Indefinites and the Type of Sets

Fred Landman

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Acknowledgments

The oldest parts of this book go back to the spring of 1994. Coming to Israel, I landed during a big strike and the spring semester started months late. That spring I wrote a text to be used in my advanced semantics classes, which included a chapter on predicates and properties, basically a discussion of Partee's work on predication and Zimmermann's work on the objects of intensional verbs. I discussed the connection between *exactly/at least* readings and predicate/argument position, and gave a tentative analysis in an as yet embryonic adjectival theory of indefinites. Since this version was as logically incoherent as adjectival theories had been up to that time, the requirement of making this coherent set an agenda which ultimately resulted in chapter 2. The predication chapter of the 1994 text also had an extensive discussion of role predicates, their intensionality, and the need for a variable constraint on quantifying in, and in fact a lot of chapter 3 is already in that text in some form or other.

In 1995, Alex Grosu and I developed an analysis for what we later called maximalizing relative clauses. In the course of this work, we noted the similarity between the external definiteness effects in these relative clauses, and the facts for adverbial *time* noun phrases that Susan Rothstein discussed. In the context of this work we noted the interpretational definiteness effects for adverbial *time* noun phrases: definite ones are indirect counters, while indefinite ones are direct counters. This, of course, set the agenda for the last two chapters of this book, which provides an analysis of these constructions, but it is fair to say that it actually set the agenda for the whole book: to find a general analysis of definiteness effects in which these interpretational effects for adverbial *time* noun phrases can find a natural place.

That year, I presented the work on direct/indirect counting of adverbial *time* noun phrases in the spring in a meeting of the Semantics Circle, a group of semanticists who met at our house in Tel Aviv every other week. I also presented this work in the summer at the 10th IATL conference in Tel Aviv, and in the fall at the 10th Amsterdam Colloquium. A first layer of thanks go to Alex Grosu and Susan Rothstein for discussing these issues extensively with me, and to the audiences of the meetings mentioned for their comments.

Here things stayed for a while, since in 1996 I had other concerns: preparing and sending off my *Events and Plurality* book to be refereed, and changing diapers.

This is all prehistory. The current book was started early in 1997, during the semester break. The invaluable help of our babysitter, Sarah Aharon, and the good weather, gave me a daily slot between ten and three to sit on park benches and scribble yellow pads full. The heart of the book, the flip-flop analysis in chapter 5, the fitting of the analysis in the theory of event maximalization of my *Events and Plurality* book, and the core of chapters 7 and 8 was developed during that month. In the spring of that year, I presented the work at a colloquium at Tel Aviv University, and in the summer, in a class on events that I co-taught with Susan Rothstein at the Summer Institute of the LSA at Cornell University in Ithaca. A second layer of thanks go to, once again, Susan Rothstein for continuous daily discussion of these issues, culminating in our joint events seminar, and to the audiences, with special mention here to John Bowers (in Ithaca).

In the fall semester of 1997/1998 I had the good luck of co-directing with Edit Doron a Semantics Group at the Institute for Advanced Study at the Hebrew University of Jerusalem. A big thank-you is due to the Institute for its financial support, to the staff for creating a wonderfully supportive environment, and of course to my fellow semanticists who made the Group an unforgettable success.

During this semester I wrote two huge manuscripts, the first covering basically the material that had already been developed during that year. I presented this material at a conference we organized at the Institute during that fall. The second manuscript developed what is now chapter 6 (adjunction to saturated predicates), and chapter 9 (definiteness effects for relational nouns). I presented the material now in chapter 6 at a colloquium in Tel Aviv in the spring of 1998, and at SALT 8 at MIT. Again, many thanks to the audiences of these presentations, with special thanks to Maria Bittner, Veneeta Dayal, Edit Doron, Marc-Ariel Friedemann, Polly Jacobson, Angelika Kratzer, Manfred Krifka, Tali Siloni, and Anna Szabolsci. Even more direct thanks are due to Gennaro Chierchia and Hans Kamp: discussions with them (distributively) shaped the chapter on negation (chapter 8).

At this point (the beginning of the summer of 1998), the bulk of the material in this book existed in the form of these two circulating unwielding manuscripts, which I was ready to rewrite and turn into a book. But the other book intervened: that summer I finally received the referee reports of the *Events and Plurality* book, and I spent the summer, and the following semester writing the final version of that book. The spring semester of 1999 was, by necessity of a grant, dedicated to other research, so in the end I didn't get to start writing the book during 1998/1999.

What I did do, during that year, was teach a year-long seminar at Tel Aviv University. In that class, chapter 5 was reshaped into a form much closer to its present form. And, most importantly, I discovered the need to present a

conceptual prehistory to the work, developing the Adjectival Theory in more detail, and comparing it with the Montague–Partee approach. Thus, the core of chapter 2 was developed during this seminar. Here many thanks go to the penetrating comments, skepticism, and encouragement of my students, Victoria Barabash, Shai Cohen, Gabi Danon, Yael Greenberg, Daphna Heller, Aldo Sevi, and Galit Sassoon.

By the summer of 1999 I was, thus, all ready to finally start writing but, again, things turned out differently. Due to another strike in the year before, that summer was very short, and because of a variety of interactions with the real world, it passed before any writing could be done. Correcting the proofs of the *Events and Plurality* book basically took care of the fall semester. By this time, I was feeling like a character in Luis Buñuel's film *Le Charme discret de la bourgeoisie* (in which a group of people is prevented from having dinner for the duration of the movie). But in 2000 things started moving again. That spring I wrote the paper on argument–predicate mismatches which is incorporated in chapter 2. I presented that paper that spring at the NP–DP conference in Antwerpen, and at a colloquium at Tel Aviv University; that summer I presented a version of it at IATL 14 at Tel Aviv University and again in February 2001 at a colloquium at ZAS in Berlin. Once more I profited greatly from the comments of the audiences of these talks; here, I mention in particular Manfred Krifka and Tanya Reinhart. An earlier version of chapter 2 was published as Landman (2003), and I am grateful to John Benjamins Publishing Company for permission to reuse this material here.

In the spring of 2000, I decided that the trick to get the material rewritten would be to think of it as a series of about ten little, semi-independent papers, the NP–DP paper being the first. While I was never serious about these really being independent papers, the trick worked very well: at the end of the summer, the material was rewritten as a series of ten papers, in which the structure of the present book becomes recognizable.

This is the right point to mention that from 1998 to 2000 and from 2000 to 2001, Alex Grosu and I received two grants from the Israel Science Foundation, the first on a Tripartite Typology of Relative Clause Constructions, and the second on Transparent Free Relatives. The first grant supported some of the work that I have mentioned (where it intersects with the problems of maximalizing relatives), the second grant supported some major work that I did on adverbial *time* noun phrases between the summer of 2000 and the spring of 2001. This financial support is gratefully acknowledged. Thanks to Alex Grosu for many discussions on topics intersecting with the topics in this book.

The work on adverbial *time* noun phrases just mentioned led to basically what is now chapters 10 and 11 (but at the time sat uncomfortably between the NP–DP paper and what is now chapter 5). I want to mention here three sources of inspiration for this work. In the first place, a talk on this class of expressions by Susan Rothstein at the Israel Science Foundation workshop on Relative Clauses that Alex Grosu and I organized in the summer of 2000. Secondly, the discussion of *time* phrases in Jenny Doetjes' dissertation, which

she was kind enough to send to me. Thirdly, joint work and discussions with Alex Grosu on Transparent Free Relatives, which inspired my particular use of categorial grammar in chapter 11. I presented the new analysis of adverbial *time* phrases in the spring of 2001 in colloquiums at the Hebrew University of Jerusalem, Tel Aviv University, and the Technion in Haifa, and in a three-hour seminar at ZAS in Berlin. Again, thanks to the audiences, with once again special thanks to Manfred Krifka and Susan Rothstein.

The year 2001/2002 we spent on sabbatical in Holland. Many thanks to UIL-LOT in Utrecht for providing hospitality. Also thanks to my family in Holland and Belgium, and in particular to my daughter Dafna, for making this year for me, after 16 years of absence, an intensely Dutch experience.

When I started rewriting the material once more, the originally successful form of ten little papers became more and more of a burden. Due to the need for more structuring glue, commentary sections came into existence, and comments on comments, and the whole started to look like a postmodernist composition with optional parts, and various optional directions to read through the material. A colloquium at the University of Amsterdam, and a week-long series of lectures at the Winterschool in Leiden of the LOT Graduate School in Linguistics created a new structure. The talk in Amsterdam was basically written as a kind of résumé of what is now the first five chapters. It was by giving this talk that I realized that it would be best to move the *time* adverbial material to the end, and that in between what is now chapter 3 (on the Variable Constraint) and chapter 5 (the flip-flop analysis), there was a real need for a chapter making the comparison with analyses of the definiteness effect in terms of a weak–strong distinction. Initially sketched as part of the Amsterdam talk, much of the contents of chapter 4 developed in the course of the lectures in Leiden. I am very grateful to the audiences, in particular to Robert van Rooy. Also in Leiden, I realized the necessity of adding a prehistory to the prehistory, and start off the book with a discussion of the Adjectival Theory within the nominal domain, in the context of a presentation of the background theory of plurality.

With this structure in place, I reworked all the existing material extensively in the spring of 2002 (merging some chapters, splitting some others), ending up with the present book. Very helpful, in this process, was the possibility of making a different résumé, this time focusing on chapters 5 and 6, that I gave that spring as a colloquium at the University of Utrecht and at the University of Groningen, and a presentation at the conference on (Preferably) Non-lexical Semantics at the University of Paris VII, and again, in the fall of 2002 as a colloquium at Tel Aviv University. Again, many thanks to the audiences.

Yet another variant of the "Amsterdam" version was presented at the conference on "Existential sentences" at the University of Nancy in the fall of 2002. Here too, many thanks to the audience, with special thanks to Barbara Partee for several stimulating lunch discussions during this conference.

The fall of 2002 saw the resurrection of the bi-weekly Semantics Circle meetings at our house. This time I spaced a variant of the "Utrecht" version over three presentations. I am very grateful for the penetrating discussions with the

audiences of these meetings: many thanks to Ron Artstein, Arik Cohen, Edit Doron, Yael Greenberg, Anita Mittwoch, and Susan Rothstein.

Finally, the comments of the referee at Blackwell Publishing have been extremely useful in writing the final version of this book.

This book is, more than any of my previous works, focused on (the semantic side of) the syntax–semantics relation. While my own views on this relation are (of course) peculiarly my own, I want to express my debt here to Barbara Partee and Gennaro Chierchia: my long exposure from close by to their virtuosity and depth in dealing with the syntax–semantics relation has influenced my own thinking in innumerable ways. Closer to home (well, in fact, at home) this work has benefitted in equally innumerable ways from daily critical interaction with Susan Rothstein. And from love, of course.

F. L.

Reading This Book at Different Levels

This book is addressed to audiences at three levels of semantic skill:

- Group 1: people who have an elementary fluency in reading semantic types and expressions with λ-operators. I have in mind here people who have been able to digest a classic paper like Partee (1987).
- Group 2: people with a background in semantics who are familiar with semantic operations and semantic derivations involving λ-conversion.
- Group 3: specialists in semantics who will stoically brave any technical complexity.

I will first address a few general comments to the first group of readers. This book is at some places dense with semantic types and type logical expressions, which may be hard to read. However, I've made a habit of describing the content of these logical expressions informally as well, which means that if you read these logical expressions *and* their informal description, you will soon gain the required fluency in reading these expressions.

The book also contains many semantic derivations, derivations of the interpretations of complex expressions from the interpretations of the parts and the composing operations. These derivations are, of course, important in the arguments made in this book, and I am not advising readers to skip them, but they contain many reduction steps (usually with λ-conversion) in which a complex representation is shown to be equivalent to a somewhat more readable one. These reductions are there to help the readers, not to scare them away. If they don't help you, trust me that they do what I claim they do, and skip them. I have done my best to make sure that you can quite well follow the story without having gone through the reduction steps. This advice applies, of course, to the second group of readers as well, though they shouldn't have problems following the reductions.

I will indicate now which parts of the book are addressed to more specialized audiences, and can be skipped by those who want to get the general picture (though, of course, this will mean skipping some of the icing on the cake).

Chapter 1 contains the background theory of numerical expressions in the nominal domain. While the basic notions from the theory of Boolean algebras may be difficult for those not familiar with them, they should not be skipped. The chapter is meant to be self-contained, and these notions can readily be understood by looking at the pictures of Boolean algebras given. However, the discussion of *every three lions* ending the chapter is a piece of "icing" meant for the specialists, which can be skipped unproblematically.

In chapter 2, sections 2.6 (on conjunctive predicates) and 2.9 (on sentence adverbials inside noun phrases) are more difficult sections meant for the specialists, and can be skipped without losing track of the story. The reader may find section 2.5 difficult; 2.5 cannot be skipped though. While I have done my best to make the discussion as gentle as possible, 2.5 is difficult because it addresses a difficult problem, the solution to which is at the heart of the chapter, and at the heart of the book. Thus the readers should fasten their seatbelts and stay with me.

Chapter 3 consists of two parts. The first part, sections 3.1–3.3, contains the basic discussion of variable constraint effects, and should not be skipped. The second part, sections 3.4–3.5, is concerned with ways of avoiding variable constraint effects. The second part is a bit more specialized than the first part. I don't really think the second part should be skipped, but admittedly skipping it doesn't affect the main story line.

In chapter 4, the only thing that can be skipped is the compositional derivation of *more than half of the boys* and the final section, 4.8, on collectivity, which is, again, for the specialists.

Chapters 5 and 6 are the heart of the book. The technical heart is the operation of flip-flop in section 5.2. While this section may look difficult, I think it is less difficult than it looks. It can certainly not be skipped. The discussion of maximalization in section 5.3, which starts one page into the section, is very technical and difficult. In presentations based on the book I have alternated between the "Amsterdam" version, which presents basically chapters 1 to 5, ending with section 5.3, and the "Utrecht" version, which presents chapters 1 to 6, skipping section 5.3 (except for the first page). The maximalization part of section 5.3 is, in a way, the official implementation of the ideas expressed in section 2.5. On the assumption that the reader has read section 2.5, it is possible (though hazardous) for the reader to take the incorporation of these ideas into my event theory for granted, and skip to the next bit (section 5.4). Note that I am not advising readers to skip this part of section 5.3, but I will let them get away with it.

Several sections in chapter 6 are at the same technical level as section 5.2: that is, on going through them carefully, they turn out to be less difficult than they look at first sight. This is not the case for section 6.2, on predicate formation. The scope shift mechanism introduced there is just difficult. And the section cannot be skipped, because it is an essential part in the theory developed. This, then, is another seatbelt section. Sections 6.6 and 6.7 are, once again, "icing" sections, where 6.6 is more syntactically oriented, while 6.7 is more spiritual. Both can be skipped, though neither is technically difficult.

Chapter 7 addresses syntactic questions, and questions about the syntax–semantics interface. This chapter can be skipped by some more semantically oriented specialists (i.e. the ones who want to get to chapter 11 as soon as they can).

Chapter 8 consists of two parts. The first part, sections 8.1–8.4, presents the basic account of negative noun phrases. This part is not difficult and cannot be skipped. The second part, sections 8.5–8.6, deals with some complex cases. This part is **very** difficult, and meant for the fearless specialist.

While chapters 1 to 8 present the basic theory, chapters 9, 10, and 11 present further developments of the theory. However, even for those who only want to get to know the basic theory, I would advise reading sections 9.1 and 9.2 as well. These sections present the analysis of *have* and relational indefinites. The analysis in 9.2 is not easy, but should give way on careful study.

Section 9.3 concerns verbs of change of possession. Here 9.3.1 and 9.3.2 are not particularly difficult, while 9.3.3, containing the ultimate analysis, is, unfortunately, very difficult. Thus, 9.3 should be approached with caution. I am not saying by this that 9.3 is for the specialist only. The data discussed in 9.3 are fascinating, and should be of interest to anyone. But the semantic analysis they entail is complex. I can't help it.

Chapter 10, on definite *time* adverbials, is maybe a bit difficult, though not really more difficult than the papers by Rothstein (1995) and Grosu and Landman (1998) that it discusses.

Chapter 11, on indefinite *time* adverbials, is **hair-raisingly** difficult, and should only be approached with a long stick through heavy metal bars. It's very beautiful, though.

Introduction

In this introduction, I will call nominal expressions as they occur in argument position or predicate position **determiner phrases**, DPs. Thus, the italic phrases in (1) are determiner phrases: in argument position in (1a), in predicate position in (1b).

(1)a. *Most girls*/*the three girls*/*at most three girls* played in the street.
b. At the party, the guests were *the girls from Dafna's class*/*at least three girls*.

The usage of the word **noun phrase**, NP, I will restrict here to nominal phrases inside determiner phrases. Thus, I will call the noun *girls* as it occurs in the expression *the three girls* a noun phrase, and I will call the phrase *three girls* in the same expression a noun phrase as well. The expression *the three girls* I will not here call a noun phrase. (This terminological purism will not extend into the book itself, though.)

This brings in a question about the expression *at least three girls* in (1b). It is a determiner phrase, since it occurs in predicate position, but *at least three girls* also occurs in it: the latter occurrence should be a noun phrase. I will avoid this conclusion by writing *Ø at least three girls* for the determiner phrase containing an empty determiner Ø and the noun phrase *at least three girls*.

I realize quite well that one can hardly adopt such terminology without committing oneself to a version of the theory of noun phrase structure underlying the terminology. I will gladly commit myself to some version of that theory in the chapters of this book (especially in chapters 1 and 2), and explain which aspects I feel strongly about (the NP–DP distinction), and which I am less strongly committed to (the extensive use of empty categories). But you can forget about this for the moment: at this stage, the only thing I need is terminological clarity.

Chapter 1 concerns the semantics of numerical noun phrases, like the noun phrase *three girls* inside the determiner phrase *the three girls*. The chapter gives an exposition of the theory of plurality, started in the work of Godehard Link (see Link 1983), in which the semantic domain of individuals forms a complete atomic Boolean algebra of singular individuals (atoms) and plural individuals (their sums), singular nouns denote sets of atoms, and pluralization is closure

under sum. It is argued that this framework provides a natural and elegant setting for analyzing numerical phrases like *three, at most three,* and *at least three* semantically as intersective adjectives. This means that they are semantically analyzed as sets (of singularities and pluralities) that combine with the interpretation of the head noun phrase (which is also a set) through intersection. More precisely, the set interpretation of the numerical phrase shifts with the type shifting operation of **adjunction** to a modifier interpretation as a function from sets to sets (the function which maps the set denoted by the numerical phrase and any input set onto the intersection of the two). This means, then, that the noun phrase *three girls* in *the three girls* is itself interpreted at the type of sets. This we can call the **Adjectival Theory of Numerical Noun Phrases**. This analysis is hardly controversial: the adjectival behavior of numerical phrases inside determiner phrases has long been noted. To get the discussion off the ground, the first chapter discusses some solid evidence that favors the Adjectival Theory of Numerical Noun Phrases over some alternative analyses, like the ones presented by Barwise and Cooper (1981) and Keenan (1987).

This book is not concerned with the Adjectival Theory of Numerical Noun Phrases, but with the Adjectival Theory of Numerical, or more generally, Indefinite **Determiner Phrases**. Chapter 2 is concerned with the semantics of determiner phrases in argument position and in predicate position, the different interpretations that these expressions have in these positions, and the relations between these interpretations. The chapter argues (among other things) for a mismatch between the syntax and the semantics of the expressions in question:

1. There are systematic syntactic differences between numerical noun phrases and numerical determiner phrases, which are easy to account for if the first are indeed NPs and the second DPs. There are no detectable syntactic differences between numerical determiner phrases in argument or in predicate position. Thus, syntactically, predicates and arguments are DPs.
2. There are systematic semantic differences between numerical, or more generally, indefinite determiner phrases in argument position and in predicate position.
3. There are no semantic differences between numerical determiner phrases in predicate position and numerical noun phrases: numerical determiner phrases in predicate position and numerical noun phrases have the same semantics.

The Adjectival Theory of Indefinite Determiner Phrases takes the third fact as its starting point. Chapter 1 argues that numerical noun phrases have a set interpretation. Numerical determiner phrases in predicate position have the same semantics as numerical noun phrases. The null assumption would be that this is the case, because the process of forming a DP from the NP is semantically interpreted as identity. Since, with fact one, there is no syntactic difference between numerical determiner phrases in predicate or in argument position,

it follows that numerical determiner phrases are generated as expressions with an interpretation at the type of sets. Once we have drawn this conclusion, we generalize this to indefinite determiner phrases in general, and we get the **Adjectival Theory of Indefinite Determiner Phrases**: indefinite determiner phrases are generated with their interpretation at the type of sets.

More generally, the Adjectival Theory assumes that different determiner phrases are generated with interpretations at different semantic types:

- **definite determiner phrases**, like *the three girls*, are generated with an interpretation at the type of individuals (type d);
- **indefinite determiner phrases**, like *Ø three girls*, are generated with an interpretation at the type of sets of individuals (type <d,t>);
- **quantificational determiner phrases**, like *every girl*, are generated with an interpretation at the type of generalized quantifiers over individuals (type <<d,t>,t>);

With Partee (1987), the assumption is that types d and <<d,t>,t> are appropriate types for argument interpretations, while <d,t> is the appropriate type for predicate interpretations. In the Adjectival Theory, quantificational determiner phrases and definites are generated with interpretations appropriate for argument interpretations, while indefinites are generated with interpretations appropriate for predicate interpretations.

But, of course, definites have predicate interpretations as well, and indefinites have argument interpretations as well. Following Partee (1987), we will assume that this is a matter of **type shifting**: the grammar contains a **type shifting theory**, a set of type shifting operations. These operations represent systematic interpretation shifts of expressions. Basically, the type shifting theory tells you which interpretation shifts are available to the grammar without cost. For determiner phrases, the relevant type shifting operations are discussed in Partee (1987): definites can shift from the argument type of individuals to the argument type of generalized quantifiers with the operation LIFT; definites can shift from the argument type of individuals to the predicate type with the operation IDENT; indefinites and definites can shift from the predicate type to the argument type of generalized quantifiers with the operation EC.

Unlike Partee's theory, the Adjectival Theory, in this version, has only lifting operations. This means that quantificational determiner phrases do not have default predicate interpretations. This aspect of the Adjectival Theory plays a crucial role throughout this book.

Traditionally (e.g. in the work of Montague 1973 and Partee 1987), predicate interpretations of determiner phrases are derived from argument interpretations, and it is assumed that the alternative strategy of deriving argument interpretations from predicate interpretations is logically untenable. This alternative strategy is, of course, precisely the Adjectival Theory of Indefinite Determiner Phrases, so traditionally it is assumed that the Adjectival Theory is logically untenable. The bulk of chapter 2 compares these two strategies.

It is argued that the logical problems facing the Adjectival Theory can be solved in a general way, by using the theory of event maximalization developed in Landman (2000). The resulting theory is logically coherent, but at the cost of some complexity, or more precisely, non-uniformity: not all noun phrases are analyzed semantically in exactly the same way. I argue that this is hardly a disadvantage, because I show that the Classical analysis – and, in fact, any analysis – must be complex and non-uniform in analogous ways. Ultimately, then, we are comparing two ways of setting up the grammar that are both logically coherent and complex. In a point by point comparison it is argued that the evidence actually favours the Adjectival Theory.

In chapter 3 I argue that the interpretation of determiner phrases in predicate position is sensitive to a constraint on variables. The issue is theory independent: e.g. the Classical Theory is as much in need of a constraint here as the Adjectival Theory. The constraint I propose is formulated in terms of type shifting: the **Variable Constraint** says that **variables** cannot be shifted from type a of a-individuals to the corresponding type <a,t> of sets of a-individuals. The chapter discusses the effects of the constraint, and the available ways the grammar has to circumvent it (in particular, functional readings).

The importance of the Variable Constraint in this book is the following: the Variable Constraint, in combination with the Adjectival Theory, predicts a battery of semantic effects for determiner phrases with interpretations generated at the type of sets <a,t>. The most obvious context where this is relevant is predicate position, but, importantly, the theory predicts similar effects for any position where the interpretation is based on the type of sets.

The Adjectival Theory together with the Variable Constraint makes the following predictions for predicate position:

1. by default, quantificational determiner phrases are infelicitous in predicate position;
2. by default, determiner phrases filling predicate position cannot be given wide scope;
3. by default, relativization with the gap in predicate position is infelicitous;
4. by default, wh-questioning with the gap in predicate position is infelicitous.

In all these cases I say "by default" because the theory only predicts the relevant infelicity if and when the Variable Constraint is violated. The chapter discusses various situations where the grammar provides "rescue mechanisms," ways of avoiding conflict with the variable constraint, leading to certain types of examples which are felicitous.

At this point, *there*-insertion constructions enter the stage, and the well-known contrast in (2):

(2)a. #There was *every girl* in the garden.
b. #There were *the three girls* in the garden.
c. There were *three girls* in the garden.

Let us, for the sake of this introduction, call *there* in the examples in (2) the **temporary subject** and the italic phrases the **delayed subjects**. The crucial observation is that, in these constructions, delayed subjects show exactly the same Variable Constraint effects as we find for determiner phrases in predicate position (i.e. 1–4 above), plus a definiteness effect:

5. By default, definite noun phrases are infelicitous as delayed subjects.

This means that given the Adjectival Theory with the Variable Constraint, there is every reason to assume that delayed subjects have an interpretation based on the type of sets.

Higginbotham (1987) and others have made a more precise assumption: they assume that *there*-insertion constructions are in fact predicate constructions, with the delayed subject being the predicate. I argue that this analysis is untenable when you look cross-linguistically: e.g. Dutch allows delayed subjects in any kind of verbal or predicative construction, and it just will not do to argue that these must be reanalyzed as structures in which the delayed subject is the predicate.

This brings us to chapter 4 where the main idea underlining the analysis of *there*-insertion constructions is proposed:

Proposal:

1. Delayed subjects are neither arguments nor predicates. They are **intersective adjuncts**: under certain circumstances determiner phrases with an interpretation at the type of sets can shift to delayed subjects with an interpretation as an intersective adjunct.

The interpretation of intersective adjuncts (like adjectives and adverbials) is accessed from the type of sets: the types of intersective adjuncts are derived from the type of sets through the general type shifting operation ADJOIN (from type <a,t> to types $<<b^n,<a,t>>,<b^n,<a,t>>$). It is shown that the Variable Constraint effects 1–4 for delayed subjects follow straightforwardly from this. The definiteness effect 5 does not as this requires a separate stipulation:

Proposal:

2. Only determiner phrases with an interpretation generated at the type of sets can shift to delayed subjects with an intersective adjunct interpretation.

This means that **indefinite** determiner phrases in delayed subject position can receive an interpretation as an intersective adjunct. While **definite** determiner phrases can receive a set interpretation in predicate position, they cannot receive an interpretation as an intersective adjunct in delayed subject position. **Quantificational** determiner phrases are already infelicitous in predicate position, so *a fortiori* they are infelicitous as delayed subjects.

The details of this proposal are worked out in later chapters. But first in chapter 4 alternative accounts of the Definiteness Effect are discussed, accounts

based on a distinction between weak and strong determiner phrases. Such theories propose a semantic criterion (strength) that distinguishes definites and quantificational expressions from indefinites. Two kinds of theories are discussed: those that identify strength with **presuppositionality**, and those that identify weakness with **symmetry**.

Several arguments against such theories are discussed. For a start, we can already see from the above discussion that the weak–strong contrast puts the dividing line at the wrong place: it groups together definites and quantificational expressions, and separates out indefinites. But the parallel with predicate position shows that the major dividing line lies first between quantificational expressions and the rest, and only then between definites and indefinites.

The discussion of presuppositionality argues in two direction: it is shown that there are many types of quantificational expressions and definites which are arguably not presuppositional, but are nevertheless infelicitous as delayed subjects; vice versa, it is shown that there are indefinites which are arguably presuppositional, which are felicitous, or only slightly infelicitous as delayed subjects. Hence the effects of presuppositionality are not strong enough to explain the robust infelicity of the quantificational expressions and definites as delayed subjects.

The case against symmetry has some discussion of Dutch *sommige* (*some*), which is arguably symmetric, but infelicitous in predicative contexts and as delayed subjects. The more important case is the comparison between *most boys* and *more than half of the boys*. While *most boys* is infelicitous in predicative position and as delayed subject, *more than half of the boys* is fine in both contexts. But not only is *more than half of the boys* arguably non-symmetric, again arguably it has exactly the same argument interpretation as *most boys*. These facts are not just problematic for accounts identifying weakness with symmetry, but in fact for any account based on a semantically interpreted weak–strong distinction.

Chapter 5 provides the basics of my account of delayed subjects. Above, I already indicated how assuming that delayed subjects are adjuncts gives you the Variable Constraint effects and the definiteness effects. The question to be answered is: how can determiner phrases in the position of delayed subjects be adjuncts? Normally determiner phrases are not licensed in adjunct position. Why can they occur as adjuncts here?

The first step lies in a modification of what in syntax is called **Theta Theory**. Classical formulations of Theta Theory assume that determiner phrases must receive a thematic role, and can receive such a role in argument position, but not in adjunct position. I replace the latter assumption by a semantic constraint, which, I argue, has by and large the same effect: a role can only be assigned to a constituent if in the semantic interpretation of the complex the interpretation of that constituent restricts the value of that role in the appropriate way. I argue that in the normal case, this semantic constraint is satisfied if the constituent is in argument position, but not if it is in adjunct position. The second step will be to argue that the constraint is actually satisfied in the delayed subject position. In this chapter, I analyze the Dutch case in (3) (postponing the English cases to chapter 6).

(3) (dat) er een meisje zingt.
that there a girl sings

My proposal is that the determiner phrase *een meisje* in (3) is an adjunct on the verbal predicate *zingt*. But, and this is the crux of the matter, there is a type mismatch: the determiner phrase is of the type of sets of individuals, <d,t>, while the type of the verbal predicate is <d,<e,t>>, functions from individuals into sets of events. While the type shifting operation ADJUNCT can shift expressions denoting sets of individuals into modifiers of (functions from entities into) sets of individuals, it cannot shift them into modifiers of (functions from entities into) sets of events. Thus, type shifting is needed to resolve this mismatch. The mechanism I propose, which I call **flip–flop**, shifts the interpretation of the verbal predicate from type <d,<e,t>> to type <e,<d,t>> (and back), allowing the adjunction.

I argue that this mechanism has several pleasing features: it uses an operation which is well attested in the semantics of passive; it can only operate high in the tree, at the level of one-place predicates (so you only get delayed subjects, not delayed objects); and importantly, it satisfies the constraint on thematic role assignment: i.e. exceptionally in adjunct position, the interpretation of these adjuncts will constrain the thematic role in the correct way, hence the role can be assigned to them.

Having successfully adjoined the determiner phrase as a delayed subject, I discuss what happens higher in the tree. Since the subject thematic role has already been assigned to the delayed subject, no more role can be assigned to the external subject position. Since normal determiner phrases cannot occur in this position unless they are thematically licensed, the position must be filled by a non-thematic determiner phrase, also called a pleonastic.

Two more things are done in chapter 5:

- The semantics of (3), with an adjoined subject and a pleonastic subject, is worked out by showing how it fits in the general theory of sentence interpretation with event maximalization of Landman (2000).
- Some thoughts are developed about the syntax of non-thematic determiner phrases, and their distribution in Dutch, German, English, and French. It is argued that the distribution of non-thematic determiner phrases in these languages is fruitfully characterized by assuming an ordered set of non-thematic determiner phrases {empty, last resort}, of which "empty" must be syntactically licensed (with parametric differences), and a non-thematic adverb (*there* in English) which can license "empty" (and of which the availability is parametrized). Thus, *there* is not a pleonastic determiner phrase: the pleonastic determiner phrase is [$_{DP}$ *there* [$_{DP}$ empty]]; *there* itself is an adverb.

Chapter 6 deals with the nature of the predicates that allow adjoined subjects. It already basically follows from the nature of flip–flop that only semantically one-place predicates allow adjoined subjects. This means that the delayed

subject cannot be adjoined below the VP level, say, directly to a transitive verb, because it's at the VP level that the interpretation reaches the stage of a one-place predicate.

It has long been known that in English (and French), adjoined subjects are allowed with (certain) unaccusative verbs and passives and with episodic predicates, but not with unergative verbs, transitive verbs, and not with non-episodic predicates. As is well known, in Dutch (and German), adjoined subjects are allowed basically with any verb (like the unergative verb *sing* in (3) above). I argue in chapter 6 that Dutch adjoined subjects are not sensitive to the episodic–non-episodic distinction either: you find felicitous adjoined subjects with non-episodic predicates as well (where the English counterpart is clearly infelicitous).

I take from Rothstein (2001) and Chierchia (1989) the distinction between **unsaturated** and **saturated** one-place predicates – which I formalize within the current event theory as a typal distinction between one-place predicates of type <d,<e,t>> (functions from individuals into sets of events) and of type <e,t> (sets of events) – and I take from them the assumption that the grammatical derivation at the level of the VP must go through a stage where the VP is interpreted as an unsaturated predicate (meaning that if it isn't, it must be shifted into one). Then I propose that while all verbs and predicates are derived with unsaturated interpretations (in which the argument structure is explicit in the type), unaccusatives, passives, and episodic predicates allow a second derivation with a saturated interpretation (in which the argument structure is typally implicit). The differences between Dutch and German on the one hand, and English and French on the other then lie in a semantic parameter: Dutch and German allow adjoined subjects for one-place predicates, both saturated and unsaturated, while English and French only allow adjoined subjects for saturated predicates.

There is a large literature on the syntax of Dutch *er*-insertion contexts. In chapter 7 I discuss, in relation to the present proposal, some of the pertinent issues that have been raised. On my proposal, the indefinite is adjoined to VP, while *er*, when present, is adjoined to an empty non-thematic DP in the external subject position.

I argue that there is strong evidence that the indefinite is inside the VP and that *er*, when present, is inside the external subject position. Concerning the indefinite, I argue that you can't really tell whether the indefinite is syntactically adjoined to VP, or in a syntactic VP-internal subject position, if you allow that the latter is semantically adjoined. Since I have shown how the adjoined indefinite is naturally thematically licensed in an adjoined position, I prefer to maintain here the connection between syntactic and semantic adjunction. Concerning *er*, I argue, against Bennis (1986), that *er* patterns with subjects and not with adverbials in normal adverbial position. But I agree with Bennis that we don't want to identify *er* with the subject: *er* is an adverbial, and adverbials do not make good subjects of the verbs they occur with (we need a DP). The proposal that *er* is adjoined to a non-thematic DP allows us to make the adverbial nature of *er* consistent with its distribution.

The other main issue discussed in this chapter is what has been called "semantic partitioning": the assumption that syntactic positions inside the VP are necessarily marked as "semantically weak," while positions outside the VP are marked as "semantically strong." I argue that some of the observed effects will follow from anybody's theory: anybody who assumes some correlation between the external subject position and a notion of topic will predict at least weak, pragmatic effects of "strength" for indefinites in the external subject position, and "weakness" for adjoined indefinites. Semantic partitioning assumes more: it assumes a grammatical correlation between these syntactic positions and semantic notions of weak and strong. I argue that this theory, insofar as it is testable, is false, and that attempts to remove the falsehood move it into the domain of the untestable.

Chapter 8 deals with problems of negative noun phrases, like *no girls*. The theory of event maximalization developed in Landman (2000), and modified in the present book in chapters 2 and 5, provides a semantics for a wide range of determiner phrases in argument position, predicate position, and adjoined position, including downward entailing ones like *at most three girls*. But it doesn't account for the semantics of negative determiner phrases, and in particular not for adjoined negative determiner phrases in *there*-insertion constructions. I argue in chapter 8 that an approach that will provide a correct semantics for negative noun phrases has long been proposed in the literature; I call it **semantic break-up**: the negative noun phrase is separated in a negation and an indefinite noun phrase (i.e. *no(t)* and *girls*), and the negation takes its scope independently from the remainder indefinite noun phrase. I argue that, while this approach may at first sight seem *ad hoc*, there are a lot of arguments in its favor, among which are several semantic arguments. I formulate the operation of semantic break-up as a type driven storage and retrieval operation (a negation of type <t,t> must be stored if the types do not match, and must be retrieved as soon as the types do match); I show how it accounts for negative determiner phrases in argument position, predicate position, and adjoined position; and I work out an account for various highly complex problems, like the problem of negative determiner phrases inside conjunctions, and negative noun phrases modified by *almost* and exception phrases.

With this, the discussion of *there*-insertion constructions ends. The remaining three chapters deal with definiteness effects in other constructions.

Chapter 9 deals with definiteness effects of relational determiner phrases. I argue that there are two connected sets of facts here. In the first place, with verbs like *have* relational determiner phrases show definiteness effects, as in (4):

(4)a. John has *a sister* in the army.
b. #John has *the sister* in the army.

Secondly, in this construction the verb *have* does not have its normal possessive meaning – I call this de-thematicization: the verb phrase *have a sister* takes over the relational meaning from the determiner phrase (the property you have if

someone stands in the sister relation to you). These two properties pattern together with *have*: if the determiner phrase is not a relation, definiteness effects do not show up, and neither does de-thematicization: both (5a) and (5b) are felicitous and possessive:

(5)a. John has *a car*.
b. John has *the car*.

These two characteristics make the *have* constructions quite different from *there*-insertion constructions, and for that reason I argue that it is not attractive to try to reduce the analysis of *have* constructions to that for *there*-insertion contexts.

Nevertheless, my account relies crucially on the Adjectival Theory in which **relational** indefinites are generated at the type <d,<d,t>> of relations.

The analysis starts with the assumption that the possessive meaning of *have* can be de-thematicized: *have* loses its possessive meaning, and with that its thematic roles. As a consequence, it can no longer take a normal object noun phrase. In comes the Adjectival Theory. The relational indefinite is of type <d,<d,t>>, the type of relations between individuals. By the general process developed in Landman (2000), and already used in chapter 6, it can shift its interpretation to the Davidsonian type <d,<d,<e,t>>>, which is exactly the type of *have*. The two interpretations now combine through **semantic incorporation**, which is basically simply intersection (through which the complex receives the interpretation of the relational indefinite) and re-thematicization as a one-place predicate, meaning in essence that a thematic role for the subject is created.

I argue further that verbs of change of possession, like *buy* and *sell*, show systematic de-thematicized readings with relational indefinites as well, though not definiteness effects. These facts are accounted for if we assume that these verbs have as part of their meaning the same possession meaning that *have* has (basically, the notions of source and goal are reanalyzed along these lines). The facts discussed follow if we assume that this possession part can be similarly de-thematicized, and re-thematicized by the relational indefinite.

Chapters 10 and 11 deal with determiner phrases with *time* occurring in adverbial position. There are two types that pattern differently. In chapter 10, I argue that definite expressions like *every time the bell rang* are based on a maximalizing relative clause (in the sense of Grosu and Landman 1998) with a relativization gap based on the type of degrees.

I argue that this allows a derivation where the whole expression *every time the bell rang* denotes a degree on events (just as *three* is a degree on objects). I assume that the expression, though it looks like a determiner phrase (and hence shouldn't be able to occur in adverbial position), actually is syntactically formed with a null measure, so the full phrase is actually not a determiner phrase, but an adverbial measure phrase. The null adverbial measure I call CANTOR, and it relates to the (equally null) nominal measure CARDINALITY. Whereas CARDINALITY directly specifies the number of atoms of a sum, CANTOR

measures the cardinality of a sum of events in terms of one–one mappings with a given sum of events. This account predicts (correctly) that adverbial definite *time* expressions count main-clause events indirectly (through one–one mappings), and it accounts for the "mapping" effects of these expressions, discussed in Rothstein (1995).

In chapter 11, I discuss adverbial indefinite *time* determiner phrases like *three times*. I argue that, unlike the definite cases discussed in chapter 10, these phrases count main-clause events directly. The simplest idea would be to assume that these phrases do in the adverbial domain what adjectival numericals, like *three*, do in the nominal domain. But I show, with some facts first discussed by Jenny Doetjes (Doetjes 1997), that such an account is too simple: the adverbial phrases introduce scopal relations that the nominal cases do not (meaning that the adverbial phrases are not simply intersective).

In my analysis, the scopal effects come in through the semantics of *time*. I argue that *time* is not a normal noun, but in fact a **classifier**. Classifiers shift between semantic domains (for instance, from mass to count). The classifier *time* shifts non-atomic sums of events to corresponding atomic group-events. This means that the scopal effect is actually a **gridding** effect.

Classifiers typically take complements, and I assume that in adverbial *three times*, *times* does takes a complement and that complement is a gap of the category PRED/PRED (in the sense of categorial grammar). This means, following standard assumptions in categorial grammar, that the expression *three times* is in fact not a DP, but a DP/PRED. In comes the Adjectival Theory again. For indefinite noun phrases (and only them), the type of this DP/PRED is a predicate modifier type, and I write this into the category as DP[PRED]/PRED. This is semantically a perfectly legitimate adverbial category, which combines with a predicate to give a predicate.

On the analysis developed, what looks like a determiner phrase in adverbial position is in fact not a determiner phrase, but a perfectly legitimate adverbial expression. This expression has indeed the semantics of a direct counter: it directly counts main clause events. At the same time, through the classifier, the counting is gridded, which means that the expression shows the correct scopal effects.