds are sensitive to a semantic distinction between high indefinite subject NPs and low subject NPs (in existential sentences). In Chapters 4 and 5 of this study, I present two experiments that test the interpretation of sentences containing *twee keer* 'twice', like (82c) and (82d) from Bergsma-Klein (1996),

2.3.3 Musolino (1998)

Musolino (1998) investigated the scope that English-speaking children aged 3;11 to 6;6 and adults assigned to indefinite NPs. Two experiments contained indefinite NPs in object position embedded under negation, as in (84).

(84) a. The detective didn't find some guys.
b. Cookie Monster didn't eat two slices of pizza.

The subjects witnessed an acted-out story in which, for (84a), the detective did find some guys and did not find some others, and for (84b), Cookie Monster did eat two slices of pizza, and didn't eat two other slices. (84a) was accepted by all adults as a remark about what happened in the story, but the children accepted the sentence only 50% of the time, the younger half of these children rejecting the sentence 65% of the time. (84b) was accepted by all adults, but the children rejected it about 50% of the time, the younger half of the children even 72.5% of the time. Apparently, the children preferred to assign a narrow scope interpretation to the indefinite object NPs.

Musolino also investigated the interpretation of sentences like (85), with the indefinite NP in subject position.

(85) Some horses won't jump over the fence.

This sentence was accepted by the children 100% of the time as a remark about a story in which some horses did, and some horses did not jump over the fence, thus accepting a wide scope reading of the subject NP. Musolino's findings are consistent with the difference between subject and object NPs found by Bergsma-Klein: children may assign narrow scope to indefinite object NPs when wide scope is appropriate for adults, but correctly assign wide scope to indefinite subject NPs.

Musolino's account of his findings makes a prediction about how children will assign scope to high and low indefinites, respectively. He claims that the children's responses are due to "isomorphism", i.e. children's equaling syntactically determined scope with semantic scope (I will return to the Musolino's proposal in more detail in Chapter 5, section 4.2.3). The isomorphism account makes predictions for sentences like those in (86):

(86) a. Het meisje heeft geen appel geplukt.
the girl has no apple picked
"The girl did not pick an apple." (no apple was picked)

b. Het meisje heeft een appel niet geplukt.
the girl has an apple not picked
"The girl did not pick an apple." (some apple was not picked)

c. Een meisje heeft niet gedanst.
a girl has not danced
"A girl did not dance."

Dutch children should correctly interpret low indefinite NPs as in (86a) inside the scope of negation, and high indefinite NPs as in (86b) and (86c) out of the scope of negation. Musolino's account predicts that high indefinite NPs are assigned a wide scope interpretation by children from the onset of language acquisition. In the following chapter, I will derive a different prediction on the basis of the non-integration hypothesis of the present study.

2.4 Conclusions

It is possible to draw some preliminary conclusions from the studies reported in this section. As to the high and low NP positions in children's language production, children have an adultlike syntax of high and low object NPs by age four, and they associate the high and low object positions with some kind of semantic distinction even earlier, though less consistently. These findings have partly determined the design of the experiments that will be presented in subsequent chapters, such that the experiments presuppose that children aged four and above are able to treat the high and low NP positions as distinct.

As to the comprehension of indefinites, predicative interpretations seem to be available very early, and there seems to be a preference for narrow scope interpretations between the ages 4 and 6 or 7. Bergsma-Klein's study suggests that children between ages 4 and 7 do not necessarily associate the high position of indefinite NPs with a wide scope, free variable interpretation. Bergsma-Klein's and Musolino's studies further show that the preference for narrow scope readings might be restricted to indefinites in object, rather than subject, position.

In sum, children initially seem to favor the predicative interpretation of indefinite NPs to the expense of the free variable interpretation. Not only does the predicative interpretation appear very early in acquisition, it may also be overgeneralized to high indefinite NPs in some cases. The next section attempts to relate this difference between the two interpretations of indefinites to the mechanisms underlying the respective interpretations.

3. Comparing the complexity of interpreting predicative and free variable indefinites

This section considers the prerequisites for interpreting utterances that contain predicative indefinites and free variable indefinites, respectively. I address the question of whether and when these prerequisites are met in children's language development. The goal is to determine whether a structural difference between predicative or free variable indefinites could explain particular difficulty, or particular ease, in children's interpretations of the one or the other type of indefinite.

3.1 Prerequisites for the interpretation of predicative indefinites

Due to the characteristics of their respective interpretation mechanisms, predicative and free variable indefinites pose different requirements both on the contexts in which they appear, as well as on the hearer who is to interpret the indefinite NPs. Can we find indications in the literature as to the age at which these prerequisites are met in the language of children?

Let us first consider semantic incorporation. In several languages, some verbs must incorporate a property argument. Van Geenhoven discusses relational 'to have', which must combine with a predicative NP. This is illustrated in (87).

(87) a. Mary has three sisters.
b. *Mary has every sister.

The relational verb combines with an indefinite NP in (87a), which can be interpreted as a restriction on the verb's internal argument. In (87b), however, relational 'to have' appears with a strongly quantified NP. Quantifiers cannot incorporate, hence the utterance is uninterpretable.

Examples of relational 'have' are rare in child language transcripts, perhaps due to the fact that the topic of children's conversations is usually the here-and-now, and not, for instance, their family relations. However, relational 'have' does occur occasionally, as the following example in (88) shows (Schaerlaekens and Gillis (1987)).

(88) Moeke ook een klein kind hebben. (Diederik, 2;8.1)
mommy also a little child have

Following Van Geenhoven (1998), relational *hebben* 'have' in (88) is an incorporating verb that takes the property denoted by *een klein kind* 'a little child' as its argument. The example shows that semantic incorporation of indefinite NPs is part of this child's grammar.

Van Geenhoven also claims that the internal argument of an intensional verb must be a predicate (following Zimmermann (1992)). Intensional contexts are quite frequent in early child language. An example (Elbers and Wijnen (1992)) is presented in (89).

(89) Mother: Wil jij wat rozijntjes hebben? (Thomas, 2;5.27)
'Would you like to have some raisins?'
Child: Ja.
'Yes.'
Mother: Hè?
'Hm?'
Child: Wil rozijntje.
'Want raisin.'
(...)

Mother:	Jij mag rozijntjes ja.
	'Yeah, you can have some raisins.'
Child:	Dropje - dropjes hebben.
	'Liquorice - have liquorice.'
Mother:	Nee je mag rozijntjes.
	'No you can have raisins.'
Child:	Nee.
	'No.'

(89) clearly presents an intensional context: the child *wants* to have a raisin, and later changes his mind and says that he *wants* to have liquorice. It is clear that *rozijntje* does not refer to any particular raisin, nor does *dropje* refer to any particular piece of liquorice. Thus, example (89), like (88), presents a verb-noun combination that corresponds to a semantically incorporating construction. This shows that children do not only use predicative indefinites in isolation in naming contexts, but that they can also combine these predicative indefinites with verbs in an adultlike manner at a very young age – even if the noun morphology is not yet adultlike, as in Thomas' *wil rozijntje* (Dutch does not allow determinerless bare singular nouns).

3.2 Prerequisites for the interpretation of free variable indefinites

Free variable indefinites are interpreted through the semantic mechanism of accommodation. One might argue that the accommodation mechanism will pose problems to interpretation by the very fact that it is a repair mechanism. Such a mechanism is only employed if an utterance constitutes an exception to some rule. However, this argument is not a strong predictor of problems with high indefinites during language acquisition for several reasons. For one thing, we do not know what children consider "ordinary" or "exceptional" with respect to indefinite NPs. In addition, we need to keep in mind that accommodation repairs some exception to a formal linguistic rule of grammar. In actual language use, it is an extremely common device. Finally, the fact that accommodated indefinites may be less frequent as compared to incorporated ones cannot, of itself, predict much about the age of acquisition or the degree of difficulty.

There is, however, another reason for expecting the accommodation of free variable indefinites to cause difficulty to children. In order to implement accommodation, a hearer must be aware that a given utterance is part of a discourse, consisting of a context and the new information that the present utterance adds to this context.[22] By itself, if the LF of an utterance contains a free variable indefinite, it is uninterpretable. Only through accommodation of the

[22] By context I mean the body of knowledge that speaker and hearer have built up by means of the discourse, and also information from the physical context that is drawn into the domain of discourse by one of the discourse participants directing to it the attention of the other participants, either through linguistic or non-linguistic means.

indefinite can it receive an interpretation, i.e. only by locating the introduction of the indefinite's variable at the level of the context.

Here, then, we see a clear difference between predicative and free variable indefinites. Whereas for the interpretation of the former, the hearer only has to pay attention to information provided by the sentence in which the indefinite NP occurs, the interpretation of the latter requires that the discourse representation is involved. A discourse representation is a semantic representation of the discourse, which contains a representation of the individuals that play a role in the discourse (discourse referents). It also contains the relations between the individuals that have been made explicit, and whatever else is predicated of them. If a hearer did not integrate a current utterance into the discourse representation, accommodation could not take place. If a hearer did integrate the utterance, while somehow failing to access or use information that the discourse representation should contain or trigger, accommodation would be possible, but crucial input to the bridging process could be lacking. Thus, the interpretation of a free variable indefinite requires a process of discourse integration.

I will use the term "discourse integration" for what, strictly, should be considered two different processes. The one process is the use of the context in the structural interpretation of particular linguistic elements, such as NPs.[23] The other process is that of bringing utterances together into a whole that is in principle connected as to content. These two types of discourse integration cannot easily be separated. Not only are they mutually interdependent[24], it is also the case that what could surface as a failure of discourse integration might originate with either subprocess. Consider the following sequence.

(90) I saw an old woman and a girl. The woman crossed the street.

Now imagine that a hearer, contrary to the speaker's intention, assigns an interpretation to this sentence in which the woman crossing the street is not the woman that the speaker referred to in the first sentence. This might be due to a failure to use the information of the first sentence for the interpretation of the NP in the second sentence, hence a failure at the first subprocess of discourse integration identified above. Such a failure might for instance be caused by a failed attempt by the hearer to access the discourse representation. However, the incorrect interpretation could also be caused by the fact that the hearer does not connect the two sentences at the level of content, as if they belonged to two different texts. As

[23] Discourse integration may play a role in the interpretation of different kinds of elements, but here I am concerned mainly with NP interpretation.

[24] If a child omits integrating (some of the) new information into the discourse representation, certain discourse referents or qualifying information that may be crucial for the interpretation of NPs in future utterances will be lacking. For instance, it will be harder for the child to determine the accommodation site of a free variable indefinite. Thus, the connection between the content of one utterance and the next may become unclear, so that the child no longer feels that previous information may be relevant for a current utterance, at all.

the exact origin of the error cannot be determined, I decided to refer to both subprocesses by the term "discourse integration".

Let us consider, for a moment, what type of information provided by the discourse is used in the interpretation of a free variable indefinite. The accommodation mechanism itself only requires that the very fact that there is a context is part of the discourse representation. However, in order to apply bridging succesfully, it is also important that relevant information from the discourse is accessible to the hearer.

This information may be made available through the discourse in different ways. First of all, there is information that is directly presented in previous utterances, as in (91).

(91) I saw a couple of cats. Two cats crossed the street.

The cardinal NP *two cats* in the second sentence can be related to information that is provided explicitly in the previous utterance, *a couple of cats*. Not all relevant information is introduced explicitly – it may have to be inferred on the basis of information that is part of the discourse representation. The required inferences employ encyclopaedic knowledge, as in (92).

(92) Het is verschrikkelijk om naast een dierenasiel te wonen. Een hond heeft de halve nacht geblaft, en daarna de GFT-bak omgegooid.
it is terrible to next an animal home to live. a dog has the half night barked, and afterwards the garbage can over-thrown
"It's awful living next door to an animal home. A dog barked all night, and after that it pushed over the garbage can."

In (92), the fact that animal homes are likely to have dogs in them is discourse information that is used in relating *een hond* 'a dog' to *dierenasiel* 'animal home' in the first sentence. Finally, visual or other physical contextual information is also considered discourse information if it is explicitly introduced, for instance by deictic terms, or by paralinguistic gestures such as pointing, nodding, or eye gaze.

Discourse information is relevant to both speaker and hearer. For instance, the presence of a referent in the discourse enables a speaker to refer to this referent by a pronoun. The presence of the referent enables the hearer to pick up the reference for the pronouns, and in addition, the discourse contains information that allows the hearer to disambiguate reference when necessary.

In sum, discourse integration is required for the interpretation of free variable indefinites. Thus, in order to arrive at an adultlike interpretation of a high indefinite NP, a child has to integrate separate utterances into a discourse, as well as make use of the discourse in the interpretation of the NP. The next section addresses the

question of whether there is any evidence of insufficient discourse integration in child language.

4. Insufficient discourse integration

In this section I will argue that there is a tendency for children to treat utterances (or possibly even parts of utterances) as separate units, not integrating them into the larger whole of a discourse. This argument has been made by numerous students of children's language production, and I will argue that it is plausible that there may be a counterpart also in language comprehension.

The question that I address in this section is whether children consistently use the discourse in the production and comprehension of elements whose structural interpretation depends on the discourse. For example, the interpretation of a definite NP like *the woman* in *The woman was walking in the street* is dependent on the discourse context. This sentence cannot be assigned a truth value without considering which woman is intended. Similarly, a sentence like *Most marbles were green* cannot be assigned a truth value if the context does not provide us with some idea of the size of the set that contains all marbles. As I noted in the preceding section, in order to interpret an indefinite as a free variable indefinite, a hearer is not required to access the contents of the context. Rather, she must be aware that the very fact that utterances are embedded in a context is involved in the structural interpretation of a free variable indefinite. The elements that are found in the context themselves, or the information that is triggered by them, may be of importance in bridging.

In section 4.1, I will discuss a number of language production studies that suggest that the awareness that utterances are part of a discourse starts affecting children's discourse production between ages five and six. Even so, six-year-old children have much less discourse cohesion than adults, i.e. they do not mark relations between one utterance and the next by linguistic means to the extent that adults do. In section 4.2, I present studies that show that children also have limited discourse integration in comprehension. Even at age seven, children still experience difficulty when discourse integration is required for comprehension. In section 4.3 I briefly discuss what might be the underlying causes of children's lack of discourse integration, and I put forward the view that limited discourse integration may facilitate the language acquisition process.

4.1 Limited discourse cohesion in language production

The question "When are children aware that utterances are part of a discourse, updating previous knowledge?", can be understood at two different levels: the level of content and the level of linguistic marking. While development of a *coherent* discourse at the content level and *cohesive* discourse at the linguistic level are to

some extent interdependent, they are not the same (Hickmann (1995)). One finds children who are able to tell a coherent story, while omitting many linguistic devices that establish discourse cohesion, such as adequate pronominal reference, or connectives other than *and* or *then*. For both discourse coherence and discourse cohesion, there is still considerable development after age four.

The distinction between these two phenomena is reminiscent of (though not the same as) the distinction between the two subprocesses of discourse integration in language comprehension. Discourse coherence corresponds to the integration of separate utterances into a whole that is connected at the level of narrative content, while discourse cohesion roughly corresponds to making use of the discourse context in the structural interpretation of particular elements. As is the case with the subprocesses of discourse integration, discourse cohesion and coherence are not easily separated. Although a lack of discourse cohesion may be due to a lack of coherence, only discourse cohesion can be observed in language production. It is therefore linguistic cohesion which concerns us here. I present findings from Karmiloff-Smith (1981, 1985), Hickmann (1982) and Stenning and Michell (1985) that show that insufficient discourse cohesion is most prominent under age six, but that the development toward adult cohesion extends for a number of years after that age.

Karmiloff-Smith (1981, 1985) elicited narratives by asking French and English speaking children to describe four different picture stories. At age five, the children's narratives were characterized by the absence of connectives other than locational deictic terms (*there* and *là*) as well as *and then* for the English, and *puis* or *puis après* for the French speaking children. As to nominal reference, these children used pronouns and definite NPs without disambiguating them, and often without mentioning the antecedent. According to Karmiloff-Smith, discourse cohesion only gradually develops from age six onwards. (93) presents an example from an under-six-year-old's narrative from Karmiloff-Smith (1981). The picture story shows a little boy walking along the road. The boy sees a balloon vendor who gives him a balloon. The boy walks off with the balloon, but later lets go of the balloon, and starts to cry.

(93) Là il se promène. Là il voit un bonhomme avec des ballons. Là il lui donne un ballon ...un vert. Là il part chez lui ou à l'école. Là il s'envole loin, très loin. Bien, là il pleure.

There he takes a walk. There he sees a chap with some balloons. There he gives him a balloon ...a green one. There he goes to his house or to school. There he flies off far, very far. Well, there he cries.

The child in (93) does not use any sophisticated connectives, and relies mainly on pronouns for nominal reference. In addition, the child does not disambiguate

reference. Note that in French, all participants to the story (*garçon* 'boy', *homme* 'man' and *ballon* 'balloon') can be referred to by the same personal pronoun, *il* 'he'. Thus, many pronouns in the child's story refer ambiguously. A listener would only be able to understand the child's story in (93) if she shared the same visual information as the child[25].

Related findings appear in Hickmann (1982). Hickmann shows that children use pronouns and definites whose antecedents have not been identified. Four-year-olds introduced only 50% of their referents properly, i.e. they first referred to them by an indefinite NP, an existential construction, or a localization (e.g., *the bird in that tree*, or *there's a bird in that tree*). For seven-year-olds, the percentage of properly introduced referents is 65%, and at age ten, 90% or more, depending on the task.

Karmiloff-Smith and Hickmann both argue that, initially, children's pronouns and definites refer directly to the physical context, rather than referring anaphorically or, to use Karmiloff-Smith's term, "intralinguistically". Although Karmiloff-Smith and Hickmann label this non-anaphoric reference "deictic", I would argue that the children's non-anaphoric reference is crucially different from adult deixis[26]. Hence, I will from now on refer to the children's non-anaphoric reference as "straight reference".

Karmiloff-Smith identifies the first type of discourse organisation appearing in children's narratives, after the "straight reference" period, as "thematic subject strategy". The children use the subject slot of a sentence for referring to what may be regarded as the protagonist of the story, often introducing this thematic subject by a full indefinite NP and maintaining reference by pronouns. An example is given in (94).

(94) A little boy is walking along. He sees a balloon seller. He wants a green balloon. He gets one. He walks off in the sunshine. He lets go of the balloon and then he starts crying.

[25] One might object that these findings are not caused by a lack of discourse cohesion, but are in fact evidence of egocentric reference (Maratsos (1976), following Piaget). Egocentric reference would result from the child's poor theory of mind, the child failing to realize that the hearer's state of mind is different than her own. Hence the child would be unaware of the need to disambiguate reference or maintain reference by overt linguistic devices. I do not believe that the results are due to flaws of children's theory of mind at such a basic level. When the children in Karmiloff-Smith's (1985) experiment were asked to retell the stories from memory, with no visual clues available for the experimenter to share, they used fewer localizations and gestures. This shows that they were aware of the fact that the hearer's state of mind is not the same as their own, and that they acted upon this knowledge. Nevertheless, the ambiguous and apparently non-anaphoric use of pronouns and definite NPs remained the same.

[26] Adults often use deixis as a tool to disambiguate reference, as in: "Could you hand me *that* box, no, I didn't mean *this* one, I meant *that one over there*". Children's "deictic" reference is characterized by a lack of such disambiguation.

In Karmiloff-Smith's data, this narrative strategy did not occur with children under the age of six. The thematic subject stage is followed by a stage at which children learn to relax this blueprint of a story.

Stenning and Michell's (1985) findings support the studies mentioned above, and found that there is considerable development towards an adult use of several cohesive devices for a number of years after age six. They analysed retellings of a story and explanations of its content by English children between ages five and ten. In both tasks, the children were aided by pictures. Children's use of the cohesive devices connectives, past tense, and pronominal reference was inadequate from an adult point of view at ages five and six. At age five, hardly any children used connectives other than *and* or *then*. Their use of more sophisticated connectives such as *but*, *because*, *suddenly*, etc. kept increasing until age seven. The proportion of children who used past tense, which Stenning and Michell consider as a tool for maintaining temporal reference throughout a story, remained around 55% from ages five to seven, then increased to 90% at age ten. The proportion of children who used an adequate mix of nouns and pronouns, rather than using only pronouns and/or omitting nominal reference entirely, rose rapidly from 20% at age five to 80% at age seven, and then continued to rise a little more slowly to nearly 100% at age ten.

(95) provides examples of the children's retellings of a story episode (examples and bracketed comments are taken from Stenning and Michell (1985, p. 267)). The picture sequence shows the main characters Tom and the Magic Snowman, flying to the emperor's palace. The sun is rising, so they have to hurry back before the Magic Snowman starts melting.

(95)

a. ... flying in the air... flying... landing... running... flying... landing...

(Nominal reference omitted; tense present continuous; connectives none).

b. ...and then they land and they look... and then he tells him something... and then they fly back...

(Nominal reference ambiguous pronouns; tense simple present; connectives and/then).

c. ...when they came to the emperor's palace the snowman jumped down from the sky and landed on the roof but it was getting dawn and it was getting hotter as well... they looked out... the snowman said "Look! there's the sun coming up... the sun's warm... come on!... let's get back or I'll melt..."

(Nominal reference successful mix nouns/pronouns; tense past; connectives other).

Examples (95a) and (95b) are typical of children under age six, (95c) is typical of a child over eight years of age. These examples show that through the lack of adultlike use of pronouns, tense and connectives, the children's narratives resemble a series of descriptions of the separate pictures, rather than a story. Note that only the third child constructs a story that shows cohesion, rather than providing merely a sequential description of the pictures.

Stenning and Michell's findings show that many children after age five do not yet adequately link separate utterances into a cohesive discourse. Previous or subsequent utterances do not affect the linguistic form of an utterance

4.2 Effects of task demands on discourse cohesion in language production

A number of studies have investigated which factors influence children's discourse cohesion. They found that not only age, but also task demands determine the degree of discourse cohesion.

Wigglesworth (1997) analyzed retellings of a long picture story (M. Mayer's *Frog, where are you?*) by adults and children aged four, six, eight, and ten. She identified several narrative strategies, similar to strategies reported by Karmiloff-Smith (1981). Contrary to Karmiloff-Smith, however, Wigglesworth found that the thematic subject strategy is not restricted to children between roughly 6 and eight. Three of her twenty adult subjects sometimes used the thematic subject strategy, and it was also used by four-year-olds, although very incohesive discourse using "straight reference" was much more frequent. This suggests that other factors than just age determine narrative strategies and discourse cohesion.

Indeed, Wigglesworth shows that as the task of assigning and disambiguating reference becomes more difficult, narrative strategies and discourse cohesion deteriorate. Most of the four- and six-year-olds who used the thematic subject strategy in the first story segment were unable to maintain it in the second segment. This can be explained by the fact that the referencing task of the latter segment was more difficult, as a number of new characters had to be introduced and their interactions with the two story protagonists must be reported. In this segment, the four- and six-year-olds fell back on less advanced nominal reference. The narratives of the eight-year-olds were also affected by the referential load of the

second segment. While most children in this age group had an adultlike use of nominals in the first story segment, they fell back on a less sophisticated use of nominals in the more complicated second segment. For example, children whose narratives initially displayed the use of nonimals that is typical of adults resorted to a thematic subject strategy or a part thematic strategy, and children who had a thematic subject strategy fell back on a part thematic strategy or what I have termed "straight reference".

Orsolini (1990) argues that discourse cohesion and other task demands are in competition for processing resources. An increase of task demands in the planning of a discourse may load the speaker's memory so that there is insufficient processing space available for discourse cohesion.

Orsolini analyzed fantasy narratives told by Italian children. The children's task was to tell a story that they would subsequently act out with some props that were in front of them. She found that long pauses tended to occur both before a child integrated a new story theme (story elements) into the existing story and before a child used an anaphoric pronoun to establish discourse cohesion. She argues that these pauses are an indication that these activities require extensive planning.

Orsolini also found that when a new theme had to be integrated, the use of anaphoric devices decreased. She argues that in these cases, the memory load of relating new elements to the previous story content loads short-term memory to such an extent that no processing space is left for discourse cohesion. Orsolini further found that discourse cohesion increased when children relied on so-called "episodes" in their narratives[27]. Episodes lighten the processing burden of planning the semantic content of a narrative.

Pratt and MacKenzie-Keating (1985) investigated the effect of task demands and practice on discourse cohesion. Two groups of English speaking children, first-graders, mean age 6;3, and third-graders, mean age 8;4, were asked to retell a story. Half the children were asked to retell a story that they had been told by an experimenter, the other group were shown a video tape in which puppets presented the story in dialog. The latter condition was more difficult, as it demanded more recoding of the information. The third-graders' discourse cohesion as measured by their appropriate use of nominals was significantly better in the verbal input condition: the retellings contained 1.6% of referents that were inappropriately introduced by definite NPs or pronouns, and an additional 1.9% of all nominals had ambiguous reference. For the video presentations, the error rates were significantly higher, 23.6% of introductions of referents were inappropriate, and 14.9% of NP references were ambiguous. No differences were found for the group of first-graders.

[27] Orsolini defines episodes as "organized themes", which "contain a conventional semantic content (...) as with scripts, they have a stereotyped, ordered sequence of actions (e.g. wolf eats somebody; somebody arrives with a weapon; the wolf is killed." (Orsolini (1990) p.57).

For all children, two retellings were analyzed, one after the child had heard the story only once, and one after she had heard it a total of three times and had one practice retelling. For the first-graders, errors decreased after practice. In the verbal input condition, the percentage of inappropriate introductions decreased from 23.5% to 5.8% and ambiguities decreased from 10% to 6.8%. In the video condition, inappropriate introductions decreased from 23.6% to 9.6%. There was no effect on the rate of ambiguities. Practice did not have an effect for the third-graders.

The three studies presented in this section show that children may fall back on non-cohesive discourse if the narrative task is demanding. This suggests that integrating utterances into a discourse is in a sense more difficult than not integrating sentences into a discourse. The fact that discourse is less cohesive for younger children may reflect that discourse-integration is more of an effort as children are younger.

If children's limited discourse integration is not just a matter of language production, but extends to comprehension, we would expect non-adultlike interpretations of elements whose interpretation requires that prior discourse is taken into account. The next section presents a number of studies investigating such elements, namely nominal anaphors.

4.3 Limited integration of discourse information in language comprehension

A number of studies show that discourse plays a more restricted role in children's comprehension of definite NPs and pronouns compared to adults' comprehension.

Karmiloff-Smith (1979) found that French speaking children often fail to recognize the anaphoric function of definites. The ages of the children taking part in the experiments ranged from 3;9 to 10;10. The children were asked to act out the following sentences (translated from French), using a boy and a girl doll and one or both of either two bells or two shoes.

(96) a The girl touches a shoe. And then the boy touches a shoe.
b The boy touches a bell. And then the girl touches the bell.

Logically, for (96a), both a response on which the boy touches the same shoe as the girl, and a response on which he touches a different shoe, are correct. Generally, the children preferred the reading on which two different shoes were involved. For (96b), on an adultlike anaphoric reading of the definite object, the girl should touch the same bell as the boy. Here, children's responses showed a development: Three- to five-year olds have what could be an anaphoric interpretation (the same bell being touched on both occasions) only just over 30% of the cases. This percentage

is still at a low 51% at age eight, then raises to 83% with nine-, and 90% with ten-year olds.

Karmiloff-Smith concluded that in a situation like the experiment presented above, in which all indication of anaphoricity depends entirely on the definite article, children below age nine are not likely to interpret the definite anaphorically. Although there are some methodological objections against this experiment[28], the experiment shows that the definite article does not immediately trigger an anaphoric interpretation even at the age of eight. If children had been using most of their definite NPs in an anaphoric manner from an early age on, we would have expected more anaphoric interpretations in comprehension, even in this particular experimental situation.

Wykes (1981) investigated pronoun resolution in child language between roughly 4;6 and 5;6. Selection of the correct antecedent involved taking into account world knowledge that was triggered by information provided in the preceding sentence. An example is given in (97).

(97) Jane found Susan's pencil. She gave it to her.

Correct resolution of the pronouns in (97) is brought about by the world knowledge that a person who finds a pen is in a position to give it to someone, and that one ought to return found goods to their owners. The children who took part in Wykes' experiments failed to select a plausible referent for the pronoun between 25% and 50% of the cases. The error rates were lowest when a sentence contained only one pronoun, and higher for conditions in which processing load was increased by the presence of a second pronoun or by the presence of an additional sentence that intervened between the sentences containing the antecedent and the pronoun. In contrast to the children, adults agreed 100% as to what constituted a plausible antecedent.

Yuill and Oakhill (1991) presented a number of studies of children's abilities to identify the correct antecedent for a pronoun. Their subjects were English speaking children between 7 and 8 years of age, mean age 7;9. The purpose of the experiments was to investigate differences between a group of children who were very skilled reading comprehenders, and a group who were far below average. It is the former group which concern us here, as some kind of impairment may underlie the findings concerning the latter group. Although Yuill and Oakhill's studies involved skilled and less-skilled reading comprehenders, only some of the experimental tasks involved reading. Most tasks involved spoken stimuli.

[28] Both sentences like those in (96) were presented in the same test session, and the presence of only two objects (shoes or bells) with two dolls, may have led the children to believe that each bell or shoe should be matched to a doll.

In a series of pronoun resolution tasks that Yuill and Oakhill discuss, the intended antecedent always appeared in the sentence preceding the one containing the pronoun. The results showed that the skilled reading comprehenders would select an implausible antecedent for a pronoun between 15% and 35% of the cases, depending on the type of task. (98) presents an example of a test item of one of the tasks. After having read the sequence in (98a), the child was asked to answer the question in (98b) (example reconstructed from Yuill and Oakhill (1991)).

(98) a. Peter lent his coat to John, because he was cold.
b. Who was cold, Peter or John?

The mean error rate of the skilled comprehenders for sentences like (98) was 15.63% when the children were presented with both clauses at once. The error rate increased to 23.96 % when memory load was increased by removing the first clause when the second clause was shown. Clearly even these skilled readers still had some problems in employing the information that the discourse provided for the selection of a plausible antecedent.

The final comprehension study that I present, Tyler (1983), contains the results of on-line experimentation. The study shows that five-year-old children can already assign anaphoric reference across sentence boundaries, but reference assignment at this age is not as rapid as for older children and adults. In addition, the thematic subject strategy as identified by Karmiloff-Smith (1981) seems to play a role also in language comprehension.

Five-, seven- and ten-year-old Dutch children and adults listened to taped sequences of two or more sentences, and pressed a button whenever they heard a mispronounced word, e.g., *leffer* instead of *letter*. The rationale of this method is that mispronunciations are detected more rapidly when the "source word" is predictable from prior discourse. Test items included the sentence pairs in (99), in which the target word *ice* (in fact, its Dutch translation) was pronounced incorrectly.

(99) a. The boy in the orange suit was our nephew.
Our nephew fell on the **ice** and broke his leg.
b. The skater in the orange suit was our nephew.
The skater fell on the **ice** and broke his leg.
c. The skater in the orange suit was our nephew.
Our nephew fell on the **ice** and broke his leg.
d. The skater in the orange suit was our nephew.
He fell on the **ice** and broke his leg.

As predicted, the reaction times for (99a) were much longer for all age groups than the reaction times for the other conditions, since in that sequence the occurrence of *ice* is not predictable. The reaction times for (99b) and (99c) did not differ. This

shows that the predictability of *ice* is equally high whether *the skater* occurs in the same sentence, or the definite *our nephew*, which is anaphoric on *the skater* in the previous sentence. Thus there is evidence that discourse integration takes place. The reaction times for the pronouns in (99d) were longer for all age groups than for the conditions which contained full NPs.

Although all age groups roughly showed the same response pattern, the five-year-olds differed from the other age groups in some respects. Consider the test sentences in (100). In (100a), *letter* was pronounced incorrectly, in (100b), *sheep* was.[29]

(100) a. Mother saw the postman coming from a distance.
Mother brought a **letter** from Uncle Charles who...

b. Every now and then, the princess goes to see the old shepherd.
She takes good care of the **sheep** and....

Both sequences are pragmatically implausible. However, whereas the five-year-old subjects' responses were slowed down to sentences containing a definite NP or a proper name as in (100a), they were not slowed down at all for (100b). Apparently, the implausibility of the situation in (100b), which only occures if the second sentence is interpreted with respect to the preceding sentence, has no effect on these children. Tyler remarks that: "... this suggests that pronominal reference had not been definitely assigned by the time the children heard the mispronounced word. Older children and adults, in contrast, were disturbed in the pronoun case, implying that they must have assigned reference by the time they heard the target (p.337))".

The five-year-olds also responded more slowly to a particular subset of the items containing pronouns, like (99d). The sentence pairs had been embedded in slightly longer stories. Some of these stories presented one character as the "thematic subject " (see section 4.1). Whenever this was the case, the five-year-olds' reaction times were even shorter than those of the other age groups. However, whenever the pronoun did not refer to a "thematic subject", the reaction times were significantly longer than in the "thematic subject" cases, and significantly longer even compared to cases like (99b), in which the relevant information was present in the utterance itself.

Tyler's results tell us, on the one hand, that there is discourse integration in children's comprehension. As of age seven, the children's response patterns differ very little from that of adults. Even five-year-old children are generally able to relate anaphoric nominals to antecedents in preceding discourse, and they are sensitive to expectations that they have formed on the basis of prior utterances. On the other hand, the results show that on-line discourse integration is slower as children are younger, and that five-year-old children rely on a thematic subject strategy given the opportunity to do so. The latter point in particular suggests that

[29] I infer that sheep was mispronounced from Tyler's article.

the development of discourse integration in comprehension may be related to that of discourse cohesion in language production.

In sum, the research presented in this section indicates that there certainly is discourse integration in children's language comprehension, but that it is more limited than adult discourse integration. These findings give us reason to expect that it is harder for children to assign a free variable interpretation to an indefinite compared to a predicative interpretation. However, before discussing the issue of the interpretation of indefinites, I briefly discuss possible sources of children's limited discourse integration and its possible function in language acquisition in the next section.

4.4 Limited discourse integration as a way of limiting effort

The studies discussed in section 4 tell us that children's language production reveals little awareness that a sentence constitutes part of a discourse until age five or six. By that age, children start making systematic use of cohesive devices, but it may take them until age nine or ten to develop adultlike discourse cohesion in production. The developmental trajectory in language production proceeds from no or little discourse cohesion to extensive discourse cohesion with older children and adults. Children's discourse cohesion decreases as the processing load increases. From these findings I conclude that, to children, discourse integration in language production is more costly in terms of processing than treating (parts of) utterances as separate units.

Would this conclusion also hold for discourse integration in language comprehension? I believe that it may. As section 4.3 shows, there are similarities between the comprehension and the production data, as the developmental trajectory proceeds from insufficient to adequate integration of discourse information. In addition, the thematic subject strategy that Karmiloff-Smith detected in children's production of discourse also seems to play a role in comprehension. Finally, it is safe to assume that a certain processing load is attached to discourse integration in comprehension, since it involves taking into account more than just the one, most recent, utterance. This makes it plausible that non-integrated comprehension may be in some respect an easier option for a child than discourse integration (see also Avrutin (1999)).

This takes us to the question of why discourse integration would be limited in children. Roughly, I believe that there may be two causes for such a characteristic of children's language. One reason could be that the child does not have access to components of the discourse representation needed for the interpretation of a given utterance. This could have several sources, such as an incomplete discourse representation, processing limitations that keep the child from accessing it, or an inability of the child to keep all potentially relevant information in mind while interpreting a new utterance. Another reason could be that there is a default setting

of the child's initial language system that gears the child toward paying attention only to one utterance at a time. Such an initial setting could well be determined by processing limitations and/or an economy strategy, or it could simply be innate. It would cause relatively little communicative breakdown, as discourse integration is no absolute requirement for the majority of sentences. For anaphoric elements, a straight reference or deictic interpretation will be just as adequate in most situations. For most sentences containing indefinites, the situations in which the free variable interpretation is true, constitute a subset of the situations in which the predicative interpretation is true (see Chapter 1).

Whatever its cause, an initial limitation on discourse integration could facilitate language acquisition, by delimiting the problem space in two ways. First, the mapping between form and meaning, for instance in word learning, would not be influenced by information belonging to different times or places. This should be an advantage, because it would exclude much irrelevant information. Secondly, the meanings that, for instance, definite NPs like *the cat* or indefinite NPs like *a cat* can take on are reduced to only referential and predicative interpretations, since anaphoric or free variable interpretations would never reach children who do not pay attention to discourse. Reduction of the range of meanings of these determiners may facilitate their acquisition by reducing the number of interpretations that are mapped to one form. In addition, the referential and predicative interpretations could be regarded as the "basic" meaning of definite and indefinite NPs, respectively (de Hoop (2000)). After children start paying more attention to the effect of discourse on sentence level interpretations, they could proceed to learning the additional interpretations of NPs by building on the basic interpretations.

4.5 How limited discourse integration may affect the interpretation of high indefinites in the acquisition of Dutch

Insufficient discourse integration may be a hindrance to children's interpretation of high indefinite NPs at two very different points. First, it may keep children from assigning an adultlike free variable interpretation to a given high indefinite NP. Secondly, it may affect the very acquisition of the language-specific means of marking a free variable indefinite. Consider that for each case in which a child failed to assign a free variable interpretation, the indefinite NP would seem a predicate to the child. As a result, many free variable indefinites would not be perceived as such by the child, so that the child would miss out on many opportunities to observe the correlation of the high syntactic position with the free variable interpretation[30]. In fact, if the child does not, or to an insufficient extent,

[30] The effect of the high position need not necessarily be acquired through observation of high indefinite NPs alone, as this position is also systematically used for pronouns and anaphoric definites (de Hoop (2000)), which also require discourse integration.

pay attention to the potential relation between indefinite NPs and the discourse, she may take long to observe that such a thing as a free variable indefinite even exists.

In sum, if children have insufficient discourse integration, they may have a problem at interpreting a given high indefinite NP, and they may also have a problem simply acquiring the fact that high indefinite NPs take a free variable interpretation.

If children indeed tend to make do with one utterance at a time rather than integrate discourse, the following predictions can be made for their interpretation of indefinite NPs[31].

a. Indefinite NPs are preferably interpreted as predicates, because this is the only interpretation available if discourse is left out of consideration. Besides, on the view that there is an initial setting to pay attention only to one utterance at a time, this would be the default interpretation of indefinite NPs.
b. The relation between the high NP position and the free variable interpretation is acquired relatively late, since if the child does not perceive that some NPs are related to the discourse, she cannot perceive that these discourse related NPs appear in a high NP position. Thus, there is a setback with respect to the amount of input that the child receives. This setback in acquisition could potentially still be noticed even after the level of discourse integration has increased considerably.
c. Even if a child correctly interpreted a certain indefinite as a free variable indefinite, she might not arrive at the proper interpretive guise, because of insufficient discourse integration.

Options a. and b. present a potential explanation for the findings of Boysson-Bardiès and Bacri, Bergsma-Klein and Musolino that I presented in section 2. These studies showed that children had a preference for narrow-scope, hence predicative, interpretations of indefinites. Musolino showed that this preference held in situations in which both a narrow and a wide scope reading were grammatical, and Bergsma-Klein showed that the preference held even for high indefinite object NPs in Dutch, a reading which is not allowed for adults.

With these predictions we have arrived at a hypothesis about children's interpretation of indefinite NPs and the relation between the interpretation and the

[31] Note that my position is different from Grodzinsky and Reinhart (1993), as the phenomenon that they describe (pronoun resolution) and the underlying analysis are very different. Grodzinsky and Reinhart propose that there are two equal ways in which pronoun reference can be resolved. While deciding on the resolution procedure, both possibilities must be kept in mind and be measured against the situation at hand. Grodzinsky and Reinhart explain children's and aphasic patients' errors in pronoun resolution as resulting from a lack of processing capacity, which prevents them from keeping these two options in mind. As a result, the subjects are forced into a guessing strategy. In contrast, I do not present the two interpretations of indefinite NPs as equal. Rather, I assume that difficulty may occur with the free variable interpretation because it requires more effort.

high position. This hypothesis, the "non-integration hypothesis" will be formulated in the next chapter, and predictions a. to c. above will be formalized.

5. Summary

In this chapter I have presented findings from previous research in language acquisition that suggest that free variable interpretations of indefinite NPs are initially dispreferred in child language development. I have related these findings to findings from studies in children's discourse development, arguing that limited discourse integration in children's comprehension may cause difficulty with the free variable interpretation. In the next chapter I present predictions of this view for the interpretation of indefinites by children, and, specifically, for the acquisition of low versus high indefinite NPs in Dutch.

THE NON-INTEGRATION HYPOTHESIS

CHAPTER 4

1. Introduction

In this chapter, I present the hypothesis that underlies the experimental research in this dissertation, as well as a first experiment investigating children's interpretation of high indefinite NPs. As we saw in the preceding chapters, the semantic distinction between predicative indefinites and free variable indefinites is indicated in Dutch by syntactically distinct NP positions, "high" and "low". Two different semantic mechanisms, semantic incorporation and accommodation, underlie the narrow scope properties of predicative indefinites on the one hand, and the non-narrow scope properties of free variable indefinites on the other. The process of bridging, employed to identify the accommodation site for a free variable indefinite, is responsible for the different interpretive guises of these indefinites.

In the previous chapter, I argued that the application of the accommodation mechanism may cause difficulty to the child, because it requires discourse integration. Discourse integration is usually very limited at age 4 and 5 and develops only gradually. This view leads to the "non-integration hypothesis", which argues that the free variable interpretation is acquired later than the predicative interpretation.

On the basis of the non-integration hypothesis, I predict two types of errors to occur in children's comprehension. One of them I will call "semantic type error", which means that high indefinites are interpreted as predicates instead of free variables. The other error I will call "pragmatic fit error", which means that high indefinites are interpreted as free variable indefinites, but they are not related to their accommodation site in an adultlike manner. Since the expected errors are due to children's limited discourse integration, it is expected that errors of this type may occur until age six or even later.

I will argue that different predictions can be formulated if we assume the analyses by Diesing (1992) and de Hoop (1992), who both propose that there is a syntactic requirement that NPs in the high argument position have a "presuppositional" (Diesing) or "strong" (de Hoop) interpretation. I will derive

from this the prediction that children will not (or hardly) make any semantic type errors after age 4, as by that age they have mastered the syntax of high and low NPs and have adultlike patterns of NP placement (see Chapter 3, section 2.1). I will argue that, on a quantificational analysis of the kind proposed by Diesing or de Hoop, we may expect yet another kind of error: the "restriction error".

This chapter also presents an initial experimental exploration of the non-integration hypothesis. The experiment investigates interpretation of high indefinite subject NPs in a story context. Its purpose is to investigate whether children's interpretations of the indefinite subject NPs reveal that they treat the sequence of utterances of a story as a connected whole. It is expected that the hypothesized lack of discourse integration negatively affects the coherence of the stories in children's comprehension.

The chapter is set up as follows: section 2 presents the non-integration hypothesis and predictions issuing from it, and section 3 devotes some words to the relation between the predictions and previous research in children's NPs. Section 4 discusses the predictions that would follow from the non-integration hypothesis if we assumed the analyses in Diesing (1992) and de Hoop (1992), followed by a summary of the predictions in section 5. Section 6 presents an initial experiment investigating children's interpretation of high indefinite subject NPs in a story context. The chapter ends with a summary in section 7.

2. Hypothesis and predictions

From the previous chapter I conclude that children experience difficulty with discourse integration. Insufficient discourse integration may be a source of difficulty with respect to the interpretation of a given high indefinite, but it may also affect the acquisition of the correlation between the high position and the free variable interpretation. No particular problems are expected for predicative indefinite NPs. On the basis of this conclusion, I formulate the following hypothesis:

> **Non-integration hypothesis:**
> The predicative interpretation of indefinites is acquired early.
> The free variable interpretation is acquired later because it requires discourse integration.

This hypothesis is in fact part of a broader hypothesis, which states that discourse integration for NP interpretation is initially dispreferred in language acquisition. Indefinites may cause particular difficulty because, unlike pronouns and definite NPs, they do not themselves contain any marking that indicates that discourse must somehow be involved.

The hypothesis does not specify whether children, until a certain age, are incapable of discourse integration, or whether they only fail to apply it in some cases. For instance, it is possible that children are able to relate high indefinites to discourse information only under ideal processing conditions, or that children see the importance of going beyond the sentence level only under certain pragmatic conditions. These possibilities remain speculative, and before investigating them, it must be established whether children indeed have difficulty with the interpretation of free variable indefinites. It is this task to which the remainder of this dissertation is dedicated.

Children's difficulty with high indefinites may surface in two kinds of errors, which I label the "semantic type error" and the "pragmatic fit error", respectively. A semantic type error occurs when a child assigns a predicative interpretation instead of a free variable interpretation[32]. Unlike the latter, the predicative interpretation does not require accommodation. The semantic type error is formulated as follows:

> **Semantic type error:**
> The child fails to accommodate indefinites that are interpreted as free variable indefinites by adults. Instead, the child interprets these indefinites as predicates.

For adults, a free variable interpretation of the indefinite is triggered by the Dutch "high" position. If children make a semantic type error in the interpretation of high indefinites, they may assign these high indefinites an interpretation as if they were in the low position, but not vice versa. This prediction is compatible with Van Geenhoven's approach to indefinites. Recall that on that approach, the syntactic position of the NPs is in no way directly linked to their interpretation. An indefinite NP can in principle always be interpreted either as a predicate or as a free variable NP, and the high syntactic position merely serves to indicate that the latter interpretation is intended.

Whether a semantic type error occurs in children's interpretation is tested in the empirical part of this study. An example of hypothetical difference between adult and child interpretations is given in (101).

[32] The label is derived from the notion that predicative indefinites are of a different semantic *type*, <e,t>, than free variable indefinites, which are of type <s,<e,t>> (Van Geenhoven (1998)).

(101) a. Die pestkop heeft een kind twee keer geslagen.
a' "That bully has beaten a (particular) child twice." (adult reading)
a'' "That bully has beaten a (possibly different) child twice." (semantic type error)

b. Die pestkop heeft twee keer een kind geslagen.
b' "That bully has beaten a (possibly different) child twice." (adult reading)

The adult interpretation of (101a) is given in (101a'). If a semantic type error occurs in acquisition, we should find children who have the interpretation in (101a'') instead. This interpretation is the same as the adult interpretation of (101b), which is shown in (101b'). For sentences like (101b) we do not expect children's interpretations to deviate from the adults', since the predicative interpretation does not require discourse integration.

The hypothesized lack of discourse integration may also surface through a pragmatic fit error. In that case, the error would lie in the child's failure to relate the indefinite to elements in the discourse in an adultlike manner. The pragmatic fit error is formulated as follows:

Pragmatic fit error:
The child fails to construe appropriate bridges between free variable indefinites and their accommodation sites.

As I argued in Chapter 2, adults identify the accommodation site of a a free variable indefinite by constructing a chain of inferences, a "bridge". A bridge is constructed on the basis of information provided by the discourse, and may result in a source-set or specific guise. A child making a pragmatic fit error would correctly interpret certain indefinites as free variable indefinites, but fail to construe an appropriate conceptual link. This is expected if children have insufficient discourse integration, since what is appropriate in a given context must be decided on the basis of discourse information. The result of the pragmatic fit error would be a pragmatically infelicitous interpretation, for example, a source-set guise when a specific guise is required, or vice versa. A pragmatic fit error might also surface as the identification of an overly restricted, overly large, or altogether incorrect source set. In keeping with the non-integration hypothesis, it is to be expected that children will prefer interpretations that require only little integration of previous discourse, trying instead to gather their information from the physical context.

In the next section I briefly discuss the relation between the predictions formulated in this section and some of the language acquisition studies that I presented in the previous chapter.

3. Considering the predictions in relation to previous studies

The reader may wonder whether the predictions formulated above are not contradicted by some of the findings that I presented in section 2 of Chapter 3. Schaeffer (1995) and Eisenbeiss (1994) found that even two-year-old children usually place definite NPs in the high object positions and indefinite NPs in the low position, much like adults. Schaeffer (1997) found that children place indefinite object NPs to the left of negation at the same rate as adults by age three. These findings might seem to contradict the non-integration hypothesis, as this hypothesis predicts non-adultlike interpretations at a much later age. However, the fact that a child selects particular NP positions in language production does not imply that the child will let an NP's interpretation be determined by its position. Recall that, in Van Geenhoven (1998), there is no mechanism that directly maps syntax onto semantics, rather a high NP position *indicates* that the indefinite is not incorporated. The child may fail to act on this indication, especially since the indefinite itself conveys no information about the way in which it should be interpreted.

Another finding that may be relevant with respect to the predictions of the non-integration hypothesis is the discrepancy between the findings for subject and object NPs. Bergsma-Klein (1996) and Musolino (1998) found that children age four and older will have non-adultlike interpretations of indefinite object NPs, but not subject NPs. This is not entirely unexpected: first, according to Van Geenhoven, the default interpretation of an indefinite subject NP is that of a free variable indefinite (see Chapter 2, section 4.2). Secondly, the sentence-initial subject position tends to be the sentence topic, which means that this position is often employed for elements that are related to previous discourse, such as the "thematic subject". Object NPs, on the other hand, are more often part of the focus of a sentence, constituting new information that is less likely to demand a relation to previous discourse. Hence, object NPs and subject NPs will be treated separately in the experimental chapters.

In the next section, I argue that the predictions for child language acquisition would be different for different analyses of indefinites.

4. Deriving predictions for the quantificational approaches

The quantificational approaches to indefinites of Diesing (1992) and de Hoop (1992) differ from the approach adopted in the present study in two major respects: they assume that the interpretive properties that are typical of high indefinites are due to the quantifier status of these indefinites, and they assume that there is a

direct link between the quantifier status of these indefinite NPs and their placement in a high NP position. This leads to different predictions with respect to the semantic type error and the domain restriction, as I will argue in this section, and roughly the same prediction with respect to the pragmatic fit error.

The definitions of semantic type error and pragmatic fit error of course need to be translated somewhat. As to the semantic type error, the interpretation assigned to high indefinites in Diesing (1992) and de Hoop (1992) is that of a quantifier, rather than a free variable indefinite. The interpretation typical of low indefinites is not that of a predicate, but rather existential for Diesing, and part of the predicate (predicate modifier or a Kamp/Heim indefinite) for de Hoop. The pragmatic fit error is defined above as a failure in the process of bridging to an accommodation site. Here, we should regard the pragmatic fit error not necessarily as the result of flawed bridging, but nevertheless as a pragmatic error leading to the child's selection of a pragmatically inappropriate interpretation of an otherwise correctly "quantificational" indefinite.

4.1 No semantic type errors should occur after age three

No semantic type errors are predicted to occur after age three on the quantificational approaches. The reasoning leading to this conclusion is as follows: as of about age 2, Dutch and German children tend to place definite object NPs and pronouns in the high position, and indefinite object NPs in the low position. This pattern is very similar to that of adults, as in adult language, definite NPs also tend to appear in high positions (although they may appear in the low object position), while indefinite NPs tend to appear in the low positions.

Neither Diesing (1992) nor de Hoop (1992) explicitly discuss the reason for high placement of definite NPs. Clearly, however, the adult pattern of NP placement follows directly from Diesing's account, as definite NPs, which come with an existential presupposition, must for that reason be quantifiers. Hence it is not surprising that they tend to appear in the high argument positions.

However, no matter what the analysis of definite NPs, if only one mechanism underlies placement of NPs in the high or the low NP position, as Diesing and de Hoop propose, all NP placement by adults must be regulated by this mechanism. By age four, children's language production shows the same patterns of NP placement as adults' language production. Therefore, we must assume that the same mechanisms underlie children's production, hence that children "know" by age four at the latest that NPs with the interpretation typical of high NPs are quantifiers and must therefore appear in the high position, and that NPs with the properties typical of "low" NPs are not quantifiers. If we assume that high placement of the NPs is driven by a quantificational status of the NPs by adults, we must assume that this is the same for the children.

For Diesing's Mapping Hypothesis or de Hoop's Case assignment mechanism, there is no a priori reason why comprehension and production would not go hand

in hand. Thus, children age four and older should never interpret high indefinites as if they were in the low position for either of these analyses. In other words, I propose to derive from Diesing (1992) and de Hoop (1992) a prediction that no semantic type errors should occur in the comprehension of children aged four and older – just the opposite of the semantic type error predicted on the basis of Van Geenhoven (1998).

This prediction is in accordance with the assumption of universality that is implicit both in Diesing (1992) and de Hoop (1992). If we assume that Diesing's Mapping Hypothesis or de Hoop's Case assignment mechanism are part of an innate Universal Grammar, we should expect children to distinguish between the high and low positions in an adultlike manner at a very early age. Some delay may be explained because the mechanisms presuppose the acquisition of particular syntactic devices (see Schaeffer (1997) for such a proposal) – but the longer the delay, the heavier the burden on this type of explanations, and the less plausible they will be[33].

4.2 Domain restriction and the interpretation of high indefinite NPs

A crucial difference between the quantificational approaches to indefinites and the approach taken in the present study lies in the fact that the former assume that high NPs must have a domain of quantification. If children do not adequately integrate discourse information for the interpretation of high NPs, we may expect errors in the domain restriction of the quantifiers[34]. In fact, findings from studies in children's interpretation of universally quantified NPs (*every N, all N*) show that children indeed respond in a non-adultlike manner to sentences containing universally quantified NPs. Studies of children's interpretation of universally quantified NPs may enlighten us as to what to expect for children's interpretations of high indefinites if we follow the assumption that they are quantifiers.

4.2.1 Domain restriction of universally quantified NPs in acquisition

The literature reports two types of errors in children's comprehension of universal quantifiers. Among others, Freeman and Stedmon (1986), Philip (1995), and Drozd and van Loosbroek (1999) found that children between roughly 4;0 and 8;0 provide non-adultlike truth value judgments of sentences like *All boys are riding a horse.* Children often judge that this sentence is not true of a picture in which there are

[33] Note that this argument holds on the assumption that universality implies innateness. Neither Diesing nor de Hoop make this claim, although it is not clear to me at present how the system that Diesing proposes could be acquired without assuming that its components are innate, as syntactic surface positions cannot provide any evidence for a language like English. For a discussion, see Chapter 5 section 4.2.2.

[34] I use the term "domain restriction" as follows: *boy* provides the restriction of the quantifier *every boy* in *Every boy is riding a horse*, but the quantifier is further restricted by the domain of discourse, such that *every boy* is understood as "every boy that is relevant in the discourse".

three boys riding a horse as well as a horse that is not ridden. In motivating their answers, the children point to the horse that is not ridden, sometimes stating that there is a boy missing (overexhaustive search error). Freeman and Stedmon (1986) also report another error in children's interpretation of universally quantified NPs: some children judge sentences like *All cars are in the garage* to be true when all garages have a car in them, even if there is a car that is not in the garage (underexhaustive search error).

These findings are not surprising given the non-integration hypothesis. If children do not effectively integrate information from the discourse, they will have a problem restricting the domain of the quantifier to the relevant set of boys or cars. A picture containing three boys riding a horse and one horse which is not ridden may suggest to the child that the quantifier's domain actually contains four boys, one of whom is missing from the picture, and thus lead to an overexhaustive search error. The fact that adults sometimes remark that "there is one boy missing" when faced with this picture, supports this view. Similarly, with respect to the underexhaustive search error, the physical prominence of the garages may have suggested to the children that the set of cars to be quantified over should be restricted to the ones in the garages. The problem underlying the children's deviant responses on either type of experiment seems to be the same, namely: inadequate domain restriction.

Findings by Crain et.al. (1996) and Drozd and van Loosbroek (1999) confirm this view. In both studies, the situation whose truth is to be judged is placed in a story context, and the child's attention is drawn to the proper domain of the quantifier. In this way, restricting the domain of quantification is no longer left entirely up to the children themselves. Both studies show that children's judgments of situations like the one containing three boys and four horses improve significantly under these altered experimental circumstances. Crain et. al. identified a group of children who jointly provided 82% non-adultlike rejection responses in a single picture context. The same children provided 88% adultlike responses to the same type of sentences under the altered experimental conditions. The percentages that Drozd and van Loosbroek present are not as striking, which is most likely due to the fact that they selected the subjects for both experimental conditions randomly. Nevertheless, the difference between the contextless and the altered condition is significant. The percentage of adultlike responses rose from 56% to 76% for four-year-olds, and from 65% to 74% for five-year-olds. The next section discusses how these findings relate to the expectations for children's comprehension of high indefinites.

4.2.2 The restriction error

If high indefinites are quantifiers, domain restriction should be a problem for high indefinite NPs as well as universally quantified NPs. If the NP *een meisje* in a sentence such as *Een meisje was aan het dansen*, 'a girl was dancing' is a quantifier, it must quantify over a set of contextually relevant girls. Children may

use inappropriate information to restrict this set, analogous to what I have argued for universal quantifiers. This error, which I label "restriction error", is formulated below:

> **Restriction error:**
> Domain restriction of high indefinites may be a problem for children until after 4;0. The problem will diminish if the domain of the quantifier is explicitly introduced prior to uttering the sentence that contains the quantified NP.

As we know that children's errors with universally quantified NPs continue at least until age six, the restriction error with high indefinite NPs should also occur until about that age. When a restriction error is made, the indefinite is interpreted in its adult semantic type [35] (i.e. the type of a quantifier in Diesing's or de Hoop's analysis). Deviant interpretations that are caused by the restriction error cannot always be distinguished from errors caused by a pragmatic fit error, as it was formulated in section 4. Consider, for example, (102):

(102) Hier zie je drie kinderen. Een meisje is aan het dansen.
"Here you see three children. A girl is dancing".

For an adult, the indefinite NP *een meisje* 'a girl' in the second sentence of (102) strongly favors a source-set interpretation. In a situation in which none of the three children mentioned in the first clause is a dancing girl, the sentence would be false on an adult interpretation even if there is some other girl who is dancing, as only the three children mentioned in the previous sentence are relevant. A child, on the other hand, may mistakenly include the additional girl in the domain of the quantifier, in which case the sentence would be true.

This mistake is indistinguishable from a pragmatic fit error that involves the child's erroneously assigning a specific guise instead of a source-set guise to the indefinite subject. However, it is possible to distinguish deviant interpretations caused by a restriction error from those caused by a pragmatic fit error on the basis of the second part of the description of the error: *The problem will diminish if the domain of the quantifier is explicitly introduced prior to uttering the sentence that contains the quantified NP*. Thus, on the assumption that the cause of children's deviant interpretations in the previous section is due to mistakes in identifying the contextual restrictions of the quantifiers, we may expect similar mistakes to affect the interpretation of high indefinite NPs if these are quantifiers. We also predict that children's interpretations will significantly improve if the domain restriction is made explicit.

[35] This is not the approach taken in Drozd and van Loosbroek (1999). They argue that children assign a weak, symmetric interpretation to universally quantified NPs.

5. Summary of the predictions

The non-integration hypothesis predicts difficulty in the interpretation of indefinite NPs as free variable indefinites. Hence, for Dutch, children may have non-adultlike interpretations of high indefinite NPs.

The following two errors may occur as a result of insufficient discourse integration under Van Geenhoven's analysis of indefinites:

> **Semantic type error:**
> The child fails to accommodate indefinites that are interpreted as free variable indefinites by adults. Instead, the child interprets these indefinites as predicates.
>
> **Pragmatic fit error:**
> The child fails to construe appropriate bridges between free variable indefinites and their accommodation sites.

Under the assumption that high indefinites are quantifiers, it is possible to predict a different error, the restriction error:

> **Restriction error:**
> Domain restriction of high indefinites may be a problem for children until after 4;0. The problem will diminish if the domain of the quantifier is explicitly introduced prior to uttering the sentence that contains the quantified NP.

The research presented in the next chapters focuses on determining whether semantic type errors occur, by investigating the scope of indefinites in children's comprehension. In evaluating the results, the other types of errors will play an important role. However, first I will present the results of an experiment that investigates the interpretation of Dutch high indefinite NPs in a story context. The aim of this experiment is not so much to distinguish between the different types of errors presented here. Its aim is to determine whether children between roughly 4 and 6 indeed rely on the context for their interpretation of high indefinites to a lesser degree than adults.

6. Experiment 1: Indefinite subjects in a story context

Experiment 1 aims at investigating whether children relate high indefinite NPs to elements in the discourse context. Stories present high indefinite NPs in such a way that adults cannot avoid a source-set interpretation. According to the non-

integration hypothesis, we expect that children may fail to properly relate the high indefinite NPs to the source sets.

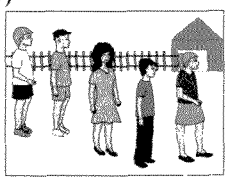
Chapters 5 and 6 will present experiments in which the focus is on scope differences as a diagnostic to determine whether children make semantic type errors. However, the non-integration hypothesis is based in the first place on assumptions about children's inadequate use of context in NP interpretation. I therefore felt that an introductory experiment was in place which investigates the interpretation of high indefinites with respect to context, without introducing as yet the additional processing burden of the scope taking elements that occur in the subsequent experiments.

An additional reason for conducting this experiment was to investigate Karmiloff-Smith's (1981) and Hickmann's (1982) suggestion that children, at least under age 5 or 6, do not refer "intralinguistically". As these studies, and many other studies of children's development of discourse, only investigated study language production, this issue could not be investigated further. A comprehension experiment may provide more insight. Since Karmiloff-Smith's and Hickmann's studies employed picture stories, Experiment 1 did so too.

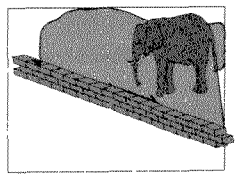
6.1 Method

The subjects' task was to complete pictures that were presented as part of a story. In the first picture, a group of five children were presented as protagonists. These protagonists engaged in an activity as a group, such as visiting the zoo or walking to their grandfather's house. The story shows events during the visit to the zoo, the walk, etc. The test sentences describe these events, such as: *Een jongen voert de olifant*, 'A boy is feeding the elephant', or: *Een meisje plukt een bloem*, 'A girl is picking a flower'. These sentences accompanied a picture in which only the arm was shown of the person feeding the elephant or the one picking the flower. The first part of one of the picture stories is shown in (103):

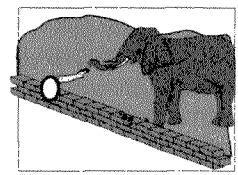
(103)



Look, here are the children. They are going to the zoo. We are going to see what they will see, and all the things that are going to happen.



First, they get to the elephant



Een jongen voert de olifant.
'A boy feeds the elephant'

There was a blue tack (a sticky material) positioned on the picture so that a figure could be placed there. The task for the experimental subject consisted of selecting a girl or boy figure from a set of twenty cut-out figures, and completing the picture

by sticking this figure on the blue tack. The set of figures contained 15 figures besides the protagonists. Each story contained twelve pictures, three of which were incomplete. Throughout the reading and of a story, including "completing" the pictures, all pictures were visible, including the first one in which the protagonists had been introduced. (104) presents the entire zoo story:

(104) Kijk, hier zijn de kinderen. Ze gaan naar de dierentuin, en wij gaan kijken wat ze zien, en wat er allemaal gebeurt. Eerst gaan ze naar... de olifant! *Een jongen voert de olifant.* Daarna zien ze een ballonnenman. *Een meisje krijgt een ballon.* Daarna gaan ze naar de dolfijnen. *Een jongen aait een dolfijn.* En nu is het alweer afgelopen. Kijk, hier is het hek van de dierentuin. De kinderen gaan weer naar buiten.

"Look, here are the children. They are going to the zoo, and we are going to see what they will see, and all the things that happen. First they go to... the elephant! *A boy feeds (is feeding) the elephant.* Then they see a balloon vendor. *A girl gets (is getting) a balloon.* After that, they go to the dolphins. *A boy strokes (is stroking) a dolphin.* And now it's already finished. Look, here's the zoo's fence. The children are about to leave."

The prediction was that adults would select one of the five children who went to the zoo as a referent for *een jongen* 'a boy' in *een jongen voert de olifant.* The non-integration hypothesis predicts that children's selection will not necessarily be restricted to this set – instead, they may select any boy from the array.

6.2 Subjects and design

Forty-seven children and 10 adults, all native speakers of Dutch, took part in the experiment. The children were drawn from the kindergarten classes of two different schools. Eight of the 10 adult subjects were university students. Table 4-1 shows how the subjects were distributed across the age groups.

TABLE 4-1. EXPERIMENT 1: DISTRIBUTION OF SUBJECTS ACROSS AGE GROUPS

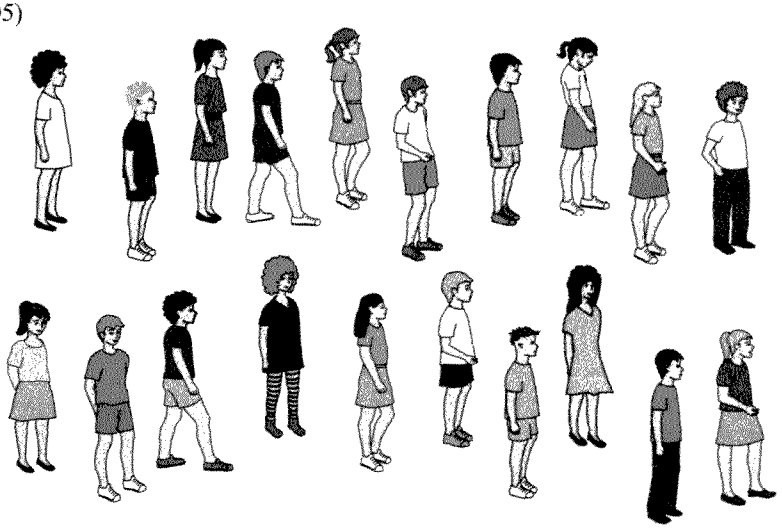
	Age group I 4;0–5;6	Age group II 5;6–6;8	Adults
No. of subjects	26	21	10
Mean age	4;10	5;11	–

6.3 Procedure

During the experimental session, the experimenter and the child were sitting at a table on which was a picture story consisting of eight colored pictures. The picture story was folded in the middle, so that it opened and closed like a book. The protagonists, which were introduced in the first picture, were two boys and three girls in two of the stories, and two girls and three boys in the other two.

The twenty cut-out figures were on the table as well. The figures were arranged on a piece of cardboard in two not-entirely-straight rows of ten figures, as in (105).

(105)



The protagonists of each picture story were grouped together, in the same order in which they appeared in the first picture of each story. Thus, each row of ten cut-out figures contained two sets of story protagonists. In order to prevent the possibility that subjects who wanted to select figures corresponding to the protagonists would not be able to find the right ones among the twenty figures, the experimenter pointed at the five relevant cut-out figures before she started to tell each story, saying: "the following story is about these children". Then she pointed at the first picture of the story, saying: "Look, here are the children".

When telling the story, the experimenter pointed at the relevant pictures. Whenever she arrived at an incomplete picture, she would first say the test sentence, and then remark: "*maar, kijk, het plaatje is nog niet af, er is alleen maar een arm!*" 'but, look, the picture is not finished yet, there's only an arm!'. The child was then allowed to select a figure and complete the picture. After a story was finished, the experimenter put all figures that the child had used back into their original places on the piece of cardboard before proceeding to the next story.

There were four stories, which each contained three incomplete pictures. They were preceded by two training stories. The first of these only served to make children acquainted with the concept of completing a picture in a story. For example, in a picture of a farmer who is about to feed a pig, only the pig's tail is visible, and the child was to provide the body. In the second story, a protagonist, a boy, is introduced and named in the first picture, and a figure depicting this boy is to be stuck onto the final one. For these training items, the children selected figures from a separate set, consisting of animals and a cut-out figure corresponding to the boy. During the warm-up session, the experimenter could give feedback to the children. This proved to be necessary only to show some of the children how to stick on the figures in the easiest way. The concept of the task itself proved no problem at all. For the adults, exactly the same procedure was followed as for the children. Approximately half of the subjects were tested by one, approximately half by another experimenter. The test items were presented in two different orders.

6.4 Results

The results of the experiment are for the most part presented as scores of adultlike and non-adultlike picture selections. The scores on the test items are followed by analyses of order and item effects.

6.4.1 Responses

Table 4-2 presents the results of Experiment 1. The second column shows the number of times at which the subjects completed the picture by selecting a referent from the set of protagonists of the story. I will refer to this type of responses as "restricted reference response". The third column shows the number of times the subjects selected a referent who was not in the set of protagonists. I will refer to this type of response as "free reference response".[36]

TABLE 4-2. EXPERIMENT 1: NUMBER OF RESTRICTED AND FREE REFERENCE FIGURE SELECTIONS BY AGE GROUP (percentages between brackets)

Age group	Restricted reference response	Free reference response
I 4;0–5;6	204 (65%)	108 (35%)
II 5;6–6;8	195 (77%)	57 (23%)
Adults	117 (98%)	3 (3%)

As we see in the table, the percentages of adultlike responses in both child age groups are well above chance, since for each story there is a choice of ten boys and

[36] Percentages in the columns may not add up to exactly 100% due to rounding. This holds for this, as well as all subsequent tables.

ten girls. This in shows that the proportion of figure selections in the child age groups that is not affected by contextual information is far below chance. Nevertheless, it is far higher than the proportion of free reference responses by adults.

A graph plotting the distribution of child subjects across the possible numbers of restricted reference responses (i.e., the number of children providing 2 adultlike responses, the number of children providing 3 adultlike reponses, etc.) does not show a particular pattern in the distribution of the responses for age group I. In contrast, for age group II, there is a clear cut-off point between eight and nine correct responses: about 25% of the children make between 4 and 10 mistakes, about 75% make between 0 and 3 mistakes (the graph is presented in Appendix A). The cause of this distribution will become clear in section 6.4.2 below.

The responses do not allow us to draw conclusions about the nature of the errors underlying the free reference responses: both a semantic type error and a pragmatic fit error may render a free reference response. If a child interprets the high indefinite NPs as a predicate (semantic type error), there will be no need for accommodation, hence there will be no need for a bridging process resulting in the source-set guise. If a child does interpret the high indefinite as a free variable, accommodating the indefinite but failing to relate the indefinite to the source set of story protagonists during bridging (pragmatic fit error), this may also result in the lack of a source-set guise.

One might argue that we should not only consider the number of free and restricted reference responses, but rather the number of truly coherent stories. If a child relates only one or two high indefinite subject NPs correctly to the story context, the resulting picture story, and presumably also the child's understanding of the story, is not the same story that the experimenter had in mind. The result may still be a coherent story, after all, it is possible that some character that was not explicitly introduced plays a role in the story. However, the child has not picked up on the cohesive device (the high subject position of the indefinite) that the story-teller employed with the intention of creating referential continuity across the entire picture sequence.

If we calculate the scores by truly coherent story responses, the percentages of non-adultlike responses are higher: 55% in age group I, and 36% in age group II. The distribution of adultlike responses is very different in the two age groups, as many children in age group II provided only one incoherent story (the corresponding graph is provided in Appendix A).

The subjects were classified according to the number of non-adultlike responses that they provided. If a subject provided maximally three (25%) free reference responses, this was scored as a "restricted reference pattern". If a subject had at least four (33%) free reference responses, this was scored as a "free reference pattern". In this way, children who are classified as having a free reference pattern

provided free reference responses on minimally two of the four stories. It should be clear that, according to this classification, a child's responses can be labeled "free reference pattern" even if only the minority of this child's total responses are free reference response. On average, children with a free reference pattern had 6.2 free reference responses, and 5.8 restricted reference responses.

All adults have a restricted reference pattern, unlike many of the children: in age group I, only 10 out of 26 (38%) children have a restricted reference pattern, and in age group II, 16 out of 21 children (76%) have a restricted reference pattern. So, although the free reference responses constitute only 35% of all responses even in the youngest age group, they occur with a majority of the children (62%) in this age group. All children in age group II who had a free reference pattern were under six years of age – the 5 six-year-olds in this age group all had restricted reference patterns. Figure 4-1 illustrates the improvement between the first and second age groups.

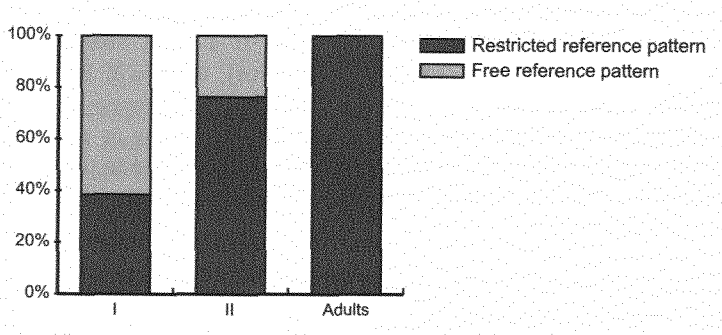


FIGURE 4-1. *Experiment 1: Percentage of subjects with restricted and free reference response patterns by age group*

There is a significant difference between the response patterns of the three age groups (Chi-square 14.18123, 2-tailed testing, $p < 0.05$). The difference between the two child groups is significant (Fisher's exact test, 2-tailed testing, $p<0.05$). The difference between age group I and the adults is significant (Fisher's exact test, 2-tailed testing, $p<0.05$), but the difference between age group II and the adults is not.

6.4.2 Order of presentation

Fifty percent of all figure selections in the story that was presented first were free reference responses, while the second, third and fourth stories evoked 24%, 21%, and 23% free reference responses, respectively. Figure 4-2 shows the percentages of non-adultlike responses for each story for both age groups.

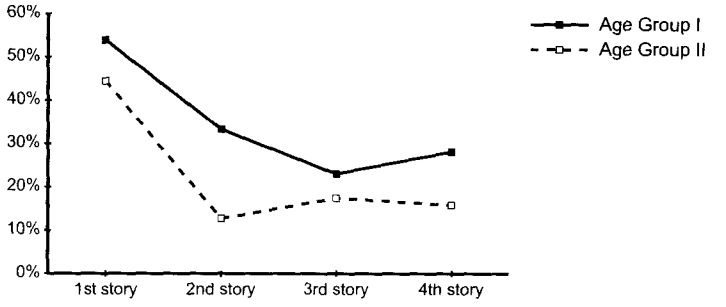


FIGURE 4-2. *Experiment 1: Percentage of free reference responses per story by order of presentation*

In age group I, 54% of all responses in the first story were free reference responses. These non-adultlike responses dropped to approximately 30% for the second to fourth stories – the differences between these items are marginal. In age group II, there is an even more pronounced decrease from 44% in the first to 13% in the second story. Once more, the difference between the second, third and fourth stories is only marginal. Due to the different orders of presentation, it could be established that the effect was due to order of presentation rather than to the test items themselves (see Appendix A).

I conclude that learning takes place between the first and second stories. This learning effect is most pronounced in the second age group, which explains why many children in this group have between 0 and 3 free reference responses: by the time they select the figures for the second story, they have learnt to select the appropriate ones.

6.4.3 Additional effects

There was no item effect, and no effect of experimenter. A "popularity" effect for the cut-out figures had to be controlled for separately. It would be natural for the experimental subjects to find some of the figures more attractive than others, due to, for instance, their coloring or their position in the array. If a subject had adult competence, these preferences should not play a role. Nevertheless, it is possible that one or more of the figures were exceptionally attractive to children, to the degree that they would even let go of their adult language competence.

To check whether this was the case, six children who had not taken part in the experiment were asked to pick up a number of boy figures and a number of girl figures. I assume that if any figures were particularly popular with the children, they should relatively often be among the first three figures that were selected. No pattern emerged. All but two of the figures were among the first three of each gender at least once, and no figure was among the top three choices more than three times.

6.5 Discussion

The results of the experiment show that children do not always restrict their choice of a referent to a source set in a context in which all adults have a source-set reading. This can only be due to their somehow failing to use information that the discourse provides, which adults do use. The findings are in line with the findings from studies in children's production of discourse. In the language production studies, the children's utterances were not sufficiently affected by information that was presented in preceding utterances. In Experiment 1, it is the *interpretation* of the utterances which is insufficiently restricted by information that was presented previously in the same story. As in Karmiloff-Smith's and Hickmann's studies, there is a major development toward adultlike discourse integration around the age of 6. However, this improvement may have been due to the learning effect that occurs at the second story that was presented to the children. It is not clear whether this really reflects an improvement in the children's interpretation of the sentence-initial indefinite subjects. I will return to this issue below.

Studies in children's production of discourse usually make a principled distinction between discourse coherence (concerning content) and discourse cohesion (concerning the linguistic marking of connections between utterances). The present findings justify the question of whether it is really possible to draw a sharp line between these two aspects of discourse in development.

The children's responses are consistent with a "straight reference" interpretation, in which case the deviant responses would be best characterized as resulting from a pragmatic fit error. However, it is also possible that the children interpret the indefinite NPs as predicates, so that the sentence *Een jongen voert de olifant* means something like "There is a boy who is feeding the elephant".

It is clear that the children often fail to relate the high indefinite subject to the source set provided in the story, however, it is not sure that the interpretation that underlies this response is not a source-set guise. A child could have an *incorrect* source-set interpretation, interpreting *een jongen* 'a boy' as "one of the boys that is available for sticking onto the picture" rather than "one of the boys who is in the story". In that case, the errors would be caused by a lack of awareness that information from the story context should take precedence over information from the physical context. Either kind of these non-adultlike interpretations is expected under the non-integration hypothesis.

There still remain questions concerning the learning effect: where does it originate, and does it force us to reconsider the interpretation of the results? Lack of familiarity with the task is not a likely cause of the effect, since the children had been acquainted with the task in the two warm-up items. I propose that the improvement after the first test story results from the children's becoming aware that for each story, selection is restricted to the set of five figures that the experimenter has pointed out. Recall that before each story started, the

experimenter pointed out the set of figures on the piece of cardboard that corresponded to the protagonists of the story, saying: "The next story is about *these* children". The fact that children heard this remark for the second time just before the beginning of the second story may have made them realize that this is a routine that is important to the way in which the game should be played. Thus, they may have concluded that it is a "rule of the game" that there is a different set from which to choose for each story.

This would explain why the improvement occurs by the second story. Some of the children's remarks are an indication that this is how they view the set of figures pointed out by the experimenter, like: *Mag ik ook van een andere rij?* 'Is it all right to choose from a different row?[37]'. Three children exclaimed *Ooh!* ('Ah!', with the intonation indicating "Now I understand!") when the experimenter pointed out which figures were going to play a role in the second story. These three children had made mistakes in the first story, but did not make any more mistakes from then on. One of them even made sure to keep his hand with the set at which the experimenter had pointed, apparently so that he would not forget which set the experimenter had indicated.

If this is the cause of the learning effect, as I believe it is, the improvement in the course of the experimental session does not reflect an increase in source-set interpretations, because it is not due to an understanding of the relation between high indefinite NPs and the context.

The results of Experiment 1 show that most children aged four and older are able to integrate information that they gather from the context for the interpretation of high indefinite NPs: clearly the majority of responses is affected by such information. However, the results also show that for many children, the extent to which they relate the indefinites to the context (or, as I pointed out above, possibly the way in which they do so) is not the same as for adults. The results suggest an improvement around age 6, but this cannot be determined with certainty. I conclude that the results of Experiment 1 provide some support for the non-integration hypothesis. Although information from the discourse seems to affect a large part of the interpretations of high indefinite subject NPs, the deviations shown in this chapter are sufficient to raise the question of whether the errors formulated in the first part of this chapter occur in children's interpretation of indefinites. This question will be addressed in chapters 5 and 6 in experiments in which different groups of children in roughly the same age range took part.

[37] The experimenter's responses to these remarks were meant to be neutral so as not to lead the child to provide answers that were in accordance with the hypothesis. The effect seemed a little stronger than intended, encouraging the children to "play it safe" by sticking to the set of figures that the experimenter had pointed out.

7. Summary

This chapter put forward the following hypothesis concerning the acquisition of indefinite NPs in Dutch:

> **Non-integration hypothesis:**
> The predicative interpretation of indefinites is acquired early.
> The free variable interpretation is acquired later because it requires *discourse integration.*

This hypothesis may surface through different types of errors, a semantic type error or a pragmatic fit error, both affecting the comprehension of high indefinite NPs. By hypothesis, no particular problems are expected for the interpretation of low indefinite NPs. If the semantic type error occurs, children will interpret high indefinite NPs in the scope of operators that affect the VP, as if they were in the low NP position. If the pragmatic fit error occurs, children may, for instance, interpret an indefinite NP with an intended source-set guise by assigning it a specific guise, or vice versa. They might also identify an incorrect source set for a high indefinite.

I also considered which errors could be predicted on the basis of the analyses by Diesing (1992) and de Hoop (1992), concluding that these analyses allow the occurrence of a pragmatic fit error, but they do *not* allow the occurrence of a semantic type error after age three. It is also possible to derive yet another prediction on the basis of these quantificational approaches, namely the restriction error. If a restriction error occurs, children fail to correctly identify the restriction of the quantifier's domain.

Initial support for the hypothesis was provided in Experiment 1, which showed that discourse integration for high indefinite NPs may indeed be insufficient. Children's failure to integrate discourse in a story context resulted in a story content that was incoherent from an adult point of view. Whether the children's deviant interpretations involved free variable or predicative interpretations of indefinites could not be determined on the basis of this experiment. This is what the experiments in the next chapters will focus on. The outcome does tell us that the context is not used in four- to six-year-olds' interpretation of indefinites to the extent that it is for adults.

THE SCOPE OF INDEFINITE OBJECT NOUN PHRASES

CHAPTER 5

1. Introduction

This chapter presents experiments that investigate the interpretation of high and low object NPs by Dutch children between roughly 4 and 8 years of age. The findings of Experiment 1 lent initial support to the non-integration hypothesis. Children aged 4 and 5 did not relate high indefinite subject NPs to the context in an adultlike manner, which resulted in a different interpretation of the stories. The experiments presented in this and the following chapter investigate whether the hypothesized low degree of discourse integration in children's comprehension has an effect on the scope taking of indefinites. Experiment 2 and a follow-up experiment investigate whether children interpret the indefinite NPs in (106) are inside or outside the scope of the negation operator.

(106) a. De jongen heeft geen vis gevangen.
the boy has no fish caught
"The boy did not catch any fish."

b. De jongen heeft een vis niet gevangen.
the boy has a fish not caught
"The boy did not catch a (particular) fish."

Experiment 3 investigates whether children interpret the indefinite NPs in (107) inside or outside the scope of *twee keer* 'twice'.

(107) a. Je mag twee keer een potje omdraaien.
you may two times a jar around-turn
"You may turn over a jar twice." (should involve two jars)

b. Je mag een potje twee keer omdraaien.
you may a jar two times around-turn
"You may turn over a jar twice." (may involve only one jar)

In the framework I adopted, the low indefinite NPs in (106a) and (107a) are predicates. They are interpreted as properties and absorbed by the verbal predicate, hence they are in the scope of the operators that operate on the verb. By contrast, the high position of the indefinite NPs in (106b) and (107b) indicates that the indefinite NP comes with a variable. This variable is bound through accommodation, a repair mechanism that introduces the indefinite's variable into the discourse universe. As a result, the indefinite NP is interpreted at a level higher than the position in which it appears, hence it may take wide scope with respect to the operators that are in a higher position than the indefinite at the surface.

As I described in section 5.1 of the previous chapter, not only do both object positions appear in the production of children aged four and over, but these children also distinguish between the different positions: definite NPs appear in the high position more often, and high placement of indefinite NPs is at an adult rate by that age (Eisenbeiss (1994), Schaeffer (1997)). Given these findings, the research question can be narrowed down to the question of whether children's comprehension of high and low indefinite NPs is adultlike from age four, the age at which they have mastered the syntax of high and low NPs. According to the non-integration hypothesis, the answer to this question is negative. Children's comprehension of high indefinite NPs may not be adultlike, because the free variable interpretation of high indefinites requires discourse integration. Studies in child language acquisition show that integration of discourse information is problematic to many children well after age four.

The experiments in this chapter focus on determining whether children make a semantic type error, i.e. whether they interpret high indefinites as if they were narrow-scope, low, indefinites. In the interpretation of the results, the pragmatic fit error and the restriction error will also be considered (for a summary of the errors, see Chapter 4 section 5).

This chapter is set up as follows: section 2 presents Experiment 2, investigating children's interpretation of indefinite object NPs in sentences containing VP negation. Section 3 presents Experiment 3, investigating children's interpretation of indefinite object NPs in sentences containing *twee keer* 'twice'. Section 4 discusses the findings in relation to the non-integration hypothesis as well as the implications of the results for different analyses of indefinites and of their acquisition.

2. Experiment 2: Direct objects and negation

Experiment 2 investigates children's interpretation of sentences like (106), repeated here as (108a) and (108b):

(108) a. De jongen heeft geen vis gevangen.
"The boy did not catch any fish."
b. De jongen heeft een vis niet gevangen.
"The boy did not catch a (particular) fish."

In adult Dutch, the low object NP *(g)een vis* is interpreted as a predicate, which is semantically incorporated by the verbal predicate and in the scope of the negation operator. Thus, for (108a) to be true, the boy should not have caught any fish. The indefinite object in (108b), on the other hand, comes with a variable besides its predicative content. It is accommodated rather than semantically incorporated, hence it is not affected by the negation operator that operates on the verb. Thus, for (108b) to be true, the boy may have caught any number of fish, provided there is one fish that he did not catch.

If children make a semantic type error, they will interpret the high indefinite NP as predicating a property (the property of being a fish) of a variable that is introduced by the verb, which would allow them to interpret the sentence without taking the discourse into account. Thus, a semantic type error would result in interpreting (108b) as if the high indefinite object NP were in the low object position. For (108a), adultlike predicative interpretations are expected.

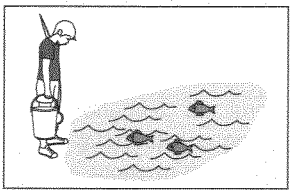
2.1 Main experiment

2.1.1 Method and design

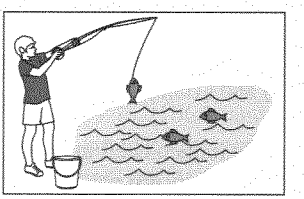
The method employed was a truth value judgment task in which the test sentence was uttered by a puppet (Lloyd and Donaldson (1976)). The subject's task was to tell the puppet whether a remark made by the latter was correct in a particular context. There were two test conditions, "High" and "Low". In the High condition, test sentences contained a high indefinite object NP, like (108b), matching the situation in a picture story. In the Low condition, the sentences contained low indefinite objects like (108a), which did not match the situation in the story.

The sentences in the High condition required a discourse that allowed for an obvious conceptual relation between the indefinite NP and material in the context. This requirement was met by providing a group of object referents, e.g., fish, one of which was the unaffected referent. Thus, a source-set guise was easily available for the high indefinite object NP. (109) presents a test story, followed by test sentences for both the Low and High conditions.

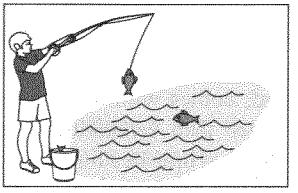
(109)



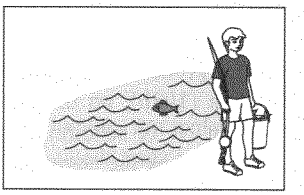
Dit is een jongen, en dit zijn vissen.
Die wil hij denk ik vangen.
'This is a boy, and these are fish.
I think he wants to catch them.'



Hier vangt hij een vis.
'Here he's catching a fish.'



En hier vangt hij een vis.
'And here he's catching a fish.'



En nu gaat hij weer weg.
'And now, he's leaving'

Puppet: *"Hee, ik zie wel wat er gebeurd is:*
Low: *De jongen heeft geen vis gevangen (incorrect). /*
High: *De jongen heeft een vis niet gevangen (correct).*
Heb ik dat goed geraden?"

Puppet: 'Hey, I see what happened:
Low: The boy has no fish caught (incorrect). /
High: The boy has a fish not caught (correct).
Did I guess right?'

The other test items contained: *appels plukken* 'picking apples', *kettingen stelen* 'stealing necklaces', *vazen breken* 'breaking vases', *bloezen strijken* 'ironing blouses' and *koekjes pakken* 'taking cookies'. All actions denoted by the verbs resulted in an easily visible change of state or location of the object.

A between-subjects design was chosen because the difference between the contrasting sentences is rather subtle; it was feared that a within-subjects design might cause confusion with the subjects or lead to carry-over effects. One group of subjects received test sentences with high indefinite objects, the other group received test sentences with low objects. Both groups received the same picture stories.

The predicted outcome of the experiment was, first of all, that all children would have adultlike interpretations of the sentences in the Low condition, i.e. they would not accept sentence (108a) as a correct description of the situation in (109). This would show that the children interpreted the low indefinite *(g)een vis* 'a fish' as a predicate that is in the scope of the negation operator. Secondly, it was predicted that a considerable proportion of the children would have a similar interpretation of the sentences in the High condition, i.e., they would reject (108b) as a correct description of the situation in (109), unlike what was predicted for the adults.

2.1.2 Subjects

Fifty children and 10 adults, all native speakers of Dutch[38], took part in the experiment. The children were drawn from three different primary schools, the adult subjects were university students. For the remainder of this section, "subjects" will only refer to the 38 child subjects that were included in the analysis, 12 children having been excluded from the analysis because they failed two or more controls (filler items, see below, see also Appendix B).

Table 5-1 represents how children and adults are divided across age groups and experimental conditions, and lists the mean ages of the children in each age group.

TABLE 5-1. EXPERIMENT 2, MAIN EXPERIMENT: DISTRIBUTION OF SUBJECTS ACROSS AGE GROUPS AND CONDITIONS

	Age group I 4;0–5;6		Age group II 5;6–6;10		Age group III 6;10–7;7		Adults	
Conditions	Low	High	Low	High	Low	High	Low	High
No. of subjects	6	7	6	8	–	11	4	6
Mean age	4;11	4;11	6;0	6;0	–	7;1	–	–

The younger child age groups were pre-schoolers, the third age group was from school group 3 (grade one) and had received nearly a year of reading education. The latter group was only tested in the High condition, as the two younger age groups were tested first, and the results on the Low condition were such that I did not feel that additional data for this condition would be very informative.

Dividing the children into broad age groups containing relatively few subjects can only provide a rough developmental picture. This sufficed for the purpose of the present experiment, which was to see whether children's responses deviate from adults' responses at all.

2.1.3 Procedure

The children were all tested by the same experimenter, one by one, in a separate room in their schools. The experimenter told the subject short stories that accompanied the pictures. In a guessing game a hand puppet, Sesame Street's Ernie, was played by the experimenter, who used a different voice. The puppet looked at the pictures, then uttered the test sentence as a remark about the pictures, and subsequently asked the child whether "he had guessed right". Whenever the subject rejected the test sentence, the puppet invited her to explain why, asking: "What did I see wrong?". The puppet was employed to reduce anxiety for the child, so that she would feel free to reject the test sentence if she deemed this necessary, and to make the experiment more enjoyable to the child in general. In testing the

[38] Often, the subjects in the adult control groups were students. As experiments 2 to 5 all investigated scope taking, care was taken that none of the adult subjects were linguists or logicians.

adults, the puppet was shown to the subjects and its role was explained, however, the puppet routine was not employed in the experiment.

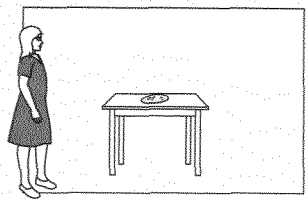
All sentences were pronounced with the intonation that matched the expected adult interpretation of the sentence most naturally: In the High condition, high indefinite NPs were always destressed, while a slight stress was put on the negation. In the Low condition, the sentences were always spoken with normal focal stress on the VP, including the object NP, e.g., *geen vis*.

There were six target items, mixed with six filler items. The filler items served both as controls and as distracters. They consisted of stories similar to the target items, and the test sentences contained singular high indefinite object NPs in the High condition, and singular low indefinite object NPs in the Low condition. (110) presents an example of a filler item.

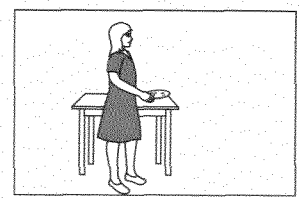
The filler items had to be construed in such a manner that a correct interpretation of the filler sentence would not depend on the free variable interpretation, since the prediction was that the child would not have this interpretation. Picture stories like (110) made this possible. Consider the High condition filler sentence for this item: *De vrouw heeft een bord niet afgewassen* 'The woman did not clean a plate'. If *een bord* 'a plate' is interpreted outside the scope of negation, as required on the adult free variable interpretation, the sentence is true. If *een bord* were interpreted inside the scope of negation, the sentence would also be true, because the woman did not clean any plates at all.

As control items, the filler items made it possible to determine whether a child had kept paying attention to the test sentences and stories. Children who failed two or more filler items were excluded from the experiment, in some cases already in the course of the experimental session. As distracters, the filler items offered a break from the story pattern of the target items. The latter always contained three potential object referents, two of which were acted upon, while one remained untouched. In contrast, the filler stories featured either one object referent, as in (110), or two or three potential object referents, which all were either acted upon, or not acted upon. For three filler items, the correct response was to reject the test sentence, both on a predicative and a free variable interpretation of the object NP. For the remaining three filler items, the correct response was to accept the test sentence. Target and filler items were presented in a pseudo-random order, which was kept constant across subjects.

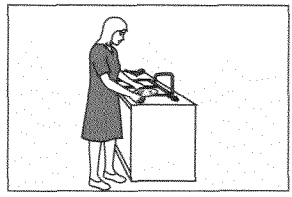
(110)



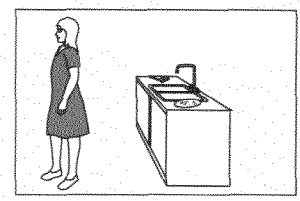
Hier is een vrouw, en dit is een bord.
Dat wil ze denk ik afwassen.
'Here is a woman, and this is a plate.
I think she wants to clean it.'



Hier pakt ze het bord.
'Here she picks up the plate.'



En hier zet ze het op het aanrecht.
'And here she is putting it on the counter top.'



En nu gaat ze weer weg.
'And now, she is leaving'

Puppet: *"Hee, ik zie wel wat er gebeurd is:*
Low: *De vrouw heeft een bord niet afgewassen.*
Heb ik dat goed gezien?"

Puppet: 'Hey, I see what happened:
Low: The woman has not washed a plate.
Did I see that right?'

The target and filler items were preceded by four warm-up items. These also had picture stories, but all sentences contained intransitive verbs. Two warm-up sentences matched the picture stories, two did not. The experimenter would help the children if their answers on the warm-up items were not correct, and whenever necessary, she would once more explain the rules of the game.

2.1.4 Results

In the Low condition, both children and adults rejected the test sentence *De jongen heeft geen vis gevangen* as a description of the situation presented by the picture story in (109). In the High condition, the children rejected the test sentence *De jongen heeft een vis niet gevangen* in 84% of the cases, whereas the adults always accepted it as a match to the situation presented in (109). Thus, in the Low condition, 100% of the child responses were adultlike, whereas in the High condition, only 16% of the child responses were adultlike. The acceptance and rejection responses per age group are tabulated in Table 5-2.

TABLE 5-2. EXPERIMENT 2, MAIN EXPERIMENT: PERCENTAGE OF ACCEPTANCE OR REJECTION OF TEST SENTENCES IN HIGH AND LOW CONDITIONS (raw numbers between brackets)

	Low condition		High condition	
Age groups	Acceptance	Rejection	Acceptance	Rejection
I 4–5;6	0%	100% (36)	17% (7)	83% (35)
II 5;6–6;10	0%	100% (36)	23% (11)	77% (37)
III 6;10–7;10	–	–	10% (7)	89% (59)
All children	*0%*	*100% (72)*	*16% (25)*	*84% (131)*
Adults	0%	100% (24)	100% (36)	0%

The responses were quite consistent, as most children in the High condition (80%) never gave a single adultlike response: adultlike responses were provided only by 6 children, two in each age group. In the Low condition, all children provided adultlike responses.

Subsequently, the subjects were classified according to response pattern: if all or all-but-one of a subject's responses were "yes", i.e. accepting the test sentence, the subject was classified as having an acceptance pattern. If all, or all-but-one of a subject's responses were "no", i.e. rejecting the test sentence, the subject was classified as having a rejection pattern.

All of the children in the Low condition, but only 4 out of 26 children in the High condition (15%), had an adultlike response pattern[39]. The difference between the High and Low conditions is illustrated in Figure 5-1. As the figure shows, there is little difference between the High and Low conditions for the children (the difference is not significant, Chi-square 2.063, $p = 0.287$, two-tailed), whereas the responses on each condition differ 100% for the adults. In the High condition, the difference between the adults and the children is significant, whereas the difference between the child age groups is not (when the adults are included, Chi-square 16.797, $p<.05$, two-tailed, when the adults are not included, Chi-square .909, $p = .794$, two-tailed).

[39] A table showing how subjects with an acceptance pattern and a rejection pattern were divided across the conditions, and a graph plotting the percentages of children who provided zero, one, two, etc., acceptances of the test sentences is provided in Appendix B.

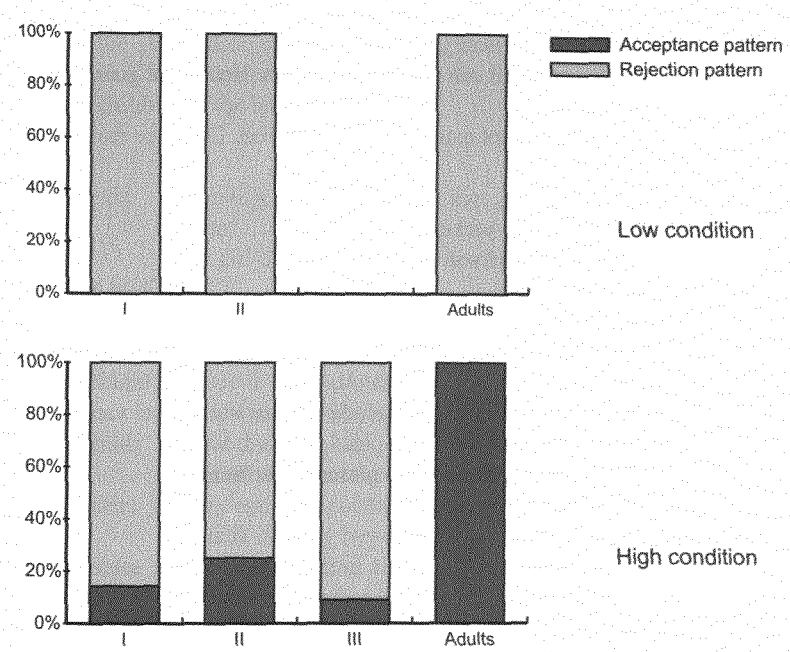


FIGURE 5-1. *Experiment 2, main experiment: Percentages of subjects with rejection and acceptance response patterns by condition by age group*

There is no item effect for the High condition: each item was judged 26 times by the children, the number of acceptance responses on each item being in between 3 and 6.

2.1.5 Subjects' motivation of their responses

Subjects were asked to motivate their response whenever they rejected a test sentence. For the acceptance responses, no motivation was asked because it was awkward to do so. The children motivated nearly every rejection, either by verbally explaining that, for instance, the boy *did* catch fish, or by pointing at one or both of the fish that were caught. Two examples of such motivations by children in the High condition are given in (111) and (112):

(High)

Ernie: De jongen heeft een vis niet gevangen. Heb ik dat goed gezien?
'The boy did not catch a (particular) fish. Did I see that right?'
(...)
Wat zie ik dan verkeerd?
'Then what do I see wrong?'

(Child N.R. 5;4.10)

(111) Die heeft wel een vis gevangen.
'That one *did* catch a fish.'

(Child F.W. 7;6.12)

(112) Aan deze plaatjes zie je toch dat hij een vis aan het vangen is?
'Don't you see from these pictures that he is catching a fish?'

This motivation makes sense for the adult interpretation of the sentences in the Low condition, since with a low object, the sentence means 'The boy did not catch any fish'. The children motivated their rejection of the test sentences in the same way in both conditions. As(113) and (114) show, motivations for the rejection responses in the Low condition were very similar to (111) and (112):

(Low)

Ernie: De jongen heeft geen vis gevangen. Heb ik dat goed gezien?
"The boy did not catch a (any) fish. Did I see that right?"
(...)
Wat zie ik dan verkeerd?
"Then what do I see wrong?"

(Child M.B. 4;6.7)

(113) Dat 'ie wel gaat vang... vissen gaat vangen
"That he *did* go ca... catch fish."

(Child M.V. 5;8.11)

(114) Wel een vis gevangen. Hier hebtie toch een vis gevangen en hier.
"*Did* catch a fish. Here he caught a fish, didn't he, and here."

For 10 children who had rejected all items in the High condition, an additional routine followed the final experimental item[40]. The puppet suggested that the one object that was left over (a cookie) could make a difference for the truth value judgment. Subsequently, the puppet repeated the test sentence.

[40] The subjects were not selected in a controlled way, as this idea occurred only in the course of a round of experiments.

Two of the 10 children changed their judgment at the repetition, while 8 stayed with their original judgment. (115) presents the exchange between the puppet and one of the children in the latter group:

(115) (Child B.K. 7;0.18)

Ernie: Het meisje heeft een koekje niet gepakt. Heb ik dat goed gezien?
'The girl did not take a (particular) cookie. Did I see that right?'

Child: Nee.
'No.'

Ernie: Wat zie ik dan verkeerd?
'Then what do I see wrong?'

Child: Omdat die twee koekjes heeft gepakt.
'Because she has taken two cookies.'

Ernie: Maar deze dan (points at cookie), die heeft ze niet gepakt. En als ik dan zeg (repeats test sentence), heb ik het dan toch verkeerd gezegd?
'But what about that one (points at cookie), she did not take that one. And then, if I say (repeats test sentence), have I then said it wrong anyway?'

Child: Ja.
'Yes'.

2.1.6 Does a semantic type error underlie the deviant responses?

The results of the experiment show that for children between 4;0 and 7;7, there is hardly a distinction between high and low indefinite NPs. Like the adults, all the children rejected the sentences containing the low indefinites, but unlike the adults, 85% of the children also rejected the sentences containing a high indefinite. These results support the non-integration hypothesis, according to which a predicative interpretation of indefinites should not pose any problems to children, whereas the free variable interpretation is likely to be problematic.

The question is what kind of error causes the children's deviant responses. The findings are compatible with the three different errors that were formulated in Chapter 4: the semantic type error, the pragmatic fit error, and the restriction error. Let us start by considering the semantic type error, the testing of which was the main goal of this experiment:

Semantic type error:
The child fails to accommodate indefinites that are interpreted as free variable indefinites by adults. Instead, the child interprets these indefinites as predicates.

The line of reasoning is as follows: The adults' rejection of the Low test sentence *De jongen heeft geen vis gevangen* 'The boy did not catch a (any) fish', is taken to be evidence of the adults interpreting the indefinite object NP *een vis* 'a fish' as a predicate, in the scope of negation. Analogously, children's rejecton of the High test sentence *De jongen heeft een vis niet gevangen* should also be taken as evidence that they interpret the high indefinite object NP *een vis* 'a fish' as a predicate.

While, in my opinion, this reasoning is plausible, it is also possible that a pragmatic fit error is the cause of the rejections of the High sentences. The next section discusses this possibility.

2.1.7 Does a pragmatic fit error underlie the deviant responses?

In the present experiment, a pragmatic fit error, surfacing as a failure to interpret the high indefinite object in a source-set guise, could have been the cause of the deviant responses.

> **Pragmatic fit error:**
> The child fails to construe appropriate bridges between free variable indefinites and their accommodation sites.

Consider that, in order to arrive at a correct truth value judgment of the High sentence *De jongen heeft een vis niet gevangen*, one must construct a set of relevant fish and then check, one by one, whether any of these fish matches the description of not having been caught. As soon as one encounters a fish that matches this description, one may conclude that the sentence is true. Thus, a source-set guise of the high indefinite, established by linking *een vis* to the source set of fish, is a prerequisite to the correct interpretation of the sentence.

It is conceivable that children fail to establish a relation to the source set. In that case, they could go about assessing the truth of the sentence by first selecting a random fish, and then checking whether it had been caught or not, failing to proceed to a second member of this set. If the one fish that the children check happens to be a fish that has been caught, they will judge the sentence false. If they happen to select the one fish that has not been caught, they will judge the sentence true. Such a failure of checking more members of the set follows if the child does not identify a source set, or if she identifies too small a set.

The possibility of the child applying this assessment procedure is compatible with the account that Karmiloff-Smith (1981, 1985) and Hickmann (1982) proposed for children's pronominal and definite NPs (see Chapter 3, section 4.1). These authors argue that children in the same age range as those in the present study often use definite NPs and pronouns non-anaphorically, and in addition, they fail to disambiguate the reference of the NP if more than one potential referent was available. The overall impression from the data presented in these studies is that children select some entity in the physical context to serve as the referent of the

NP, which I have termed "straight reference". If children also applied straight reference to the high indefinite object NPs in the present experiment, this would lead to their employing precisely the assessment procedure described above.

However, the children's behavior and responses during the experiment indicate that a pragmatic fit error involving straight reference is not a likely cause of the non-adultlike responses. First, had the children just randomly selected any one object referent (i.e. just any of the fish in our example item), we would have expected less consistency within their responses – after all, one of the fish matches the description of not having been caught, and a child might occasionally select this fish as a referent, which should have led to acceptance of the sentence. Secondly, we would have expected some hesitation when the children were asked to judge the truth of the sentence, because they would have had to select one of the fish in the picture as *the* referent. Instead, the children generally responded rapidly and without hesitation. Thirdly, and most importantly, the children's motivations for rejecting the test sentences contained many utterances like the ones in (116).

(116)

a. Hij heef wel appels geplukt. (Child J.D. 4;10.25)
"He did pick apples."

b. Hij heeft twee vissen gevangen. (Child P.P. 5;6.20)
"He caught two fish."

c. Omdat ze twee bloezen wel heeft gedaan van de drie. (Child M.Z. 7;2.6)
"Because she did do two blouses of the three."

If the children's reason for rejecting the sentences had been straight reference of the NP *een vis* 'a fish' to one of the fish in the story which in fact *was* caught, they would not have used plural object NPs like the ones in (116a-c).

2.1.8 Does a restriction error underlie the deviant responses?

The third error underlying the results could be the restriction error, which was derived on the basis of Diesing's (1992) and de Hoop's (1992) characterization of high indefinites as quantifiers. Sentences with universal quantifiers evoke non-adult judgments from children, the cause of which is likely to be located in the an inadequate identification of the quantifier's domain (see Chapter 4, section 4.2.1). Children's responses improved on experiments in which the children's attention was drawn explicitly to the delimitation of the domain. On the assumption that high indefinites are quantifiers, we may expect similar mistakes, and improvement under similar conditions.

Restriction error:
Domain restriction of high indefinites may be a problem for children until after 4;0. The problem will diminish when the domain of the quantifier is explicitly introduced prior to uttering the sentence that contains the quantified NP.

If there is a problem with the domain presupposition in children's interpretation of the sentences in Experiment 2, it is not likely that this has led to an overly narrow domain containing only one referent. The same arguments that apply against a straight reference approach apply to that possibility, as well. However, it is possible that the children excluded from the domain an object that constituted an exception – in this case, the only fish that was not caught. A similar error was found in Freeman and Stedmon (1986), when children responded affirmatively to the question "Are all cars in the garage?", even when one car was *not* in the garage.

Due to the second clause of the definition of the restriction error, it is possible to investigate systematically whether it is the cause of the deviant responses. In Crain et. al. (1996) and Drozd and van Loosbroek (1999), responses to sentences like "All boys are riding a horse" improved significantly when the relevant set of boys had been introduced explicitly, prior to the presentation of the test sentence and the situation against which its truth had to be judged. The present experiment could be modified by stressing the entire set of fish, apples, etc. in the beginning of the stories, so that the domain and its limits become more prominent. Therefore, a follow-up experiment was conducted.

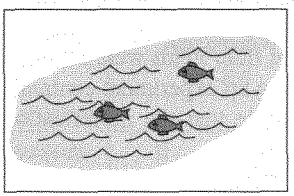
2.2 Follow-up experiment

Given a quantifier analysis, the domain of quantification of *een vis* 'a fish' consists of the source set of fish in the test situation. In the follow-up experiment, this set was introduced explicitly. In addition, the relation between the one object that remained unaffected (e.g., the fish that had not been caught) and the source set was pointed out explicitly. This should lead to a significant improvement of the children's responses, as it did for the experiments testing the interpretation of universally quantified NPs (see Chapter 4, section 4.2.1).

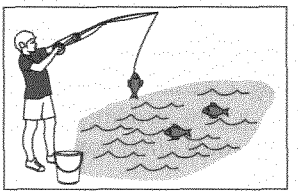
2.2.1 Method and design

Two modifications were made to the beginning of the stories. In order to lend more prominence to the source set (or domain of quantification), the story was preceded by a large picture of the source set (the three fish in the pond, the three apples in the tree, etc.). The experimenter remarked that: "The following story is about..." , and the child usually completed the utterance by saying: "fish", or "apples", etc. In addition, the representation of the agent, i.e., the boy with the fishing gear, the girl with the basket, etc., was deleted from the original first picture. (117) shows the modified test story and the test sentences.

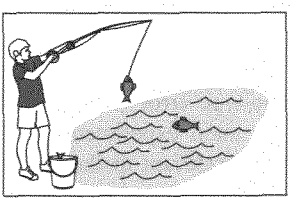
(117)



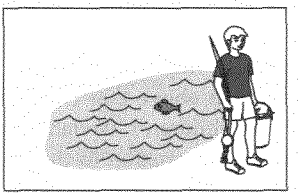
Hier zijn de vissen. De vissen zwemmen lekker in het water. Ze zijn bang dat iemand ze gaat vangen. Dat willen ze niet, want ze willen in het water blijven.
'Here are the fish. The fish are nicely swimming in the water. They are afraid that someone might come and catch them. They don't want that, because they want to stay in the water'.



Maar wat gebeurt er? Een jongen vangt een vis.
'But what happens next? A boy is catching a fish.'



En hij vangt nog een vis.
'And he's catching another fish.'



Nu gaat de jongen weer weg. Deze vis (points) *zwemt nog in het water, de andere vissen zijn weg.*
'Now, the boy is leaving again. This fish is still swimming in the water, the other fish are gone.'

Puppet: *"Hee, ik zie wel wat er gebeurd is:*
Low: *De jongen heeft geen vis gevangen (incorrect). /*
High: *De jongen heeft een vis niet gevangen (correct).*
Heb ik dat goed geraden?"

Puppet: 'Hey, I see what happened:
Low: The boy has no fish caught (incorrect). /
High: The boy has a fish not caught (correct).
Did I guess right?'

The accompanying text no longer introduced the agent as the main character, but rather the object referents: "Here are the fish. They are swimming in the water. They are afraid that someone will come and catch them, because they want to stay in the water" [41]. Yet another modification was made to the end of the stories. The experimenter pointed at the one potential object referent that had not been caught, picked, etc., saying: "This fish is still in the water, but the other fish are gone". This

[41] The stories ascribe volition to fish, apples, necklaces, etc. I judged that this was acceptable, since ascribing volition and animacy to otherwise inanimate objects is common in children's stories.

modification served to stress that there is a relation between the object that remains unaffected and the other members of the source set, and to diminish the possibility of children's excluding this particular fish from the set corresponding to the domain of the quantifier. The warm-up items and filler items were all modified in a similar way. Like the main experiment, the follow-up experiment contained a High as well as a Low condition, since it was possible that the modifications to the experiment would affect both.

Now what would the children's answers to this follow-up experiment be able to tell us? If the children's non-adultlike responses were due to a restriction error, parallel to the error causing children problems for universally quantified NPs, we should see a significant improvement in the results of the follow-up experiment.

Such a parallel is not expected if we do not assume that high indefinites are quantifiers. However, also in that case, children might of course leave the one unaffected object out of consideration and thus make a particular kind of pragmatic fit error. The difference is that, in this case, we do not expect a parallel to children's interpretation of universally quantified NPs. Thus, on the assumption that the children's deviant responses originate with a pragmatic fit error, responses may or may not improve.

I pointed out above that I believe the semantic type error to be more likely to underlie the children's deviant responses on the main experiment. In that case adding more information to the context should be irrelevant to the children's NP interpretations, as there is no need for the children to bridge to an accommodation site if, to them, the indefinites are predicates which do not need to be accommodated. On the other hand, there are reasons why the responses on the follow-up experiment would be informative also in that case. As I pointed out in Chapter 3, children might fail to employ the context of a sentence for the interpretation of a high indefinite NP, while they are, in principle, capable of doing so. It could be the case that they do not regard the utterances as part of the same text, failing to recognize that they are related at the level of the content. The modifications made in the follow-up experiment may have the effect of bringing under the child's attention the content relation between the story sentences, including the test sentence. This may make the child more liable to use the discourse in the interpretation of the high indefinite.

2.2.2 Subjects and Procedure

A different group of children took part in the follow-up experiment. The results of 39 children were included in the analysis. the data of 4 children were excluded (see Appendix C). No adults took part in this experiment. Table 5-3 shows how the subjects were divided across age groups and experimental conditions, as well as listing the mean ages.

TABLE 5-3. FOLLOW-UP TO EXPERIMENT 2: DISTRIBUTION OF SUBJECTS ACROSS AGE GROUPS AND CONDITIONS

	Age group I 4;0–5;6		Age group II 5;6–6;10		Age group III 6;10–7;9	
Conditions	Low	High	Low	High	Low	High
No. of subjects	6	7	9	8	–	9
Mean age	4;11	5;0	6;1	6;1	–	7;3

2.2.3 Results

There were a total of 105 responses, as one response was missing for one child from the second age group[42]. Table 5-4 presents the numbers and percentages of rejection and acceptance responses across conditions and age groups.

TABLE 5-4. FOLLOW-UP TO EXPERIMENT 2: PERCENTAGES OF ACCEPTANCE AND REJECTION RESPONSES BY AGE GROUP AND CONDITION (raw numbers between brackets)

		Low condition		High condition	
Age groups		Acceptance	Rejection	Acceptance	Rejection
I	4–5;6	6% (2)	94% (34)	0%	100% (42)
II	5;6–6;10	2% (1)	98% (54)	30% (14)	70% (33)
III	6;10–7;10	–	–	44% (24)	56% (30)
	All children	*3%*	*97% (87)*	*27% (38)*	*73% (105)*

There seems to be a slight change toward the adult interpretation of high indefinites (27%) as compared to the main experiment (16%). The cause of this change lies mainly in the third age group, for which adultlike responses increased from 10% to 44%. However, for the youngest age group, acceptance responses on the High condition decreased from 17% to 0.

The subjects were classified according to response pattern in the same manner as in the main experiment. One child, who had rejected half, and accepted half of the test sentences, was classified as a separate "mixed" category. The response patterns are represented in Figure 5-2 (a table containing the way in which the subjects divided across the response patterns is provided in Appendix C).

[42] This was the first test item of the child B.O. He had adultlike acceptance responses for all other items, but seemed reluctant to produce a simple "yes" or "no" response. For instance, at the second item (picking apples), he said: "*Je moet zeggen: Er blijft er nog één over. Dus 't is goed.*" 'You have to say: there is still one left. So it is right.' This reluctance may have played a role in his refusal to give an answer on the first item.

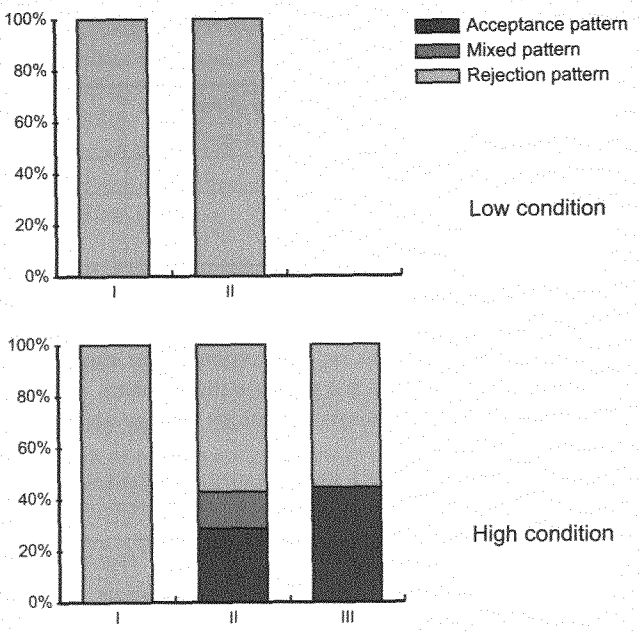


FIGURE 5-2. *Follow-up to Experiment 2: Percentages of subjects with rejection and acceptance response patterns by condition by age group*

As was the case for the main experiment, the High and Low conditions do not differ significantly (Chi-square 5.332, p = 0.065, 2-tailed). The difference between the outcomes in the High condition on the main experiment (4 acceptance patterns versus 22 rejection patterns) and the follow-up experiment (6 acceptance patterns and 1 mixed pattern versus 17 rejection patterns) is not significant (Chi-square 1.964, p = 0.382, 2-tailed).

The children's responses do not improve under conditions similar to those that made children's responses to sentences with universal quantifiers improve. One might argue that the lack of a difference between the main and follow-up experiments is due to the low power of the experiment resulting from the low number of subjects. However, note that previous studies investigating comprehension of universally quantified NPs found a significant increase of adultlike responses with four- and five-year-old children when the domain of the quantifier had been explicitly introduced. In contrast, the present follow-up experiment shows no increase at all for the children in this age range, in fact, the percentage of adult-like responses decreased. Some improvement does occur in the older age groups, but this is far less than in the Drozd and van Loosbroek, and Crain et. al. experiments (see Chapter 4, section 4.2.1), and not statistically significant.

2.2.4 Conclusion

Children's responses on the follow-up experiment did not improve as compared to the main experiment. Had the cause of the deviant responses been similar to the cause underlying the deviant responses to sentences with universal quantifiers, a considerable improvement would have been expected. From the absence of a parallel, I conclude that it is unlikely that the error underlying the deviant responses is a restriction error. Given this finding and children's rejection responses and the ways in which they motivated them, the deviance is most likely the result of a semantic type error. It is clearly not the case that making the unaffected object referent and its source set more prominent has had any serious effect in leading the children to "switch" from a predicative interpretation of the indefinites, which does not involve the discourse context, to a free variable interpretation, which does.

The next section presents a second experiment, which was conducted in order to determine whether a different task and different test sentences would yield similar results to those obtained in Experiment 2. In addition, this experiment may provide evidence for a decision on whether the error that the children make is a pragmatic fit error or a semantic type error.

3. Experiment 3: Direct objects and 'twice'

A second experiment used an act-out task and *twee keer* 'twice' as an intervening scope taking element. The experiment was specifically set up so that a semantic type error could be detected.

3.1 Method and design

Like negation, *twee keer* can be used to distinguish predicative indefinites from free variable indefinites. There were two test conditions, "High", containing a high indefinite object NP to the left of *twee keer*, and "Low", containing a low indefinite object NP. Example (118), repeated from example (107), provides a pair of test sentences that were used in the second experiment:

(118) a. Je mag twee keer een potje omdraaien.
"You may turn over a (any) jar twice." (should involve one or two jars)
b. Je mag een potje twee keer omdraaien.
"You may turn over a (particular) jar twice." (should involve only one jar)

A respondent to (118a) will most likely comply with the request by turning around two different jars. This is the result of the NP serving as a predicate over a variable

that is introduced by the verb. Since the event denoted by the verb should take place twice, there is also room for two object referents. Although the expected preferred response for adults is to turn around two different jars, a respondent to (118a) may also comply by turning around one particular jar twice, because the referents of the two object NPs involved may happen to coincide. In contrast, an adult respondent to (118b) can only comply with the request by turning around one particular jar twice; *een potje* is out of the scope of *twee keer*.

The experimenter would put sentences like the ones in (118) to the subjects as a request for them to perform simple actions on toys. Examples of test items, besides example (118), are: rolling marbles down a marble run (*rollen* 'roll'(transitive)), and blowing cotton balls through little "gates" in a box (*wegblazen* 'blow away'). The toys were all such that an action could be performed on a particular object twice, i.e. the action incurred no permanent change of state. There were always four objects available for manipulation, each of which was easily distinguishable from the other ones by color or position. One group of subjects received test sentences with high indefinite object NPs only, the other group received test sentences with low object NPs. The sets of toys and the instruction were the same for both groups.

If children are prone to semantic type errors, they should not interpret high indefinites as in (118b) as free variables, because such an interpretation would force them to accommodate the indefinite to the context. Instead, they would be interpreting the high indefinites as predicates, which would lead to their turning around two jars instead of one: a non-adultlike response. For sentences like (118a), the children are predicted to have adultlike predicative responses, exhibiting a preference for turning around two jars.

3.2 Subjects

Thirty-eight children and an adult control group took part in the experiment (ten children having been excluded, most of them because of failing the pre-test, described in section 3.3.1 below. For details, see Appendix D). The children were drawn from two different primary schools, the adults were university students. The subjects were divided into three age groups that were very similar to those in Experiment 2.

Table 5-5 shows how the subjects were divided across age groups and experimental conditions, as well as the mean ages.

TABLE 5-5. EXPERIMENT 3: DISTRIBUTION OF SUBJECTS ACROSS AGE GROUPS AND CONDITIONS

	Age group I 4;0–5;6		Age group II 5;6–6;11.15		Age group III 6;11.15–7;9		Adults	
Conditions	Low	High	Low	High	Low	High	Low	High
No. of subjects	8	7	7	7	–	9	4	6
Mean age	5;0	4;10	6;2	6;3	–	7;5	–	–

3.3 Procedure

3.3.1 Pre-test

Subjects could only take part in the experiment if they had passed a pre-test. The pre-test served to ensure that the children were able to apply *twee keer* to a situation in which something happened twice. Pretesting was necessary because many children in the youngest age group were still in the process of learning to count, and because counting events that leave no visible trace, as required in the present experiment, is even harder than counting objects.

The procedure of the pre-test was as follows: for the first item, the experimenter made a farm animal jump over a fence twice. The child was asked how many times it had jumped. For the second item, the experimenter made one farm animal jump twice, and one animal three times. The child was asked which animal had jumped three times. If a child failed on both pre-test questions, she could not take part in the experiment. If a child failed on one of the questions, another item was presented, similar to the second one. The child was asked how many times one of the animals had jumped (it had jumped twice). If the child responded correctly to this item, she would be given the benefit of the doubt and pass the pre-test. If the child responded incorrectly, she could not proceed to the main experiment. The pre-test was omitted for adults.

3.3.2 Experimental session

The children were tested one by one, in a separate room in their schools. The first two age groups were tested by the same experimenter, a different experimenter tested the third age group. In the room there were either a big table or benches on which the toys were displayed, one set of toys next to the other.

The experiment consisted of a training session and a test session. During the training session, the experimenter explained what the toys were called, and showed what onecould do with them. The experimenter never manipulated all of the four objects, and one of the objects that she manipulated was always used twice. After she had finished "playing" with a set of toys, she invited the child to try it out for

herself. The children did not seem to feel that they should copy the experimenter's behavior with the toys – they would use different numbers of objects, in different orders.

The experimenter instructed the child to put the objects on a paper napkin that was lying next to each set of toys after using them, and saw to it that the child did not place any objects on the napkin until after finishing playing with the set of toys. This part of the procedure was included to ensure that the experimenter could see how many objects the child had manipulated. The experimenter also made sure that the child placed the rings and cotton balls in their original position right after they had been used, so as to ensure that the child would be able to use the same object once more, should she choose to do so. Using the term 'twice' or any other cardinal terms, was avoided during the training session.

After the child had been introduced to all the toys, the experimenter introduced two handpuppets to the child, Ernie and Little Bear. She explained to the child that, depending on whether there were one or two objects on the napkin, either the one or the other puppet would "win". For instance, Ernie would always be the winner in case there was one object on the napkin, and Little Bear would always be the winner in case there were two objects on the napkin. This game element was added because, during the training session, the children had been at liberty to use as many objects as they liked, as many times as they liked. This might have given them the impression that the number of objects manipulated could not possibly matter. Such a belief might influence the children's behavior during the main session, potentially leading them to manipulate either a random number of objects, or possibly two objects simply because the word *twee* 'two' appeared in the input as part of *twee keer* 'two time'. The game element was included in order to prevent this type of behavior.

Only after these preparations could the actual test session start. The experimenter sat on a chair at some distance from the table, using the test sentences to ask the subject to perform actions. The subject moved from one set of toys to the next, performing the actions. After the subject had finished manipulating the objects of one set of toys, she placed the objects on a napkin and rewarded the winning puppet with a token before she moved on to the next set of toys.

There were six target items, mixed with five filler items. The filler items served as distracters, and also as control items that would enable checking afterwards whether the child had kept paying attention and had understood the task. An example of the test sentence of such a filler item is given in (119):

(119) Wil je de witte boontjes in het pannetje doen?
"Could you put the white beans in the pot?"

The set of objects for the filler items in (119) consisted of a small toy cooking pot, and a matchbox containing 5 black beans and two white beans. Target items and filler items were presented in two fixed orders, the second the reverse of the first.

Two warm-up items similar to the filler items preceded the target and filler items, providing the subjects with an opportunity to get used to the rules of the game in the test session. When necessary, the experimenter would give feedback on these items.

All sentences were pronounced with the intonation pattern most natural for the expected adult reading of the sentence. This means that the pitch rise for the VP started on the adverbial *twee keer*. Thus the low indefinite object was included in the focal contour of the VP, whereas the high indefinite object was destressed.

For adults, the pre-test and the puppet game were omitted. During the training session, the adults watched the experimenter handle the toys, but did not try them out themselves. As a result, the entire experimental session took less than 10 minutes for the adults, whereas it took about 20 minutes for most children.

3.4 Results

The responses that involved manipulating only one object were labeled '1-response', the ones involving two objects were labeled '2-response'. Three responses could not be coded as involving the manipulation of either one or two objects. These responses will be ignored in the description of the results.

Table 5-6 shows the percentages and the numbers of 1- and 2-responses by age group and condition.

TABLE 5-6. EXPERIMENT 3: PERCENTAGES OF 1- AND 2-RESPONSES IN THE LOW AND HIGH CONDITIONS BY AGE GROUP AND CONDITION (raw numbers between brackets)

	Low condition		High condition	
Age groups	1-response	2-response	1-response	2-response
I 4–5;6	13% (6)	88% (42)	30% (12)	70% (28)
II 5;6–6;11.15	0%	100% (42)	43% (18)	57% (24)
III 6;11.15–7;9	–	–	66% (35)	34% (18)
All children	*7% (6)*	*93% (84)*	*49% (66)*	*51% (69)*
Adults	0%	100% (24)	92% (33)	8% (3)

We see that the adults always interpreted the indefinites of the Low condition (*wil je twee keer een potje omdraaien?*) in the scope of *twee keer* 'twice', while they interpreted the high indefinite objects of the High condition (*wil je een potje twee keer omdraaien?*) out of the scope of *twee keer*. Three exceptions occurred, when adults manipulated two objects in the High condition at the very first test item.

In the Low condition, the child responses hardly differ from the adult responses. The only exception are six responses in age group I, involving manipulation of the same object twice. Such a response would have been grammatical for adults, too. The child responses deviated from the adult responses only in the High condition. Since there were no mistakes at all on the filler items, the deviant responses are not likely to have been caused by difficulties with the task. The percentage of adultlike 1-responses on the High condition increases with age: from 30% in age group I, via 45% in age group II, to 66% in age group III. As in Experiment 2, the children tend to provide either mainly adultlike, or mainly non-adultlike responses, although the U-shape of the distribution is not as extreme in the present experiment (see Appendix D).

The subjects were divided according to response patterns. If all, or all-but-one of a subject's responses involved manipulating one and the same object twice, this was classified as a 1-pattern. If all, or all-but-one of the responses involved manipulating two objects, each once, this was classified as a 2-pattern. Any other response pattern was classified as a mixed pattern. We see that 93% of the children's response patterns (14 out of 15) in the Low condition are adultlike, in contrast with 39% in the High condition (9 out of 23). Figure 5-3 shows how the response patterns are distributed across conditions and age groups.

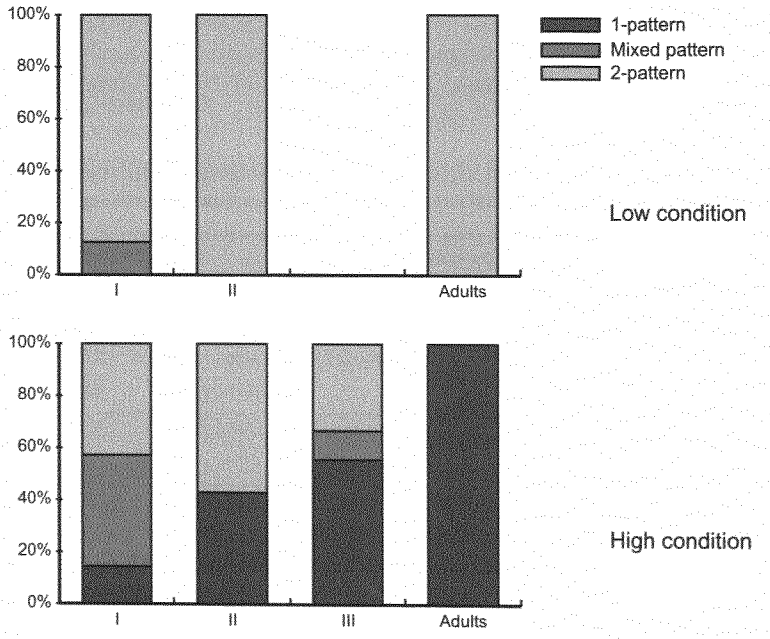


FIGURE 5-3. *Experiment 3: Percentages of subjects with 1-, 2- and mixed response patterns by condition by age group*

The responses of the adults on either condition are maximally different. For the children, the difference between the conditions is also significant, but clearly not maximal (Chi-square 10.236, $p < .05$, two-tailed). (A table showing how subjects with a 1-, a 2- or a mixed pattern divide across the conditions, and a graph plotting the percentages of children who provided zero, one, two, etc., 1-responses is provided in Appendix D).

There is clearly no significant difference between the age groups in the Low condition. The difference between the age groups in the High condition is not significant (Chi-square 6.296, $p = .181$, two-tailed). However, the results suggest a developmental trend, the proportion of adultlike response patterns increasing from 14% in age group I to 43% in age group II and 55% in age group III.

There were no item effects, no effect of canonical versus reversed item order and no effect of "winning puppet".

3.5 Conclusion

The children's responses deviated in the direction predicted by the non-integration hypothesis. The deviations may have been the result of a semantic type error, in which case the children interpreted an indefinite object NP in the scope of 'twice'in a sentence like: *Wil je een potje twee keer omdraaien?* 'would you turn over a (particular) jar twice?'. If this is so, the children were interpreting the high indefinite as a predicate which is semantically incorporated by the verbal predicate.

In section 2.1.7, I discussed the possibility that the children's deviant responses to the sentences in the High condition of Experiment 2 were caused by a pragmatic fit error, specifically, by the children's applying a straight reference strategy. Such an account would fail here, because a straight reference response would lead to adultlike responses, as would the restriction error. Consider the way in which straight reference might have been responsible for the deviant responses to Experiment 2. The example test sentence for the High condition of Experiment 2 is repeated in (120) below:

(120) De jongen heeft een vis niet gevangen.
"The boy did not catch a (particular) fish."

In order to judge the truth of a sentence like (120), the child might select one fish in the story as *the* referent for *een vis* 'a fish', and check whether the negated predicate 'not having been caught' applies to it. If the child had selected the fish that was not caught, the sentence would be judged true, otherwise it would be judged false.

In contrast to Experiment 2, applying this assessment procedure to the sentence *Wil je een potje twee keer omdraaien* 'would you turn over a (particular) jar twice?' would lead to an adultlike response. The child would first select one particular object, e.g., a jar, as *the* referent. She would then apply the complex

predicate 'turn over twice' to the selected jar, manipulating this object twice. We see that this is exactly the procedure that one is supposed to follow for an adultlike 1-response to the test sentence. I thus conclude that it is the semantic type error which underlies the children's deviant interpretations in Experiment 3 [43].

4. Discussion of Experiments 2 and 3 and conclusion

In this section I discuss the results of the experiments that have been presented in this chapter with respect to the non-integration hypothesis. Subsequently, I will discuss the implications of these findings for the different theoretical approaches to indefinites that were discussed in Chapter 3, and for Musolino's (1998) and Schaeffer's (1997) studies of the correspondence of NP placement and interpretation in acquisition.

4.1 Considering the results in relation to the hypothesis

Experiments 2 and 3 investigated whether children, like adults, assign a predicative interpretation to "low" indefinite object NPs to the right of negation or 'twice', and a free variable interpretation to indefinite object NPs to the left of these elements. The non-integration hypothesis predicts that children initially prefer a predicative interpretation even for high indefinite NPs, since interpreting a free variable indefinite would require that the child relate the indefinite to prior discourse.

The results of the experiments support this hypothesis. All children interpret low indefinite NPs in the scope of VP negation and *twee keer* 'twice', which shows that low indefinites are interpreted as predicates certainly by age four. In contrast, the interpretation of sentences containing high indefinite NPs is often non-adultlike. Only part of the children interpret high indefinite NPs in a manner that is straightforwardly compatible with wide scope of the indefinite.

These results show that there is a semantic type error in the children's interpretation of indefinites, as high indefinite NPs are interpreted as predicates, instead of free variable indefinites. In theory, it is possible that (part of the) deviant responses in Experiment 2 were due to a pragmatic fit error, rather than a semantic type error. However, there is no need to assume two explanations where one suffices.

While the direction of the errors is the same in both experiments, there are also differences. First, in Experiment 3, there are many more adultlike responses compared to Experiment 2, and secondly, the individual subjects of Experiment 3 do not respond equally consistently. One can only speculate about the causes of this

[43] The possibility of a narrow scope reading of an indefinite that is interpreted as a free variable infefinite is discussed in Chapter 6, section 4.2.1.

difference. A number of possible causes are (adhering to the present framework and hypothesis):

a. The act-out task of Experiment 3 leaves the child more freedom of action. The child is tempted to use this freedom in playing with the toys.
b. The negation in the judgment task of Experiment 2 may trigger rapid responses, whereas the act-out task provides a better opportunity for the child to think the sentence over. Thus, in Experiment 3, children may be better able to employ knowledge of grammar that has not yet been completely automized.
c. It may be the case that in both experiments, a semantic type error co-occurs with a pragmatic fit error occur, the latter in the form of a straight reference interpretation. Whereas in Experiment 2, both types of error would lead to non-adultlike responses, in Experiment 3 only the semantic type error could cause non-adultlike responses. Thus, the odds of encountering non-adultlike responses are higher in Experiment 2.

4.2 Implications for analyses of indefinite NPs

The present findings on children's comprehension of high indefinite object NPs show a discrepancy with respect to previous research in children's language acquisition. Research in child language production showed that children place definite and indefinite object NPs in high and low positions to the same degree as adults by the time children are four years old. The present findings in child language comprehension, on the other hand, show that adultlike "high" or wide scope interpretations often are not acquired until after that age.

Below, I argue that the new findings, as well as the difference between those and the findings in language production can be captured while staying within the framework of Van Geenhoven (1998). In contrast, the quantificational analyses of Diesing (1992) and de Hoop (1992) do not capture these facts. I argue that de Hoop's analysis can be expanded so as to account for the findings, but that this is not possible for the analysis of Diesing.

4.2.1 Van Geenhoven (1998)

The spontaneous speech data showing that children place definite object NPs mainly in the high position as early as age 2 does not directly pertain to Van Geenhoven's analysis, since that analysis does not propose a relation between NP position and interpretation that holds in the same way for definite NPs and indefinite NPs. As noted earlier, Schaeffer (1997) found that children place indefinite NPs to the left of negation approximately as often as adults by age three – adults have a rate of using the high position of 66% and three-year-olds at 56%. These results are consistent with other conditions in Schaeffer's experiment, in that there is a leap toward the adult interpretation between the group of two-year-olds

and the group of three-year-olds. I therefore believe that we should take these findings seriously, and conclude that there is a lag between production and comprehension which needs to be explained.

This difference can be explained within Van Geenhoven's framework. We need to keep in mind that the indefinite's interpretation does not directly follow from the NP's position but rather that the position is a language-specific clue to the intended interpretation. Children will have to learn exactly how important this language-specific clue is. Therefore, we do not expect the correspondence between position and interpretation to be present from the onset of language acquisition. In addition, if we take into account that the hearer's task of reconstructing the speaker's intentions is more complicated than the speaker's task of putting her intentions into words, we may expect that comprehension lags behind production.

4.2.2 Quantificational approaches

The issue of whether or how the analyses of Diesing (1992) or de Hoop (1992) can account for the language acquisition data should be approached by asking two questions. The first is, whether the findings are compatible with a quantifier status of the children's high indefinites. If the answer to the first question is that high indefinites initially are not quantifiers in child language, we have to ask whether the analyses allow for an acquisition trajectory from non-quantificational readings of high indefinites to quantificational ones. Such a trajectory should be compatible both with the findings, and with the respective theories.

I believe that the first question should be answered in the negative, although at first sight it might seem possible to argue that the deviant responses are caused a failure to involve the context in restricting the domain of the quantificational indefinite NP in an adequate manner. Such an explanation would be in line with the non-integration hypothesis. The discrepancy between production and comprehension data could then be due to the relative ease of producing a quantifier as compared to understanding one. Since the child knows the meaning that she wants to express in an utterance, she may know the domain restriction, whereas in comprehension she will have to infer it, which may be more difficult.

However, this explanation of the results is insufficient for the following reasons. First, if the children's problem consisted in restricting a quantifier, we would have expected an improvement in the follow-up to Experiment 2. No improvement was found. Although it does not exclude it, this finding renders a restriction problem less likely. Secondly, the assumption that the cause of the deviant responses lies in problems with the domain restriction does not explain the pattern of the findings. If children for some reason could not manage a proper domain restriction, the error that one would expect is an *incorrect* domain restriction. However, what we see instead is that children do not treat the high indefinites as quantifiers at all, thus abandoning domain restriction altogether. The children massively opt for an interpretation in the nuclear scope (on Diesing's analysis), or a "weak" interpretation (on de Hoop's analysis), options that their grammar, if it is structured

in the way that Diesing and de Hoop propose, simply does not allow. I therefore conclude that the non-adultlike responses in Experiments 2 and 3 are evidence that narrow scope and thus "weak" or "non-presuppositional" interpretations of High indefinites are a grammatical option of children's grammar.

As I concluded that children's grammar initially allows non-quantificational high indefinites, it should be investigated whether it is possible to propose an acquisition trajectory leading to the adult grammar as proposed by Diesing or de Hoop.

Let us first consider Diesing's Mapping Hypothesis. The proposed universality of this mechanism requires innateness, since it seems to be the only way in which a child learning for instance English can ever master the system, as there is no overt evidence of movement of "presuppositional" NPs in that language. The findings show that innateness of the requirement that indefinites appear in a high position at the syntactic surface simply does not hold. This problem cannot be circumvented by proposing that children initially assume that the requirement holds only at a covert syntactic level rather than the level of overt syntax. This does not explain how it is possible that children's grammar enables them to derive a "low" interpretation for NPs in a high position, which should be impossible under the Mapping Hypothesis. Neither does it explain why there is a strong preference for non-quantificational readings, as both the quantificational and the existential, narrow scope readings should be available in the child's grammar.

Even if we set asside the issue of innateness, Diesing (1992) cannot account for the preference for narrow scope readings of indefinites. The analysis does not provide anything that could explain why children, in the case of breakdown of the attempted quantificational interpretation of high indefinites, would massively opt for the ungrammatical option of assigning these indefinites a non-specific interpretation. The analysis presents the two different readings of indefinites as fundamentally distinct, and it is not clear why one of them would be available at an earlier age.

The analysis proposed by de Hoop (1992) also requires innateness. However, the relation between NP position and NP interpretation need not itself be innate. The assumption that not all components of the proposed mechanism are innate could account for the fact that children's interpretations are initially different than adults' interpretations. At the same time, it is possible to assume that the proposed mechanism is learnable on the basis of linguistic input if some crucial components are innate. Hence, the finding that children do not initially interpret "high" indefinites in the manner that is required for adults does not affect de Hoop's analysis.

The reasoning is as follows: recall that the relation between the syntactic positions and NP interpretation in de Hoop's analysis is indirect: "strongly" interpreted NPs must receive strong Case, and only strong Case NPs may appear in the high position. If a child is equipped with the knowledge that strong Case is directly related to a "strong" interpretation, the child would need to discover the

fact that in Dutch, the high position only allows strong Case NPs. Therefore, this fact need not be innate. One may also propose that it is the relation between the high NP position and strong syntactic Case which is innate, while the fact that NPs that take "strong" interpretations must be assigned strong Case is absent from the child's initial grammar. On the basis of language input, the child will then eventually be able to infer the fact that "strong" interpretations must take strong case from the fact that only NPs that have these interpretations appear in the high position, which is reserved for strong Case NPs.

Although this reasoning shows that the mechanism proposed by de Hoop (1992) is learnable also if part of this mechanism is not innate, it does not explain the discrepancy between NP placement in children's production and the present findings, nor does it account for children's preference for a "weak" interpretation. On the other hand, it may be possible to capture the present findings by adjusting or expanding upon the analysis. In contrast to Diesing, de Hoop's analysis provides a starting point because the typically "low" and "high" interpretations are related. De Hoop considers the type of indefinite that appears in the low position as the more basic type. The quantifier status of a high indefinite NP is derived from this basic, non-quantificational interpretation via a type-shifting operation. Thus, the fact that children assign a "weak" interpretation when their "strong" interpretation breaks down can be accounted for.

It is possible to build upon this view and envisage an acquisition trajectory in which the child starts out with the following: an initial setting that all indefinite NPs are of the non-quantificational type, a set of type-shifting operations, and possibly a set of ways in which languages trigger type shifts. The child will then have to decide on the basis of input which type-shifting operations occur in the language that she is learning, and how the type shifts are marked in this language. The question of why children have a non-adult grammar until age six or later in spite of their innate equipment could be answered by referring to the non-integration hypothesis. Under the non-integration hypothesis, it may take children some time to discover that the high NP position serves as a trigger for type-shifting as the child is not "tuned in" to recognizing the type-shifted reading for the strong reading that it is (see de Hoop (2000) for an elaboration of the view that there is a "basic interpretation strategy" for indefinite and definite NPs).

I hope that the crude acquisition trajectory that I have proposed clarifies the point that, although de Hoop (1992) cannot account for the findings of the present chapter, this analysis can in principle be extended so as to become compatible with the language acquisition data. This is not possible for Diesing's Mapping Hypothesis or any other analysis that proposes a direct link between NP position and interpretation (see section 4.3 below). This is mainly due to the rigid syntax/semantics mapping that constitutes the core of the latter type of analysis, and the presentation of the two interpretations of indefinite NPs as fundamentally distinct.

4.3 Implications for views on the acquisition of wide scope or "specific" NPs

The results of experiments 2 and 3 speak against the views on the relation between NP interpretation and NP position in language acquisition that are put forward in Musolino (1998) and Schaeffer (1997).

4.3.1 Musolino's (1998) proposal

The findings of the present chapter are different than what is predicted by the proposal of Musolino (1998), who claims that the scope of all NPs is initially determined by their syntactic position. Contrary to this prediction, children interpreted the high indefinite object NP in Experiment 2 in the scope of negation. Let me first explain the rationale underlying Musolino's account.

Musolino proposes that children initially assume that all NPs in the language that they are learning are of the quantified NP-type II (QNPII), which is the type of strong quantifiers like *every N* or *most N*. The scope of type II QNPs is syntactically determined, such that it is either c-command at the syntactic surface, or c-command after a covert, syntactically constrained movement operation. Musolino further assumes that syntactic constraints do not allow covert NP movement across negation, such that the scope of QNPII is determined by its surface position with respect to negation. In contrast, the scope taking of type I QNPs, those that I have labeled "indefinites", can take place through a special wide scope mechanism (the mechanism that Musolino refers to is that proposed by Reinhart (1997), but one could also assume Van Geenhoven (1998) to the same purpose). This mechanism allows indefinites to take wide scope with respect to operators that appear in a higher position at the syntactic surface.

Musolino proposes that Universal Grammar offers the child a choice between a grammar that contains both type I and type II QNPs, and a grammar that only contains type II QNPs. The child's learning mechanism is such, that she will initially select the smaller grammar. In this way, she will be able to extend it when she encounters positive evidence that the language that she is acquiring is of the other, larger, type. The result is "isomorphism" of syntax and semantics. Musolino puts this proposal forward in order to account for his findings concerning the sentences in (121). Children initially do not assign wide scope readings to the indefinite object NPs in (121a) and (121b), whereas they do assign wide scope to the indefinite subject NP in (121c):

(121) a. The detective didn't find some guys.
b. Cookie Monster didn't eat two slices of pizza.
c. Some horses won't jump over the fence.

The reasoning is that the children assume that the indefinite NPs are of type II, which doesn't allow the special type of scope taking needed for the wide scope

readings of the indefinite NPs in (121a) and (121b). (121c) is interpreted with adultlike wide scope, as for this reading, the special scope taking mechanism is not required.

Musolino also presents the finding that children between 4;0 and 7;3 almost never accepted the sentence in (122) in a situation for which it was true on a wide scope reading of negation. Adults always judged the sentence true.

(122) Every horse didn't jump over the fence.

In (122), the scope that children assign to the quantified NP *every horse* corresponds to the syntactic surface position of the subject NP with respect to negation. Hence, this reading could also be characterized as "isomorphic".

I believe that the non-integration hypothesis is a more likely explanation of the findings concerning indefinite object NPs in Musolino's and my findings, for several reasons. First of all, it is undesirable to assume that children initially interpret all (quantified) NPs as strongly determined NPs, as this would involve initial assignment of strongly quantified NPs and indefinites to one class, whereas these different kinds of NPs constitute crucially separate classes. The classes of strongly quantified NPs (type II) and indefinites (type I) differ in a number of respects: indefinites are symmetric, intersective and existential (Barwise and Cooper, (1981), Keenan (1987)), and their determiners have some descriptive content, such as *some*, *few*, or the cardinal determiners. Strongly quantified NPs, on the other hand, have none of these properties. Thus, Musolino's proposal has the consequence of requiring reclassification of these NPs at some time during acquisition. Reinhart (1995) points out that an account that ignores the boundaries of the different classes of NPs is not desirable from a methodological point of view. This argument holds irrespective of whether the analysis is purely theoretical, or concerns acquisition, as in the present case.

Secondly, the English sentences that Musolino investigated cannot provide the required evidence. The only findings that actually bear on the isomorphism account concern the sentences in (121a) and (121b), for which children incorrectly reject wide-scope interpretations of indefinite object NPs. These findings could be accounted for equally well by the non-integration hypothesis. Children's adultlike interpretation of (121c) cannot count as evidence for the isomorphism account, as it could simply be the case that the adultlike interpretation of indefinite subject NPs is acquired earlier. Children's interpretation of (122) cannot count as evidence, either. It is clear that the "isomporhism" observed for (122) cannot be the result of children's interpreting the NP *every horse* as a type II QNP, as *every horse* is a type II QNP for adults as well. As the kind of narrow scope taking in (122) is of an entirely different kind than the narrow scope readings of (121a-b), results regarding (122) do not bear upon the underlying cause of children's interpretation of (121a-b).

It is crucial to Musolino's acount that children always interpret indefinite NPs out of the scope of negation if they appear out of the scope of negation at the syntactic surface. The results of Experiment 2 show that children assign non-adultlike narrow scope to the indefinite object NP in *De jongen heeft een vis niet gevangen*, a reading which does not correspond to surface syntax. The non-integration hypothesis can account for this result, whereas isomorphism cannot.

4.3.2 Schaeffer's (1997) conclusions

The results of experiments 2 and 3 are incompatible with the conclusions of Schaeffer's (1997) study of the acquisition of direct object placement. This incompatibility does not lie in the pragmatic part of Schaeffer's account (Schaeffer puts forward that children initially lack a discourse rule (see below), a view which is akin to the non-integration hypothesis that I have put forward). Rather, it is the analysis of the relation between object placement and interpretation underlying Schaeffer's conclusions that causes the incompatibility with the present results.

In the analysis that Schaeffer assumes, following Sportiche (1992), movement of object NPs to higher positions is forced by a feature [+specific] on referential NPs. Schaeffer's definition of referentiality is a slightly altered version of that in Fodor and Sag (1982):

> *Referentiality* (Schaeffer 1997)
> A nominal expression is understood to be referential if it has a *fixed referent* in the (model of the) world, meaning that it can be identified by the speaker and/or by one of the people whose propositional attitudes are being reported.
>
> (Italics by Schaeffer)

The specificity feature only forces movement if it is specified for one of two settings: discourse-related, or nondiscourse-related. The rationale behind these two different settings is that discourse related referential object NPs must move to a higher position than non-discourse related ones. If the syntactic feature on the NP is not marked for either one of these settings, movement cannot take place. Schaeffer shows that children under the age of three or four do not place object NPs in a position above negation as frequently as adults. To explain this delay, she puts forward the following pragmatic rule:

> *Discourse Rule* (Schaeffer 1997)
> Preceding linguistic discourse and knowledge of interlocutor must be taken into account.

The reasoning is that children initially lack this principle. As a result, they are not always able to specify NPs as either discourse related or non-discourse related. Hence, the specificity feature may not be marked, so that young children's NPs do not move to the high position in which the feature would have to be checked if it

were marked. Schaeffer's results show that at age three for most children, and at the latest age four, children have adultlike NP placement, which shows mastery of this pragmatic rule.

In Schaeffer's analysis, the fact that young children place object NPs in the low position far more often than adults only tells us that the child does not move the NP to a high position – it does not tell us anything about the relation between position and interpretation in the child's grammar. In this way, Schaeffer is not forced to interpret the non-adult placement of NPs by young children as evidence against innateness of the relation between a high position and a "referential" interpretation. She argues that this relation is part of Universal Grammar, and present in children's grammar from the onset of language acquisition.

However, the results of Experiments 2 and 3 in the present study show that, even until age 7, the object position to the left of 'twice' or negation is not necessarily associated with a "referential" interpretation. The children who took part in these experiments could not possibly have interpreted the high indefinite NPs in the scope of negation or 'twice' if the high object positions had been associated with a referential interpretation. Therefore, the child language data presented here are not compatible with an analysis like that of Sportiche, which proposes a direct relation between NP interpretation and syntactic position, nor with innateness of such an analysis. On the contrary, the present results must be regarded as evidence against such a view.

The new findings offer a different view on two- and three-year-old children's tendency to place object NPs in a low position in contexts in which adults employ the high position. Schaeffer argues that the cause lies in the absence of marking of a syntactic feature on children's NPs. The present findings suggest the possibility that children's NP interpretations may be different than adults, so that they see no reason to place them in the high position.

For now, the next step is to determine whether children also have non-adultlike interpretations of indefinite subject NPs. The following chapter is dedicated to this question.

THE SCOPE OF INDEFINITE SUBJECT NOUN PHRASES

CHAPTER 6

1. Introduction

In this chapter I present experiments that investigate the interpretation of sentence-initial indefinite subject NPs by Dutch children between 4;0 and 8;0. Experiment 4 and a follow-up experiment investigate whether, for children, the indefinite NP in sentences like (123) is inside or outside the scope of *twee keer* 'twice'.

(123) Een knikker mag twee keer rollen.
a marble may two-time roll
"A (particular) marble may roll twice"

Experiment 5 investigates whether children interpret the indefinite subject NPs in sentences like (124) inside or outside the scope of negation.

(124) Een meisje is niet aan het dansen.
a girl is not PROGR-dance
"A (particular) girl is not dancing".

For adults the high position of the indefinite NPs in (123) and (124) indicates that the indefinite NP comes with a variable. Such high indefinites must be out of the scope of elements that directly modify the VP, since they are bound at a level that precedes the introduction of the verb and its operators (see Chapter 2). In addition, a high indefinite NP requires that a conceptual relation be established between the indefinite and material at its accommodation site.

The experiments focus on whether the children make a semantic type error (see Chapter 4, section 2), interpreting high indefinite subject NPs as predicates rather than free variables. As a diagnostis, it is determined whether the children have wide or narrow scope readings. If the high indefinites in (123) and (124) are interpeted

with narrow scope, this will be taken as an indication that, to the children, these are predicates. As suggested by Van Geenhoven (1998), such predicative interpretations of indefinite subjects can occur if the VP incorporates the indefinite (an option which is triggered in adult Dutch by the existential expelitive er "there"). If one assumes that predicative readings on indefinite subject NPs originate with this kind of semantic incorporation, predicative subject NPs should always take narrow scope with respect to the elements that take scope over the verbs. De Hoop (p.c.) points out that this analysis is not sufficient, in view of the following examples:

(125) a. Er rolt twee keer een knikker.
there rolls two time a marble
"Twice, there rolled a marble."

b. Er rolt een knikker twee keer.
there rolls a marble two time
"A marble rolled twice."

While it is possible to characterize both indefinite NPs in the existential constructions as predicative low subjects, *een knikker* 'a marble' takes narrow scope with respect to *twee keer* to its left in (125a), whereas it takes wide scope with respect to *twee keer* to its right in (125b).

From these examples I conclude that if an indefinite subject NP as in example (123) is interpreted in the scope of "twice", it shows that it is interpreted as a predicate. If it is interpreted out of the scope of "twice", it may, or may not be, a predicate. Note that examples (125a) and (125b) are given here only for expository purposes – low indefinite subject NPs are not investigated in the experiments, as the existential sentences that contain them are not true counterparts to canonical sentences[44].

The possibility that children make a pragmatic fit error (see Chapter 4), correctly interpreting the high indefinite subject as a free variable indefinite, but failing to establish an appropriate relation between the high indefinite and its accommodation site, is also investigated. Both errors may occur as a result of a lack of discourse integration, and are predicted by the non-integration hypothesis.

Although the hypothesis under investigation is the same as for the object NPs in the previous chapter, the expected outcomes are not necessarily the same. There are two reasons why children could be more likely to interpret high subject NPs as free

[44] In Dutch, contrary to canonical sentences, existential sentences do not always easily allow the insertion of the negative *niet*, or 'twice'. In addition, the range of verbs allowed in existential sentences is narrower, copulas and intransitive verbs usually being considered the most felicitous. Judgments differ as to which verbs exactly may occur in existential sentences, and the degree of infelicity resulting from existential constructions with "improper" verbs. Another reason for not including existential sentences in the experiments is the ambiguity of *er* between existential 'there' and locational anaphor 'there'.

variable indefinites. First, the default interpretation of indefinite subject NPs is that of a free variable (see Chapter 2, section 4). Secondly, the fact that sentence-initial subject NPs are often discourse topics may guide the children toward taking the discourse level into account. Indeed, previous language acquisition research indicates that children's interpretation of high indefinite subject NPs is more adultlike than their interpretation of high indefinite object NPs.

The final part of the chapter does not investigate the implications for the various analyses of indefinites that were discussed in previous chapters. Instead, I will present a discussion of the differences between the outcomes of Experiments 2 to 5 and the possible causes.

This chapter is set up as follows: section 2 presents Experiment 4, on indefinite subjects and 'twice', as well as a follow-up experiment. Section 3 presents Experiment 5, on indefinite subjects and negation. That section also includes a discussion of remarks that the children made during the experiment, and a follow-up experiment. Both indicate that a pragmatic fit error plays a role in the children's non-adultlike responses on Experiment 5. Section 4 relates the results of the experiments to the non-integration hypothesis and discusses the differences between Experiments 2 to 5.

2. Experiment 4: Subjects and 'twice'

The focus of Experiment 4 is on determining whether a semantic type error occurs. The main experiment is followed by a follow-up experiment that checks whether the results were due to the presence of a modal verb in the test sentences.

2.1 Main experiment

2.1.1 Method and design

Experiment 4 used an act-out task to determine children's interpretations of sentences containing the adverbial quantifier *twee keer* 'twice', as in (126). Subjects were asked to perform simple actions on toys.

(126) Een knikker mag twee keer rollen.
a marble may two time roll
"A (particular) marble may roll twice."

If sentence (126) is put as a request to an adult, the adult will pick up a marble, and make this marble roll twice, the sentence-initial indefinite subject NP taking wide scope with respect to 'twice' because it tranlates as a free variable indefinite. According to the non-integration hypothesis, children may interpret high indefinite

NPs as predicates. If children pick up two marbles and roll each of them once, this betrays a predicative interpretation, and hence, a spemantic type error.

2.1.2 Subjects

Forty-six children took part in the experiment after passing a pretest that assessed their comprehension of the term *twee keer* 'twice'(see Chapter 5, section 3.3.1). Three of these children were excluded from the analysis (see Appendix E). An adult control group consisting of 10 Dutch adults also took part. Six adult subjects were employees of one of the schools, the remaining 4 were university students. All subjects were native speakers of Dutch. Table 6-1 only includes the subjects who passed the pretest and who responded correctly to the filler items.

TABLE 6-1. EXPERIMENT 4, MAIN EXPERIMENT: DISTRIBUTION OF SUBJECTS ACROSS AGE GROUPS

	Age group I 4;0–5;6	Age group II 5;6–6;8	Age group III 7;2–8;3	Adults
No. of subjects	14	14	15	10
Mean Age	4;6	6;2	7;8	–

The subjects from the two youngest age groups were pre-schoolers, the children in the oldest age group were in school group 3 (first grade) and had received nearly a year of reading education, similar to the previous experiments. In the present experiment, there is nearly a six-month interval in between the oldest child of age group II and the youngest one of age group III.

2.1.3 Procedure

The procedure for Experiment 4 was the same as the procedure for Experiment 3 in Chapter 5. For an extensive description of the procedure, I refer the reader to section 3.3 of that chapter. The verbs in the test sentences having been replaced by intransitive ones, some test items had to be changed (for a listing, see Appendix E).

About half of the first and second age groups were tested by one experimenter, about half by another experimenter. The third age group was tested by only one of these two experimenters.

2.1.4 Results

The responses of 43 children are tabulated in table 6-2. Whenever a subject manipulated two objects, each once, this is labeled "2-response", whenever a subject manipulated one particular object twice, this is labeled "1-response".

TABLE 6-2. EXPERIMENT 4, MAIN EXPERIMENT: PERCENTAGES OF 1- AND 2-RESPONSES BY AGE GROUP (raw numbers between brackets)

Age groups	1-response	2-response
I 4;0–5;6	66% (53)	34% (27)
II 5;6–6;8	43% (35)	57% (47)
III 7;2–8;3	74% (66)	26% (23)
All children	*61% (154)*	*39% (97)*
Adults	100% (59)	0% (0)

Eight responses could not be classified as either a 1-response or a 2-response. Seven of these occurred in the child groups. Three appeared to be random mistakes, but the other four showed a pattern: the child selected two objects, and manipulated each of them twice. The eighth non-codable response occurred in the adult age group.

We see that the adults always interpreted the high indefinite subject NPs out of the scope of *twee keer* 'twice'. Although the majority of the child responses was adultlike, many child responses deviated from the adult responses because they involved manipulating two objects once.

Most children were relatively consistent in their responses, providing either no or one adultlike response (19% and 12% of the children, respectively), or five or six adultlike responses (21% and 33%, respectively). The experimental subjects were divided according to response patterns. If all, or all-but-one of the classifiable responses involved manipulating one and the same object twice, this was classified as a 1-pattern. If all, or all-but-one of the responses involved manipulating two objects, each once, this was classified as a 2-pattern. Any other response pattern was classified as a mixed pattern (a graph showing the distribution of 1- and 2-responses across the subjects and a table presenting the distribution of subjects across responses patterns are provided in Appendix E). Figure 6-1 shows how the response patterns distribute across the age groups.

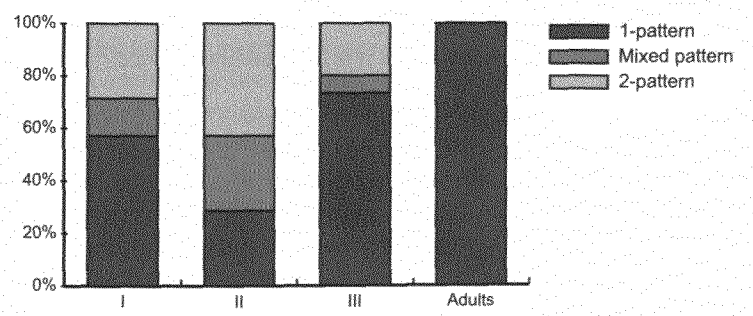


FIGURE 6-1. *Experiment 4: Percentages of subjects with 1-, 2- and mixed response patterns by age group*

We see that just over half of the children (23 out of 43) have an adultlike response pattern, whereas 16% (7 children) have a mixed pattern, and 30% (13 children) have consistent non-adultlike responses. Age group III clearly has the highest proportion of adultlike response patterns.

The difference between the age groups is significant, $p<.05$, if the adults are included in the comparison (Chi-square 14.104, 2-tailed). There is no significant difference between the child age groups, $p=.054$ (Kruskall-Wallis test, Chi-square 5.825, 2-tailed). There is no item effect: each item was presented 43 times, and evoked an adultlike response between 22 and 29 times. There is no effect of experimenter for the two youngest age groups, $p=.884$ (Chi-square .469, 2-tailed). None of the four puppets used in the experiment evoked a disproportionately large number of adultlike response patterns when he was the "winner" (Chi-square 3.978, $p=.287$, 2-tailed, for figures, see Appendix E)[45].

The overall percentage of non-adultlike responses on Experiment 4, 39%, is a little lower than the 51% of non-adultlike responses in the High condition of Experiment 3, which investigated the interpretation of object NPs. In comparing the results, the child age groups were collapsed. The difference between the children's responses to the sentences containing high indefinite objects and those containing high indefinite subjects is not significant, $p=.880$ (Chi-square .229, two-tailed).

2.1.5 Does a semantic type error underlie the deviant responses?

Adults respond to the test sentences by making one particular marble roll twice, while children often respond by selecting two marbles and making each of them roll once. In the present study, I assume that when adults hear a sentence like (127a), they repair the context by adding to it the introduction of the variable for een knikker 'a marble': the accommodation mechanism is applied. The result is a reading which can be paraphrased as (127b).

(127) a. Een knikker mag twee keer rollen.
a marble may two time roll
b. There is a marble such that it is allowed to roll twice

For the children, the indefinite subject NP *een knikker* is in the scope of *twee keer*. We can characterize this deviant interpretation as a semantic type error, i.e. interpreting the indefinite as a predicate in stead of a free variable indefinite. Children who interpret the indefinite subject NPs as predicates do not repair the context – this is appropriate only for free variable indefinites. I assume that instead,

[45] It had been intended that the same pair of puppets, Ernie and Cookie Monster, would be used in all experimental sessions, so that the variable "winning puppet" could be counterbalanced. However, in nearly half of the sessions, one or both of the puppets were not available and had to be replaced, which prevented counterbalancing.

semantic incorporation applies to the children's indefinites: the indefinite is interpreted as a property, and absorbed by the verbal predicate. The reading of (127a) on a semantic type error is then something like (127c):

(127) a. Een knikker mag twee keer rollen.
c. Rolling-of-a-marble is allowed twice

In this case, the interpretation that many children have of (127a) is no different than if the sentence had been an existential sentence, as in (128):

(128) Er mag twee keer een knikker rollen.
there be-allowed two time a marble roll
"Twice, there may roll a marble."

The children's deviant responses in Experiment 4 are not compatible with a pragmatic fit or restriction error based on a straight reference approach (see Chapter 5, section 3.5). Nevertheless, assuming that a semantic type error underlies the deviant responses might be jumping to conclusions: the children may be interpreting the subject NPs as free variable indefinites while the deviance is caused by non-adultlike accommodation. The modal verb in the test sentences may may be responsible for this[46]. The following section describes how this reading could occur.

2.1.6 Could the presence of the modal verb have caused the deviant responses?

The deviant responses could in principle result from accommodation of a free variable indefinite at some level below the frequency adverbial *twee keer* 'twice'. For such a reading to occur, *twee keer* would have to associate with, preferably, a verbal element which takes wide scope with respect to the indefinite subject NP. The presence of a modal verb in principle provides this option. Let us assume that (129a) may have the readings in (129b) and (129c) for Dutch adults:

(129) a. Een knikker mag twee keer rollen
a marble may two time roll
b. There is a marble such that it is allowed to roll twice
c. It is allowed that there is a marble such that it rolls twice

(129b) represents the subject-oriented reading[47]. (129c) represents the epistemic or speaker-oriented reading. Readings (129b) and (129c) differ in the scope of the

[46] Thanks to Eric Reuland and John Payne for pointing this out to me.
[47] Or deontic reading. The term subject-oriented is an adaptation of "agent-oriented (Champaud et.al. (1993)), which is not appropriate in this example, since *een knikker* 'a marble' is a theme rather than an agent.

modal operator represented by *mag* 'be allowed', but they are truthfunctionally equivalent. I am not convinced that adult Dutch really has a separate raised modal reading as in (129c), however, the point that I want to make is that children may believe that it does, as the readings in (129b) and (129c) would both be possible for this sentence, because both render the same truth values.

Now if a child had a raised modal reading as in (129c), but in addition construed 'twice' as modifying the modal verb *mag* 'be allowed', she would have the reading in (129d) below:

(129) a. Een knikker mag twee keer rollen.
d. It is allowed twice that there is a marble such that it rolls

In (129d), *een knikker* 'a marble' is in the scope of 'twice'. It could nevertheless have an intuitively specific reading, much like the specific interpretive guise. This reading is made explicit in (130).

(130) "There may be two situations and for each of them, a particular marble rolls."

On the reasoning presented here, the modal verb may be responsible for a narrow scope reading of the high indefinite, while at the same time the indefinite has a free variable interpretation.

The reader may wonder how a child might arrive at this interpretation, as construing the frequency adverbial 'twice' with the modal verb is not an option in adult Dutch. However, the language itself may be misleading the child. In main clauses *twee keer*, like other adverbials, associates with the verb that is directly to its left, as in (131):

(131) Ik struikelde twee keer.
"I tripped twice."

On the basis of examples like (131), the child may be led to believe that *twee keer* 'twice' associates with *mag* 'is allowed'. Although this does not occur in adult Dutch, it is reminiscent of Neg-raising, which does occur in Dutch. Neg-raising refers to the phenomenon that, for example, (132a) conveys the meaning represented by (132b):

(132) a. I don't believe Rochester's wife is insane.
b. I believe Rochester's wife is not insane.

It is the view of many (see Horn (1989)) that the negation in (132a) in fact associates with the verb of the embedded clause, and that it raises to the main clause through some syntactic mechanism. The proposed "child" analysis of *Een knikker mag twee keer rollen* mirrors what happens in Neg-raising, the operator in

the lower clause ('twice', in this case) associating with the verb of the higher clause.

Children's interpretation of the test sentences in the manner of (129d) might explain why the results of the present experiment are different than those found by Bergsma-Klein (1996) (see Chapter 3, section 2). In Bergsma-Klein's experiment, sentence-initial indefinite subject NPs were interpreted out of the scope of *twee keer* 'twice' at least 70% of the time in each of the age groups of four-, five- and six-year-olds. In the present experiment, the percentage for these ages is lower, 66% for ages 4;0 to 5;6, and 43% for ages 5;6 to 6;8. In addition, the discrepancy that Bergsma-Klein found between the interpretation of high indefinite subject NPs and high indefinite object NPs is absent from the present study. The difference between the outcomes on that, and the present experiment might be caused by the fact that the former, but not the latter, employed modal verb. The next section presents a follow-up experiment pursuing the alternative explanation proposed in this section.

2.2 Follow-up experiment

The follow-up experiment employed only main verbs. If the non-adultlike responses originated from raising of the adverbial along with the modal operator, they should disappear.

2.2.1 Method, subjects and procedure

The test sentences of the main experiment were replaced by sentences containing only main verbs, as in (133):

(133) Een knikker rolt twee keer.
'A marble rolls twice.'

The sentences of warm-up items and filler items were changed in a similar manner.

Different children took part in the follow-up experiment than in the main experiment. The follow-up included only the younger two age groups. The results of 19 children were included in the analysis. Table 6-3 lists the way in which they are distributed across the age groups, as well as their mean ages.

TABLE 6-3. FOLLOW-UP TO EXPERIMENT 4: DISTRIBUTION OF SUBJECTS ACROSS AGE GROUPS

	Age group I 4;0–5;6	Age group II 5;6–6;10
No. of subjects	9	10
Mean age	4;11	6;3

The procedure was the same as for the main experiment, but for one difference: the sentences with the main verbs could not be used as requests to the children to perform an action. Hence, the experimenter presented the sentences as in (134).

(134) Een knikker rolt twee keer, en dat mag jij laten zien.
'A marble rolls twice, and you may show this.'

2.2.2 Results and conclusion

The percentages and numbers of responses can be read off Table 6-4.

TABLE 6-4. FOLLOW-UP TO EXPERIMENT 4: PERCENTAGES OF 1- AND 2-RESPONSES BY AGE GROUP

Age groups		1-response	2-response	Other
I	4;0–5;5	39% (21)	39% (21)	22% (12)
II	5;6–6;10	37% (22)	50% (30)	13% (8)
	All Children	*38% (43)*	*45% (51)*	*17% (20)*

Table 6-4 includes 1- and 2-responses as well as a category of "other" responses. The high proportion of "other" responses may be due to the fact that the test sentences of the follow-up experiment did not fit in with the experimental situation as naturally as the sentences that contained a modal verb. For instance, a generic interpretation is more likely in the follow-up experiment. Nine of the "other" responses are compatible with a generic interpretation, the child manipulating either all, or nearly all objects twice.

The subjects were classified according to their response patterns, using the same criteria as in the main experiment (for a table, see Appendix F).. The results are presented in Figure 6-2. Four children were not included because they had three or more "other" responses.

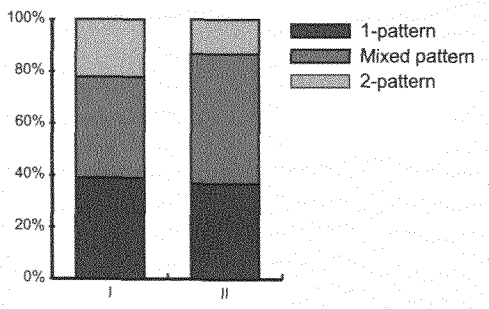


FIGURE 6-2. *Follow-up to Experiment 4: Percentage of subjects with 1- and 2-response patterns by age group*

The proportion of adultlike response patterns is a little lower than in the main experiment, which had a total of 42% adultlike 1-patterns for groups I and II. This shows that the presence of a modal verb in the main experiment was not the cause of the children's deviant responses.

3. Experiment 5: Subjects and negation

Experiment 5 tested children's interpretations of sentences like (135):

(135) Een meisje is niet aan het dansen.
a girl is not PROGR-dance
"A (particular) girl is not dancing".

The experiment focused on determining whether children interpret sentence-initial indefinite subject NPs as predicates rather than free variable indefinites. If that is the case, they may interpret the indefinites in the scope of the negation operator.

This section presents Experiment 5 as well as a follow-up experiment which further investigates whether a semantic type error played a role in the children's responses. At the end of the section, I present an additional analysis which shows that the children who took part in the main experiment did not always employ the same assessment procedures as adults.

3.1 Main experiment

3.1.1 Method and design

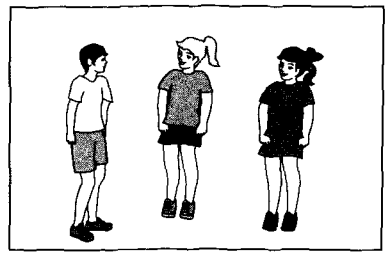
A truth value judgment task was employed to assess children's interpretation of sentences like (135) above. For an adult, the high indefinite subject NP must be out of the scope of negation, such that the only reading of the sentence is that there is a girl who is not dancing. The experiment aims at determining whether children allow a reading on which the indefinite NP is in the scope of negation. In that case, the sentence would have the reading that there is no girl who is dancing. There was only one test condition.

Adults and children were invited to judge whether sentences of the type in (135) matched a picture which, for (135), contained a girl who is dancing and a girl who is not dancing; rather, she is swinging. On the adult wide scope reading of the indefinite subject NP, the sentence is true of this picture. On a narrow scope reading of the indefinite NP, which can be paraphrased as: "there is not a girl who is dancing", the sentence would be false. Note that the test picture also contained a boy who is dancing – this was needed for a felicitous occurrence of the full NP *een meisje*.

The test sentence and test picture were preceded by another picture and a short story in which the three persons were introduced, so that they constituted an obvious source set. In order to provide a felicitous context for the occurrence of negation, the story raised the expectation that all three children *would* dance.

The test items were presented to the child as follows: A puppet (Sesame Street's Ernie) is asleep while the experimenter tells the child the story that goes with the pictures. After they finish carefully looking at each picture, the child wakes up the puppet, who is then allowed to have a look. The test sentence was presented as a remark that the puppet makes about what he sees, and the puppet invites the child to tell him whether he "saw it right". The puppet was employed for two reasons. First, to reduce anxiety for the child, so that she would feel free to correct the sentences. Secondly, to help increase felicity of the indefinite subject. High indefinite subject NP are often used in observation contexts, in which a speaker describes objects or events in a scene that is newly revealed to her (Schouten 1998). An example of the pictures and the accompanying story is given in (136):

(136)

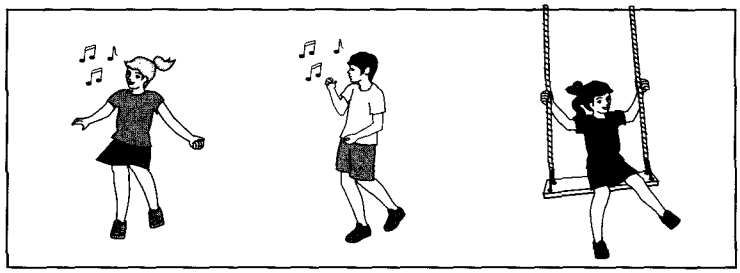


Exp: *Hier zijn kinderen: een jongen, een meisje, en nog een meisje* (experimenter points). *Ze willen iets gaan doen, maar ze weten nog niet wat ze gaan doen. Misschien gaan ze dansen, maar, misschien gaan ze wel iets anders doen.*
En wat ze doen, dat zie je hieronder:

Exp: '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 given in (137):

(137)



Exp:	*Kijk, dit meisje is aan het dansen (points), en deze jongen is aan het ...*
Child:	*dansen*
Exp.:	*Ja, en dit meisje is...*
Child:	*aan het schommelen.*
	(child wakes up puppet)
Puppet:	*Ik zie al wat er gebeurt: Een meisje is niet aan het dansen. Heb ik dat goed gezien?*

Exp.:	'Look, this girl is dancing (points), and this boy is...
Child:	dancing.'
Exp:	'Yes, and this girl is...
Child:	swinging.'
	(child wakes up puppet)
Puppet:	'I see what happens: (test sentence) "a girl is not dancing". Did I see this right?'

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

3.1.2 Subjects

Experimental subjects were seventy Dutch children, drawn from two different primary schools, and ten adults, five of whom were university students. The children in the two youngest age groups were kindergarteners, the children in age group III were at the end of school group 3 (grade 1), having received nearly a year of reading education.

In the remainder of this section, "subjects" will only refer to the 66 subjects whose responses were included in the analysis (for excluded subjects, see Appendix G). Table 6-5 shows how the subjects were divided across the age groups.

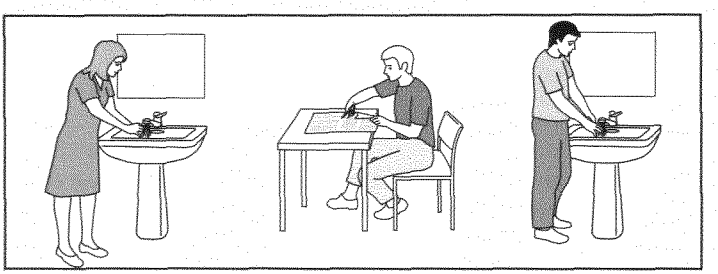
TABLE 6-5. EXPERIMENT 5, MAIN EXPERIMENT: DISTRIBUTION OF SUBJECTS ACROSS AGE GROUPS

	Age group I 4;0–5;6	Age group II 5;6–6;10	Age group III 6;10–8;3	Adults
No. of subjects	23	24	19	10
Mean age	4;9	6;0	7;10	–

3.1.3 Procedure

The children were tested one by one, in a separate room in their schools. All children were tested by the same experimenter. The five target items were preceded by training items, consisting of five single pictures and four two-picture training items. The experimenter would give explicit feedback whenever a child made mistakes on these items. In the first two of the single pictures, the concept of truth value judgments was introduced by using affirmative sentences. The other training items contained only negated sentences, like the test items. The single picture items were followed by four two-picture training items, which were completely similar to the test items except for the fact that they were unambiguously either true or false, whether on a wide or a narrow scope interpretation of the indefinite subject NP. For example, one of these training items contained the picture that is presented in (138).

(138)



The test sentence for this item, *Een vrouw is haar handen niet aan het wassen* 'A woman is not washing her hands' is false, irrespective of whether *een vrouw* 'a woman' takes wide or narrow scope with respect to negation.

The experiment also contained four control items that were much like the two-picture warm-up items. They enabled the identification of children who could not handle the task. Two of the control items were true and two of them false, irrespective of whether the high indefinite subject took wide or narrow scope. The "true" control items were mixed with the experimental items, whereas the "false" items appeared at the end of the experiment. The reason for adding them only at the

end was that they also served to investigate children's assessment strategies. I will return to this point in section 3.3 below.

The experimenter made an effort to keep the intonation pattern of the test sentences constant: there were two main stresses in the sentence, one on the subject and one on the predicate, including the negation. The stress on the subject was not a contrastive focus stress, but a much flatter stress appropriate for topical elements.

3.1.4 Results

Of a total of 330 responses, 4 could not be coded as either a rejection or an acceptance of the test sentence. These four items were excluded from the counts. Table 6-6 shows the percentages and numbers of acceptance and rejection responses for the remaining 326 child responses and the 50 adult responses.

TABLE 6-6. EXPERIMENT 5, MAIN EXPERIMENT: PERCENTAGES OF REJECTIONS AND ACCEPTANCES OF THE TEST SENTENCE (raw numbers between brackets)

Age group	Accepting test sentence	Rejecting test sentence
I 4;0–5;6	37% (42)	63% (72)
II 5;6–6;10	70% (84)	30% (36)
III 6;10-8;3	84% (77)	16% (15)
Adults	100% (50)	0% (0)

As expected, all 50 adult responses were acceptances of the test sentence, i.e., the adults accepted a sentence like *Een meisje is niet aan het dansen* 'a girl is not dancing' as a correct remark about a picture which contained a girl who was not dancing besides a girl and a boy who were dancing. Children often rejected the test sentences, most often in age group I and increasingly less in the older age groups.

There was no item effect for the child responses: the number of acceptance responses evoked by each of the items was in between 38 and 43, on a total of potentially 66 responses per item. The children were fairly consistent in their responses, most children providing either zero (29%), all (42%), or all-but-one (14%) adultlike acceptance response (a graph plotting the distribution of the responses is provided in Appendix G).

The subjects were 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 were classified as "mixed". One child from age group III could not be assigned to any of these groups, as three of her responses could not be coded as either an acceptance or a rejection (see Appendix G for a table showing how subjects divide across acceptance and rejection patterns).

The majority of child response patterns (57%) is adultlike, but a substantial portion (43%) is non-adultlike. Most of the non-adultlike response patterns occur in the youngest of the three age groups. The differences between the age groups are illustrated more clearly in Figure 6-3:

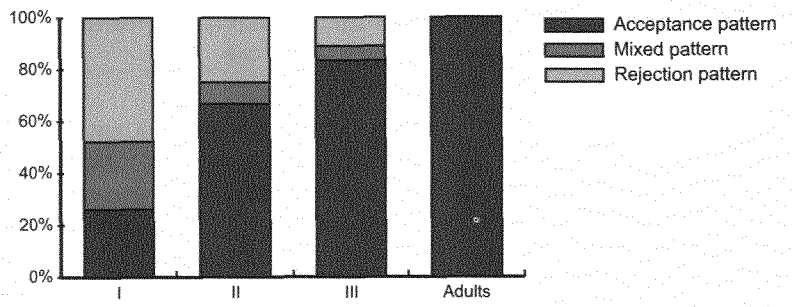


FIGURE 6-3. *Experiment 5, main experiment: Percentage of subjects with acceptance, mixed, and rejection response patterns by age group*

The difference between the age groups is significant, $p < .05$, both if the adults are included, and between the child age groups (Adults included: Chi-square 22.883, two-tailed. Child age groups only: Chi-square 15.247, two-tailed). Further Chi-square testing revealed that the difference between age group I and either of the other child age groups is significant ($p<.05$), whereas the difference between age groups II and III is not ($p=.57$).

3.1.5 Subjects' motivation of their responses

Whenever a child rejected the test sentence, the puppet asked the child to explain exactly what it was he had seen wrong. The children always offered some motivation of their rejections, either verbally or by pointing at the picture. For 106 out of the total of 123 rejections (86%), they indicated that the puppet should have paid attention to the person who was of the gender denoted by the subject NP and who was engaged in the action denoted by the predicate. For our example item in (137) this means that children motivated their rejection of *Een meisje is niet aan het dansen* by referring to the girl who *was* dancing. The remaining 17 motivations were unclear or not to the point, such as exhaustively describing everything that could be seen in the picture. 13 of these unclear motivations were provided by children in age group I.

Only the children in the oldest age group and the adults were asked to motivate the affirmative responses, as asking for a motivation of an acceptance response is awkward and might lead to confusion. The experimenter asked for a motivation of an affirmative response maximally twice per session. All of the motivations that were obtained in this manner, as well as the occasional motivations of affirmative responses that were volunteered by the subjects, referred to the one referent of the

gender mentioned who was *not* engaged in the action. For our example item in (137), this means that the presence of the girl on the swing is the reason for accepting the sentence.

3.1.6 Does a semantic type error underlie the deviant responses?

The results of the main experiment show that children between roughly four and eight often rejected the test sentence in (139) as a remark about a picture in which one of two girls is dancing, while another girl is otherwise occupied. Adults always accepted the sentence for this picture, on the grounds that there is a girl who matches the descriptive content of "not dance".

(139) Een meisje is niet aan het dansen.
"A (particular) girl is not dancing."

The children's deviant responses are compatible with an interpretation of the indefinite subject NP as a predicate, i.e., they may result from a semantic type error. If the indefinite NP is interpreted as a predicate, it can be in the scope of operators that operate on the verb, resulting in a reading that is equivalent to the reading for the existential sentence in (140) (see McNally (1997) for a proposal that the subject NPs in the English existential construction are predicates):

(140) Er is geen meisje aan het dansen.
"No girl (at all) is dancing."

The reading of (140) is compatible with the children's motivations for rejecting the test sentences, since these all contain reference to the fact that the picture contains a girl who *does* dance. On the other hand, the error underlying the children's deviant responses may also be a pragmatic fit error: a failure to relate the high indefinite NP to the context in an appropriate way. In the context of the experiment, the indefinite should be related to the source set of children, but it is possible that children do not use this source set in bridging, and instead use straight reference to interpret the indefinite NP. This would lead to a "specific" rather than a source-set interpretation. In the next section I discuss how this could explain the results of Experiment 5.

3.1.7 Does a pragmatic fit error underlie the deviant responses?

If children employed straight reference for the interpretation of the indefinite subject NPs in Experiment 5, this would lead to a pragmatic fit error. Straight reference is illustrated most clearly in the use of pronouns in children's narratives. Karmiloff-Smith (see Chapter 3) found that children younger than six seemed to use pronouns to refer to entities that they had selected, at will, from the visual context, as if the sentence had not been embedded in a discourse.

Consider now what would happen if children failed to interpret the indefinite subject NPs in Experiment 5 in a source-set guise, and had a straight reference interpretation instead (the argument that follows was also presented, in less detail, in the discussion of Experiment 2 in Chapter 5). Presumably, the procedure for arriving at the adult acceptance judgment of sentence (139) *Een meisje is niet aan het dansen* 'A girl is not dancing' starts with the construction of a set of contextually relevant objects that match the descriptive value "girl". The adult can then proceed to check each of these referents until she finds a referent that matches the descriptive value "not dance". Should the adult first check the referent who matches this description (i.e. the girl on the swing), logically, there is no need to proceed to check any further referents in the set. Should the adult, however, start out with checking the other referent (i.e. the girl who is dancing), she will find that this referent is not a match to the description "not dance", and she must move on to check whether the next referent in the set provides a match. Thus, in order to assess the truth of the test sentence in the situation presented in the experiment, adults must interpret the indefinite subject in its source-set guise.

If children fail to relate the indefinite subject NP *een meisje* to its source set of children, they will not realize that this source set is the set of contextually relevant referents needed for assessing the truth of the sentence. On a straight reference approach, they will select some girl in the picture as the referent of the indefinite, considering only this girl relevant for judging the truth of the sentence. 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 will not, as adults do, proceed to check further whether the second girl matches this description. It is relevant to point out here that "straight reference" does not need to be the same as "referentiality" in Fodor and Sag (1982). In Fodor and Sag's view, a referential NP does not engage in scope relations. However, whether high indefinite NPs are referential in that sense cannot be determined on the basis of the children's responses. Within the approach that I have adopted, we can characterize "straight reference" as a particular kind of pragmatic fit error. A child who has a free variable interpretation may fail to bridge to an accommodation site in an adultlike manner. She may understand that the indefinite must be accommodated, and hence that the reading of the sentence is that there is some girl that is not dancing. However, whereas an adult would appreciate the relevance of the source set, the child might not. The child may very well engage in a process of bridging, however, she may not envisage a source set relation to the accommodation site, but rather find the fact that somehow, the context contains an element that matches the description "girl" a sufficient conceptual relation, and also, perhaps, a more prominent one.

The following section contains an analysis of remarks that the children made during the experimental session. This analysis was conducted in order to determine whether there is any support for a straight reference approach as a source of the children's deviant responses.

3.1.8 Children's remarks: Evidence of straight reference

During the experimental sessions of all of the experiments presented above, the children and the experimenter occasionally made remarks that were not part of the experimental protocol. These remarks were few and they usually did not directly concern the experimental items. When the children were asked to make their truth value judgments for Experiment 2, they would normally do so, providing a motivation for their judgment immediately afterwards. In Experiment 5, however, a particular kind of remarks occurred that had a recurring pattern and that co-occurred with hesitations on the side of the children. These remarks directly oncerned the experimental items, and they indicated that for the children, the truth value of the sentence may have been dependent on the choice of a referent. Usually, in these cases, children do not straightforwardly provide a truth value judgment. Thirty remarks of this kind were made by thirteen different children. Consider example (141).

(141) (Child J.N. 4;06.12)

Ernie: Een jongen is niet aan het voetballen. Heb ik dat goed gezien?
'A boy is not playing soccer, did I see that right?'

Child: Ja, DEZE jongen is NIET aan 't voetballen.
'Yes, THIS boy is NOT playing soccer.'

Ctxt: points at boy who is pulling a cart.

(Capitals indicate contrastive focal stress, "Ernie" is the puppet played by the experimenter)

By the contrastive focus intonation on the deictic pronoun *deze* 'this', J.N. indicates that she is aware that there is another boy in the picture. She seems to indicate that the test sentence is only acceptable if the other boy is not considered.

Most of these remarks are more explicit, as in (142), in which the child explicitly indicates that his judgment depends on which girl one decides on as the referent.

(142) (Child J.L. 5;07.04)

Ernie: Een meisje is niet aan het slapen. Heb ik dat goed gezien?
'A girl is not sleeping, did I see that right?'

Child: Nee.
'No.'

Ernie: Wat heb ik dan verkeerd gezien?
'Then what did I see wrong?'

Child: Die is wel aan het slapen.
'That one *is* sleeping.'
Ctxt: points at girl who is sleeping
Child: (pause) Je kan 't allebei zeggen, want die is niet aan het slapen.
'You can say both, because she is not sleeping.'
Ctxt: points at girl doing jump rope.

Children who made this type of remark sometimes found it difficult to select a referent: they seemed to try to avoid making a true or false judgment. Usually, after the puppet repeated the sentence and insisted that he really wanted to know whether he saw it right or wrong, these children provided a judgment, as did M.L. in (143):

(143) (Child M.L. 7;09.15)
Ernie: Een meisje is niet aan het schommelen. Heb ik dat goed gezien?
'A girl is not swinging, did I see that right?'
Child: Eh... één meisje is niet aan het schommelen, de andere wel.
'Em...one girl is not swinging, the other one is.'
Ernie: Maar als ik nou zeg (herhaalt zin), is dat dan goed, of is het fout?
'But when I say (repeats sentence), is that right, or is it wrong?'
Child: Goed.
'Right.'

A few times, the child would not provide a simple truth value judgment, even after the puppet had asked several times. These children could only be persuaded into saying that the sentence is "more wrong than right" (or vice versa), as in (144).

(144) (Child M.K. 7;04.08)
Ernie: Een meisje is niet aan het slapen. Heb ik dat goed gezien?
'A girl is not sleeping. Did I see that right?'
Child: Eéntje niet goed, en ééntje wel goed.
'One not right, and one right.'
Ernie: Maar als ik nou zeg (herhaalt zin), is dat dan goed, of is het fout?
'But when I say (repeats sentence), is that right, or is it wrong?'

Child: Deze is aan het springtouwen, en deze is aan het slapen.
'This one is doing jump rope, and this one is sleeping.'
Ernie: Maar, ik begrijp het niet helemaal. Als ik nou zeg (herhaling zin), is dat dan goed, of is het fout?
'But, I don't quite understand. If I say (repeats sentence), is that right, or is it wrong?'
Child: Een beetje goed, en een beetje fout.
'A bit right, and a bit wrong.'
Ernie: Is het meer goed, of meer fout?
'Is it more right, or more wrong?'
Child: Meer goed.
'More right.'

Seventeen remarks like the ones in (141) to (144) occurred with rejection responses, in ten cases the children eventually decided on an acceptance response. M.K. even refused the "mild" truth value judgment that she provided in (144) on three occasions. The remarks can be divided into two kinds: one kind by which the children signal that the truth value that they assign to the sentence only pertains to one of two potential referents, as in (141), (142) and (144). By the other kind of remark, the children signal that they cannot easily assign the sentence a truth value because they do not know which referent to select, as in (143) and (144). Both kinds of remarks can only be explained if the children interpret the indefinite subject NP by straight reference. Apparently, these children feel that they should consider only one potential referent in an assessment procedure, and they do not feel that the truth value of the sentence depends on all the elements in a larger set.

Of the twenty-eight children with a non-adultlike response pattern, nineteen provided consistent rejection responses, and nine had a mixed pattern. One might object that a straight reference approach should have led to more random response patterns than the ones we actually found for Experiment 5, since this approach would allow the children to select either the matching, or the non-matching potential referent. However, two factors are likely to influence a child's choice of an object that is to serve as the referent for the indefinite NP. First of all, a certain consistency within the responses is expected if experimental subjects have a choice of approaches in the solution to a problem: one settles for one particular option. Thus the data display, to an extent, a strategy. A second, potentially even more important factor is that the child will probably select as a referent the entity that seems most relevant. Given our example sentence, in which the word *dansen* 'dance' occurs, and given the context, which raised an expectation of dancing, a dancing girl should seem more relevant than a girl on a swing.

I conclude that the children's remarks point to a pragmatic fit error, more specifically, a straight reference approach to high indefinite subjects in Experiment 5. However, since only 13 out of 66 children made this type of remarks, a follow-

up experiment was designed to test in a more systematic way whether children have a straight reference approach to the indefinites in the test sentences.

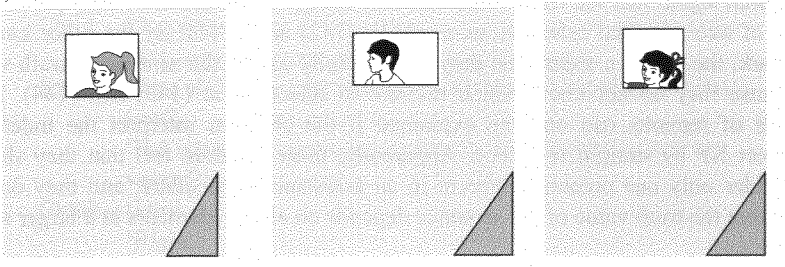
3.2 Follow-up experiment

3.2.1 Method and design

For the follow-up experiment, the characters in the test pictures were hidden behind little doors that covered all but their heads. This would enable monitoring the subjects' assessment procedures, as the experimental subjects would need to open the doors in order to make out what each person was doing. (146) shows the test picture for our example sentence, which is repeated in (145):

(145) Een meisje is niet aan het dansen
"A girl is not dancing."

(146)



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

For adults the prediction was that whenever the first door they opened revealed a mismatch, i.e. the girl who is dancing, they would proceed to check the door behind which is the other member of the relevant set. Only then would they make a truth value judgment. For children the prediction was that many of them would fail to proceed to a second door because they would not feel the need to check an entire set.

3.2.2 Subjects

The subjects were Dutch pre-schoolers, drawn from one kindergarten, and an adult control group that consisted of 10 subjects. The responses of 26 children were

analyzed (for excluded subjects see Appendix H). Table 6-7 shows how the subjects are divided across age groups.

TABLE 6-7. FOLLOW-UP TO EXPERIMENT 5: DISTRIBUTION OF SUBJECTS ACROSS AGE GROUPS

	Age group I	Age group II	Adults
	4;0–5;6	5;6–6;8	
No. of subjects	11	15	10
Mean age	4;9	6;1	–

3.2.3 Procedure

The procedure of the follow-up experiment was much like the main experiment. Some changes had been made to the test items because the picture presentation had changed, but most test sentences, pictures and stories remained the same. Since it was not useful to ask the children for a motivation of rejection responses in the follow-up experiment, less time was needed for each experimental item. This allowed the addition of an additional test item to the experiment, so that the total of target items in the follow-up experiment was six.

Since we are mainly interested in those occasions on which the subject first opens the door that reveals a mismatch to the predicate description, three of the test items were manipulated such that both potential referents for the subject NP were mismatches. For example, our example item *dansen* 'dance' continued to contain one mismatch to the predicate 'not dance' (a dancing girl) and one match (a girl on a swing). In contrast, the picture for the test sentence *Een meisje is niet aan het lezen* 'A girl is not reading' contained two mismatches: both girls are reading. Note that a subject will only find out that both potential subject referents are mismatches if she has an adultlike assessment procedure (i.e. if she opens more than one door).

As in the main experiment, a number of training items preceded the test items. They included two items that looked just like the experimental items, for which the children were not asked to provide a truth value judgment, but rather to open some doors that the experimenter indicated. This routine was included in order to ensure that children would have performed the act of opening more than one door before they arrived at the test items, so that they would feel free to open more than one door whenever they deemed necessary.

Two filler items were included, both of which should render an acceptance response on the hypothesized adult assessment procedure, as well as on the hypothesized straight reference assessment procedure, because both of the relevant pictures revealed a match to the sentence. These items served as fillers in that they would provide a break from a response pattern which was predicted to consist mainly of rejections for most children. They also served as controls: if a child provided an incorrect response on both filler items, this was taken as a sign that the child was unable to perform the task that the experiment required.

3.2.4 Results: Assessment procedures

The responses of the subjects who made maximally one error on the filler items are presented in Table 6-8. In part of the cases, opening 1 door sufficed for a valid truth value judgment. These were the cases in which the first door that the subject opened revealed a matching object, e.g., a girl who was not dancing. Another part of the cases is more interesting with respect to the hypothesis that this follow-up experiment investigates, namely those cases for which opening 2 doors was required to arrive at a valid truth value judgment. These were the cases in which the first door that the subject opened revealed a mismatch, e.g., a girl who *was* dancing. In these cases it was necessary to check a second door in order to judge the truth value of the sentence, since that one might contain a match to the sentence. Only if the second door also revealed a mismatch could the subject provide the answer that the sentence was not true. The figures printed in bold face represent responses that consist of opening the number of doors that was minimally required, i.e. 1 door for the third column, and 2 doors for the fourth column. These are the responses that are both correct and efficient.

TABLE 6-8. FOLLOW-UP TO EXPERIMENT 5: PERCENTAGES OF OPENING EITHER 1, 2 OR 3 DOORS BY AGE GROUP (raw numbers between brackets)

Age group	Doors opened	Opening 1 door required	Opening 2 doors required
	1	**79% (11)**	88% (46)
I 4;0–5;6	2	7% (1)	**10% (5)**
	3	14% (2)	2% (1)
	1	**58% (14)**	70% (46)
II 5;6–6;8	2	42% (10)	**30% (20)**
	3	0	0
	1	**50% (7)**	2% (1)
Adults	2	50% (7)	**98% (45)**
	3	0	0

Both adults and children would only open doors that covered a character matching the descriptive value of the noun. Thus, for the example item, subjects would open only doors behind which a girl was visible, and they would not open the door of the boy. Only the youngest child in the sample responded differently: on three occasions, she opened all three doors.

For testing our hypothesis, those cases in which verifying the sentence required considering two persons are of most interest. These are the cases on which the subject encountered a mismatch at opening the first door, e.g., a dancing girl for (145). For adults, there were a total of 46 such cases, for which they proceeded to

open a second door 45 times (98%). So, whenever adults first encountered a mismatch to the sentence, they proceeded to open the door of the other person matching the descriptive value of the noun. The children encountered a similar situation 118 times, but they opened 2 doors only in 25 cases (21%). In 92 cases (78%), the children did not open more than one door.

We can also compare adults' and children's responses on the cases in which the door that they first opened revealed a match to the test story, e.g., the girl who is not dancing. Adults opened one door in half the cases (7), a response which is both correct and efficient. On the other half of the cases, they opened a second door, which was not required to arrive at a truth value judgment. Some adults mentioned that they were aware that opening the second door was not really necessary, but felt they wanted to check the second potential referent anyway. For the children, there were thirty-eight occasions on which they immediately opened the door that revealed a match to the test sentence. On 25 (66%) of these, the children stopped at the first picture, in 11 cases (24%) they moved on to check a second picture, and in 2 cases, the child checked three pictures. This means that the children checked "too many" pictures less often than the adults. The children in age group II more often checked too many doors than did the children in age group I.

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 encountered a mismatch behind the first door that she opens. If a subject in all or all but one case opened at least as many doors as was logically required, this was classified as an "at-least-as-many-as-needed" pattern. If a subject never checked a second door when this was logically required, this was scored as a 1-pattern. The remaining subjects had a mixed pattern: they all failed at least twice to open a second door when this was required.

This classification revealed that, whereas all adults consistently opened at least as many doors as was logically required, the children generally did not. In age group I, there are no adultlike response patterns, in age group II, there are five. There is an increase of adultlike response patterns between age groups I and II, and a decrease of mixed patterns. The results are represented in Figure 6-4. The difference between the age groups is significant ($p<.05$), both if the adults are included in the comparison and if they are not. (Chi-squares 25.125 and 6.591, respectively, two-tailed tested).

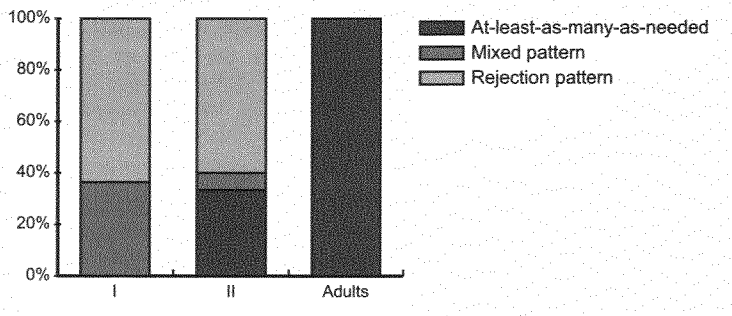


FIGURE 6-4. *Follow-up to Experiment 5: Percentages of subjects with at-least-as-many-as-needed, mixed and rejection patterns by age group*

3.2.5 Results: Truth value judgments

So far I have discussed only the subjects' assessment procedures, however, their truth value judgments were also scored. The truth value judgments that the children provided when they opened only one door were based on the one picture that they saw. If it was a mismatch to the test sentence, they rejected the sentence, if it was a match, they accepted the sentence. There were only 5 cases out of 92 (5%) in which the children accepted the sentence even though the picture they saw was a mismatch.

Whenever children displayed an adultlike assessment procedure by opening a second door when the first door revealed a mismatch, they also generally provided adultlike truth value judgments. In 17 of such cases, the second picture proved a mismatch like the first one, and the children always rejected the sentence in these cases. In 8 cases, the second picture proved a match. The children accepted the sentence in 7 of these cases, and there is one, non-adultlike, rejection. In general, then, it is the case that whenever the children's assessment procedure as revealed by their opening the doors was adultlike, their responses were also adultlike.

Whenever children opened more doors than logically required, i.e. they opened a second door when the first door already revealed a matching picture, the response was generally not adultlike. There were 13 such cases of a child's opening one door too many. In only two of these cases, did the child accept the sentence, which would have been an adultlike judgment. In eight of these cases, the child judged the sentence "false", and in three cases, the judgment was "both true and false". These responses resemble the children's responses and remarks as discussed section 3.1.8. Note that the scene that these children saw is nearly the same as in the main experiment, as both potential subject referents had been uncovered: one girl is dancing, the other one is not.

3.2.6 Conclusion

The main result of the follow-up experiment is just as as we would expect if children assign straight reference to one object, failing to check an entire contextually relevant set of objects matching the noun description. The children only opened one door to check one of the objects, and then produced a truth value judgment based on checking this object. If the object matched the predicate description, the test sentence was judged true, if the object was a mismatch, the test sentence was judged false. They rarely moved on to the second door. This finding is certainly in line with a straight reference approach to the indefinite NPs, hence, it can be characterized as a pragmatic fit error.

However, the follow-up experiment cannot exclude the possibility that all or part of the children's non-adultlike responses also reflect a semantic type error, since children might both have predicative interpretations of high indefinite subject NPs, and a failure to check an entire, contextually relevant set. In fact, there is some evidence in the follow-up experiment that some children may have a reading of the test sentences that is equivalent to the existential *Er is geen meisje aan het dansen* 'There is no girl dancing', in which case the subject NP is a predicate. As we saw in Table 6-8, on a number of occasions, children in age group II opened a second door when the first door had already revealed a "match", namely the girl on the swing. If the children had a wide scope interpretation of the indefinite subject NP, they could have made the truth value judgment on the basis of this picture, because it shows that it is true that there is a girl who is not dancing. However, the children go on to check the second girl. This behavior would be entirely appropriate if the children's reading of the sentence were equivalent to the existential 'There is no girl who is dancing'.

One could argue that the children's opening too many doors corresponds to adultlike behavior, because adults also several times opened one door "too many" under the same circumstances. However, all adults provided "true" judgments in all of these cases, whereas the children provided a "true" judgment only in 2 out of 13 cases. Note also that the eleven "false" judgments provided by the children are consistent with the existential reading.

Although it is possible that the non-adultlike assessment procedure coincides with predicative interpretations of the indefinite subject NP, the outcome of the follow-up experiment shows that there is no reason to assume that a semantic type error must be underlying the non-adultlike responses. A large part of the data could be explained by assuming only a pragmatic fit error[48].

Before we move on to a discussion of the implications of the results of experiments 4 and 5, I present an additional analysis of the results of Experiment 5.

[48] On this analysis, the findings of Experiment 5 support those of Musolino (1998), presented in Chapters 3 and 4, section 4.3.1. In that study, all children (ages 4;0 to 6;2) who judged sentences like *Some horses won't jump over the fence* interpreted the indefinite subject out of the scope of the negation.

This analysis further qualifies the adultlike responses that were produced during the main experiment.

3.3 An additional analysis: Arriving at adultlike judgments in a non-adultlike manner

I have argued that adultlike assessment of the truth value of the sentences starts with construing a set and subsequently checking whether one of the referents in this set is also part of another set. One of the sets must contain all relevant objects matching the description of the subject noun (in the example: girls), and the other set must contain all relevant objects matching the Verb Phrase description (in the example: non-dancers). Whether one starts the assessment procedure with the one or the other set does not make a difference for the outcome: the truth value judgment for the example item is always that the sentence is true. I assume that adults start their assessment procedure with the set denoted by the noun description, however, whether children also do this is an empirical question.

Although this issue is not directly related to the questions regarding the interpretation of indefinites that are the focus of the present study, it is of some importance. First, because it is possible that what seem to be adultlike responses in Experiment 5 are the result of a non-adultlike assessment procedure. Secondly, if children indeed employ a different assessment procedure, the reason may be that they have a non-adultlike understanding of the information structure of the sentence. This is what we would expect under the assumption that I have been making, namely that children have a problem with discourse integration.

3.3.1 Information structure and assessment

Logically it is possible that the experimental subjects in Experiment 5 started out assessment by first construing a set of "non-dancers". This may have had an effect on the outcomes of the experiments in the following manner. Note that the children's deviant responses were due to their not checking an entire set, but rather focusing on one member of that set and basing the truth value of the sentence on whether this member was also included in the second set (in this case the predicate set of non-dancers). If subjects were to start assessment by checking the predicate set first, a straight reference response by the children could not lead to non-adultlike responses, for the simple reason that the predicate set in all test items contains only one member, which is always also part of the set denoted by the subject NP. Consider the example item in (137): it presents a dancing girl, a dancing boy, and a girl who is swinging. The only relevant member of the predicate set is the girl on the swing. If an experimental subject started out with this set, the next step would be to check whether at least one member of this set is also part of the set denoted by the subject NP, i.e. the set of girls. Since this is the case, the judgment would be "true". In other words, a child who selects this alternative

assessment procedure is robbed of the opportunity to provide a non-adultlike response.

Strawson (1964) points out that in order to verify a sentence containing indefinite NPs, one starts out with checking the set denoted by the topic[49]. I had made an effort to make the indefinite subject NPs in the experiment appear maximally topic-like in order to suppress this variable as much as possible: first, the predicate *not dance* contrasted with an expectation of dancing evoked in the previous discourse, so that *is niet aan het dansen* 'is not dancing' would be interpreted as a contrastive focus. The subject NP could then clearly not be the focus as well. Secondly, I had selected human referents for the subject NP, and thirdly, the intonation pattern used in the sentences had a topic intonation for the subject NP.

Since I nevertheless felt that some means was needed to check to what extent these measures had the desired effect, I added two filler items to the end of the experiment. These items would enable me to separate those subjects who started assessment by construing a set of objects matching the subject NP (subject-set approach) from those who started by construing a set of objects matching the predicate (predicate-set approach). These items, and the responses that they evoked, are presented in the following section.

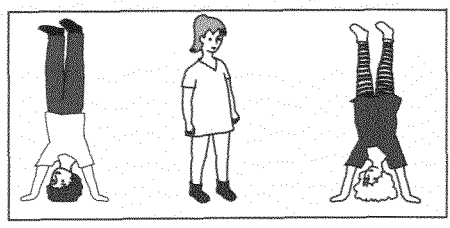
3.3.2 Method, results and discussion

The filler items at the end of the experiment were construed so that they might provide some indirect evidence of whether the experimental subjects chose a subject-set approach or a predicate-set approach for these items. Consider (147), a test sentence in one of the control items.

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

This sentence accompanied the picture in (148):

(148)



[49] Strawson's term is "subject", contrasting with "predicate". I refer to the former as topic and to the latter as focus, following Lappin and Reinhart (1988).

Whether one starts the assessment procedure by construing a set of boys or a set of objects that are not standing on their heads, either way such a set only contains one object. On either procedure, the judgment should be "false", since the boy *does* in fact stand on his head, and the person who is not standing on her head is a *girl*, rather than a boy. Nevertheless, the item is useful as a control condition, because the puppet asks for a motivation of rejections of the test sentence. If the 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. However, should the subject say: "it's a girl", this indicates that the predicate, including negation, is the topic.

A number of responses indicated that the experimental subjects employed the predicate-set approach, as illustrated in (149):

(149) (Child R.M. 7;5.22)

Ernie: Een jongen staat niet op zijn kop. Heb ik dat goed gezien?
'A boy is not standing on his head. Did I see that right?'
Child: Nee.
'No.'
Ernie: Wat zie ik dan verkeerd?
'Then what do I see wrong?'
Child: Da's een meisje die nie op d'r kop staat.
'That's a girl, the one who's not standing on her head.'

Responses like (149) contrast with the more frequent responses reflecting a subject-set approach as in (150):

(150) (Child S.L. 6;10.20)

Ernie: Wat zie ik dan verkeerd?
'Then what do I see wrong?'
Child: Die jongen is *wel* op de kop aan 't staan.
'That boy *is* standing on his (lit. the) head.'

The experimental subjects who had been classified according to their patterns of responses to the test items were now classified according to their motivations on the two control items. Four children whose responses could not be classified unambiguously on both items were excluded. Of these four children, there was one child who provided one response that was most likely an indication of a predicate-set approach and another that was an indication of a subject-set approach. The other three children had produced one or two unclassifiable responses.

The results were as follows: The adults had nearly only subject-set approaches to assessment of the two items. Two adults each provided one response that indicated a predicate-set approach, showing that the predicate-set approach is probably an option for adults, too. Note, however, that there are no adults who only had a predicate-set approach. This is different for the children: ten children displayed a

predicate-set approach to both control items. I would argue that it is likely that these children also used this approach with the test items. If this is so, we should find that these children never rejected the test sentence, and this is indeed what we find. These 10 children, who constitute 16% of all classifiable children, always accepted the test sentences. The responses of the children who take a subject-set approach and the children who take a predicate-set approaches differ significantly, $p<.05$ (Chi-square = 8.885154, two-tailed testing).

The analysis of the control items sheds a somewhat different light on the results of Experiment 5. Of a total of 66 children who took part in the experiment, 37 had an adultlike response pattern. However, the analysis of the responses to the control items shows that 10 (27%) of these children most likely arrived at their adultlike responses in a non-adultlike manner. This changes the overall outcome of the experiment. If we subtract the number of children whose predicate-set assessment procedure prevents them from providing any incorrect responses from the total number of child subjects, the proportion of adultlike responses drops from 56% to 41%.

4. Discussion of the experiments and conclusions

4.1 The hypothesis

The preceding chapter showed that children age four and older interpreted low indefinite object NPs in the same way as adults, whereas they interpreted high indefinite object NPs as if these had been in the lower position. The present chapter investigated whether children made the same error for high subject NPs. The investigations were guided by the non-integration hypothesis:

> **Non-integration hypothesis:**
> Children acquire the predicative interpretation of indefinites early.
> The free variable interpretation is acquired later because it requires discourse integration.

The results show that children's interpretation of high indefinite subject NPs is both similar and dissimilar to the interpretation of object NPs. The findings are similar in that the children make errors in a way that is expected if discourse integration is flawed. The findings are dissimilar in that two different kinds of errors occur with subject NPs, whereas only one kind of error needs to be assumed for object NPs.

Experiment 4 is similar to the experiments of the previous chapter, as it showed that children interpreted the indefinites in the scope of the frequency adverbial *twee keer* 'twice'. I therefore concluded that these children made a semantic type error

on this experiment, interpreting the indefinites as predicates as in Experiments 2 and 3. It is Experiment 5 which may be regarded as the "odd one out". This experiment, investigating the interpretation of high indefinite subject NPs in sentences containing negation, also found non-adultlike interpretations. In this case, however, I concluded from remarks made by the children and a follow-up experiment that a pragmatic fit error might be involved. Due to a straight reference approach, children selected one object in the context to serve as the referent of the indefinite subject NP. This led to a failure to consider the entire set of relevant objects in assessment of the sentence, which means that effectively, the children's NP interpretations lacked a source-set guise.

I believe that it is justified to say that a pragmatic fit error like the one surfacing in Experiment 5 is less "grave" than a semantic type error, because the semantic type error entails a pragmatic fit error, but not vice versa: if a child incorrectly assigns a predicative interpretation to a high indefinite, the child both fails to interpret the indefinite in the correct semantic type, and fails to assign an interpretive guise. This was the main reason for me to assume that no semantic type error underlies the deviant responses in Experiment 5. However, while this may be the most conservative approach considering that one experiment, it renders the overall picture of the results of all experiments less elegant. If the error underlying the deviant responses on Experiment 5 is different from the other experiments, this means that children interpret high indefinite NPs as predicates in some, and as free variables in other experimental situations. The following section addresses this issue.

4.2 Are there different indefinite interpretations on different experiments?

There are several ways in which to approach the difference between the outcomes of Experiment 5 and the other experiments. One is to propose that it does not really exist. I explore this option in sections 4.2.1 and 4.2.2. Another option is to analyze the differences between the experiments in order to find out what may have caused the different responses.

4.2.1 Could the deviant responses involve free variable interpretations on all experiments?

If the deviant responses on the first three main experiments could all be regarded as resulting from pragmatic fit errors, this would allow us to assume that the "high" interpretation of indefinites is underlying all deviant responses. Apart from providing a more homogeneous picture of children's interpretations, this would render the results compatible with the analyses of Diesing (1992) and de Hoop (1992), as these analyses propose a (relatively) strong relation between NP type and NP placement. If we assume that children have "low" interpretations of high indefinite NPs, this relation is largely absent for children.

Let us see if it is possible to propose "pragmatic fit error" as the common denominator of the errors involved in Experiments 2 to 5. In the previous chapter, I already discussed the possibility that a pragmatic fit error would play a role in the children's deviant responses to sentences like: *De jongen heeft een vis niet gevangen* 'The boy did not catch a fish'. The kind of pragmatic fit error that might explain the deviant responses would be the same straight reference approach, underlying the deviant responses in Experiment 5. If children assigned straight reference from the NP *een vis* a fish' to one of the fish that was caught, this might have led to non-adultlike rejection responses. However, I rejected this possibility for several reasons (see Chapter 5, section 2.1.7). The responses to Experiment 5 provide some additional support for this rejection. The distribution of the responses in Experiment 1 does not resemble that of Experiment 5. The proportion of adultlike responses is much lower in the former experiment, and particularly, there is very little variability in the individual children's responses. On a straight reference approach, we might expect more variability on Experiment 2, as we find it in Experiment 5. In both experiments, children have the option of selecting the referent that would make the judgment true on a straight reference approach (the girl who is not dancing, the fish that was not caught). However, whereas on Experiment 5, 41% of the children at least once accepted a test sentence, in Experiment 2, only 23% of the children accepted at least one sentence in the High condition.

As I discussed in Chapter 5, a straight reference approach would have rendered adultlike responses in Experiments 3 and 4. If we were to consider that a pragmatic fit error would be underlying the results of these experiments, it would have to be a different kind of pragmatic fit error than the one proposed for Experiment 5. Perhaps we can think of an error along the lines that I considered in the section concerning the follow-up to Experiment 4. In the follow-up experiment, I investigated whether the children might have construed 'twice' with the modal verb, in a position higher than the indefinite at the interpretive level of Logical Form. If that were the case, the indefinite subject NP could be interpreted as a free variable while at the same time receiving a narrow scope interpretation with respect to 'twice' due to accommodation below this raised frequency adverbial[50]. However, the follow-up experiment showed that the presence or absence of a modal verb was not a factor.

I have not yet considered the option that children could have interpreted 'twice' in a raised position in the absence of a modal verb. Theoretically, this option exists, as 'twice' might mistakenly modify some situation variable that is in a higher position at LF than the indefinite. Intermediate accommodation below 'twice' could then result in the readings represented by the paraphrases of (151) and (152):

[50] I leave open the question of whether this type of accommodation error really qualifies as a pragmatic fit error.

(151) Je mag een knikker twee keer rollen.
* "You are allowed, on two occasions, to roll a (particular) marble."

(152) Een knikker rolt twee keer.
* "On two occasions, a (particular) marble rolls."

There is, however, an obvious problem with assuming that children can have the proposed (starred) representation of (151) and (152): this scope configuration is impossible to derive for adults. This would raise two problems: How is it possible that the child has this option in her grammar?, and: How does the child unlearn this? This problem does not occur with the accounts that I provided for the other non-adult readings that I have proposed in the present study. For instance, if children interpret a high indefinite as a predicate, as I have argued, they avail themselves of an option that is also present in the adult grammar, namely a predicative interpretation through semantic incorporation.

I have argued that it is not likely that the deviant responses to Experiment 2 involve free variable interpretations of the indefinite NPs, and that this assumption for Experiments 3 and 4 only raises new problems. In addition, even if free variable interpretations were underlying the deviant responses, they would still have to involve two different kinds of pragmatic fit errors, namely straight reference for Experiment 2 and in situ accommodation for Experiments 3 and 4. I conclude that treating the children's deviant responses on Experiments 2, 3 and 4 as involving free variable indefinites complicates our picture of the acquisition of indefinites, rather than simplifying it.

4.2.2 Could the deviant responses involve predicative interpretations on all experiments?

One could attempt to regard the predicative interpretation as the common denominator of the children's indefinite interpretations in all non-adult responses. In that case, I would need to reconsider my conclusion that the indefinite subjects in Experiment 5 are free variables to the children. Can such a relabeling from pragmatic fit error to semantic type error be defended?

I believe it can. The fact that children seem to consider only one of the girls in the picture relevant for the assessment of the sentence does not exclude a predicative interpretation: both tendencies could co-exist. In fact, if the child represented the indefinite subject NPs as a predicate, the child would not need to identify an accommodation site, hence the child would not need to employ the option of relating the indefinite to a source set. Therefore, the child may consider any one instance of "girl" relevant, irrespective of whether this is likely with respect to the context.

Regarding all non-adult indefinite interpretations of Experiments 2 to 5 as predicates is less problematic than regarding them all as free variable indefinites. It does not force us to postulate an alternative non-adultlike construction to explain the results of experiments 3 and 4. If we assume that wide scope indefinites are necessarily free variable indefinites, there is also a disadvantage to this view, as it entails that the children's behavior on Experiment 5 differs from the adult's in two dimensions: they make a semantic type error in addition to considering a too narrow set of objects while assessing the sentence. A more conservative approach would be to assume only as many deviations as are needed to explain the children's behavior. In the case of Experiment 5, assuming only the second deviation would suffice. If we assume that a wide scope indefinite subject NPs can be predicates also in adult grammar, this dilemma does not arise (see example (125) in section 1 of this chapter).

4.2.3 The difference between subjects and objects, and the difference between the experimental paradigms

Another angle from which to approach the difference between the responses is to investigate whether there are any reasons why the children might assign a different type to the indefinite NPs in Experiment 5. As I mentioned in section 1 of this chapter, there are reasons why we would have expected the results for the experiments involving high indefinite subjects to be more adultlike than those involving high indefinite objects: the sentence-initial subject position is normally occupied by topical material, which may point children to an interpretation in which prior discourse is taken into account. The other reason is that external arguments have a free variable interpretation by default if they are indefinite. If this distinction between subjects and objects is reflected in children's grammars just as it is in adults' grammars, we would expect a non-incorporating interpretation of the high indefinite subjects. On this reasoning, the outcomes of Experiment 4 are unexpected, rather than those of Experiment 5.

Considering this view on the difference between subject and object NPs, there may be two conflicting tendencies in the children's interpretation of indefinite subject NPs: one, the tendency to interpret all indefinite NPs as predicates, and the other, to interpret all subject NPs as non-predicates. On this assumption, small factors may make the difference between either an incorporated or a free variable interpretation. The question is, what factors may have tipped the balance to predicates in Experiment 4, and to free variables in Experiment 5.

A tentative answer to this question is that the potential referents of the indefinite subject NPs in Experiment 5 were more typically individuals than the potential referents in Experiment 4. The individuality of the referents may have prevented incorporation of the indefinite NPs. Here is how: The subject referents in Experiment 5 are people, and they are placed in a context of volition ('they want to do something, but they are not yet sure, what'). When the bottom picture is

revealed, experimenter and subject go through a routine of describing each character, and what she or he is doing ('this girl is dancing, this boy is dancing, and this girl is swinging'), thus stressing the differences between each of the characters. Stressing the differences between these individuals may convey that it does not just matter whether a potential referent matches the description "girl", but also that it matters which girl is considered, because girls differ from one another, and, what's more, they differ on the dimension that is presented as crucial: dancing or not dancing. All in all, Experiment 5 stresses the individuality of the potential referents in several ways. Now consider the task employed in the experiment: the child is to judge whether the property of dancing or not dancing can be attributed to the characters. Since the property of dancing or not dancing varies with each individual, this will focus the child's attention on the predication relation between particular individuals and the verbal predicate. If the verb is predicating something of the subject NP, the latter cannot be incorporated into the verbal predicate. I conclude that it is possible that the weight which is put on the predication relation in Experiment 5 may have precluded an incorporated reading of the indefinite subject NP.

Now consider, in contrast, the set-up of Experiment 4. Children are asked to perform actions on toys. The potential referents (marbles, toy cars, etc.) are not contrasted. On the contrary, during the training session the experimenter makes sure that she picks up random objects. Also, although the objects in the target items can always be distinguished by color or position, they are very similar. This is even more strongly the case even with a number of filler items. It would not be surprising if children focused on performing the actions, for instance by making sure that rolling would take place, and regarded the marbles, cars, etc. only as instrumental in reaching that goal. In this experimental set-up, nothing in particular focuses the child's attention on the predication relation between an individual, say, "marble" and the predicate, say "roll".

In sum, I believe that the stressing of the individuality of potential referents in Experiment 5, in just the way it occurs in a judgment task, may have provided just the little push that was needed for the children to arrive at an adult non-incorporated reading of the indefinite subject NP. This would explain the different findings on Experiment 5 compared to the other experiments. This view also captures the findings of Bergsma-Klein (1996) and Musolino (1998), who both found that indefinite subject NPs take wide scope for children. Both experiments employed a truth value judgment task, the former with Dutch sentences containing *twee keer* 'twice', the latter with English sentences containing negation.

If we follow the reasoning that I just presented, the difference between the outcomes at different experiments may give us a clue as to what may be involved in children's eventual acquisition of free variable interpretations of high indefinites.

4.3 Summary

I have discussed the difference between the outcomes on Experiment 5 (many children made a pragmatic fit error) and Experiments 2 to 4 (many children made semantic type errors), asking the question of whether it would be desirable to reconsider the interpretations that I assigned to the results of these experiments. I concluded that it is certainly not desirable to assume that only pragmatic fit errors are underlying the results. The most descriptively elegant solution would be to assume that children make semantic type errors on all four experiments. The most conservative solution would be to seek an explanation for the relatively more adultlike results to Experiment 5 in the circumstances evoked by the experiment. I proposed as a tentative explanation in section 4.2.3 that the experimental items in Experiment 5 provide precisely the type of situation that triggers a free variable interpretation.

SUMMARY AND FINAL REMARKS

CHAPTER 7

1. Introduction

This chapter presents a summary of the findings and conclusions presented in this dissertation as well as a summary of the implications for previous research. Some final remarks follow, on what may be involved for children in acquiring adult interpretations of high indefinite NPs, and on suggestions for future research on the effects of limited discourse integration on NP interpretations.

2. Summary of the dissertation and conclusions

In Chapter 1, I presented a number of differences between indefinite NPs that occur in a low syntactic position in Dutch, and those that occur in a high position. The sentences that I focused on are those with high object NPs, low object NPs, and high subject NPs, as in (153).

(153) a. Ik wil een paard even vasthouden.
I want a horse PART hold
"I want to hold a (particular) horse for a minute".

b. Ik wil even een paard vasthouden.
I want PART a horse hold
"I want to hold a horse for a minute".

c. Een oude vrouw liep op straat.
an old woman walked on street
"A (particular) old woman was walking in the street."

The "high" indefinite NPs, i.e. the object NPs in a position to the left of some element intervening between the object NP and the position in which the non-finite verb can appear, and the sentence-initial subject NP, share a number of properties: they can take wide scope, even with respect to operators that appear in a higher position at the level of surface syntax, and they take on readings that are intuitively

"specific". The "low" indefinite NPs, such as the object NP in (153b), take narrow scope and are intuitively "nonspecific".
The research question lying at the root of this dissertation was presented as follows:

> **Research question:**
> How do children interpret high and low indefinite Noun Phrases compared to the adult interpretation?

In Chapter 2, I examined several analyses of the phenomenon, and I adopted the analysis proposed by Van Geenhoven (1998). According to that analysis, there are two interpretations for indefinites, that of a predicate, and that of a free variable indefinite. Their scope properties follow from the way in which they receive their existential interpretation, either through absorption by the verb, or through an accommodation mechanism. I argued that the pragmatic effects, among other things, "specific" or "source-set" readings, can be explained by the need to bridge to the accommodation site of the free variable indefinite.

In Chapter 3, I presented a number of studies that support the view that children's discourse integration is more limited than adults'. Paired with the consideration that accommodation of free variable indefinites requires discourse integration, this led to the formulation of the following hypothesis in Chapter 4:

> **Non-integration hypothesis:**
> Children acquire the predicative interpretation of indefinites early.
> The free variable interpretation is acquired later because it requires discourse integration.

Insufficient discourse integration could cause two types of error: the child could assign the high indefinite a predicative interpretation, which does not require accommodation. The child could also correctly assign a free variable interpreation, while failing at assigning a proper interpretive guise to the high indefinite.

An initial experiment investigated children's interpretation of high indefinite subjects in a story context. It showed that children in the age group between 4;0 and 5;6 failed to relate high indefinites to previous discourse in an adult-like manner. Consider the following sequence:

> ***Experiment 1***
> Kijk, hier zijn de kinderen. Ze gaan naar de dierentuin (...)
> Een jongen voert de olifant.

In over one third of the cases, children in the age group between 4;0 and 5;6 did not properly assign a source-set guise to the indefinite subject in the second sentence. They completed a picture depicting the sentence "a boy feeds the elephant" in such a way that the boy feeding the elephant was not part of the group of children that

went to visit the zoo, but rather some other boy. An older age group performed much better, though not adultlike.

In Chapter 5, I investigated the interpretation of high and low indefinite object NPs in children between 4;0 and 8;0. The experiments employed sentences containing low indefinite object NPs appearing to the right of negation or the adverbial 'twice', or high indefinites appearing to the left of these elements.

Experiment 2

a. De jongen heeft geen vis gevangen.
"The boy did not catch any fish."

b. De jongen heeft een vis niet gevangen.
"The boy did not catch a (particular) fish."

Experiment 3

a. Je mag twee keer een potje omdraaien.
"You may turn over a jar twice." (may involve two jars)

b. Je mag een potje twee keer omdraaien.
"You may turn over a jar twice." (should involve only one jar)

As predicted under the non-integration hypothesis, the low indefinites took narrow scope for all children, as they did for adults. The high indefinites also took narrow scope for many children, but never for the adults. In Chapter 6, I showed that many children allowed a narrow scope interpretation in an experiment that employed sentences like the following:

Experiment 4

Een knikker mag twee keer rollen.
"A (particular) marble may roll twice."

Another experiment investigated the interpretation of sentences containing negation:

Experiment 5

Een meisje is niet aan het dansen.
"A (particular) girl is not dancing".

Many children rejected this sentence as a remark about a scene in which a girl and a boy were dancing, while another girl was otherwise engaged. This may indicate narrow scope of the indefinite subject NP, but given an analysis of remarks made by the child subjects and the results of a follow-up experiment, it is likely that the error originates in children's failure to assign a source-set guise to the high indefinite. In that case there is no need to assume that the indefinite subject NP takes narrow scope with respect to negation.

On the basis of the findings of this dissertation, it is now possible to draw a number of conclusions. The research question can be answered: children in the ages that took part in the experiments are able to interpret low indefinite Noun Phrases in an adultlike manner, but they are often unable to interpret high indefinite Noun Phrases in an adultlike manner.

The problems in the interpretation of high indefinite NPs occur well after age 4. It is to be expected that all interpretations are adultlike as of age 8, as Experiments 3, 4 and 5 show that children who still have non-adultlike interpretations constitute a small minority by age 7. Experiment 2 shows that this may not hold for all types of utterances, as in that experiment there is no improvement with age at all. This difference between the experiments also shows that children's interpretation of indefinites is highly dependent on the context in which they appear.

The way in which children's interpretations deviate from adult interpretations is consistent with the non-integration hypothesis. A deviation at the semantic level became apparent in Experiments 2 to 4. The narrow scope interpretations in these experiments show that high indefinites are often interpreted as predicates, which do not accommodate and hence do not require discourse integration. A deviation at the pragmatic level became apparent in Experiments 1 and 5. Experiment 1 showed that the high position of the indefinite subject NPs did not lead to adultlike story coherence, and bothin Experiments 1 and 5, children often failed to assign source-set guises. As these source-set guises are a pragmatic reflection of a relation between high indefinites and the context, a failure to assign them reflects insufficient discourse integration.

3. Implications for previous studies

At the end of Chapter 5, I presented a discussion of the implications of the findings for previous studies. I will briefly summarize my conclusions concerning the analyses of indefinites that I presented in Chapter 2 as well as two studies in language acquisition.

3.1 Analyses of indefinites

The findings presented here can easily be accommodated under Van Geenhoven's (1998) analysis. The finding that the interpretations of high indefinites by children do not correspond to their syntactic positions is irrelevant to that analysis, as it does not propose a direct link between syntactic position and interpretation. Van Geenhoven explicitly states that the high object position is a language-specific means of marking an indefinite as a free variable. It is therefore expected that this correspondence between syntactic positions and NP interpretations is absent in an initial stage of language acquisition. The fact that the predicative interpretation is acquired early, and that it is overgeneralized is consistent with the view that the predicative interpretation only consists of the descriptive content, the "core" of the

NP, whereas the free variable interpretation comes with a variable in addition to its predicative content.

De Hoop's (1992) analysis cannot accommodate the findings as straightforwardly. The finding that high indefinites are often interpreted as if they were low indefinites constitutes a problem, as it is not allowed in de Hoop's analysis. However, it is possible to make the relatively late age of acquisition compatible with her analysis by assuming a delay in the acquisition of one component of this mechanism. I argued that de Hoop's analysis can be extended so as to provide a way to account for the preference for "low" interpretations.

The findings are more problematic to the analysis in Diesing (1992). Diesing claims that the high NP position can only lead to a typically "high" interpretation, which would be quantificational. Even if we assumed that quantifiers cause difficulty to children because the domain restriction is dependent on discourse integration, this analysis cannot account for children's preference for typically "low" interpretations of high indefinite NPs in Experiments 2 to 4. On Diesing's analysis, it should be impossible to derive such interpretations.

3.2 Acquisition studies

The findings call for a revision of the conclusions that Musolino (1998) and Schaeffer (1997) drew on the basis of their studies of child language acquisition. Musolino found that four- and five-year-old English speaking children only assign narrow scope to indefinite object NPs. He proposes that this restriction is caused by syntactic constraints on scope taking in children's grammar, which cause a strict parallelism between syntactic configuration and scope-taking. This view is not supported by the findings of the present study.

I believe that the scope taking options of NPs are a function of the different "natures" of nominals (bare nominals, indefinites, strongly quantified NPs). The properties of these different NPs interact with syntactic constraints and, a point which has received little attention in the present study, information structure. I therefore propose to take the nature of NPs as a starting point for hypothesis formation rather than the syntactic restrictions on scope taking. The non-integration hypothesis could account both for the narrow scope readings that Musolino found, and for the deviant interpretations found in the present study.

The research in this study was partly intended to complement Schaeffer's findings in children's production with comprehension data. Schaeffer found that children initially place NPs in the low object positions more often than adults, but that the pattern of placement is adultlike by age four. She concluded from these findings that the adult mechanism of that relates NP position and interpretation is present and fully active in children's grammars by that age. The findings from the present study show that this conclusion must be modified, as children's NP interpretations in comprehension are not adultlike until a much older age. The findings even suggest a different answer to the question of why children initially leave NPs

(incorrectly) in the low position: their interpretation of these NPs may be one that ordinarily goes with low placement.

4. How can children acquire the free variable interpretation for high indefinites?

I have argued that children initially have a preference for predicative interpretations of indefinites, regardless of their position, and that it is even possible that all of children's indefinites are initially predicates. Why would children eventually let go of this preference, and assign a free variable interpretation to high indefinite NPs? The existence of a general tendency for hearers to interpret utterances as connected to previous discourse, to which children will eventually conform, is not a sufficient explanation. It cannot explain why children would ever start paying attention to the discourse in the comprehension of indefinite NPs. I assume that adults do not consider the context in their comprehension of predicative indefinites. This is not because they do not have the ability, the processing resources, or the "mind-set" to pay attention to discourse, it is because there is no need to do so in the case of predicative indefinites. Since I assume that children tend to have predicative interpretations of indefinites, it is not sufficient that they learn to integrate discourse, they should also become aware that for some indefinites, the context does matter.

I believe that there are situations in which this will become clear to the child. These situations force a non-incorporated reading of high indefinites. It follows that the non-incorporated indefinite is accommodated, hence, that the child makes use of a discourse representation. This does not automatically mean that there is proper discourse integration of high indefinites in these cases: the responses to Experiment 5 provide an example of free variable indefinites that have not been properly embedded in the discourse. However, such a "straight reference" free variable interpretation provides a foothold for further discourse integration.

Situations could trigger a free variable reading of an indefinite NPs if they made clear to the child that a predication relation obtains between the high indefinite NP and the verb. I assume that in child grammar, as in adult grammar, no predication relation is possible between a verb and an argument that has been absorbed by that same verb (see the argument by de Hoop in Chapter 2, section 3.1). On this reasoning, children's predicative interpretations of high indefinites are due to a failure to identify the predication relation between the high indefinite NP and the verb. Therefore, if it is clear to a child that a given verb is to be interpreted as a predicate of an argument represented by the sentence initial subject NP, this should preclude absorption of this NP.

Will the child encounter situations that clearly point to a predication relation between high indefinite NPs and the verb? I believe that such situations occur. Consider, for example, the test sentence *Een knikker mag twee keer rollen* 'a

marble may roll twice'. I have proposed that the child initially interprets this utterance through semantic incorporation, so that it is more or less equivalent to "the rolling of a marble takes place twice". Imagine that a child is placed in a situation in which the question of which marbles are going to roll, and which ones are going to bounce, is important. In such a case, the child will be forced to keep *een knikker* 'a marble' constant while considering the possibilities of its going to either roll or bounce. In such a situation, the interpretation "rolling of a marble" will be difficult to maintain. *Een knikker* must then be interpreted by another mechanism.

Is the child likely ever to encounter the right type of sentence in the right type of situation? The answer is affirmative. While simple indefinites are not very frequent in high argument positions, cardinals, on the other hand, are. Note that cardinals tend to trigger source-set guises, as in (154).

(154) a. Twee meisjes plukten een bloem.
"Two girls picked a flower".
b. De jongen heeft twee vissen niet gevangen.
"The boy has not caught two fish."

The use of the cardinal determiners invokes a contrast – cardinal NPs are often used with the purpose of highlighting the contrast between the referents of the NPs and some contextually defined set of which they are part. For (154a) we tend to imagine a situation in which two girls pick a flower, whereas some other number of girls are otherwise engaged. For (154b), we get the impression that some number of fish were not caught. Note that this is precisely the kind of contrast that I described above. It highlights the predication relation between fish and catching, while triggering a consideration in which the fish, not the predicate, is kept constant: the fish that were not caught *could* have been caught, but they were not. I believe that sentences like (154a) and (154b) will eventually succeed in pointing children's attention to the fact that there is a predication relation between *knikker* and *rolt* in *Een knikker rolt twee keer* 'a marble rolls twice'.

5. Future research

I have presented the view that children's limited discourse integration affects their interpretation of utterances at the sentence level. Although I only applied this view to children's interpretation of indefinites, limited discourse integration should affect the interpretation of other elements as well. I do not believe that there is some threshold level of discourse integration such that when children reach it, the effects of insufficient discourse integration will disappear across the board. Rather, discourse integration seems to be acquired gradually, as the differential sizes of its effects in the different experiments indicate.

I think of insufficient discourse integration as a general factor in acquisition, pulling the children's NPs toward interpretations that involve little discourse integration, such as the predicative interpretation of indefinites. Other factors will be pulling the NPs toward interpretations that do involve discourse integration. There may be many of these factors: context, canonical information structure, and morphological marking of the NPs. Thus, we may expect rates of adultlike interpretations to increase at different ages for different contexts, and for different kinds of NPs. As I suggested in section 4 above, cardinal indefinite NPs may attain adult levels earlier than simple indefinites. This may also be the case for anaphoric definite NPs and pronouns, as their morphological or lexical markings may trigger discourse integration.

Different kinds of NPs (definites, indefinites, pronouns) will lead to different "non-integrating" interpretations. The non-integrating interpretive option of indefinite NPs is that of a predicate, whereas definite NPs and pronouns are more likely to be interpreted as "deictic" or "referential". Children might also initially ignore the morphology of the definite NPs, interpreting them as predicates, as they carry descriptive content. This is not a likely option for pronouns. With respect to strongly quantified NPs, it is not immediately clear what the prediction would be – perhaps incorrect domain restriction, as I have suggested previously (see Chapter 4, section 4), or perhaps they will not project a restrictive clause at all, which would make them indefinite or "weak". In sum, limited discourse integration could have a range of effects on the emergence of the adult language, even if we only consider NP interpretation.

For all of the possibilities that I mentioned, there is some support in the literature. Several students of child language acquisition have suggested that the definite and pronominal NPs that young children produce in narrative are not anaphoric (see the discussion of work by Karmiloff-Smith and Hickmann in Chapter 3, section 4.1) A related view on children's comprehension of pronouns was presented in Avrutin (1999). This view has some support from a comprehension experiment reported by Karmiloff-Smith (1979) (see Chapter 3, section 4.3). The issue of anaphoric interpretations in children's language comprehension could be further investigated by using the method that I employed in Experiment 1 of this study. This method allows tapping into story comprehension and reference assignment. The "doors" paradigm that was used in the follow-up to Experiment 5 may also be useful in this respect.

The "doors" paradigm could also be used in investigating children's interpretation of sentences containing strongly quantified NPs. It may allow us to determine which domain children search in evaluating the truth of such sentences, and which are the (non-linguistic) factors determining this domain. Instead of the paradigms employed in this thesis, one may also be able to use eye-tracking to investigate issues of anaphora, domain restriction and truth assessment in children. This more advanced technique, which has become available for research in child language acquisition only recently, offers the possibility of investigating in a more direct manner which elements in a context a child takes into account in the

interpretation of an utterance. Thus, building on previous research, and employing new research methods, future research may tell us more about whether, when and how children relate the interpretation of elements in a particular utterance to the discourse.

REFERENCES

Abusch, D. (1994). The scope of indefinites. *Natural Language Semantics, 2*, 83-135.

Avrutin, S. (1999). *Development of the syntax-discourse interface.* Dordrecht: Kluwer.

Avrutin, S., & Coopmans, P. (2000). Children who build bridges. In C. S. Howell, S. A. Fish, & T. Keith-Lucas (Eds.), *Proceedings of the 24th annual Boston University Conference on Language Development* (pp. 80-91). Somerville: Cascadilla Press.

Barwise, J., & Cooper, R. (1981). Generalized quantifiers and natural language. *Linguistics and Philosophy, 4*, 159-219.

Bergsma-Klein, W. (1996). *Specificity in child Dutch: An experimental study.* Unpublished MA. Thesis, Utrecht University.

Boysson-Bardiès de, B., & Bacri, N. (1977). The interpretation of negative sentences. *International Journal of Psycholinguistics, 4*, 73-81.

Carlson, G. (1977). *Reference to kinds in English.* Amherst: University of Massachusetts.

Champaud, C., Bassano, D., & Hickmann, M. (1993). Epistemic modality and reported discourse in french children; Modalité epistemique et discours rapporté chez l'enfant français. In N. Dittmar & A. Reich (Eds.), *Modality in language acquisition; Modalité et acquisition des langues* (pp. 185-209). Berlin: Walter de Gruyter.

Clark, H. H. (1977). Bridging. In P. N. Johnson-Laird & P. C. Wason (Eds.), *Thinking: Readings in cognitive science* (pp. 411-420). Cambridge: Cambridge University Press.

Crain, S., Thornton, R., Boster, C., Conway, L., Lillo Martin, D., & Woodams, E. (1996). Quantification without qualification. *Language Acquisition, 5*, 83-153.

Diemen-Berkhout van, T., Ebus-Mulders, S., & Huntink, D. (1995). *Montessori materiaalboek.* Lekkerkerk: Pravoo.

Diesing, M. (1992). *Indefinites.* Cambridge, MA.: MIT Press.

Does van der, J., & Hoop de, H. (1998). Type-shifting and scrambled definites. *Journal of Semantics, 15*, 393-416.

Drozd, K. F., & Van Loosbroek, E. (1999). Weak quantification, plausible dissent, and the development of children's pragmatic competence. In A. Greenhill, H. Littlefield, & C. Tano (Eds.), *Proceedings of the 23rd annual Boston University Conference on Language Development* (Vol. 1, pp. 184-195). Somerville: Cascadilla Press.

Eisenbeiss, S. (1994). Kasus und Worststellungsvariation im Deutschen Mittelfeld: Theoretische Überlegungen und Untersuchungen zum Erstspracherwerb. In B. Haftka (Ed.), *Was determiniert Wortstellungsvariation?* (pp. 277-298). Opladen: Westdeutscher Verlag.

Elbers, L., & Wijnen, F. (1992). Effort, production skill, and language learning. In C. A. Ferguson, L. Menn, & C. Stoel Gammon (Eds.), *Phonological development: Models, research, implications* (pp. 337-368). Timonium: York Press.

Enç, M. (1991). The semantics of specificity. *Linguistic Inquiry, 22*, 1-25.

Farkas, D. (1981). Quantifier scope and syntactic islands. *Papers from the Regional Meetings, Chicago Linguistic Society, 17*, 59-75.

Fodor, J. D., & Sag, I. A. (1982). Referential and quantificational indefinites. *Linguistics and Philosophy, 5*, 355-398.

Freeman, N. H., & Stedmon, J. A. (1986). How children deal with natural language quantification. In I. Kurcz, G. W. Shugar, & J. H. Danks (Eds.), *Advances in Psychology* (Vol. 39, pp. 21-48). Amsterdam: North-Holland.

Geurts, B. (1999). *Specifics.* Unpublished Ms., Catholic University of Nijmegen.

Grodzinsky, Y., & Reinhart, T. (1993). The innateness of binding and coreference. *Linguistic Inquiry, 24*, 69-101.

Heim, I. R. (1982). *The semantics of definite and indefinite noun phrases.* Unpublished PhD thesis, University of Massachussetts, Amherst.

Hickmann, M. (1982). *The development of narrative skills: Pragmatic and metapragmatic aspects of discourse cohesion.* Unpublished PhD thesis, University of Chicago, Chigago.

Hickmann, M. (1995). Discourse organization and the development of reference to person, space, and time. In P. Fletcher & B. MacWhinney (Eds.), *The handbook of child language* (pp. 194-218). Oxford, England: Blackwell Publishers.

Hoop de, H. (1992). *Case configuration and noun phrase interpretation.* Published (1996), New York: Garland.

Hoop de, H. (1997). *Optional scrambling and predication.* Paper presented at the Conference on the Syntax and Semantics of Predication, Texas Linguistic Forum, Austin.

Hoop de, H. (2000). Optional scrambling and interpretation. In H. Bennis, M. Everaert, & E. Reuland (Eds.), *Interface strategies* (pp. 153-168). Amsterdam: KNAW.

Horn, L. R. (1989). *A natural history of negation.* Chicago: The University of Chicago Press.

Hout van, A. (1996). *Event semantics of verb frame alternations: A case study of Dutch and its acquisition.* Unpublished PhD Thesis, Katholieke Universiteit Brabant, Tilburg.

Kamp, H. (1981). A theory of truth and semantic interpretation. In J. Groenendijk, T. Jansen, & M. Stokhof (Eds.), *Formal methods in the study of language* (pp. 277-322). Amsterdam: Mathematisch Centrum.

Kamp, H., & Reyle, U. (1993). *From discourse to logic.* Dordrecht: Kluwer.

Karmiloff-Smith, A. (1979). *A functional approach to child language: A study of determiners and reference.* Cambridge: Cambridge University Press.

Karmiloff-Smith, A. (1981). The grammatical marking of thematic structure in the development of language production. In W. Deutsch (Ed.), *The child's construction of language* (pp. 123 - 147). London: Academic Press.

Karmiloff-Smith, A. (1985). Language and cognitive processes from a developmental perspective. *Language and Cognitive Processes, 1*, 61-85.

Keenan, E. (1987). A semantic definition of 'indefinite NP'. In E. J. Reuland & A. G. B. ter Meulen (Eds.), *The representation of (in)definiteness* (pp. 286-318). Cambridge, MA.: MIT Press.

Krämer, I. (1999). *Are indefinites quantifiers?* Unpublished Ms., Max Planck Institute for Psycholinguistics, Nijmegen.

Kratzer, A. (1989). *Stage-level and individual-level predicates.* Unpublished PhD thesis, University of Massachusetts, Amherst.

Lappin, S., & Reinhart, T. (1988). Presuppositional effects of strong determiners: A processing account. *Linguistics, 26*, 1021-1037.

Lewis, D. (1979). Score-keeping in a language game. In A. R. Bäuerle, U. Egli, & A. von Stechow (Eds.), *Semantics from different points of view* (pp. 172-187). Berlin: Springer.

Lloyd, P., & Donaldson, M. (1976). On a method of eliciting true/false judgments from young children. *Journal of Child Language, 3*, 411-416.

MacWhinney, B., & Snow, C. (1985). The child language data exchange system. *Journal of Child Language, 12*, 271-296.

Maratsos, M. (1976). *The use of definite and indefinite reference in young children: An experimental study of semantic acquisition.* Cambridge: Cambridge University Press.

May, R. (1977). *The grammar of quantification.* Unpublished PhD thesis, MIT, Cambridge, MA.

McNally, L. (1997). *A Semantics for the English existential construction.* New York: Garland.

McNally, L., & Van Geenhoven, V. (1997). *Redefining the weak/strong distinction.* Paper presented at the 2nd Syntax-Semantics Colloquium, Paris.

Musolino, J. (1998). *Universal grammar and the acquistion of semantic knowledge: An experimental investigation into the acquisition of quantifier negation interaction in English.* Unpublished PhD thesis, University of Maryland.

Neeleman, A., & Reinhart, T. (1998). Scrambling and the PF interface. In M. Butt & W. Geuder (Eds.), *The projection of arguments: Lexical and compositional factors* (pp. 309-353). Stanford: CSLI Publications.

Orsolini, M. (1990). Episodic structure in children's fantasy narratives: "Breakthrough" to decontextualised discourse. *Language and Cognitive Processes, 5*, 53-79.

Partee, B. (1987). Noun phrase interpretation and type shifting principles. In J. Groenendijk, D. de Jongh, & M. Stokhof (Eds.), *Studies in discourse representation theory and the theory of generalized quantifiers* (pp. 115-143). Dordrecht: Foris.

Philip, W. (1995). *Event quantification in the acquisition of universal quantification.* Unpublished PhD thesis, University of Massachusetts, Amherst.

Pinto, M. (1997). *Licensing and interpretation of inverted subjects in Italian.* Unpublished PhD thesis, Utrecht University, Utrecht.

Pratt, M. W., & MacKenzie-Keating, S. (1985). Organizing stories: Effects of development and task difficulty on referential cohesion in narrative. *Developmental Psychology, 21*, 350-356.

Reinhart, T. (1995). *Interface Strategies.* Unpublished Ms., Utrecht University.

Reinhart, T. (1997). Quantifier scope: How labor is divided between QR and choice functions. *Linguistics and Philosophy, 20*, 335-397.

Reuland, E. (1988). Indefinite subjects, *Proceedings of the North-Eastern Linguistics Society* (Vol. 18, pp. 375-394). Amherst: GLSA.

Reuland, E. J., & ter Meulen, A. G. B. (1987). *The representation of (in)definiteness*. Cambridge, MA.: MIT Press.

Rullmann, H. (1989). *Indefinite subjects in Dutch.* Unpublished Ms., University of Massachusetts, Amherst.

Ruys, E. G. (1992). *The scope of indefinites.* Unpublished PhD thesis, Utrecht University, Utrecht.

Sandt van der, R. A. (1992). Presupposition projection as anaphora resolution. *Journal of Semantics, 9*, 333-377.

Schaeffer, J. (1995). On the acquisition of scrambling in Dutch. In D. MacLaughlin & S. McEwan (Eds.), *Proceedings of the 19th annual Boston University Conference on Language Development* (Vol. 2, pp. 521-532). Somerville: Cascadilla Press.

Schaeffer, J. C. (1997). *Direct object scrambling in Dutch and Italian child language.* Unpublished PhD thesis, University of California, Los Angeles.

Schaerlaekens, A. M., & Gillis, S. (1987). *De taalverwerving van het kind.* Groningen: Wolters-Noordhoff.

Schouten, C. (1998). *Zinsinitiële indefiniete subjecten in hun context.* Unpublished PhD thesis, Catholic University Nijmegen.

Sportiche, D. (1992). *Clitic constructions.* Unpublished Ms., University of California, Los Angeles.

Stenning, K., & Michell, L. (1985). Learning how to tell a good story: The development of content and language in children's telling of one tale. *Discourse Processes, 8*, 261-279.

Strawson, P. F. (1965). Identifying reference and truth-values. Reprinted (1975)in D. D. Steinberg & L. A. Jakobovits (Eds.), *Semantics: An interdisciplinary reader in philosophy, linguistics and psychology* (pp. 86-99). Cambridge: Cambridge University Press.

Tyler, L. K. (1983). The development of discourse mapping processes: The on-line interpretation of anaphoric expressions. *Cognition, 13*, 309-341.

Van Geenhoven, V. (1998). *Semantic incorporation and indefinite descriptions: Semantic and syntactic aspects of noun incorporation in West Greenlandic*. Stanford: CSLI Publications.

Wigglesworth, G. (1997). Children's individual approaches to the organization of narrative. *Journal of Child Language, 24*, 279-309.

Wykes, T. (1981). Inference and children's comprehension of pronouns. *Journal of Experimental Child Psychology, 32*, 264-278.

Yuill, N., & Oakhill, J. (1991). *Children's problems in text comprehension: An experimental investigation*. Cambridge: Cambridge University Press.

Zimmermann, T. E. (1992). On the proper treatment of opacity in certain verbs. *Natural Language Semantics, 1*, 149-179.

APPENDIX A

EXPERIMENT 1: SUBJECTS IN STORY CONTEXTS

Contents:

- Materials
- Distribution of subjects across number of adultlike responses
- Exact numbers of subjects assigned to response patterns
- Results according to story cohesion

MATERIALS

Verhaal 2 **Opa**

Kijk, hier zijn de kinderen. Ze gaan op bezoek bij opa, en wij gaan kijken wat ze onderweg allemaal tegenkomen. De kinderen komen bij struiken met hele mooie bloemen. Een meisje plukt een bloem. Daar zien ze vogels. Een jongen aait een vogel. Ze lopen verder, en kijk, daar staat een paraplu tegen de boom. Dat komt goed uit, want het begint net te regenen. Een meisje pakt de paraplu. En kijk, daar is het huisje van opa al, zie je wel, daar is opa.

Story 2 *Grandad*

Look, here are the children. They are going to pay a visit to grandad, and we are going to see everything they meet on the way. The children arrive at some bushes with really pretty flowers. A girl picks a flower. There they see some birds. A boy strokes a bird. They walk on, and look, there's an umbrella leaning against the tree. That comes in handy, because it has just started to rain. A girl takes the umbrella. And look, there's grandad's house, you see, that's grandad.

Verhaal 3 **Boswandeling**

Kijk, hier zijn de kinderen. Het is heel mooi weer, dus ze gaan een wandeling maken. En wij gaan kijken wat er allemaal gebeurt. Eerst komen de kinderen bij een boom met allemaal lekkere appels. Een meisje plukt een appel. Daarna zien ze twee lammetjes staan. Een jongen aait een lammetje. En wat zien de kinderen daar? Daar ligt een bal. Een jongen pakt de bal. En kijk, nu zijn ze al weer thuis. De wandeling is afgelopen.

Story 3 *Walk in the woods*

Look, here are the children. The weather is very nice, so they are planning to take a walk. And we are goint to see everything that happens. First, the children arrive at a tree full of lovely apples. A girl picks an apple. Then they see two little lambs. A boy pets a lamb. And what do they see overthere? There's a ball sitting overthere. A boy picks up the ball. And look, they are home again. The walk has finished.

Verhaal 4 **Feest**
Kijk, hier zijn de kinderen. Vandaag zijn ze op een verjaardag, kijk, er zijn slingers. Er zijn allemaal lekkere dingen om te eten en te drinken. Op de tafel ligt worst. Een jongen eet een plakje worst. Er is ook een tafel met allemaal glazen limonade. Een meisje drinkt een glas limonade. En er is natuurlijk ook taart. Een jongen neemt een stuk taart.

Story 4 *Party*
Look, here are the children. They are at a birthday party, see, there are streamers. There's all sorts of nice things to eat and drink. On the table there is sausage. A boy is eats a bit of sausage. There's also glasses of lemonade on a table. A girl drinks a glass of lemonade. And of course there's also cake. A boy takes a piece of cake.

DISTRIBUTION OF SUBJECTS ACROSS NUMBER OF ADULTLIKE RESPONSES

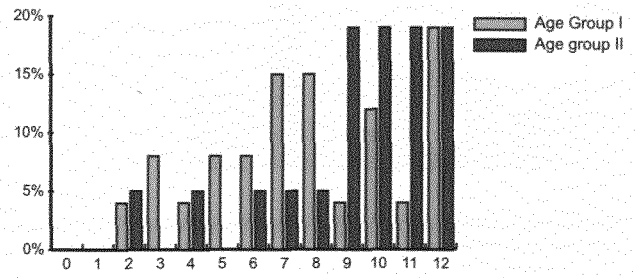


Figure A-1. *Experiment 1: Distribution of child subjects across possible number of adultlike figure selections*

EXACT NUMBERS OF SUBJECTS ASSIGNED TO RESPONSE PATTERNS

TABLE A-1. EXPERIMENT 1: NUMBER OF RESTRICTED AND FREE REFERENCE PATTERNS BY AGE GROUP

Age group	Restricted reference pattern	Free reference pattern
I 4;0–5;6	10	16
II 5;6–6;8	16	5
Adults	10	0

STORY COHESION

The proportion of adultlike reconstructions of the story coherence, labeled "cohesive story response" (3 restricted reference responses) is presented in Table A-2:

TABLE A-2. EXPERIMENT 1: NUMBER OF COHESIVE AND NON-COHESIVE STORY RESPONSES BY AGE GROUP (percentages between brackets)

Age group	Cohesive story response	Non-cohesive response
I 4;0–5;6	47 (45%)	57 (55%)
II 5;6–6;8	54 (64%)	30 (37%)
Adults	37 (98%)	3 (3%)

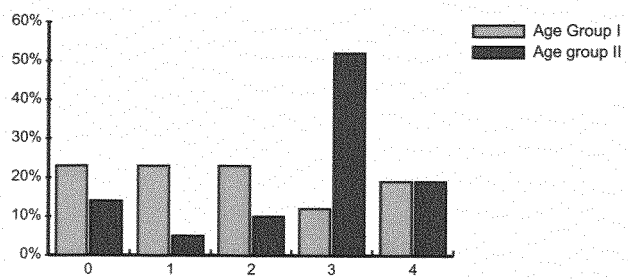


Figure A-2. *Experiment 1: Distribution of child subjects across possible number of adultlike cohesive story responses*

Each possible number of cohesive stories is represented in both groups. 19% of all children have no cohesive story responses, 47% have one or two non-cohesive stories, and 34% have three or four. The patterns for the two age groups are very different, most clearly so in the clear peak at 3 cohesive stories for age group II. This peak is the result of an order effect, as the following section will show.

This order effect can be distinguished from an item effect. Two different stories were presented as the first story, "zoo" and "walk in the woods". Across both age groups, "zoo" evoked 25% cohesive story responses when presented as the first picture, and 63% when presented third. "Walk in the woods" evoked 37% cohesive story responses when presented first, 61% when presented third.

APPENDIX B

EXPERIMENT 2: DIRECT OBJECTS AND NEGATION

Contents

- Materials
- Subjects: Exact age range and exclusions
- Distribution of subjects across number of adultlike responses
- Exact numbers of subjects assigned to response patterns

MATERIALS

Warm-up items ("w"), target items ("t"), and filler items ("fh" and "fl").

w1 **schommel**

Hier is een meisje. Ze wil denk ik gaan schommelen. Hier schommelt ze. En hier schommelt ze. En nu gaat ze weer weg.
swing
Here's a girl. I think she wants to swing. Here she is swinging. And here she is swinging. And now, she is leaving (lit: leaving again).

Het meisje heeft geschommeld.	Expected adult response:
The girl has swung.	acceptance

w2 **handen wassen**

Hier is een vrouw. Ze is aan het kneden, en ze krijgt vieze handen. Ze wil denk ik haar handen wassen. Hier wast ze haar handen. En nu gaat ze weer weg.
wash hands
Here is a woman. She is kneading, and her hands are getting dirty. I think she wants to wash her hands. Here she is washing her hands. And now, she is leaving

De vrouw heeft haar handen niet gewassen.	Expected adult response:
The woman has not washed her hands.	rejection

w3 **glas**

Hier is een meisje. Ze wil denk ik gaan tekenen. Hier gaat ze tekenen, en hier tekent ze nog meer. En nu gaat ze weer weg.
glass
Here's a girl. I think she wants to draw. Here she's starting to draw, and here she goes on drawing. And now, she is leaving.

Het meisje heeft niet gedronken.	Expected adult response:
The girl has not drunk	rejection

w4 **slapen**

Hier is een jongen. Hij wil denk ik gaan slapen. Hier slaapt hij. Hier staat hij weer op. En nu gaat hij weer weg.
sleep
Here's a boy. I think he wants to go to sleep. Here he's sleeping. Here he's getting up again. And now, he is leaving.

De jongen heeft niet geslapen. *The boy has not slept.*	Expected adult response: rejection

t1 **vissen**

Hier is een jongen. En dit zijn vissen. Die wil hij denk ik gaan vangen. Hier vangt hij een vis. En hier vangt hij een vis. En nu gaat hij weer weg.
fishing
Here is a boy. And these are fish. I think he wants to catch them. Here he's catching a fish. And here he's catching a fish. And now, he's leaving.

High:	De jongen heeft een vis niet gevangen. *the boy has a fish not caught*	Expected adult response: acceptance
Low:	De jongen heeft geen vis gevangen. *the boy has no fish caught*	Expected adult response: rejection

t2 **plukken**

Hier is een meisje. En dit zijn appels. Die wil ze denk ik plukken.
Hier plukt ze een appel. En hier plukt ze een appel. En nu gaat ze weer weg.
picking
Here is a girl. And these are apples. I think she wants to pick them (off the tree). Here she is picking an apple. And here she is picking an apple. And now, she's leaving.

High:	Het meisje heeft een appel niet geplukt. *the girl has an apple not picked*	Expected adult response: acceptance
Low:	Het meisje heeft geen appel geplukt. *the girl has no apple picked*	Expected adult response: rejection

t3 **stelen**

Hier is een boef. En dit zijn kettingen. Die wil hij denk ik stelen. Hier steelt hij een ketting. En hier steelt hij een ketting. En nu gaat hij weer weg.
steal
Here's a bad guy. And these are necklaces. I think he wants to steal them. Here he's stealing a necklace. And here he's stealing a necklace. And now, he's leaving.

High:	De boef heeft een ketting niet gestolen. *the bad guy has a necklace not stolen*	Expected adult response: acceptance
Low:	De boef heeft geen ketting gestolen. *the bad guy has no necklace stolen*	Expected adult response: rejection

t4 **breken**

Hier is een stout meisje. En dit zijn vazen. Die wil ze denk ik breken. Hier breekt ze een vaas, kijk maar (experimenter points at broken pieces in following picture). Hier breekt ze een vaas. En nu gaat ze weer weg.

break

Here is a naughty girl. And these are vases. I think she wants to break them. Here she is breaking a vase, look! (experimenter points at broken pieces in following picture). And here she is breaking a vase. And now, she is leaving.

High:	Het meisje heeft een vaas niet gebroken. *the girl has a vase not broken*	Expected adult response: acceptance
Low:	Het meisje heeft geen vaas gebroken. *the girl has no vase broken*	Expected adult response: rejection

t5 **strijken**

Hier is een vrouw. En dit zijn bloezen. Die wil ze denk ik strijken. Hier strijkt ze een bloes. Hier strijkt ze een bloes. En nu gaat ze weer weg.

ironing

Here is a woman. And these are shirts. I think she wants to iron them. Here she is ironing a shirt. And here she is ironing a shirt. And now, she is leaving.

High:	De vrouw heeft een bloes niet gestreken. *the woman has a shirt not ironed*	Expected adult response: acceptance
Low:	De vrouw heeft geen bloes gestreken. *the woman has no shirt ironed*	Expected adult response: rejection

t6 **pakken**

Hier is een meisje. En dit zijn koekjes. Die wil ze denk ik pakken.
Hier pakt ze een koekje. Hier pakt ze een koekje. En nu gaat ze weer weg.

taking

Here is a girl. And these are cookies. I think she wants to take them. Here she is taking a cookie. And here she is taking a cookie. And now, she is leaving.

High:	Het meisje heeft een koekje niet gepakt. *the girl has a cookie not taken*	Expected adult response: acceptance
Low:	Het meisje heeft geen koekje gepakt *the girl has no cookie taken*	Expected adult response: rejection

fh1 **wasgoed** (story depicts one T-shirt)

Hier is een jongen. En dit is een T-shirt. Dat wil hij denk ik ophangen. Maar, hier houdt hij het T-shirt vast, en hier laat hij het op de grond vallen. En nu gaat hij weer weg.

laundry

Here is a boy. And this is a T-shirt. I think he wants to hang it up. But, here he's holding the T-shirt, and here he's dropping it unto the floor. And now, he's leaving.

High:	De jongen heeft een T-shirt niet opgehangen. *the boy has a T-shirt not hung up*	Expected adult response: acceptance

fh2 **hoed** (story depicts two hats)
Hier is een jongen. En dit zijn hoeden. Die wil hij denk ik opdoen. Hier doet hij een hoed op. En hier doet hij een hoed op. En nu gaat hij weer weg.
hat
Here is a boy. And these are hats. I think he wants to put them on. Here he's putting on a hat. And here he's putting on a hat. And now, he's leaving.

High: De jongen heeft een hoed niet opgedaan. Expected adult response:
the boy has a hat not put on rejection

fh3 **afwas** (story depicts one plate)
Hier is een vrouw. En dit is een bord. Dat wil ze denk ik afwassen. Ze pakt het bord, en zet het op de aanrecht. En nu gaat ze weer weg.
washing up
Here is a woman. And this is a plate. I think she wants to clean it. She picks up the plate, and puts it on the counter top. And now, she's leaving.

High: De vrouw heeft een bord niet afgewassen. Expected adult response:
the woman has a plate not washed up acceptance

fh4 **boek** (story depicts one book)
Hier is een meisje. En dit is een boek. Dat wil ze denk ik gaan lezen. Hier leest ze, en hier leest ze. En nu gaat ze weer weg.
book
Here is a girl. And this is a book. I think she wants to read it. Here she is reading. And here she is reading. And now, she's leaving.

High: Het meisje heeft een boek niet gelezen. Expected adult response:
the girl has a book not read rejection

fh5 **paard** (story depicts one horse)
Hier is een man met een borstel. En dit is een paard. Hij wil denk ik het paard gaan borstelen. Hier kijkt de man naar het paard. En hier kijkt hij naar het paard. En nu gaat hij weer weg.
horse
Here is a man holding a brush. And this is a horse. I think he wants to brush the horse. Here the man is looking at the horse. And here he is looking at the horse. And now, he is leaving.

High: De man heeft een paard niet geborsteld. Expected adult response:
the man has a horse not brushed acceptance

fh6 **kaars** (story depicts three candles)
Hier is een jongen. Dit zijn kaarsen. Ze zijn omgevallen, kijk maar. De jongen wil ze denk ik rechtop gaan zetten. Hier zet hij een kaars rechtop. Hier zet hij een kaars rechtop. En hier zet hij een kaars rechtop.
candle
Here is a boy. And these are candles. Look, they have fallen over I think the boy wants to put them up straight. Here he's putting up a candle. Here he's putting up a candle. And here he's putting up a candle.

High: De jongen heeft een kaars niet rechtop gezet. Expected adult response:
the boy has a candle not put up straight?? rejection

fl1 **wasgoed** (story depicts two T-shirts)
Hier is een jongen. En dit zijn T-shirts. Die wil hij denk ik ophangen. Hier hangt hij een T-shirt op. En hier hangt hij een T-shirt op. En nu gaat hij weer weg.
laundry
Here is a boy. And these are T-shitst. I think he wants to hang them up. Here he is hanging up a T-shirt. And here he's hanging up a T-shirt. And now, he's leaving.

Low: De jongen heeft geen T-shirt opgehangen. Expected adult response:
the boy has no T-shirt hung up rejection

fl2 **hoed** (story depicts two hats, neither is affected)
Hier is een jongen. En dit zijn hoeden. Hier kijkt hij naar een hoed. En hier kijkt hij naar een hoed. En nu gaat hij weer weg.
hat
Here is a boy. And these are hats. I think he wants to put them on. Here he's looking at a hat. And here he's looking at a hat. And now, he's leaving.

Low: De jongen heeft geen hoed opgedaan. Expected adult response:
the boy has no hat put on acceptance

fl3 **afwas** (story depicts three plates)
Hier is een vrouw. En dit zijn borden. Die wil ze denk ik afwassen. Hier pakt ze de borden, en hier wast ze ze af. En nu gaat ze weer weg.
washing up
Here is a woman. And these are plates. I think she wants to clean them. Here she picks up the plates. and here she is cleaning them. And now, she's leaving.

Low: De vrouw heeft geen bord afgewassen. Expected adult response:
the woman has no plate washed up rejection

fl4 **boek** (story depicts one book)
Hier is een meisje. En dit is een boek. Dat wil ze denk ik gaan lezen. Hier kijkt ze naar het boek. En hier kijkt ze naar het boek. En nu gaat ze weer weg.
book
Here is a girl. And this is a book. I think she wants to read it. Here she is watching the book. And here she is watching the book. And now, she's leaving.

Low: Het meisje heeft geen boek gelezen. Expected adult response:
The girl has no book read. acceptance

fl5 **paard** (story depicts one horse)
Hier is een man, met een borstel. En dit is een paard. Hij wil denk ik het paard gaan borstelen. Hier kijkt de man naar het paard. En hier kijkt hij naar het paard. En nu gaat hij weer weg.
horse
Here is a man holding a brush. And this is a horse. I think he wants to brush the horse. Here the man is looking at the horse. And here he is looking at the horse. And now, he is leaving.

Low: De man heeft geen paard geborsteld. *The man has no horse brushed.* — Expected adult response: rejection

fl6 **kaars** (story depicts three candles)
Hier is een jongen. Dit zijn kaarsen. Ze zijn omgevallen, kijk maar. De jongen wil ze denk ik rechtop gaan zetten. Hier kijkt hij naar de kaarsen. En hier kijkt hij naar de kaarsen. En nu gaat hij weer weg.
candle
Here is a boy. And these are candles. Look, they have fallen over I think the boy wants to put them up straight. Here he's looking at the candles. And here he's looking at the candles. And now, he's leaving.

Low: De jongen heeft geen kaars rechtop gezet. *The boy has no candle put up straight.* — Expected adult response: acceptance

SUBJECTS: EXACT AGE RANGE AND EXCLUSIONS

TABLE B-1. EXPERIMENTAL CONDITION AND AGE GROUP OF CHILDREN WHO WHERE EXCLUDED FROM THE ANALYSIS OF EXPERIMENT 2

	Age group I 4;0–5;6	Age group II 5;6–6;10
High condition	8	2
Low condition	1	1

The ages of the children included in the analysis ranged between 4;2.11 and 7;6.12.

DISTRIBUTION OF SUBJECTS ACROSS NUMBER OF ADULTLIKE RESPONSES

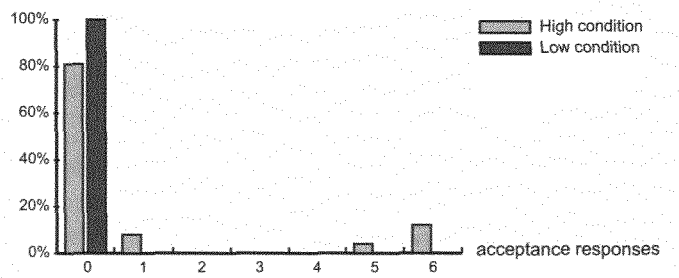


Figure B-1. *Percentage of children for each possible number of acceptance responses by condition*

APPENDIX B

EXACT NUMBERS OF SUBJECTS ASSIGNED TO RESPONSE PATTERNS

TABLE B-2. EXPERIMENT 2, MAIN EXPERIMENT: RESPONSE PATTERNS IN THE HIGH AND LOW CONDITIONS

	Low condition		High condition	
Age groups	Acceptance	Rejection	Acceptance	Rejection
I 4–5;6	0	6	1	6
II 5;6–6;10	0	6	2	6
III 6;10–7;10	–	–	1	10
All children	*0*	*12 (100%)*	*4 (15%)*	*22 (85%)*
Adults	0	4	6	0

APPENDIX C

FOLLOW-UP TO EXPERIMENT 2

Contents

- Subjects: Exact age range and exclusions
- Exact numbers of subjects assigned to response patterns

SUBJECTS: EXACT AGE RANGE AND EXCLUSIONS

TABLE C-1. EXPERIMENTAL CONDITION AND AGE GROUP OF CHILDREN EXCLUDED FROM THE ANALYSIS OF THE FOLLOW-UP TO EXPERIMENT 2

	Age Group I 4;0–5;6	Age Group II 5;6–6;10	Age Group III 6;10–7;9
High Condition	2	0	1
Low Condition	1	0	–

The ages of the children included in the analysis ranged between 4;4.7 and 7;8.25.

The three children in the youngest age group were excluded because they failed two filler items. The results of the fourth child were excluded as she, for an unknown reason, refused to respond to the final two test items.

EXACT NUMBERS OF SUBJECTS ASSIGNED TO RESPONSE PATTERNS

TABLE C-2. FOLLOW-UP EXPERIMENT TO EXPERIMENT 2: RESPONSE PATTERNS IN THE HIGH AND LOW CONDITIONS (percentages between brackets)

	Low			High		
Age groups	Acceptance	Mixed	Rejection	Acceptance	Mixed	Rejection
I 4–5;6	0	0	6	0	0	7
II 5;6–6;10	0	0	9	2	1	5
III 6;10–7;10	–	–	–	4	0	5
All children	*0*	*0*	*15*	*6 (25%)*	*1 (4%)*	*17 (71%)*

APPENDIX D

EXPERIMENT 3: DIRECT OBJECTS AND 'TWICE'

Contents:

MATERIALS

PRE-TEST

Farm animals: a pig, a horse, and a sheep, and a small fence. All are sitting on top of a table.

Scenarios and test sentences:

1. Pig jumps the fence twice.
   Hoeveel keer is het varken over het hek gesprongen?
   How many times did the pig jump over the fence?
2. Horse jumps the fence three times, and the pig jumps twice.
   Wie is er drie keer over het hek gesprongen?
   Who jumped over the fence three times?
3. Sheep jumps the fence twice, pig jumps three times.
   Hoeveel keer is het schaap over het hek gesprongen?
   How many times did the sheep jump the fence?

MAIN SESSION

Warm-up items ("w"), target items ("t") and filler items ("f").

w1 **letter board**
seven colored letters, two of which are yellow, and a magnetic letter board
Wil je de gele lettertjes op het bord plakken? Expected adult response:
Would you stick the yellow letters unto the board? 2 objects on napkin

w2 **animals**
two plastic pigs and one elephant, small plastic container
Wil je de olifant in het bakje doen? Expected adult response:
Would you put the elephant into the container? 1 object on napkin

t1	**rolling marbles**	
	task: rolling marbles down a marble run	
	materials: four differently colored marbles, adventure slopes with three "entrances" for the marbles	
High	Wil je een knikker twee keer rollen?	Expected adult response:
	Would you a marble twice roll?	1 object on napkin
Low	Wil je twee keer een knikker rollen?	Expected adult response:
	Would you roll a marble twice?	2 objects on napkin
t2	**jars**	
	task: turning upside down little jars filled with oil and glitter so that the glitter whirls around	
	materials: four transparent plastic jars filled with oil and glitter	
High	Wil je een potje twee keer omdraaien?	Expected adult response:
	Would you a jar twice turn-over?	1 object on napkin
Low	Wil je twee keer een potje omdraaien?	Expected adult response:
	Would you twice a jar turn-over?	2 objects on napkin
t3	**cotton balls**	
	task: blowing cotton balls through little "gates" in a box	
	materials: four differently colored cotton balls, two straws (one for the experimenter, one for the child), one cardboard box from which top and back have been removed. Three "gates" have been cut out from the front of the box.	
High	Wil je een watje twee keer wegblazen?	Expected adult response:
	Would you a cotton ball twice blow-away?	1 object on napkin
Low	Wil je twee keer een watje wegblazen?	Expected adult response:
	Would you twice a cotton ball blow-away?	2 objects on napkin
t4	**bunnies**	
	task: pushing little puppets so that they will make a squeaking noise	
	materials: four plastic bunnies (two different colors) in square array. when pressed, they make a beeping sound	
High	Wil je een poppetje twee keer indrukken?	Expected adult response:
	Would you a puppet twice push-into?	1 object on napkin
Low	Wil je twee keer een poppetje indrukken?	Expected adult response:
	Would you twice a puppet push-into?	2 objects on napkin
t5	**rings**	
	task: tossing rings around pins	
	materials: four differently colored rings, three target sticks	
High	Wil je een ring twee keer gooien?	Expected adult response:
	Would you throw a ring twice?	1 object on napkin
Low	Wil je twee keer een ring gooien?	Expected adult response:
	Would you twice throw a ring?	2 objects on napkin

t6 **rainbows**

task: pulling "little rainbows" (multicolored slinkies stuck to a piece of wood) and then letting them go so that they wiggle

materials: four rainbow colored slinkies of different shapes, glued by one end to a piece of wood

High	Wil je een regenboogje twee keer uittrekken?	Expected adult response:
	Would you a rainbow twice pull-out?	1 object on napkin
Low	Wil je twee keer een regenboogje uittrekken?	Expected adult response:
	Would you twice pull out a rainbow?	2 objects on napkin

f1 **beans**

matchbox containing two white beans and three black ones, toy cooking pot

Wil je de witte boontjes in het pannetje doen?	Expected adult response:
Would you put the white beans in the pot?	2 objects on napkin

f2 **tower**

seven colored Duplo blocks, two of which are blue.

Wil je van de blauwe blokjes één toren maken?	Expected adult response:
Would you make one tower out of the blue blocks?	1 object on napkin

Note: children often took the two blocks apart before putting them on the napkin rather than putting the tower as a whole on the napkin. This resulted in 2 objects being placed on the napkin. This response was also coded as a correct response.

f3 **windmills**

two windmills, one with a green, and one with an orange face in the centre.

Wil je tegen het molentje met het groene mannetje blazen? Expected ad.:
Would you blow against the mill with the green man? 1 object on napkin

f4 **marbles and cups**

six differently colored marbles, two of which are blue, four toy cups.

Wil je de blauwe knikkers in een kopje doen?	Expected adult response:
Would you put the blue marbles into a cup?	2 objects on napkin

f5 **beads**

six colored giant beads, two of which are yellow.

Wil je de gele kralen aan elkaar vast maken?	Expected adult response:
Would you connect the yellow beads to each other?	2 objects on napkin

SUBJECTS: EXACT AGE RANGE AND EXCLUSIONS

TABLE D-1. CHILDREN WHO WERE EXCLUDED FROM THE ANALYSIS OF EXPERIMENT 3

	Age Group I 4;0–5;6	Age Group II 5;6–6;10
Excluded on basis of pre-test	8	2
Failing 2 or more control items	0	0
Failure to grasp task	2	0

The ages of the children included in the analysis ranged between 4;3.23 and 7;8.13.

DISTRIBUTION OF SUBJECTS ACROSS NUMBER OF ADULTLIKE RESPONSES

The figure presents the children's 1-responses, which constitute the only grammatical adultlike response in the High condition (*Wil je een potje twee keer omdraaien?*).

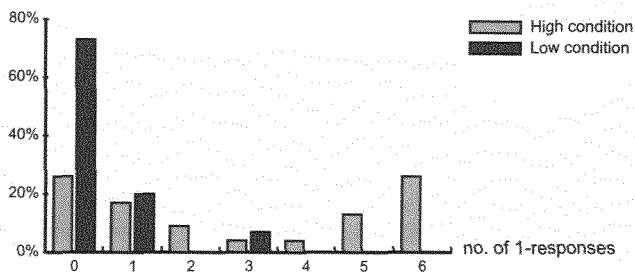


Figure D-1. *Experiment 3: Percentage of children for each possible number of 1-responses by condition*

Plotting a similar graph for the separate age groups in the High condition (graphs not provided) would show a similar, though less regular, U-shape for age groups II and III. No pattern can be discerned for age group I.

EXACT NUMBERS OF SUBJECTS ASSIGNED TO RESPONSE PATTERNS

TABLE D-2. EXPERIMENT 3, SCRAMBLING ACROSS 'TWICE': RESPONSE PATTERNS IN THE HIGH AND LOW CONDITIONS

	Low condition			High condition		
Age Groups	1-pattern	Mixed	2-pattern	1-pattern	Mixed	2-pattern
I 4–5;6	0	1	7	1	3	3
II 5;6–6;11.15	0	0	7	3	0	4
III 6;11.16–7;10	–	–	–	5	1	3
All children	*0*	*1 (7%)*	*14 (93%)*	*9 (39%)*	*4 (17%)*	*10 (43%)*
Adults	0	0	4	6	0	0

APPENDIX E

EXPERIMENT 4: INDEFINITE SUBJECT NPS IN SENTENCES CONTAINING *TWEE KEER* ('TWICE')

Contents:

MATERIALS

PRE-TEST

See Appendix D.

MAIN SESSION

Warm-up items ("w"), target items ("t") and filler items ("f").

w1 **letter board**
seven colored letters, two of which are yellow, and a magnetic letter board
De gele lettertjes mogen op het bord. Expected adult response:
The yellow letters go (lit. may) unto the board. 2 objects on napkin

w2 **animals**
two plastic pigs and one elephant, small plastic container
De olifant mag in het bakje. Expected adult response.
The elephant goes into the container. 1 object on napkin

t1 **rolling marbles**
four differently colored marbles, adventure slopes with three "entrances" for the marbles
Een knikker mag twee keer rollen. Expected adult response:
A marble may roll twice 1 object on napkin

t2 **lights**
two devices normally used in reaction time experiments: each device has two red lights and two corresponding push buttons, such that if you push the buttons, the light burns.
Een lampje mag twee keer branden. Expected adult response:
A light may burn twice. 1 object on napkin

t3 **cars**
four differently colored toy cars, one cardboard box from which top and back have been removed. Three "gates" have been cut out from the front of the box.
Een auto mag twee keer rijden. Expected adult response:
A car may drive twice. 1 object on napkin

t4 **bunnies**
four plastic bunnies (two different colors) in square array. when pressed, they make a beeping sound
Een konijntje mag twee keer piepen Expected adult response:
A bunny may beep twice. 1 object on napkin

t5 **rings**
four differently colored rings, three target sticks.
Een ring mag twee keer vallen. Expected adult response:
A ring may fall twice. 1 object on napkin

t6 **rainbows**
four rainbow colored slinkies of different shapes, glued by one end to a piece of wood
Een regenboogje mag twee keer wiebelen. Expected adult response:
A rainbow may wiggle twice. 1 object on napkin

f1 **beans**
matchbox containing two white beans and three black ones, toy cooking pot
De witte boontjes mogen in het pannetje. Expected adult response:
The white beans to (lit. may) into the pot. 2 objects on napkin

f2 **tower**
seven colored Duplo blocks, two of which are blue.
De blauwe blokjes mogen samen één torentje worden. Exp. ad. response:
The blue blocks may become one tower together. 1 object on napkin

Note: children often took the two blocks apart before putting them on the napkin rather than putting the tower as a whole on the napkin. This resulted in 2 objects being placed on the napkin. This response was also coded as a correct response.

f3 **windmills**
two windmills, one with a green, and one with an orange face in the centre.
Het molentje met het groene mannetje mag draaien. Exp. ad. response:
The windmill with the green man may turn. 1 object on napkin

f4 **marbles and cups**
six differently colored marbles, two of which are blue, four toy cups.
De blauwe knikkers mogen in een kopje. Expected adult response:
The blue marbles go into a cup. 2 objects on napkin

f5 **beads**
six colored giant beads two of which are yellow.
De gele kralen mogen aan elkaar. Expected adult response:
The yellow beads may (be stuck) to each other. 2 objects on napkin

SUBJECTS: EXACT AGE RANGE AND EXCLUSIONS

TABLE E-1. CHILDREN WHO WERE EXCLUDED FROM THE ANALYSIS OF EXPERIMENT 4

	Age group I 4;0–5;6	Age group II 5;6–6;10
Excluded on basis of pre-test	9	4
Failing 2 or more control items	1	0
Failure to grasp task	2	0

The ages of the children included in the analysis ranged between 4;5.26 and 8;2.8.

DISTRIBUTION OF SUBJECTS ACROSS NUMBER OF ADULTLIKE RESPONSES

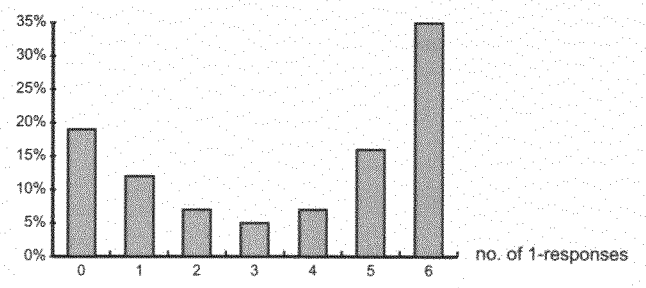


Figure E-1. *Experiment 4: Percentage of children for each possible number of 1-responses*

If the results are plotted in a similar way for each age group separately (graphs not provided), each graph shows a similar U-shape, albeit not as clearly as in Figure E-1.

EXACT NUMBERS OF SUBJECTS ASSIGNED TO RESPONSE PATTERNS

TABLE E-2. EXPERIMENT 4: RESPONSE PATTERNS BY AGE GROUP AND CONDITION

Age groups	1-pattern	Mixed	2-pattern
I 4;0–5;6	8	2	4
II 5;6–6;8	4	4	6
III 7;2–8;3	11	1	3
All children	*23 (53%)*	*7 (16%)*	*13 (30%)*
Adults	10	0	0

TABLE E-3. NUMBER OF ADULTLIKE (1-PATTERN) AND NON-ADULTLIKE (2- AND MIXED PATTERNS) RESPONSE PATTERNS BY " WINNING PUPPET"

Winning puppet	Adultlike pattern	Non-adultlike pattern
Ernie	7	6
Cookie Monster	10	6
Mickey Mouse	6	5
Duck	0	3

APPENDIX F

FOLLOW-UP TO EXPERIMENT 4

Contents:

SUBJECTS: EXACT AGE AND EXCLUSIONS

TABLE F-1. RESULTS OF THE FOLLOW-UP EXPERIMENT, RESPONSE PATTERNS

Age groups	1-pattern	Mixed	2-pattern
I 4;0– 5;5	1	3	2
II 5;6– 6;10	3	2	4
All children	*4 (27%)*	*5 (33%)*	*6 (40%)*

The ages of the subjects in the follow-up experiment ranged between 4;5.5 and 6;9.27.

21 children passed the pre-test. Two of these were excluded in the course of the experiment: One child, because it became clear during the experimental session that she did not know numbers, in spite of having passed the pre-test. The other child was extremely indecisive, and had to be pressed into performing any kind of response. Both children were in the youngest age group.

c1 **spit**
girl simply standing, boy spitting on the floor, boy spitting on the floor
Een jongen is niet aan het spugen. Expected adult response:
A boy is not spitting. rejection

c2 **upside down**
boy standing on his head, girl standing straight, girl standing on her head
Een jongen staat niet op zijn kop. Expected adult response:
A boy is not standing on his head. rejection

SUBJECTS: EXACT AGE RANGE AND EXCLUSIONS

TABLE G-1. EXPERIMENTAL CONDITION AND AGE GROUP OF CHILDREN WHO WHERE EXCLUDED FROM THE ANALYSIS OF EXPERIMENT 5

	Age group I 4;0–5;6	Age group II 5;6–6;10	Age group III 6;10–8;3
Excluded on basis of warm-up items	2	0	0
Failing 2 or more control items	2	0	0

The ages of the child subjects ranged between 4;4 and 8;3.

DISTRIBUTION OF SUBJECTS ACROSS NUMBER OF ADULTLIKE RESPONSES

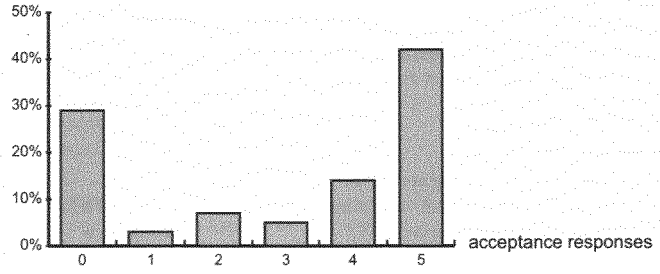


Figure G-1. *Experiment 5, main experiment: Distribution of subjects across possible number of adultlike responses*

Plotting the responses for each age group in separate graphs (not provided here) renders similar U-shapes, although the peaks at the low numbers of acceptance responses are taller for the youngest age group, and the peaks at the high numbers of acceptance responses are taller for the two older age groups.

EXACT NUMBERS OF SUBJECTS ASSIGNED TO RESPONSE PATTERNS

TABLE G-2. DISTRIBUTION OF RESPONSE PATTERNS ACROSS THE AGE GROUPS

Age groups	Acceptance pattern	Mixed pattern	Rejection pattern
I 4;0–5;6	6	6	11
II 5;6–6;8	16	2	6
III 6;10–8;3	15	1	2
All children	*37 (57%)*	*9 (14%)*	*19 (29%)*
Adults	10	0	0

APPENDIX H

FOLLOW-UP TO EXPERIMENT 5: "DOORS"

Contents:

- Materials
- Subjects: Exact age range and exclusions
- Exact numbers of subjects assigned to response patterns

MATERIALS

Single picture warm-up items: See Appendix G.
On all remaining pictures, all but the heads of the protagonists is covered.
Warm-up items requiring no truth value judgment ("wkl"), regular warm-up items ("w"), target items ("t"), filler items ("f") and control items ("c").

wkl1 two girls and one boy behind doors
Experimenter: *Now you may open this door (girl), and this door (girl).*

wkl2 one girl and two boys behind doors
Experimenter: *Now you may open this door, and this door, and this door.*

w1 **fishing rod**
boy fishing, boy simply standing, girl simply standing
Puppet: Ik zie een hengel.
I see a fishing rod.
Experimenter: "Did Cookie monster see right? Let's have a look. (experimenter turns doors). There's no fishing rod here. And here... there is a fishing rod. Cookie Monster saw right!"

w2 **spitting**
1 girl, 2 boys, boys are spitting on the floor
Een meisje is niet aan het spugen. Expected adult response:
A girl is not spitting. open 1 door / acceptance
(Child now tries out for herself)

w3 **write**
1 girl, 2 boys. A boy and the girl are writing.
Een meisje is niet aan het schrijven. Expected adult response:
A girl is not writing. open 1 door / rejection

w4	**washing up**	
	1 man, 2 women, man is holding a bag.	
	Een man is niet aan het afwassen.	Expected adult response:
	A man is not washing up.	open 1 door / acceptance
t1	**swing**	
	1 boy, 2 girls, both girls are swinging.	
	Een meisje is niet aan het schommelen.	Expected adult response:
	A girl is not swinging.	open 2 doors / rejection
t2	**bicycle**	
	1 boy, 2 girls, one painting, one cycling	
	Een meisje is niet aan het fietsen.	Expected adult response:
	A girl is not cycling.	1 or 2 doors / acceptance
t3	**dance**	
	1 boy, 2 girls, one swinging, one dancing	
	Een meisje is niet aan het dansen.	Expected adult response:
	A girl is not dancing.	1 or 2 doors / acceptance
t4	**read**	
	1 boy, 2 girls, both girls are reading	
	Een meisje is niet aan het lezen.	Expected adult response:
	A girl is not reading.	open 2 doors / rejection
t5	**draw**	
	1 boy, 2 girls, one waving a flag, one drawing	
	Een meisje is niet aan het tekenen.	Expected adult response:
	A girl is not drawing.	1 or 2 doors / acceptance
t6	**iron**	
	1 man, 2 women, both women are ironing a shirt	
	Een vrouw is niet aan het strijken.	Expected adult response:
	A woman is not ironing.	open 2 doors / rejection
f1	**wash hands**	
	2 men, 1 woman holding a candle	
	Een vrouw is haar handen niet aan het wassen.	Expected adult response:
	A woman is not washing her hands.	open 1 door / acceptance
f2	**sew**	
	2 women, one man cutting out newspaper clippings	
	Een man is niet aan het naaien.	Expected adult response:
	A man is not sewing.	open 1 door / acceptance

SUBJECTS: EXACT AGE RANGE AND EXCLUSIONS

TABLE G-1. EXPERIMENTAL CONDITION AND AGE GROUP OF CHILDREN WHO WHERE EXCLUDED FROM THE ANALYSIS OF THE FOLLOW-UP TO EXPERIMENT 5

	Age group I 4;0–5;6	Age group II 5;6–6;8
Failing 2 or more control items	4	0

The ages of the child subjects ranged between 4;1.13 and 6;7.25.

EXACT NUMBERS OF SUBJECTS ASSIGNED TO RESPONSE PATTERNS

TABLE G-2. FOLLOW-UP TO EXPERIMENT 4: RESPONSE PATTERNS BY AGE GROUP (percentages between brackets)

		At-least-as-many-as-needed	Mixed pattern	1-pattern
I	4;0–5;6	0	4	7
II	5;6–6;8	5	1	9
	All children	*5 (19%)*	*5 (19%)*	*16 (62%)*
Adults		10	0	0

SAMENVATTING

Dit proefschrift gaat over de interpretatie van indefiniete Nominale Frasen (NPs) bij Nederlandse kinderen. Indefiniete NPs kunnen in het Nederlands voorkomen in "hoge" en "lage" syntactische posities. "Hoge" object-NPs staan links van een bijwoord of een ander element dat hen scheidt van de positie die kan worden ingenomen door het niet-finiete werkwoord. "Lage" object-NPs staan rechts van zo'n element (wanneer er geen tussenliggend element is, is het verschil syntactisch niet zichtbaar). "Hoge" subject-NPs staan in de zinsinitiële positie.

Het proefschrift toont aan dat "hoge" indefinieten voor veel kinderen tusen vier en acht jaar een eng semantisch bereik hebben, en dat kinderen hoge indefinieten vaak niet adequaat aan de context relateren. Ik betoog dat de oorzaak van deze afwijkende interpretatie erin gelegen is dat veel kinderen in deze leeftijd, in tegenstelling tot volwassenen, losse zinnen nog niet vanzelfsprekend behandelen als deel van een groter geheel. Dit is echter een noodzakelijke voorwaarde om tot een volwassen interpretatie van hoge indefinieten te komen.

Hoge en lage indefiniete NPs onderscheiden zich van elkaar in betekenis. Het onderzoek in dit proefschrift spitst zich toe op de onderzoeksvraag of kinderen in staat zijn gebruik te maken van de aanwijzingen die de NP-positie hen geeft omtrent de interpretatie. Het proefschrift gaat in op twee soorten betekeniskenmerken van hoge en lage indefiniete NPs. Het eerste is het semantisch bereik; hoge indefinieten kunnen wijd bereik hebben ten opzichte van andere elementen in de zin, terwijl lage indefinieten eng bereik hebben. Het tweede is de pragmatische kleuring, door mij betiteld als "interpretatie-verschijning" (interpretive guise). Voorbeelden van interpretatie-verschijningen zijn de specifieke lezing, in de zin dat de spreker een bepaalde referent in gedachten heeft, en de bron-groep lezing, waarbij een hoge indefiniet wordt geïnterpreteerd als deel van een eerder genoemde groep. Deze interpretatie-verschijningen zijn meestal opvallend aanwezig bij hoge indefinieten, maar spelen bij lage indefinieten nauwelijks een rol.

In Hoofdstuk 2 gaf ik de semantische en pragmatische achtergrond waartegen het onderzoek van de interpretaties van kinderen zal plaatsvinden. Ik besprak drie semantische analyses van de interpretaties van indefinieten zoals die worden

onderscheiden door de hoge en lage positie, Diesing (1992), de Hoop (1992) en Van Geenhoven (1998). Naar later zou blijken, zijn niet alledrie deze analyses even goed in staat om de resultaten van het kindertaalonderzoek te verklaren.

Volgens Diesing is de interpretatie van hoge indefinieten "presuppositioneel". Zij stelt dat presuppositionele indefinieten indefinieten alleen in de hoge NP-posities kunnen verschijnen. Niet-presuppositionele indefinieten verschijnen slechts in de lage posities.

De Hoop betitelt de interpretaties van hoge indefinieten als "sterk". Zij stelt een universeel grammaticaal mechanisme voor, dat bepaalt dat "sterke" indefinieten zowel in hoge als lage NP posities voor kunnen komen. "Zwakke" indefinieten, daarentegen, moeten zich tot de lage posities beperken.

Uiteindelijk koos ik Van Geenhovens analyse als achtergrond voor het onderzoek, omdat deze de volwassen taaldata het beste verklaart. Van Geenhoven stelt dat hoge indefinieten bestaan uit een descriptieve inhoud en een vrije variabele: "vrije-variabele indefinieten". Lage indefinieten betstaan uitsluitend uit descriptieve inhoud: "predicatieve indefinieten". De existentiële interpretatie van deze indefinieten komt via verschillende mechanismen tot stand: semantische incorporatie en accommodatie.

In deze analyse zijn eng en wijd bereik van vrije-variabele en predicatieve indefinieten het gevolg van hun respectievelijke interpretatie-mechanismen. De door het werkwoord geabsorbeerde predicatieve indefinieten zijn in het bereik van operatoren die wijd bereik hebben ten opzichte van het werkwoord. Het bereik van de geaccommodeerde vrije-variabele indefinieten is in eerste instantie afhankelijk van hun accommodatieplaats, niet van hun syntactische positie in de zin. Van Geenhoven stelt dat plaatsing in de hoge positie een taalspecifieke manier is om een indefiniet te markeren als een vrije variabele.

In het laatste deel van Hoofdstuk 2 stel ik voor dat de hoorder de accommodatieplaats van een vrije-variable indefiniet bepaalt door middel van een inferentieproces: Bridging. De spreker draagt er zorg voor dat de hoorder de accommodatieplaats kan bepalen door een conceptuele relatie te leggen tussen de indefiniet en elementen in de context. Dit resulteert weer in interpretatie-verschijningen. Wanneer bijvoorbeeld een hoorder een relatie legt tussen een hoge indefiniet en een reeds eerder in de tekst geïdentificeerde groep leidt dit tot een bron-groep verschijning.

Op basis van de analyse van indefinieten zoals ik die heb uiteengezet in Hoofdstuk 2, kunnen we stellen dat de interpretatie van hoge indefinieten als vrije-variabele indefinieten discourse-integratie vereist. In Hoofdstuk 3 beschreef ik discourse integratie als twee gerelateerde processen. Ten eerste, het integreren van zinnen (of mogelijk delen van zinnen) in een groter geheel: een discourse, en ten tweede, het benutten van het feit dat een zin deel is van een groter geheel voor de interpretatie van elementen op zinsniveau. Vervolgens besprak ik een aantal onderzoeken

waarvan de uitkomst doet vermoeden dat discourse integratie bij kinderen vaak tot ná hun zesde jaar in mindere mate plaatsvindt dan bij volwassenen.

In het eerste deel van Hoofdstuk 4 formuleerde ik op grond van het in Hoofdstuk 3 besproken onderzoek de non-integratie hypothese: *Kinderen verwerven de predicatieve interpretatie van indefinieten vroeg; de vrije-variabele interpretatie daarentegen wordt later verworven, omdat die discourse integratie vereist.* Onvoldoende discourse integratie zou twee soorten fouten kunnen veroorzaken: Het kind zou aan hoge indefinieten een predicatieve interpretatie kunnen toekennen, die immers geen accommodatie vergt. In dat geval interpreteert het kind dus een hoge indefiniet alsof hij in de lage positie stond. Het is ook mogelijk dat het kind weliswaar een vrije-variabele interpretatie toekent, maar niet in staat is de informatie uit de context op een adequate manier te benutten in het proces van Bridging, zodat het een verkeerde interpretatie-verschijning toekent aan een gegeven hoge indefiniet.

In het tweede deel van dit hoofdstuk presenteerde ik een eerste experiment, dat onderzocht of kinderen bron-groep verschijningen toekennen in een verhaalcontext waarin dit de meest voor de hand liggende interpretatie is voor een hoge indefiniete subject-NP. In meer dan een derde van alle gevallen kenden kinderen tussen 4;0 en 5;6 niet de correcte bron-groep verschijning toe aan de indefiniet in de derde zin. Oudere kinderen presteerden veel beter.

In Hoofdstuk 5 onderzocht ik de interpretatie van hoge en lage indefiniete object-NPs door kinderen in de leeftijd tussen 4;0 en 8;0. Zoals de non-integratie hypothese voorspelde, hadden lage indefinieten in zinnen met negatie of het adverbium *twee keer* eng bereik voor alle kinderen, net als voor volwassenen. De respons op zinnen met hoge indefinieten was daarentegen onvolwassen; ook deze indefinieten hadden voor veel kinderen eng bereik.

In Hoofdstuk 6 toonde ik aan dat veel kinderen ook eng bereik toestonden voor hoge subjecten in zinnen met *twee keer*, dit in tegenstelling tot volwassenen. Een volgend experiment onderzocht de interpretatie van hoge indefiniete subjecten in zinnen die negatie bevatten. Veel kinderen vonden deze zinnen onwaar in een situatie waarin volwassenen de zinnen als waar beschouwden. Gezien de experimentele situatie zou dit een teken van eng bereik van de indefiniete subject-NP kunnen zijn, maar opmerkingen die kinderen maakten tijdens de afname van het experiment duidden erop dat de fout te wijten was aan het onvermogen van de kinderen om een bron-groep interpretatie-verschijning toe te kennen aan de hoge indefiniet. In dat geval is het niet nodig om aan te nemen dat de indefiniete subject-NP eng bereik heeft ten opzichte van negatie.

Op grond van deze bevindingen kunnen we concluderen dat de interpretaties van de kinderen verschillen van die van de volwassenen, op de wijze die we mochten verwachten op grond van de non-integratie hypothese. De interpretaties van de

indefinieten met eng bereik in Experiment 2 tot en met 4 tonen aan dat hoge indefinieten vaak worden geïnterpreteerd als preciaten, die niet hoeven te accommoderen en daarom geen discourse-integratie vereisen. Het feit dat kinderen vaak geen correcte bron-groep verschijning toekennen in Experiment 1 en 5 is ook te beschouwen als een weerspiegeling van onvoldoende discourse-integratie, aangezien interpretatie-verschijningen een weergave zijn van de relatie tussen hoge indefinieten en de context. Experiment 1 toonde bovendien aan dat afwijkende interpretaties niet beperkt zijn tot zinnen met negatie en *twee keer*.

Veranderen de resultaten nu iets aan onze visie op de theoretische analyses van indefinieten die ik heb besproken in Hoofdstuk 2? Tot op zekere hoogte is dit het geval. Ik beargumenteer dat de resultaten, zowel de vrij late verwervingsleeftijd van vrije-variable interpretaties voor hoge indefinieten als de voorkeur voor predicatieve indefinieten, zonder meer kunnen worden gevat in Van Geenhovens analyse. De Hoops analyse lijkt in eerste instantie niet verenigbaar met de late verwervingsleeftijd, maar bij nadere beschouwing blijkt dat deze analyse wel ruimte laat om een vertraging in de verwerving te verklaren. Het is bovendien mogelijk om de analyse op een zodanige manier uit te breiden dat ook de initiële voorkeur voor "lage", eng-bereik-interpretaties kan worden verklaard.

Ik stel dat, in tegenstelling tot deze analyses, Diesings analyse niet verenigbaar is met de resultaten. Diesing beweert dat een hoge NP positie tot een kwantificationele, typisch "hoge" interpretatie moet leiden. Onder Diesings analyse is het onmogelijk om de voorkeur voor eng-bereik interpretaties te verklaren.

Samenvattend heb ik betoogd dat het redelijk is aan te nemen dat kinderen tot de leeftijd van 7 à 8 jaar, bij het begrijpen van taal, afzonderlijke zinnen niet vanzelfsprekend beschouwen als deel van een discourse. In dat geval mogen we problemen verwachten bij de interpretatie van elementen waarvoor discourse-integratie een noodzakelijke voorwaarde is om tot een volwassen interpretatie te komen. Zo'n element is de hoge indefiniete NP, die een vrije-variabele interpretatie krijgt bij volwassenen.

Deze verwachting werd bevestigd in de experimenten: lage indefinieten, die als predicaten geïnterpreteerd moeten worden, leverden geen enkel probleem op voor kinderen tussen vier en acht jaar. Hoge indefinieten, daarentegen, werden vaak ook als predicaten geïnterpreteerd, alsof ze in de lage positie stonden, en vaak niet op pragmatisch juiste wijze aan de context gerelateerd. Daardoor hebben voor kinderen deze indefinieten semantische en pragmatische eigenschappen die wezenlijk verschillen van die van volwassenen, en die tot andere waarheidswaarden leiden. In deze dissertatie heb ik voorgesteld dat de oorzaak van dit verschil tussen kindergrammatica en volwassen grammatica in de eerste plaats gelegen is in de ontwikkeling van discourse, en niet in de ontwikkeling van syntax of de projectie van syntax naar semantiek.