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Indefinites and Binding: from Specificity to Incorporation

— Lecture Notes, Revised Version —

Ágnes Bende-Farkas and Hans Kamp

Stuttgart University
e-mail: {agnes,hans}@ims.uni-stuttgart.de
URL: http://www.ims.uni-stuttgart.de/˜{agnes,hans}

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Preface

These notes are an updated and expanded version of those we submitted in advance of the course we offered at the 2001 ESSLLI Summer School (Helsinki, 19-23 August 2001). They are intended neither as a paper nor as the beginnings of a book; we are aware that publication in some such form would require a very substantial amount of additional work.

The purpose of the course (and, by extension, of these notes, which contain all that we were able to say during the five sessions of which the course consisted, and a little more) was to provide an overview of the different uses that we find in natural language "indefinite noun phrases". These range from "specific" uses in the strong sense of the word, which are understood as designating some particular thing the speaker has in mind, to cases of "incorporation", where it looks as if all that the indefinite contributes to the clause in which it occurs is its descriptive content.

There are many problems which this spectrum of posible functions poses. First, the linguist is faced with the enormous task of describing the possible uses of different types of indefinite *NP*s in different human languages in a systematic and theoretically perspicuous form. In this regard the syntax, semantics and pragmatics of indefinites don't differ fundamentally from what one encounters when attempting an in-depth cross-linguistic description of any other cluster of linguistic phenomena. The anaylsis of indefinites, however, is surely among the more challenging tasks of this kind.

In addition, indefinites also pose problems of a more abstract and, especially, methodological sort. First, it is, in view of the plurality of purposes to which "indefinite" NPs can be put, a non-trivial question what should be the criteria according to which a certain form of NP of some natural language L qualifies as an "indefinite" in the first place. Secondly, and even more importantly, there is the question which aspects of natural language interpretation are responsible for assigning indeifnites the various functions which have been associated with them; and in particular what of this has to do with the pragmatics of utterance interpretation and what belongs to semantics in a narrow sense of the term.

In this regard there seems to be a rough difference between the uses towards the "incorporation" end of the spectrum and those towards the "specificity" end. While the latter seem to involve a stage in the interpretation process which is heavily influenced by pragmatic principles (and which therefore arguably lies beyond the level of semantics proper), the former "uses" appear to be the effect of interactions at the level of lexical and supra-lexical semantics and syntax, and their explanation thus belongs to the syntax-semantics interface narrowly conceived. Inasmuch as this assessment is right, the study of indefinites is of importance not only in its own right, but also because it provides illuminating input towards quite general questions about the over-all architecture of linguistic theory. We hope that these notes will succeed in conveying some of our own sense of this two-fold importance.

Every form of serious linguistics needs a formal framework in which it can express the analyses it proposes of individual cases as well as the general hypotheses it wants to put forward. The framework we have chosen is that of DRT. There are several reasons for this choice. On the one hand much of what we have to say about specificity has to do with how the specific uses of indefinites are connected with features of the corresponding mental states of speaker and recipient. The integrated formalism for the description of linguistic and mental content that has been developed within DRT seems to be well-suited for this task. On the other hand, the account we will propose for incorporation-like occurrences of indefinites will be based on a unification-based conception of the compositional process which "computes" the semantic values (or representations thereof) of complex expressions form the semantic values (or their representations) of their parts. Here too, a version of DRT, in which the composition proces is described in unification-based form, suits the particular needs of our proposals well (and better than other formulations of the syntax-semantics interface with which we are familiar).

The same temporal limitations that we would like to make responsible for at least some of the flaws that the reader will no doubt detect in this document also made it necessary to partition the subject matter between us. The result has been that the first author (ÁBF) was responsible for the second part of these notes (Chs. 4 & 5), and the second author (HK), for the first three (Chs.1-3). Our joint responsibility is for the whole of it. But the actual planning and writing of the chapters we divided up between us in the indicated way.

Indefinites are a topic that every linguist or philosopher of language spends some time of his life worrying about (or trying very hard not to worry about). Such has been true of us no less than of anyone else, and in the course of our linguistic and philosophical lives we have talked to and learned from very, very many of our colleagues and friends. They cannot all be named and thanked here. But there are five people who have helped us especially, and in particular during the time when we were actively engaged in preparing for the ESSLLI course, then delivering it and finally winding up the present notes in its aftermath. They are: Donka Farkas, Peter Krause, Bernhard Schwarz, Henriette de Swart and Ede Zimmermann.

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Ágnes Bende-Farkas & Hans Kamp

Chapter 1

Introduction

1.1 What Are Indefinites and What Are They for?

Indefinite noun phrases serve a number of different functions. These functions form a kind of spectrum, with the so-called specific uses of indefinites at one end and those which linguists treat as cases of incorporation on the other. The purpose of these lectures is to look into a number of these functions, and to do this by considering a range of different languages (though the number of languages will be modest when compared with many current crosslinguistic investigations). In the course of this we hope not only to draw your attention to how the different uses of indefinites differ, but also to go some way towards an explanation of why it should be that indefinites cover this range.

A paradigm example of the specific use of indefinites is an utterance of (1.1),

(1.1) Mary believes that her husband is seeing a real estate agent.

where the speaker attributes to the subject *Mary* a belief concerning some specific individual, which the speaker describes as a real estate agent. Such beliefs are sometimes called "*de re*" (with respect to the individual x in question), a term which we will also use.

In English, the most typical examples of indefinites which in recent years have been treated as cases of incorporation are bare plural *NP*s, as in (1.2).

(1.2) *a.* Bill is looking for mushrooms.
b. Mary collects stamps.
c. Fred discovered fresh tracks.

(1.2a) and (1.2b) invite paraphrases like "BIll is engaged in mushroom-hunting" and "One of Mary's hobbies/activities is stamp-collecting." In these paraphrases the "incorporation" (of the noun into the verb) is directly visible. These paraphrases suggest that the sentences are talking about certain kinds of looking and collecting, respectively, with the incorporated nouns telling us what kinds of looking and collecting are in question. Typical of many such sentences is that they are "opaque": They cannot be paraphrased as existential claims, such as *There are (some) mushrooms that Bill is looking for.* or *There are stamps that Mary collects.* (unless what is meant is that Mary collects stamps of a certain kind, e.g. those of the British Commonwealth, or only stamps with pictures of airplanes). In contrast with (1.2a) and (1.2b), (1.2c) does allow for an existential paraphrase: To say that Fred discovered fresh tracks is equivalent to saying that there were fresh tracks which he discovered. But in other respects (1.2c) is much like (1.2a) and (1.2b). More about this later.

In between the paradigmatic cases of the specific use of indefinites and the cases of incorporation there are a number of others. Notable in particular are partitive indefinites such as *one of the boys*, *two of the nectarines on the platter*, etc,. which talk about some member or subset of a determined collection, given by the definite *NP* embedded under the preposition *of*. (In a language such as Hungarian, such phrases have clearly distinct syntactic properties, but even in languages where this is not so, such as English, they have distinctive semantic/pragmatic properties.) There are other distinctions between uses and functions of indefinites that should be made as well, but these we will explain as we go along.

If the uses of indefinites cover such a range as this, then what *is* an indefinite noun phrase? This is a serious methodological question, especially if what is wanted is a characterisation that is *crosslinguistically* meaningful (i.e. applicable to a large number of different languages), which is what we need here. Phrases can be classified according to their form or according to function. For us a characterisation in terms of function would beg the question, since it is our aim in these lectures to sketch out the range of different functions that indefinites can serve. This leaves characterisations in terms of form. But such characterisations are problematic as well, first because it isn't clear how a linguistic form in one language should be identified with a form in some other language, and second because even in one single language we cannot expect all "indefinites" to be instances of a single form. (A first glimpse of this problem already showed up, inasmuch as our discussion of the examples (1.1) and (1.2) implied that *NP*s beginning with the indefinite article *a*, bare plurals and plural noun phrases beginning with a cardinal like *two* are all to be considered indefinite *NP*s of English.)

The way in which, we take it, linguistics has got around this quandary is to concentrate on one function — or, if you prefer, a small number of closely related ones — and to identify as the indefinite phrases of a given natural language L those which can be used in L to serve that particular function. This gives us a characterisation by form, and we can then ask of expressions of those forms for what other purposes they can be used as well. If one proceeds in this way, one finds that the phrases which qualify as the indefinites of different human languages according to the basic criterion will cover closely similar ranges of additional functions, although the alignment is by no means perfect.

The criterion which we will use, and which we believe to be in keeping with linguistic practice, is to take as the core function that of introducing the addressee to a new entity, which had not yet made its entry into the discourse before. Moreover, we will consider this core function only within the context of simple categorical sentences, in which all other noun phrases are referential phrases, such as proper names or demonstratives. Examples are given in (1.3).

(1.3) *a.* Bill bought a car yesterday.
b. Mary loves a stockbroker.
c. A student was looking for you this morning.

It is standard wisdom that each of the sentences in (1.3) has a translation into predicate logic in which the *NP*s beginning with *a* turn into existential quantifiers. For instance, the standard translation of (1.3a) has the form given in (1.4).

(1.4) $(\exists y)(car(y)\ \&\ bought(b, y))$

Indeed, it has long been a first rule of translating natural language into symbolic logic that phrases beginning with *a* are to be turned into existential quantifiers. As a general rule this is too simplistic, and much of the debate over indefinite *NP*s has been over what should be said about those cases where the first rule leads to the wrong results. But for simple sentences like those in (1.3) the rule is fine.

Behind the first rule lurks the intuition that indefinites express existential quantification. Note that this gives us a further criterion for indefiniteness: an indefinite *NP* is one which expresses existential quantification in simple categorical sentences. But on the face of it, this criterion is not the same as the one with which we started out, viz that indefinites are used to intrroduce new entities. We state the two criteria once more in (1.5).

(1.5) (*i*) An indefinite *NP* is one which in simple categorical sentences expresses existential quantification.
(*ii*) An indefinite *NP* is used to introduce new entities into the discourse.

While (1.5.i) and (1.5.ii) are not identical, there is an evident connection between them, and it is not surprising that they single out the same phrase types. For if it is the function of an indefinite to introduce a new entity, and to assert of it that it satisfies the (verbal) predicate of which it is an argument in the sentence, then the information that is thereby made available to the recipient is that there is something which satisfies the predicate. Conversely, a phrase which systematically expresses existential quantification couldn't have the function of referring to something already known, for if that were so, sentences containing the phrase would generally have stronger truth conditions, viz to the effect that some particular thing satisfies the predicate (and not only that there is something or other which does).

Although this argument is right in spirit, it fails to take an important part of the meaning of indefinites into account, viz the descriptive content of the noun (or common noun phrase) N' which combines with the article *a* to give the *NP*. As (1.4) makes clear, the truth conditions of (1.3a) aren't just that there is something that Bill bought, but that there is something that is a car and that he bought: Indefinite *NP*s express restricted existential quantification, with N' as restrictor. Similarly, when an indefinite is used to introduce a new entity, the N' serves to tell what kind of entity is in question. In other words, both (1.5.i) and (1.5.ii) should be understood in this more "restricted" sense. The equivalence argued for in the last paragraph will thus be preserved.

As a starting point for determining what the indefinite phrases of different natural languages are, we will rely, then, on the two closely related criteria in (1.5). When applied to English, these criteria, severally or jointly, single out as indefinites at least the following types of *NP*s:

(1.6) (*i*) singular *NP*s beginning with *a, some* or *one*;
(*ii*) bare plurals;
(*iii*) plural *NP*s beginning with
(a) a cardinal (*two, three*, ..)
or (b) one of a number of determiner-like words, such as: *some, many, several*, ...

The fact that the criteria single out as indefinites both bare plurals and the plural *NP*s mentioned under (1.6.iii) points towards one quite general complication of our topic. In other contexts bare plurals and the *NP*s of (1.6.iii) behave quite differently, they cover different parts of the spectrum of functions of which we spoke at the outset. In other words, English has apportioned different parts of the full range of possible uses of indefinites to indefinites of different forms. This we find in other languages too: By the core criteria there are several forms that qualify as indefinites; together these will cover (more or less) the entire range of possible functions, but not every form can be used for every function.

1.2 A Well-Known Challenge to the Claim that Indefinites Express Existential Quantification

In the early sixties Peter Geach drew attention to a number of puzzles having to do with the behaviour of pronouns in natural languages (cf. Geach (1962)). The most notorious of these puzzles is that of the so-called donkey sentences (so-called because of the example sentences which Geach had found in mediæval texts). Donkey sentences are sentences in which a pronoun is anaphoric to an indefinite *NP*, but where the simple binding mechanisms that are afforded by predicate logic do not give us the right logical form, if the indefinite is represented as an existential quantifier. Thus the sentences in (1.7) cannot be represented either as in (1.8) or as in (1.9):

(1.7) *a.* If Pedro owns a donkey, he beats it.
b. Every farmer who owns a donkey beats it.

(1.8) *a.* $(\exists y)(donkey(y)\ \&\ own(p,y) \rightarrow beat(p,y)$
b. $(\forall x)(farmer(x)\ \&\ (\exists y)(donkey(y)\ \&\ own(x,y)) \rightarrow beat(x,y))$

(1.9) *a.* $(\exists y)(donkey(y)\ \&\ (own(p,y) \rightarrow beat(p,y)))$
b. $(\exists y)(donkey(y)\ \&\ (\forall x)(farmer(x)\ \&\ own(x,y)) \rightarrow beat(x,y)))$

The formulas in (1.8) are "ill-formed" in that the last occurrences of y aren't bound; so the formulas do not express a proposition and do not define truth conditions. The formulas in (1.9) do not have this problem, but the truth conditions they identify are clearly wrong. For instance, (1.9a) will be true as soon as there exists any donkey which Pedro doesn't own; clearly this is not what (1.7a) means. It was assumed both by Geach and by the mediæval source from which he got this puzzle that the truth conditions of the sentences in (1.7) are as given in (1.10).

(1.10) *a.* $(\forall y)((donkey(y) \; \& \; (own(p, y)) \rightarrow beat(p, y))$
b. $(\forall x)(\forall y)((farmer(x) \; \& \; donkey(y) \; \& \; own(x, y)) \rightarrow beat(x, y))$

Part of the unending debate on the interpetation, truth conditions and logical form of donkey sentences which got under way for real in the late seventies, has been over the question whether donkey sentences have these truth conditions, according to which the effect of the indefinite *NP* amounts to that of a universal quantifier. This is not the place to retrace the arguments over this. And for present purposes it suffices to note that at least some utterances of donkey sentences convey such truth conditions, something on which, to our knowledge, there is no disagreement. The question then is: How can sentences of the form of those in (1.7) convey such truth conditions?

The various solutions to this puzzle that have been proposed to solve this question, and which have survived to this day, fall into two main groups, which can, we believe, be labelled without undue historical distortion as "E-type pronoun solutions" and "DRT-based solutions", respectively. Here is a brief characterisation of what these solutions come to in the case of (1.7a).

The E-type pronoun solution locates the problem of donkey sentences in the interpretation of the pronoun. The indefinite is interpreted in the "traditional" manner, i.e. as a device of existential quantification. And in (1.7a) this quantifier has, as the syntactic form of the sentence suggests, narrow scope with respect to the conditional. (That is, the scope of the quantifier is the antecedent of the conditional only, as in (1.8a), and not the entire conditional, as in (1.9a). The pronoun, however, is assigned a special interpetation, according to which it behaves as a kind of definite description. In the present case, the description that the pronoun should be considered as proxy for can be phrased as "the donkey or donkeys Pedro owns". Moreover, the verbal predicate of which the pronoun is an argument — here *owns* — must be interpreted distributively with respect to the denotation of this description. This means that if the denotation consists of several donkeys, then the predicate is true of every one of them. This leads to a logical form as in (1.11):

(1.11) $(\exists y)(donkey(y) \; \& \; own(p, y)(\forall y)(y \in (Tz)(donkey(z) \; \& \; own(p, z)) \rightarrow beat(p, y))$

One arguable draw-back of this approach is that it drives a wedge between donkey pronouns like the *it* of (1.7a) and "bound occurrences" of pronouns such as the *him* of (1.12a), whose logical form is given in (1.12b), with the pronoun translating directly into an occurrence of the variable x, which is then bound by the quantifier introduced by *no man*.

(1.12) *a.* No man loves a woman who admires him.
b. $\neg(\exists x)(man(x) \; \& \; (\exists y)(woman(y) \; \& \; admire(y, x) \; \& \; love(y, x))$

However, there are yet other occurrences of pronouns (such as in so-called paycheque sentences, like *The man who put his paycheque in the bank was wiser than the one who gave it to his mistress.*); so considerations of uniformity have to be handled with care.

The "DRT-based" solution is more radical, in that it involves a different type of logical form, and with it a different mode of "translation" from the syntactic structures of natural language sentences into such forms. On the other hand, "donkey pronouns" are treated as anaphoric devices yielding variables that are bound by quantifiers arising elsewhere in the sentence, much as we just saw in (1.12a). (So there is uniformity between the donkey pronouns in (1.7) and "bound" pronouns such as the *him* of (1.12a).) Part of the novelty of DRT is its treatment of indefinites, which are no longer translated as existential quantifiers in their own right, but rather as variables, which are **not** bound by some other operator in the sentence. In the case of (1.7a) this operator is connected with the conditional construction, in a way which is best explained in relation to the diagram in (1.13). (Such diagrams are graphic representations of the "formulas" of the representation formalism of DRT, and are called Discourse Representation Structures, or DRSs.)

(1.13)
$$\begin{array}{|c|}\hline p \\ \hline \textit{“Pedro”}(p) \\ \begin{array}{|c|}\hline y \\ \hline donkey(y) \\ own(p,y) \\ \hline \end{array} \;\Rightarrow\; \begin{array}{|c|}\hline v \\ \hline v = y \\ beat(p,v) \\ \hline \end{array} \\ \hline \end{array}$$

The relevant part of the structure in (1.13) is the implicational formula (or "DRS condition" in the terminology of DRT) at the bottom. The left hand box of this formula represents the antecedent of (1.7a). The variable y, which is contributed by the indefinite *a donkey*, has been introduced into the local "universe" (separated from the local conditions of the antecedent by the horizontal line). The right hand side box represents the consequent of the conditional. Here the pronoun *it* introduces its own variable v, which gets identified with the variable y from the indefinite — this is the effect of the anaphoric relation between the pronoun and its antecedent. The complex condition as a whole, consisting of the two boxes and the arrow between them, represents the following truth conditions: Any "situation" s which verifies the left hand side box — by making available a value d for y which satisfies the local conditions of the antecedent; so d has to be a donkey owned by Pedro — is part of a situation s' verifying the right hand side box. Such an extending situation s' will have to make available a value d' for v which satisfies the local conditions of the right hand side box; because of the condition $v = y$, d' must be the same as d, and the second condition then requires that d is beaten by Pedro.

The DRT-based solution to the semantics of sentences like (1.7a) thus rests on two deviations form the classical conception: (i) a different concept of logical form, with logical forms belonging to a formalism that differs from that of standard predicate logic, and with it a novel algorithm for translating natural language sentences into logical forms of that formalism; and (ii) a treatment of indefinites as introducing "free" variables, which are not bound on account of the indefinite itself, but will be bound by some other mechanism, connected with some other aspect of the translated sentence.

One of the motivations behind the DRT-based solution is the analogy between donkey pronouns and pronouns which are anaphoric to indefinite and other antecedents occurring in earlier sentences of the discourse. For instance, the approach sees a close relationship between (1.7a) and a discourse such as (1.14).

(1.14) Pedro owns a donkey. He beats it.

Most would agree that interpretation of (1.14) proceeds in two stages, first the interpretation of the first sentence and then that of the second one. For the interpetation of the second sentence it is crucial that it proceeds in the context provided by the first sentence, for only in this way is it possible to establish the cross-sentential anaphoric link; but there is nothing unusual about this, for sentence interpretation typically takes place within context, and often the immediately preceding discourse is a crucial component of that context. According to DRT (in its orginal form), the interpretation of the first sentence of (1.14) leads to a logical form which is quite similar to the left hand box in (1.13) . More exactly, it consists of the "merge" of this box and the information that is found at the top in (1.13) . This merge is given in (1.15).

(1.15)
$$\begin{array}{|c|}\hline p \qquad\qquad y \\ \hline \textit{“Pedro”}(p) \qquad donkey(y) \\ own(p,y) \\ \hline \end{array}$$

This logical form determines the same truth conditions as the predicate logic formula in (1.16):

(1.16) $(\exists p)(Pedro(p)\ \&\ (\exists y)(donkey(y)\ \&\ own(p,y)))$

Interpreting the second sentence of (1.14) in the context provided by (1.15) now permits making the same kind of link between the pronouns *he* and *it* and their antecedents *Pedro* and *a donkey* as in (1.13), resulting in the logical form (1.17):

(1.17)
$$\begin{array}{|c|}\hline u \qquad\qquad v \\ \hline \\ u = p \qquad v = y \\ beats(u,v) \\ \hline \end{array}$$

Merging (1.17) with (1.15) produces the logical form of the two-sentence discourse (1.14) :

(1.18)
$$\begin{array}{|cc|}\hline \multicolumn{2}{|c|}{p\ y\ u\ v} \\ \hline & \\ \text{“}Pedro\text{”}(p) \quad donkey(y) & u = p \quad v = y \\ own(p,y) & beats(u,v) \\ \hline \end{array}$$

The truth conditions of (1.18) are that there is a donkey which Pedro both owns and beats.

DRT thus offers a uniform treatment for the sentence-internal cases of anaphora one finds in donkey sentences and the trans-sentential cases of anaphora exemplified by (1.14). This, however, is a virtue which the E-type account can claim as well. And, in addition, the E-type account is immune to a certain objection against (1.18) as logical form for (1.14) . It has been observed that in order for a discourse like (1.14), with the pronoun *it* in the second sentence having the indefinite *NP a donkey* in the preceding sentence for its antecedent, is felicitous only if the speaker can uniquely identify an instance of the indefinite and intends the discourse to be about this individual. The DRT analysis of (1.14) we have just sketched does not account for this, witness the truth-conditions that (1.18) expresses. It is to be noted that a similar, though not identical, problem arises if the E-type analysis we gave for (1.7a) is applied unmodified to (1.14) . The result of such an unmodified application is to assign (1.14) the meaning that Pedro owns (at least) one donkey and that he beats all the donkeys he owns. This seems to be even farther removed from the intuitive meaning of (1.14) than the analysis we just gave. It is possible to do justice to the intuition just mentioned by interpreting the pronoun *it* as equivalent to the singular description *the donkey Pedro owns*. This description carries a uniqueness presupposition to the effect that there is no more than one donkey Pedro owns. So (1.14) as a whole will be felicitous only if this condition is fulfilled. But note that the use of this singular description to interpret the pronoun *it* of (1.7a) will impose a similar uniqueness presupposition there. We take there to be widespread agreement that this cannot be right in general.

There has been much argument over whether a discourse like (1.14) really does carry the mentioned uniqueness implication. Our own view of the matter is that inasmuch as this is so, it is something that is true only of discourses which are interpreted as “real world reports”; in fictional discourse there is no uniqueness effect with regard to the “fictional world” which the discourse describes. The upshot of this is, as we see it, that the DRT treatment captures the basic aspects of trans-sentential anaphora and donkey anaphora correctly, but that certain additional contraints are operative under certain conditions. Evidently, a full theory should account for these additional constraints too, but we believe that such a theory can be built upon the foundations of the DR-theoretical treatment just mentioned.

This is not to say that there are no pronouns which do not require an E-type treatment. We believe that something like an E-type analysis is needed for many plural pronouns. This is in accordance with what Evans, one of the originators of the E-type theory, said about examples like (1.19):

(1.19) John owns some sheep. Harry vaccinates them for him.

Evans observed that the prominent interpretation of (1.19) is that John owns some sheep and that Harry vaccinates all the sheep that John owns, and that what (1.19) does not mean is that there are some sheep which John owns and Harry vaccinates. (Which might be true also if Harry vaccinates only some of the sheep John owns.) Evans gets the intuitively right reading by interpreting the pronoun *they* as *the sheep John owns*. The DRT account of plural pronouns developed in Kamp and Reyle (1993), Ch. 4 offers just such an E-type treatment for plural pronouns like the one in (1.19); moreover, the account could easily be extended to singular pronouns. This leads to precisely the uniqueness presupposition we discussed in connection with (1.14). The problem is not so much whether this kind of uniqueness-presupposing analysis is available within a DRT-like setting, but rather in which cases it should be deployed.

Since DRT, like other forms of Dynamic Semantics, provides the basis for a dynamic theory of discourse interpretation, in which the interpetation of a discourse is the result of an incremental, sentence-by-sentence process of interpetation of the sentences of which the discourse is made up, and since we will have need of such an incremental theory of discourse semantics again and again in what we will have to say in this course, this is the framework we have adopted for what is to come.

Chapter 2

Formal Framework

This is not the place for an extensive résumé of DRT. We have provided some background reading material that should fill the gap for those who have seen little or no DRT before. However, even for those familiar with an introduction to DRT such as Kamp and Reyle (1993) — henceforth: F(rom) Disocurse) T(o) L(ogic) I, there are some aspects to the form of DRT we will be using here which ought to be pointed out explicitly. The most important differences between the framework we will be using and DRT à la FDTL I have to do with the treatment of presupposition.

The treatment of presupposition we will adopt here follows in essence Sandt (1992). With this treatment comes a fundamental change in the over-all architecture of DRT, which in fact brings it closer to a more traditional conception of the organisation of linguistic knowledge than was the case for the theory in its original form. Processing a sentence in the context of an interpretation of the preceding discourse now consists of two stages:

(*i.*) First a preliminary representation of the sentence is constructed, in which all its presuppositions are explicitly represented. This stage of the interpretation proceeds without reference to the discourse context.

(*ii.*) The second stage concerns the integration of the preliminary sentence interpretation with the context. (As in original DRT, we concentrate on that part of the context which is contributed by the antecedent discourse, and assume that this contribution is available in the form of a DRS representing the interpretation assigned to this part.) Integration takes the form of verifying that the presuppositions are satisfied, and, if they are not, to "accommodate" (i.e. modify) the context so as to make presupposition satisfaction perfect. If and when the presuppositions are satisfied, the non-presuppositional part of the sentence representation is merged with the context DRS. The result is an updated context DRS into which the contribution by the new sentence has been incorporated, just as in the original version of DRT.

This new architecture also takes care of pronominal anaphora, the phenomenon which was at the cenre of attention in original DRT (and, indeed, the principal motivation for its invention). This is because anaphora is — again following Van Der Sandt — treated as a form of presupposition. In general presuppositions are constraints which the current sentence imposes on the context in which it is used. Anaphoric expressions (pronouns, definite descriptions or whatever other definite *NP*s that can be used anaphorically) are like other presupposition triggers in that they too impose certain constraints on the context. With anaphoric expressions the presuppositional constraint is to the effect that the context must "saliently contain" an antecedent for the anaphoric expression. When the anaphoric expression is a pronoun, then "saliently containing" the antecedent usually amounts to the discourse context having an explicit representation of the antecedent. With other anaphoric expressions, such as definite descriptions, other modes of "saliently containing" are admissible as well (cf. in particular "bridging descriptions", such as *the clutch* in *My car broke down on the way home yesterday and had to be towed away. The clutch had finally given out completely. The clutch* here refers to the (unique) clutch of the car mentioned in the preceding sentence.)

To give an idea of how this new form of DRT works, we rework the two exmples on which we have so far concentrated, (1.7a) and (1.14), within it.

First (1.14). We assume for simplicity that the first sentence is interpreted within the empty discourse context Λ. Since we are assuming that all definite *NP*s (whether anaphoric or not) trigger presupppositions, this first sentence comes with a presupposition too, triggred by the proper name *Pedro*. A first occurrence of a proper name in a discourse comes with the presupposition that the addressee has some means of identifying, on independent grounds, who or what the referent of the name is. But this is the kind of presupposition that is easily accommodated: The addressee adopts the view that the context assumed by the speaker is one in which such an identification would have been possible. If our starting context is the empty context Λ, then accommodation is of course the only possible option. Let us, again for the sake of simplicity, assume that the effect of accommodation is a context containing a representation of the referent of the name, and that this information is represented schematically as in the DRSs (2.1) and (2.2).

(2.1) gives the preliminary representation of the first sentence (with a very schematic representation of the proper name presupposition). Our reason for showing this representation separately is not so much this presupposition, but another feature of the DRT repesentation formalism which we will be using (and which it shares with that of FDTL I, Ch. 5): temporal information is explicitly represented, and its representation is based on the assumption that any token of a verb has a "referential argument", which is the state or event which that token serves to describe. Variables for states and events are related to the utterance time and/or other contextually relevant reference times via tense, temporal adverbials, control and other lexical or grammatical devices.

(2.1) $$\left\langle \left\{ \begin{array}{|c|}\hline \underline{p} \\ \hline \text{“}Pedro\text{”}(p) \\ \hline \end{array}_{\,pr.na.} \right\}, \begin{array}{|c|}\hline s\ y \\ \hline donkey(y) \\ n \subseteq s \\ s\!: own(p,y) \\ \hline \end{array} \right\rangle$$

(2.1) consists of two parts, (i) a singleton set of presuppositions, whose only member is the presupposition triggered by the name *Pedro*, and (ii) the non-presuppositional part, which asserts that there is a donkey which the referent p of the name owns. The own-relation is expressed as a three-place relation between p, the donkey y and the state s which consists in the first owning the second. The present tense of the sentence leads to a location of this state around the utterance time n. (n is an indexical designator, which stands for the time at which the utterance of the represented sentence is made.) In the single presupposition of (20) the variable p has been underlined to indicate that the presupposition is "entity-oriented": The context has to provide an entity with which the underlined variable can be identified. This identification must obey the conditions of the presupposition representation; in the present case this means that the entity made available by the context is the (intended) bearer of the name *Pedro*. We have subscripted the presupposition with *pr.na.* to indicate that the way in which the referent ought to be available in the context is that appropiate to proper names (as opposed, say, to the kind of availablitly required by other types of definite *NP*s, e.g. pronouns). But we won't elaborate on the details.

Accommodation of the empty context Λ to one in which the referent for the name *Pedro* is available, and integration of the non-presuppositional part of (2.1) with this accommodated context will yield a representation of the first sentence of (1.14) which is essentially the one given in (1.15) :

(2.2) $$\begin{array}{|ccc|}\hline & p\ s\ y & \\ \hline \text{“}Pedro\text{”}(p) & n \subseteq s & donkey(y) \\ & s : own(p,y) & \\ \hline \end{array}$$

Just as in orginal DRT, (2.2) now serves as discourse context for the interpretation of the second sentence of (1.14) .

The preliminary representation of the second sentence is given in (2.3):

$$(2.3)\quad \left\langle \left\{ \begin{array}{|c|}\hline (\underline{u}) \\ \hline human(u) \\ male(u) \\ \hline \end{array}_{\,pron.} , \begin{array}{|c|}\hline \underline{v} \\ \hline donkey(v) \\ \hline \end{array}_{\,pron.} \right\} , \begin{array}{|c|}\hline s' \\ \hline n \subseteq s' \\ s'\!: beats(u,v) \\ \hline \end{array} \right\rangle$$

This time the set of presuppositions has two members, an entity-oriented presupposition triggered by the pronoun *he* and one triggered by the pronoun *it*. The subscripts *pron.* indicate that the context must have explicit representations of the entities that are to serve as values for the underlined variables $\underline{u}$ and $\underline{v}$, while these entities satisfy the conditions of their respective presupposition representations. Fortunately the discourse context (2.2) provides such entities (p for $\underline{u}$, and y for $\underline{v}$), so that this time no accommodation is needed. Presupposition satisfaction takes the effect of identifying the variables in question, whereupon merge of the non-presuppositional part of (2.3) with (2.2) leads to the appropriate update of the discourse representation:

$$(2.4)\quad \begin{array}{|c|}\hline p\ s\ y\ u\ v\ s' \\ \hline \text{“}Pedro\text{”}(p) \qquad n \subseteq s \\ donkey(y) \qquad u = p \qquad v = y \\ n \subseteq s' \qquad s\!: own(p,y) \qquad s'\!: beats(u,v) \\ \hline \end{array}$$

The analysis of (1.7a) within the new DRT architecture proceeds in much the same way. The only point which deserves to be mentioned is that the presuppositions triggered by the pronouns *he* and *it* are now to be represented in their “local” context. Since the pronouns occur in the consequent of the conditional, it is to the representation of this consequent that their representations should be attached. Since the antecedent of a conditional is part of the local context of the conditional, it can be be used to satisfy any presupppositions triggered within the consequent, including the entity-oriented presuppositions triggered by definite *NP*s like the pronouns *he* and *it*. (The notion of the local context of a presupposition thus generalises and replaces the notion of accessibility as it was used in original DRT. Accessibility becomes subsumed under the theory of presupposition *projection*.) Similarly, the presupposition triggered by *Pedro* is attached to the antecedent of the conditional, but since the local context of the antecedent coincides with the global context, this has no interesting consequences for the interpretation of (1.7a).

The preliminary representation thus looks like (2.5):

$$(2.5)\quad \begin{array}{|c|}\hline \\ \hline \begin{array}{|c|}\hline \\ \hline \left\langle \left\{ \begin{array}{|c|}\hline \underline{p} \\ \hline \text{“}\mathit{Pedro}\text{”}(p) \\ \hline \end{array}_{\,pr.na.} \right\}, \begin{array}{|c|}\hline s\ y \\ \hline donkey(y) \\ n \subseteq s \\ s\colon own(p,y) \\ \hline \end{array} \right\rangle \\ \hline \end{array} \Rightarrow \\ \begin{array}{|c|}\hline \\ \hline \left\langle \left\{ \begin{array}{c} \begin{array}{|c|}\hline \underline{u} \\ \hline human(u) \\ male(u) \\ \hline \end{array}_{\,pron.}, \\ \begin{array}{|c|}\hline \underline{(v)} \\ \hline donkey(v) \\ \hline \end{array}_{\,pron.} \end{array} \right\}, \begin{array}{|c|}\hline s' \\ \hline n \subseteq s' \\ s'\colon beats(u,v) \\ \hline \end{array} \right\rangle \\ \hline \end{array} \\ \hline \end{array}$$

If we assume once more that the context in which (1.7a) is uttered is the empty context Λ, then the proper name presupposition will once again have to be satisfied through accommodation. However, the pronoun presuppositions can be satisfied by the context as is, since the representation of the antecedent (which constitutes the local context for the consequent) provides explicit representations of the entities we need to fulfill these presuppositions. Global accommodation of the presupposition triggered by *Pedro* and local satisfaction of the pronoun constraints again leads to a representation that is basically like the one yielded by the old theory:

$$(2.6)\quad \begin{array}{|c|}\hline p \\ \hline \text{“}\mathit{Pedro}\text{”}(p) \\ \begin{array}{|c|}\hline s\ y \\ \hline donkey(y) \\ n \subseteq s \\ s\colon own(p,y) \\ \hline \end{array} \Rightarrow \begin{array}{|c|}\hline s'\ u\ v \\ \hline u = p \qquad v = y \\ n \subseteq s' \\ s'\colon beats(u,v) \\ \hline \end{array} \\ \hline \end{array}$$

For further details on the new DRT-architecture and the treatment of presuppositions within it, see Kamp (2001.a, 2001.b), as well as the notes for the course on presupposition offered during the first week of this year's ESSLLI.

Chapter 3

Specific Indefinites

3.1 Specificity and *de Re* Belief

In 1.1 we mentioned two core criteria for determining what should count as the indefinite *NP*s of a given natural language *L*. The first concerned their semantic contribution to simple categorical sentences (we didn't explicitly define what we mean by a simple categorical sentence but we hope the extension of the notion is clear enough from the few examples we gave): its contribution should be that of an existential quantifier restricted by the descriptive content of the noun phrase (which presupposes that the *NP* contains such a descriptive part). The second criterion was that such *NP*s are used by the speaker in cases where he wants to introduce into the discourse an entity that he takes to be new to his interlocutor (within the context of the given discourse). We gave an informal reason why these two criteria might in practice single out the same *NP*s. But it should nevertheless be stressed that conceptually the criteria are very different from each other. The first is stated in more or less traditional semantic terms, compatible with a perspective of natural languages as largely user-independent systems, defined by (at least) a syntax, lexicon and morphology, and with that a semantics, which includes the meanings of the lexical items and the rules for projecting these into meanings of larger units — phrases, sentences and multi-sentence discourses and texts. The second criterion is unashamedly "pragmatic" in that it refers to the speaker's intentions, which in turn are based on what propositional attitudes he attributes to the person or persons he is addressing. Generative linguistics, and in particular formal semantics, have been, in the course of their (roughly) forty year history, suspicious of such conditions: While acknowledged to be important at an informal and heuristic level, they have on the whole been kept out of the actual theories that these disciplines have come up with. This tendency is understandable, given that incorporating such communication-related considerations into a formally precise account presupposes a sufficiently articulate theory of propositional attitudes, one which makes it possible to relate the attitudes which give rise to an utterance in detail to its content and form. Such a theory has been missing and there was (and in many quarters continues to be) a strong suspicion that such a theory would of necessity be circular — in that it would base its account of the form and content of thought more or less exclusively on the form and content of how these thoughts are expressed in language.

We are aware of the serious methodological difficulties on which this scepticism is based. But at the same time we are under the impression that with growing frequency research into natural language meaning finds itself confronted with problems whose analysis requires systematic reference to psychological aspects of communication. So, rather than trying to stay clean and pristine by keeping away from explicit reference to beliefs and intentions (and thereby complying with the widely accepted methodological restraints), we feel that in dealing with certain questions of natural language semantics the time has come to stick one's neck out, even at the risk of someone else making off with one's head. Moreover, it seems to us that salient among the problems which ask for solutions that involve explicit reference to the propositional attitudes that arise in the context of verbal communication are those having to do with the specificity of indefinites.

We will be making use in this connection of a DRT-based formalism for the description of attitudinal states which we have been developing over a nmber of years, although a (near-)complete account is still only available in manuscript form. (See Kamp (1999). For an earlier and more informal introduction see Kamp (1990).) We do not give an explicit introduction to this formalism here, but trust that the uses we will be making of it will be reasonably easy to understand given the *legenda* we will add.

The phrasing of the second criterion (1.6.ii) is easily read as implying that the speaker has a particular entity in mind, but chooses an indefinite to speak of it because he believes that the entity is unfamiliar to the addressee (or because he wants to create an impression to this effect). It is true that many uses of indefinites are motivated in just this way. When Professor A says to his colleague B:

(3.1) A student was looking for you this morning.

on the strength of this student having approached A with the question where she might be able to find B, then clearly A has a concept of some particular person of which he knows that she satisfies the predicate of which *a student* is an argument in his utterance. The thought, we might also say in this case, which motivates the speaker's statement is that that particular student was looking for B earlier that day — a singular proposition, to the effect that this person and B stand in a certain relation (that of the first having been looking for the second). And it is likely that B, on hearing what A says to him, will assume that this is the way in which A's statement came about — that A himself entertains the singular proposition just described.

We will come back to the question what follows from this for the meaning of what A has actually said. But what matters now is that not all the cases that fall under the "existential quantifier" criterion (1.6i) are of the kind discussed in the preceding paragraph. In other cases the speaker will choose an indefinite *NP* because he himself has no knowledge of any particular entity which satisfies the predicate which has the indefinite as argument in the utterance he produces, but where his own information is limited to there being such an entity (or to there being one of the kind fitting the common noun phrase of the indefinite *NP* employed). These too are cases where the speaker has no reason to assume that there is an entity which satisfies the predicate and which is also familiar to the addressee. (If the speaker did think this, then his statement would be pointless, since it would communicate to the addressee something that he knew already.) So, in a sense these cases can also be seen as falling under (1.6ii), even though the phrasing of the criterion may suggest those of the last paragraph more strongly.

Nevertheless, there is an important difference between the two types, and it is a difference that has directly to do with the topic of this section — specificity. Recall what has been so far our only example of a specifically used indefinite, sentence (1.1) repeated here as (3.2):

(3.2) 1.1 Mary believes that her husband is seeing a real estate agent.

Here, we said, a specific interpretation of the indefinite NP within the complement of the attitude-attributing verb *believe* amounts to interpreting the belief attributed to Mary as having for its content a singular proposition concerning some particular person that Mary's husband is seeing. In contrast, a non-specific interpretation of the indefinite amounts to taking (3.2) as attributing to Mary the belief that her husband is seeing some real estate agent, but leaving it open whether Mary has any more precise idea of who this person might be. We have learned to see this difference as a genuine ambiguity. This opinion has been bolstered by the circumstance that the formalisms which have been in use since the early days of formal semantics are able to express the distinction. For instance, if *believe* is analysed as a 2-place predicate *BEL* which relates individuals to propositions, and proposition-denoting terms are formed by attaching the intensional abstraction operator $^\wedge$ to formulas, then the two interpetations of (1.1) can be expressed as in (3.3).

(3.3) (*i*) $BEL(m,^\wedge(\exists y)(REA(y)\ \&\ SEE(Husb(m),y)))$ (*de dicto* belief)
(*ii*) $(\exists y)(REA(y)\ \&\ BEL(m,^\wedge SEE(Husb(m,y)))$ (*de re* belief)

The difference between these two forms is greater than may meet the untutored eye. Quine, in particular, stressed the very different commitments that the two forms make and drew to the problems connected with "quantifying into opaque contexts" (as he put it) which we find in (3.3ii) but not in (3.3i). (3.3ii) attributes to Mary a so-called *de re* belief, which in this case can be described as a ternary relation between Mary, the property of being seen by Mary's husband and the person to whom Mary attributes this property. This belief is *de re* (i.e. "about the thing itself") with respect to the person in question; (3.3ii) asserts that there is such a person).

There is a voluminous literature on the question what conditions must be fulfilled in order that an agent can have a *de re* belief (or other attitude) with respect to some other person or thing. Usually what is said is that the agent must be acquainted with the individual at issue. Exemplary are cases where the subject is directly perceiving the individual, e.g. is looking at it under conditions where he can clearly see it. But it is difficult to know where to draw the line between such cases and those where *de re* attitudes are not possible for lack of acquaintance. Some draw the line extremely liberally, so that any information which enables the subject to individuate the individual uniquely suffices if not for acquaintance, then at least for *de re* attitudes. Others draw it much more narrowly.

But in any case, this is a debate that does not belong to linguistics. What is important for our purposes is that many of our thoughts are *about* other people or things — thoughts, in other words, through which we are related to *them*. And that, moreover, there are linguistic forms which seem to be describing just such entity-related thoughts. (An often cited example are sentences of the type: *There is someone that Mary believes her husband is seeing.*, which has been claimed to only have the interpretation given in (3.3ii) (and not that in (3.3i)). We will assume that the kind of "relational thought" is possible only when the subject has an individual-representation for any individual with respect to which his thought is *de re* (or, in other words, the individual to which his thought relates him). And we will follow a recent practice within DRT in that we take such individual representations to have the form of so-called anchors. This requires us to say something about the general formalism for representing propositional attitudes of which the anchoring notation is part.

Basically, we use DRSs to represent the contents of attitudes. But we are interested not only in the representation of single attitudes (beliefs, hopes, intentions, doubts, etc), but more generally of attitudinal states which consist of several such attitudes at once. It is an important feature of such complex attitudinal states that their component attitudes often "share discourse referents" in that they are about the same things (and this even in cases where these "things" exist in the subject's mind only). Thus attitudinal states can be abstractly represented as sets of the attitudes of which they are composed. We assume moreover that each attitude can be represented as a pair consisting of a DRS (or similar contentual structure) identifying the content of the attitude and a mode indicator, which determines what kind of attitude (belief, desire, intention doubt, etc.) we are dealing with. The DRS-components of the individual attitudes may share discourse referents, which means that the attitudes to which they belong are "about the same thing" in the sense just alluded to. (3.4) is a first try at a representation of (the relevant part of) the mental state of somenone who sees a gold coin in the middle of the road, forms the desire to possess it and the intention, which is to realise this desire, to pick it up.

$$
(3.4)\qquad \left\{ \begin{array}{l}
\langle BEL, \boxed{\begin{array}{c} x\ s_1 \\[4pt] n \subseteq s_1 \\ gold\ coin(x) \\ s_1\colon x\ be\ lying\ in\ front\ of\ i \end{array}} \rangle \\[20pt]
\langle DES, \boxed{\begin{array}{c} s_2 \\[4pt] n \subseteq s_2 \\ s_2\colon i\ have\ x \end{array}} \rangle \\[20pt]
\langle INT, \boxed{\begin{array}{c} t_3\ e \\[4pt] n < t_3\quad e \subseteq t_3 \\ e\colon i\ pick\ up\ x \end{array}} \rangle
\end{array} \right\}
$$

(N.B. n represents the psychological "now" of the subject; at any time t at which the subject is in a state characterised by the representation the occurrences of n in the representation represent t. i represents the self; it is that representation of the self which gives rise to the subject's use of the word I. Because of their special "indexical" status these two discourse referents can be assumed to be always present. Supposing this to be so, there is no need to say this on each single occasion; so we will refrain from explicitly entering these two discourse referents in any particular DRS universe.) The point of this representation is that desire and intention share the discourse referent x with the belief, and it is this referential sharing which accounts for the way in which the belief gives rise to the desire and the belief together with the desire to the intention.

In (3.4) there is no question yet of anchors. However, the case is one which seems to qualify: It seems reasonable to assume that the subject has an anchored representation for the coin he sees. A representation of the same mental state in which x is anchored is given in (3.5).

$$(3.5)\quad \left\{ \begin{array}{l}
\langle [ANCH, x], \boxed{\begin{array}{c} x\ s\ s_1 \\ \\ n \subseteq s\ n \subseteq s_1 \\ s\text{: } \textit{i see x} \\ s_1\text{: } \textit{x be lying ifo i} \end{array}} \rangle \\[2ex]
\langle BEL, \boxed{\textit{gold coin(x)}} \rangle \\[2ex]
\langle DES, \boxed{\begin{array}{c} s_2 \\ \\ n \subseteq s_2 \\ s_2\text{: } \textit{i have x} \end{array}} \rangle \\[2ex]
\langle INT, \boxed{\begin{array}{c} t_3\ e \\ \\ n < t_3\ e \subseteq t_3 \\ e\text{: } \textit{i pick up x} \end{array}} \rangle
\end{array} \right\}$$

As shown, the anchor for the discourse referent x consists of a certain mode indicator, saying that we are dealing with a special kind of thing-representation, in which x represents the thing in question. (Thus an anchor is a component of an attitudinal state which is not a *propositional* attitude.) The second part gives the content of the information under which the subject has represented the given thing. In the present case we have assumed that this information connsists in the subject seeing the thing at the time when he is in the represented state, and that he sees the thing as someting that is lying in front of him. (The exact form and content of this component of the representation is still a matter of some dispute.) In (3.5) the anchored discourse referent x is shared by the three other components of the state which the representation displays.

What if the subject is mistaken in his perception of the coin? Perhaps there is nothing there; what he thought he saw was just a reflection of the light which he mistook for an object. In this case there is nothing that x stands for. Does that mean x cannot be anchored? Yes and no. In this case of course neither the subject nor his token representation x are anchored to any external object. Nevertheless, from a purely psychological point of view the situation may differ in no way from one in which there really is a coin which the subject observes. We do justice to this distinction by saying that in both cases the subject will have an *internal anchor*, but that only in the case where there actually is an object lying on the tarmac which he observes, there also is a corresponding *external anchor*. We can distinguish these two cases by adding in the case where there is a thing that is observed an external statement to this effect, as in (3.6).

$$(3.6)\quad \left\{ \begin{array}{l} \langle [ANCH, x], \boxed{\begin{array}{c} x\ s\ s_1 \\ n \subseteq s\ \ n \subseteq s_1 \\ s\text{: } i\ see\ x \\ s_1\text{: } x\ be\ lying\ ifo\ i \end{array}} \rangle \\ \\ \langle BEL, \boxed{\ gold\ coin(x)\ } \rangle \\ \\ \langle DES, \boxed{\begin{array}{c} s_2 \\ n \subseteq s_2 \\ s_2\text{: } i\ have\ x \end{array}} \rangle \\ \\ \langle INT, \boxed{\begin{array}{c} t_3\ e \\ n < t_3\ \ e \subseteq t_3 \\ e\text{: } i\ pick\ up\ x \end{array}} \rangle \end{array} \right\} \quad \langle x, \mathbf{x} \rangle$$

The external anchor $\langle x, \mathbf{x} \rangle$ confirms that the subject's internal representation x is anchored to (and thus represents) the object $\mathbf{x}$. (We also call $\mathbf{x}$ the *external anchor* for x in this case.) Note that the external anchor is not part of the representation of the mental state, but an external judgement, of which the subject himself is not capable. Internal anchors presuppose an external anchor: When there is an external anchor for an internally anchored discourse referent, then it is the thing for which the discourse referent stands. If there is no external anchor for the internally anchored x, then the internal anchor is deficient, x suffers of reference failure and all the representations in which x occurs fail to determine a well-defined propositional content.

Statements to the effect that a certain a is at some time in a mental state with certain attitudinal components are represented with the help of the state-attributing predicate *Att*. For instance the statement that at t_0 Fred (believed that he) saw something in the road, believed it to be a gold coin, coveted it and wanted to pick it up can be represented as in (3.7).

$$(3.7)\quad \begin{array}{|c|} \hline t_0 \quad s_0 \quad f \\ \hline t_0 < n \quad t_0 \subseteq s_0 \quad Fred(f) \\ s_0\text{: } ATT(f, \left\{ \begin{array}{l} \langle [ANCH, x], \boxed{\begin{array}{c} x\ s\ s_1 \\ n \subseteq s\ \ n \subseteq s_1 \\ s\text{: } i\ see\ x \\ s_1\text{: } x\ be\ lying\ ifo\ i \end{array}} \rangle \\ \\ \langle BEL, \boxed{gold\ coin(x)} \rangle \\ \\ \langle DES, \boxed{\begin{array}{c} s_2 \\ n \subseteq s_2 \\ s_2\text{: } i\ have\ x \end{array}} \rangle \\ \\ \langle INT, \boxed{\begin{array}{c} t_3\ e \\ n < t_3\ \ e \subseteq t_3 \\ e\text{: } i\ pick\ up\ x \end{array}} \rangle \end{array} \right\}) \\ \hline \end{array}$$

(3.7) represents the statement that at the past time t_0 there was a state to the effect that Fred's mental state at that time contained the components which make up the second component of *Att*. We also make use of a 3-place version of *Att*, in which its third component is a set of external anchors, each of them corresponding to an internal anchor occurring in the second argument (so that the set of external anchors always corresponds to a subset of the internal anchors). For instance, a person *b* who ascribes to Fred the mental state represented in (3.5) may make it a part of his ascription that the internally anchored discourse referent x is externally anchored to some individual x'. Such ascriptions are possible whether or not *b* can himself identify this individual. If he cannot, he can only claim that there is such an individual. In this case x' functions as an existentially quantified variable at the level of the ascription:

(3.8)

$$\begin{array}{|c|}\hline t_0 \quad s_0 \quad f \quad f \\ \hline t_0 < n \;\; t_0 \subseteq s_0 \;\; Fred(f) \\ s_0\!: Att(f, \left\{ \begin{array}{l} \langle [ANCH, x], \boxed{\begin{array}{c} x \quad s \quad s_1 \\ n \subseteq s \;\; n \subseteq s_1 \\ s\!: i\ see\ x \\ s_1\!: x\ be\ lying\ ifo\ i \end{array}} \rangle \\ \langle BEL, \boxed{gold\ coin(x)} \rangle \\ \langle DES, \boxed{\begin{array}{c} s_2 \\ n \subseteq s_2 \\ s_2\!: i\ have\ x \end{array}} \rangle \\ \langle INT, \boxed{\begin{array}{c} t_3\ e \\ n < t_3 \;\; e \subseteq t_3 \\ e\!: i\ pick\ up\ x \end{array}} \rangle \end{array} \right\}, \{\langle x, x' \rangle\}) \\ \hline \end{array}$$

Using this representation formalism we can represent the two belief attributions in (3.3.i) and (3.3.ii) as in (3.9.i) and (3.9.ii).

(3.9) (*i*)

$$\begin{array}{|c|}\hline s_0\ m\ x' \\ n \subseteq s_0 \;\; Mary(m) \\ s_0\!: ATT(m, \langle BEL, \boxed{\begin{array}{c} x\ s_1 \\ n \subseteq s_1 \\ s_1\!: see(husb(i), x) \end{array}} \rangle) \\ \hline \end{array}$$

(*ii*)

$$\begin{array}{|c|}\hline s_0\ m\ x' \\ n \subseteq s_0 \;\; Mary(m) \\ s_0\!: Att(m, \left\{ \begin{array}{l} \langle [ANCH, x], \boxed{\begin{array}{c} x \\ \\ \end{array}} \rangle \\ \langle BEL, \boxed{\begin{array}{c} s_1 \\ n \subseteq s_1 \\ s_1\!: see(husb(i), x) \end{array}} \rangle \end{array} \right\}, \{\langle x, x' \rangle\}) \\ \hline \end{array}$$

(N.B. The internal anchor which is part of the content of the attributed state specifies no conditions expressing how the subject Mary takes herself to be causally linked to the represented referent. This should not be understood as attributing to Mary a "blank" internal anchor. Rather, the representation remains neutral with regard to what the anchoring information she has might be like. The point here is in fact a very general one: All components occurring in the attitude attribution representations so far considered are to be understood as claiming only that the subject in question has attitudes containing at least as much information as the representation specifies. Negative specifications — to the effect that certain information is not present in the subject's mental state — can, with the means made available so far, only be expressed by denying that the subject is in a mental state containing that information.)

The representations in (3.7) – (3.9.ii) can all be regarded as representations of the contents of mental state attributions. But when such an attribution occurs in thought, then it will be itself a propositional attitude, with an attitudinal mode as well as a content. For instance I can believe that Mary has the represented belief, but I can also doubt this, or wonder whether it is so. These are three possible attitudes with the same content, but different modes. Representing in the manner of (3.4) – (3.6) Fred's belief that Mary has the belief represented in, say, (3.9.i), will take the form of a singleton set $\{\langle BEL, (3.9.i)\rangle\}$, and analogously for the other two attitudes just mentioned. Of course, this given belief can also be part of a more complex representation of Fred's mental state, in which the belief is one among several attitude components. For instance, it can be combined with Fred's own belief that Mary's husband is seeing someone.

Going one step further, such state representations can in their turn be attributed to Fred by others and these attributions can once more be represented using the predicate *Att*. And since Mary is among the possible attributors, we have the possibility of representing the kind of back-and-forth which, when iterated indefinitely, yields what is sometimes called "shared belief" or "shared knowledge".

3.2 Specific Use and Specific Interpretation

So much for the representation of anchored and unanchored attitudes and mental states. These representations make it easier (or so it seems to us) to see more clearly the similarities between "specific indefinites" like that of (1.1) and the kind of specificity that may be involved in simple statements such as (3.1). We just saw that the representation (3.9.ii) of the specific interpretation of (1.1) attributes to the subject a mental state with the same kind of structure that, according to our representational conventions, can also be found in the mind of our speaker A of the sentence (3.1), if the context is as we described it. In both cases we are dealing with internally and externally anchored attitudes. The question to which we now turn — and which is one of the questions that are directly relevant to our concerns in these notes — is:

(3.10) What is the connection between these attitudinal structures and the possible uses of indefinites?

Part of the answer to this question has already been given: An indefinite occurring in the complement of an attitude-attributing sentence can be interpreted as standing for something with respect to which the atttributed attitude is to be understood as being *de re* — or in our terminology, as corresponding to an anchored thing representation. Such at any rate is as far as we know the received view about sentences like (1.1): besides an interpretation of the indefinite according to which the attributed attitude is *de dicto*, there is also an interpretation which leads to the *de re* reading of (3.3.ii) and (3.9.ii). With regard to statements like (3.1), on the other hand, the received view has, if we are right, been the opposite. Rather than seeing (3.1) as ambiguous in a way analogous to (1.1) — i.e. as expressing either a purely existential (*de dicto*) thought on the part of the speaker or a thought that is *de re* with regard to the thing representation that gives rise to the seaker's use of the indefinite *NP a student*, the usual assumption is that (3.1) unambiguously expresses the purely existential proposition.

Is this difference which exists according to the standard view between the possible roles of the indefinite in (1.1) and its possible roles in (3.1) justified? The matter is hard to decide. Part of the problem has to do with the way one traditionally thinks about what it is the relevant sentences — the complement sentence of (1.1) and the entire sentence (3.1) — are supposed to do. The complement sentence is generally thought of as specifying the belief which sentence (1.1) as a whole serves to attribute to Mary. In contrast, the unembedded sentence is usually regarded as expressing some propositional content. A speaker may wish to convey this content to somebody else by asserting the sentence, and he will be entitled to do this when he has information from which the propositional content of (1.1) follows. Noone would deny, of course, that among the situations in which the speaker possesses such information there are in particular those in which he has reliable information to the effect that some particular individual was looking for the person he is addressing; nor for that matter that the addressee wouldn't under certain conditions conclude or conjecture that the information which the speaker must be having is of that form. Indeed, for a sentence like (3.1), spoken in the situation we described, it is hard to imagine that such inferences would not be forthcoming. But it is possible and in fact straightforward — so the story goes — to explain how this happens *on the basis of* the existential proposition which (3.1) expresses.

For the moment we will leave the question whether or not (3.1) is ambiguous. But we conclude this section by introducing a couple of notions which will be of use later on. These are: (i) the *specific use* that a speaker can make of an indefinite in certain epistemic situations and (ii) the *specific interpretation* which the addressee assigns to an indefinite. Specific uses of indefinites arise in cases when the speaker has an anchored representation of a content. Here we will concentrate on those cases in which the attitude in question is a belief (or opinion if one prefers) but other attitudinal modes can be relevant in analogous ways.

First, we need the more general notion of a speaker using an *NP* to *represent* a discourse referent which is a constituent of one of his attitudes. (Again we will limit attention to beliefs here.) This is a notion which we cannot strictly speaking define. What is at issue, rather, is an assumption about what happens in language production. It is the assumption that at least in some cases where speakers produce sentences they have information that is represented in the DRS-like forms shown above; that the sentences they produce are designed to express those representations; and that the relation between sentence and information representation is in such cases the one familiar from DRT: The representation K of the information is what one would get when applying the interpretation mechanism of DRT (i.e. the DRT-construction algorithm) to the produced sentence S. On this assumption there will in particular be links between individual discourse referents occurring in K and certain constituents of S. From the perspective of sentence interpretation such a link between discourse referent d and constituent C would get established when d is introduced as "referential argument" of C (i.e. as the representation of the thing that C denotes). We presume that the same links arise in sentence production (under the special production conditions assumed), with certain constituents being chosen by the speaker as realisations of discourse referents in K. When such a production-related link exists between d and C, we say that C is *used to represent* d. We abbreviate this relation as *REP(C,d)*. The instances of this relation that are of direct interest to us here are those where C is an *NP* — and, even more directly, those where C is an indefinite.

We are now in a position to define what it is for an indefinite *NP C* to be used *specifically by* a speaker A *in* a sentence S. Informally, A uses C specifically if C is linked to an anchored discourse referent — i.e. *REP(C,d)* for some achored d. In somewhat more formal terms:

Def.1 Let $\langle [ANCH, d], K' \rangle$ be a constituent of the mental state of speaker A, let $\langle MOD, K \rangle$ be another constituent of this mental state such that d occurs in K, let S be a sentence which A produces to express the information contained in $\langle MOD, K \rangle$ and let C be an *NP* occurring in S. such that $REP(C, d)$. Then we say that A *uses* C *specifically in* S.

A related notion is that where A uses an indefinite C in a syntactically embedded position to represent a discourse referent occurring in a DRS universe higher than the one corresponding to the syntactic position of C. A formally adequate definition of this notion requires careful consideration of issues concerning the syntactic structure of sentences on the one hand and the structure of DRSs on the other, and will not be given here.

Just as it is possible to characterise the concept of a specific use of indefinites, it is possible also to define what it means for an indefinite to be given a *specific interpretation*. An indefinite C is interpreted *specifically by* a recipient B of an incoming utterance U iff the discourse referent d which B introduces as representation of the thing that C stands for is *internally anchored in the attitude* (more accurately: *attitude complex*) *which results from his interpretation of* U. This internal anchor, we will asume, specifies its discourse referent as standing for the presumed external anchor of the anchored thing representation in the mind of the speaker which gave rise to the speaker's specific use of the indefinite. We summarise this assumption in (3.11)

(3.11)

> The interpreter B of a sentence S uttered by a speaker A in which there is an occurrence of an indefinite C will introduce an anchored discourse referent d to represent what C stands for whenever B takes A to have used C specifically.[1]

What does the mental representation which results from specific interpretation look like in the notation we have been exemplifying in the representations shown above? Crucial is the form of the "vicarious" anchor for the discourse referent x_B which is meant to stand for the external anchor of the representation which led to the specific indefinite. More elaborately, such an internal anchor will specify the discourse referent x_B as anchored to whatever object d is the external anchor for the discourse referent x_A which the recipient B assumes gave rise to speaker A's (specific) use of the indefinite to which he, B, is assigning a specific interpretation. Note that B need not know which object d is. (B need not be acquainted with d in any of the familiar uses of "acquaintance".) It is enough if B assumes that there is some d to which x_A is anchored. In this respect B's representation may be assumed to be like the one given in (3.9) for sentence (1.1). In that representation we assumed that the speaker of (1.1) took it that the subject Mary had an anchored representation for the discourse referent corresponding to the indefinite *a real estate agent* but without necessarily knowing who this person was. In (3.12) we present the mental representation which, according to the present proposal, the recipient of (3.1) is likely to form in the kind of situation in which (3.1)

[1] Coincidence of the two characterisations of specific interpretation is guaranteed only if the "whenever" in (3.11) is read as "if and only if". We have refrained from using "iff" because there seem to be certain cases where something like a specific interpretation in the first sense occurs, although B does not assume that A made a specific use of C. These are cases where B takes himself to have identifying knowledge of the thing satisfying the argument slot occupied by C in the interpreted utterance on independent grounds. E. g. A says ***Last week Fred got himself a wife at last.*** B, who knows that Fred has been courting Esmeralda for years and recently proposed to her, swearing to himself that if she would turn him down, he would remain single forever, is in a position to provide an anchored representation for the *NP a wife*. And this is possible also if B doesn't take A's use of the indefinite to have been specific. In fact, given A's particular choice of words this would not be a likely hypothesis.

This may look like a case of B interpreting C specifically in the first but not in the second sense. However we are inclined to think that it is an interpretation which is specific in neither sense. Although the interpretation that results in the end does involve an anchoring for the discourse referent d introduced by B for C, this anchor is really the effect of a secondary inferential process which identifies d with the (presumably anchored) discourse referent e which B already had as a representation for Esmeralda before A's utterance was received. The difference between such an anchor and a "*vicarious*" anchor which links B's new discourse referent to the anchor that A is presumed to have for the discourse referent that gave rise to his use of the indefinite will show up in the form of the respective anchors. The vicarious anchor will mention the link to A, while the anchor for e will not contain this information.

was supposed to be uttered.

(3.12) recipient B's representation of the content of (3.1) on a specific interpretation of the indefinite

$$\left\{ \begin{array}{l} \langle [ANCH, a], \boxed{\begin{array}{c} a \\ \text{“}speaker(a)\text{”} \end{array}} \rangle \\ \\ \left\langle [ANCH, x], \boxed{\begin{array}{c} s_0 \\ n \subseteq s_0 \\ s_0\!: Att(a,\ \{\langle [ANCH, x_a], \boxed{\begin{array}{c} x_a \\ \\ \end{array}} \rangle\},\ \{\langle x_a, x\rangle\}) \end{array}} \right\rangle \\ \\ \left\langle MOD, \boxed{\begin{array}{c} e\ t \\ t < n \quad e \subseteq t\ t \subseteq morning[day[n]] \\ student(x) \\ e\!: be\text{-}looking\text{-}for(x, i) \end{array}} \right\rangle \end{array} \right\}$$

Here the content B has assigned to the utterance is represented in the DRS following the underspecified modality indicator MOD (It is left open whether the utterance leads to a belief — i.e. whether B accepts what A tells him as true — or not). $morning[day[n]]$ stands for the morning of the day of the time n at which the representation is entertained (for current purposes the same as the utterance time.). The representation assumes that the representation of the utterance "leans" on a "vicarious" anchor for the discourse referent x. The anchor says of this discourse referent that it represents the individual for which the speaker A (represented by B as a) has a certain anchored representation — i.e. the individual is the external anchor of that representation. (It is this anchored representation which B assumes to have given rise to what he takes to be A's specific use of the indefinite). The details of this anchor are left open, as B need not have any particular ideas about how A is causally connected to the external anchor. The internal anchor for x is in its turn dependent on an anchored representation for the discourse referent a which B has for the speaker A.

3.3 Interpretation and Semantic Representation

In the last section we have been talking about the specific use of indefinites and about their specifc interpretation. The specific use, we said, arises in cases where the speaker has an anchored representation for the thing he wants to talk about. And the representation which results from taking the indefinite as specifically used (i.e. giving it, in our terminology, a specific interpretation) is anchored also. But these two anchors are different, and this is true, a fortiori, for the representations which speaker and hearer connect with the utterance of which the "specific" indefinite is part. According to our proposal the representation which results form the specific interpretation of an indefinite will in the typical case not be identical with the representation which led to its being specifically used. This discrepancy reinforces the urge with which one might want to ask: But what about the semantic representation (or semantic value) of the utterance itself? We do not think that there are no such things as semantic values of linguistic expressions and that, in particular, sentences (and even sentential utterances) do not have truth conditions or express propositions. Verbal communication works (as well as it does) because expressions have remarkably stable conditions of truth and reference. And we cannot see how a theory of language which refrains from making this assumption could succeed in explaining the possibility of effective verbal communication in general, let alone in any of its endless and intriguing details. Arguably, the assumption that linguistic expressions have use-independent contents involves some kind of idealisation, and to that extent the sceptics about independent content have a point. But it is an idealisation that seems to stay remarkably close to the realities of how language is learned, understood and used.

This does not mean that the content representations to which utterances give rise in the minds of those to which they are addressed need be identical to what the theory postulates by way of content representations which the utterances have on the strength of their linguistic form (or, even, on the strength of that and certain salient and public features of the context). In fact, it is widely assumed that in a certain sense this will hardly ever be the case, since various pragmatic processes will tend to transform the content representation of a given utterance into one that is typically different from, and usually richer than, the one serving as input. (This is the general message behind the approach towards semantics + pragmatics first explicitly put forward by Grice and still rightly associated with his name.)

In recent years it has become increasingly difficult to know exactly where to draw the line between semantics and pragmatics. (i) For one thing our understanding of “pragmatic” processes has developed to a point where it can be seen clearly that there exist big differences between these processes and (ii) that often some such process must have applied before another can come into action, with the output of the first acting as input to the second. As a consequence the distinction between semantics and pragmatics has become increasingly “theory-laden”, and the same goes for the “independent” contents, or content representations which our theory postulates. Nevertheless, when a theory of meaning and use talks explicitly of mental representations to which lawful processing of verbal input will give rise, it seems a natural stipulation that these mental representations belong to pragmatics. If the theory at the same time assumes content representations (or “logical forms”) for linguistic objects (such as sentences, *NP*s, etc.), then the latter would, by the same stipulation, still belong to the province of semantics.

But whatever the use we want to make of the terms “semantics” and “pragmatics”, one question can and must always be asked in relation to such a theory, and that is the one we stated above: How are the mental representations to which an utterance gives rise related to the “independent” content representations which the theory assigns to this utterance? Moreover, as we have seen, there is an equally legitimate question about the relation between a verbal utterance and the representation which the speaker intends to convey by it.

In connection with the discussion of specific uses and interpretations of indefinites these questions have, as we just noted, a special urgency. And we see it as appropriate to try and say something already at this point. To start with, we consider a superficially close variant of sentence (3.1)

(3.13) (3.1) (a) There was a student who was looking for you this morning.

(3.13) could be used just as easily and felicitously in the context in which we considered (3.1), and it would be likely to provoke in the recipient a specific interpretation of the indefinite *a student* and the same representation. Suppose then that (3.12) is indeed the representation which a specific interpretation of a student, in the sense discussed so far, will produce. What can we say about the relationship between this representation and the “semantic representation” of this sentence?

In this particular case there seem to be good reasons for assuming the two representations to be quite different from each other. At least, that is what our over-all theory predicts. To explain this we have to refer to what lies ahead. In Chapter 5 we will present an account of the interpretation of *there*-sentences according to which the *there be* construction expresses an existential operator which needs a variable to bind and can get this variable only from the *NP* following *be*. This mechanism (which is in the spirit of a number of proposals for the analysis of *there*-sentences beginning with Milsark (1977)) accounts for some of the well-known properties of such sentences, such as their being subject to the Definiteness Effect, and the narrow scope readings which the licit *NP*s in such sentences usually get. Any mechanism of this kind leads to logical forms (or semantic representations) in which the *NP* in question translates into a narrow scope existential quantification. For the sentence in

(3.13) the representation will, in our DRS-based notation, take the form of (3.14)[2]

$$(3.14)\quad \boxed{\begin{array}{c} t\ e\ x \\ \hline t < n \quad t \subseteq morning[day[n]] \\ student(x) \\ e\text{: } \textit{be-looking-for}(x, i) \end{array}}$$

In other words, (3.14) is, it will be argued in Chapter 5, the only possible semantic representation for this sentence. Therefore, specificity can in this case only be a matter of further interpretational moves, which are distinct from the syntax-semantic interface strictly speaking. For instance, it may be that the recipient, in trying to account for how the speaker knew what he was telling him, will hypothesise that the source of that knowledge must have been some form of direct contact with a certain student, which must have left the speaker also with the stronger information that some particular, identifiable student was looking for the recipient. Such a hypothesis uses the content represented in (3.14) as premise, while yielding a conclusion which logically entails that premise. Psychologically it may be difficult to distinguish between the weaker, existential premise and the stronger, singular conclusion. But in this case at least our theory forces the distinction upon us.

However, if this is the right assessment of (3.13) — that it has the semantic representation in (3.14), while a specific representation of the indefinite *a student* will lead to the mental representation given in (3.12) — what are we to say about (3.1)? Here the matter is more difficult to decide. As it stands, we do not see compelling reasons which tell against specific interpretations of indefinites at the level of semantic representation or logical form. But nor is it possible to perceive compelling reasons at this point why we should insist on this possibility. For as we have just seen, in the case of *there*-sentences additional mechanisms will be needed in any case to arrive at representations which correctly capture the intuitive content of "specific" interpretations of the indefinites in such sentences. If these mechanisms are available in connection with indefinites in *there*-sentences, why shouldn't they be just as available for other indefinites, such as, e.g. the subject of (3.1)?

In fact, Occam's razor would suggest that we do without specific interpretation of indefinites at the semantic level altogether. But this is a terrain where caution is especially advisable. In particular, this would be a move with consequences for the analysis of propositional attitude sentences which at the very least deserves to be mentioned explicitly. We noted earlier that a sentence like (1.1) is generally taken to permit specific interpretation of the indefinite in the complement clause. And in (3.3.ii) we gave what we believe is an adequate rendering of the "logical form" which philosophers of language and others with an interest in *de re* attitudes have proposed for it. If we follow the suggestion of Occam's razor, this representation can no longer be considered a possible semantic representation of sentence (1.1), but must also be relegated to the domain of "post-semantic" representation.

Note that this is a conclusion which is forced upon us in any case for the following variant (3.15) of (1.1)

(3.15) Mary believes that there is a real estate agent her husband is seeing.

It has been claimed that (3.15), in contrast with (1.1), only has a narrow scope (*de dicto*) reading for the indefinite. But it seems to us that as a theory-neutral and purely intuitive evaluation of the facts this judgement is problematic. To us it seems possible for someone who hears (3.15) to understand the speaker to be saying that Mary is suspecting some particular real estate agent (whom she has met, or could identify by name); and it also seems quite legitimate to us to use the sentence with that very communicational effect in mind. Thus the sentence will often lead to mental representations of the type exemplified in (3.12) and such a representation belongs to the regular "pragmatic repertoire" of the sentence.[3]

[2] For a more elaborate representation see Chapter 5. For our point here nothing hinges on the differences between (3.14) and the analysis from that chapter.

[3] There may be a stronger tendency for (3.15) to convey a narrow scope (i.e. *de dicto*) interpretation than (1.1). But in our judgement this is only a matter of degree, and certainly not of black and white.

Our commitments concerning the analysis of *there*-sentences force a narrow scope interpretation upon us just as much in the case of (3.15) as they do in the case of (3.13). So, the *de re* interpretation of (3.15) can, just as the specific interpretation of (3.13), only be obtained as the result of additional, pragmatic processes which further transform an initial semantic representation.

The upshot of this discussion should be clear. The two definitions of specificity of indefinites we have given so far — of their specific use and of their specific interpretation — must be seen as belonging to a part of linguistic theory which lies beyond semantics in the stricter sense in which formal semanticists tend to understand this term. In the case of *there*-sentences this appears to be the sense in which an indefinite can be "specific" — this at least is the conclusion that forces itself on someone who accepts the analysis that we will propose in Chapter 5. And once the conclusion has been accepted for those cases, it seems plausible that the same pragmatic mechanisms that are responsible for specific interpretations of such occurrences of indefinites are available also in connection with others. This assumption would seem to promise a theory of specificity which is much simpler over-all than one which allows in addition for a notion of semantic specificity, with semantically specific indefinites leading to distinct representations already at the level of semantic form, as the direct result of applying the principles of the syntax-semantics interface.

There is evidence, however, that in general things cannot be that simple. The following data are from Romanian. Romanian has a particle, *pe*, which occurs immediately in front of *NP*s and which conveys, well, "specificity". It can on the one hand appear in front of definite *NP*s like demonstratives or proper names, as in (3.11.a). In such cases *pe* only confirms what such definites convey in any case, viz that what is at issue is a particular, uniquely identifiable referent. *Pe* can also occur in front of indefinites. Here it is optional, and it is not vacuous.

(3.16) (*a*) Maria crede că Ion a angajat-o pe Lucia.
Maria believes that Ion has hired Lucia.
(*b*) Maria crede ca Ion a angajat o secretară.
Maria believes that Ion has hired a secretary.
(= he has hired someone in the capacity of secretary.)
(*c*) Maria crede că Ion a angajat-o pe o secretară.
Maria believes that Ion has hired a secretary.
(= he has hired someone who was a secretary in some capacity. or other)
(*d*) Maria crede că Ion iubeşte un agent immobiliar.
Maria believes that Ion loves a real estate agent.
(Maria does't believe of any particular person that Ion loves her.)
(*e*) Maria crede că Ion iubeşte pe un agent immobiliar.
Maria believes that Ion loves a real estate agent.
(there is some particular real estate agent that Ion loves.)

These uses of *pe* are illustrated in examples (3.11.b-e). (3.11.b) means that Maria believes that Ion hired someone in the capacity of secretary. (Maybe the person is a syntactician by profession, but with the job market being what it is, becoming Ion's secretary is the best one could hope for.) In contrast, in (3.11.c) the person hired must have been a secretary before, and it isn't implied that it is as a secretary that Ion is believed to have hired her — her function could be that of Ion's cook or one of his gardeners. (3.11.d,e) are the pair that most immediately concerns us. They correspond to the two interpretations of (1.1) which we have been distinguishing from the outset. (3.11.d) is the non-specific, *de dicto* belief attribution, while (3.11.e), in which the indefinite is preceded by *pe*, only has the specific, *de re* interpretation.

Here then we find a type of indefinite which has specificity built into its actual form. Much the same seems to be true of all indefinite determiners in Lillooet Salish (with the exception of the polarity determiner *ku*), as discussed in Matthewson (1999). And as far as English is concerned, similar suggestions have been made à propos indefinites which begin with *a certain*. Actually, as noted by (among others) Kratzer and briefly related in the next section, the story about *certain* is more complicated than is revealed by the simple thesis that it turns any indefinite into a specific one. And it may well be that, when we look more closely, the same is true for specificity markers in other languages. Much like in the domain of demonstrative reference, it is quite possible that the devices we find in different human languages cover a considerable spectrum of alternative possibilities; if so, then there remains a lot of cross-linguistic work to be done.

But whatever the details of the principles that govern particular specificity markers, it seems clear from the little we have discussed that it won't do to delegate specificity entirely to the realm of (post-semantic) pragmatics. Sometimes, the specificity of an indefinite NP will have to show up in "first level" semantic representations.

3.4 Specific, Wide Scope and Intermediate Scope Indefinites in the Linguistic Literature. A First, Selective Review of Facts and Theories

We noted that sentence (1.1), repeated here as (3.17)

(3.17) (1.1) Mary believes that her husband is seeing a real estate agent.

has been analysed as involving a wide scope existential quantifier, as in (3.3.ii). (3.9.ii) presents a slightly different picture. From the perspective of the complete sentence (and thus from that of the speaker), the indefinite is once again a wide scope existential. But as part of the complement clause, which describes the content of the attributed belief, it seems to function more like an individual constant, standing for the particular person that Mary' belief is about. In fact, we might contemplate a slightly different analysis of the sentence, in which this last feature is preserved. In this analysis the indefinite is interpreted *just* as an individual constant, though one whose denotation may be unknown to the speaker, and thus will in the normal course of events also remain unknown to the interpreter. This makes (1.1) into an "underspecified" statement of the form that Mary believes that her husband is seeing b (for some unspecified person b).

At first sight this alternative analysis may not seem to have much to recommend it. But it is not so easy to prove that it must be wrong. And in fact an analysis which essentially amounts to this was proposed in 1982 by Janet Dean Fodor and Ivan Sag (Fodor and Sag (1982), henceforth F&S). It is still often quoted today, and rightly so. F&S maintain that indefinite *NP*s (in particular singular English *NP*s beginning with *a*) are ambiguous between (i) a quantificational interpretation, according to which they are existential quantifiers subject to the same scope restrictions as other quantifier phrases (such as *NP*s beginning with *every* or *most*) and (ii) an interpretation as individual constants. What makes this proposal attractive is that it allows us to treat indefinites as subject to the same scope restrictions as other *NP*s. Note in this connection that the proposal implies this not only for the quantificational interpretation (this we already observed), but also for the individual constant interpretation. This is so because from a semantic perspective constants are essentially scopeless — they may seem to have wide scope in a way, but this is only because their denotations are not dependent on other material in the sentences in which they occur.

The principal empirical prediction which this theory makes is that indefinites allow only for interpretations in which they have either "local" (that is, narrow) scope or else they seem to have maximal scope (i.e. they are outside the scope of all other operators in the sentence). In this regard the theory differs from accounts which analyse indefinites as devices of existential quantification which are not subject to the scope restrictions of other quantifiers, and can be adjoined to any higher clauses. F&S see their theory confirmed by sentences like:

(3.18) Every colleague heard about the rumour that a student of mine
was called before the dean.

This sentence, they claim, has two readings, formalisable as (3.19a) and (3.19b), respectively:

(3.19) a. $(\forall x)(coll(x) \rightarrow heard\text{-}about(x, (Ty)(rumour(y)\ \&\ y = {}^\wedge(\exists z)(stud\text{-}of(z,a)\ \&\ was\text{-}called\text{-}before(z,d)))))$

b. $stud\text{-}of(b,a)\ \&\ (\forall x)(coll(x) \rightarrow heard\text{-}about(x, (Ty)(rumour(y)\ \&\ y = {}^\wedge was\text{-}called\text{-}before(b,d))))$

(Here a stands for the speaker, T is the description operator and the part beginning with $\hat{}$ denotes the proposition expressed by the formula that constitutes the scope of $\hat{}$.) But the sentence lacks — and this is the crucial point — the interpretation given in (3.20):

(3.20) $(\forall x)(coll(x) \rightarrow (\exists z)(stud\text{-}of(z,a)\ \&\ heard\text{-}about(x,(Ty)(rumour(y)\&$
$y = \hat{}was\text{-}called\text{-}before(z,d)))))$

This missing interpretation can be paraphrased as: *For each colleague there is a student of the speaker's such that the colleague heard the rumour that that student had been called before the dean.* It seems easy to concur with F&S's judgement, so it seems that, at least as far as this sentence is concerned, their analysis is vindicated.

In due course it was noted, however, that there are sentences where an intermediate scope reading for indefinites seems possible. The first intermediate scope readings were found by Donka Farkas, and were reported in Farkas (1981):[4]

(3.21) *a.* Each student has to come up with three arguments which show that some condition proposed by Chomsky is wrong
b. Everybody told several stories that involved some member of the Royal family

Another example with an intermediate scope reading (attributed to Angelika Kratzer) is found in Rullmann (1989):

(3.22) Each writer overheard the rumour that she didn't write a book she wrote

Here are some more examples of sentences with an intermediate reading. Those in (3.23) are from Abusch (1994); the sentence in (3.24a), a close variant of (3.18), is from Kratzer (1998)); (3.24b) is a further variant of this example, adding to our sense of how delicate the empirical data are in such matters of scope. Both (3.25a) and (3.25b), which is taken from Chierchia (t.a.), are examples of a type of sentence discussed extensively by Tanya Reinhart and Yoad Winter (Reinhart (1997), Winter (1997), Winter (1998)).

(3.23) *a.* Each professor rewarded every student who had read a book he had recommended.
b. Each choreographer believes that it would be damaging for a dancer of his to quit the company
c. Everyone moved to Stuttgart because a woman lived there.
d. When everybody an agent works with trusts him, he is usually a traitor.
e. Every professor got a headache whenever a student he hated was in class.
e′. Every professor got a headache whenever there was a student he hated in class.

(3.24) *a.* Every teacher overheard the rumour that a student of his had been called before the dean.
b. Every teacher overheard a rumour that a student of mine had been called before the dean.

(3.25) *a.* If a distant relative of mine (, who is now in his seventies,) makes me his heir, I will end up filthy rich.
b. Everyone is convinced that if a friend of mine comes to the party, it will be a disaster.

The point common to all these examples (with the exception of (3.23e')) is that each of them permits an interpretation in which the indefinite has "intermediate scope". That is, if we write out the truth conditions connected with the interpretation with the familiar means of predicate logic, then (i) the indefinite will be represented by an existential quantifier which is within the scope of one other operator in the sentence while it itself contains a third operator within its own scope; and (ii) the position of the existential quantifier is outside the clause to which the indefinite belongs. Thus

[4] F&S was available as a Stanford working paper at the time.

the truth conditions of the intended interpretation (for (3.23a), for instance) can be represented in predicate logic notation as in (3.26):

(3.26) $(\forall x)(prof(x) \rightarrow (\exists y)(book(y)\ \&\ recom(x,y)\ \&$
$(\forall z)(stud(z)\ \&\ read(z,y) \rightarrow reward(x,z))))$

Note that the existential quantifier binding the variable y which comes from the indefinite *NP* *a book* occurs outside the scope of the quantifier $\forall z$ corresponding to *every student* in spite of the fact that *a book* occurs in a relative clause adjoined to *every student*.

The range of examples in (3.23)–(3.25) is meant to give some impression of the range of grammatical constructions from which an indefinite can apparently "escape" in that its representing quantifier ends up outside the construction in a logical representation of the truth conditions of the sentence (on the intended interpretation). There is one notable exception to this, which is (3.23e'): When an indefinite occurs as the subject of a *there*-insertion clause, then it *cannot* escape from the clause. In this respect (3.23e) and (3.23e') constitute a telling minimal pair. (An explanation of why (3.23e') deviates from the general pattern which the above examples display will be given in the second part of the course.)

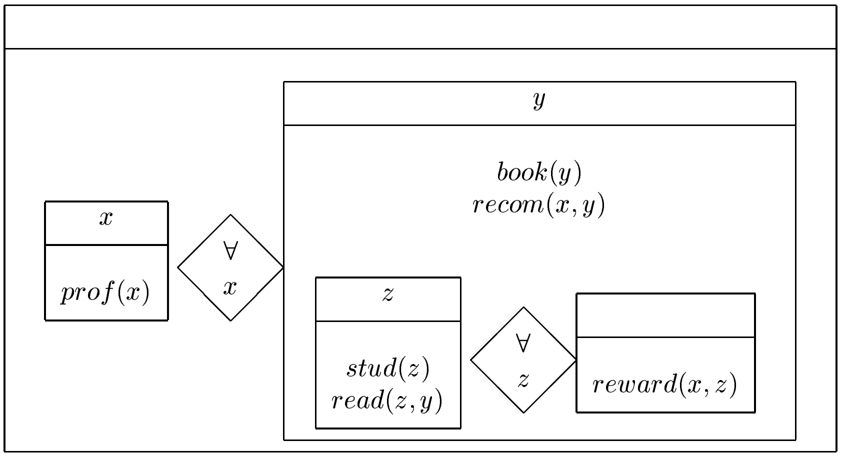
Abusch saw examples of this sort as clearly refuting the proposal of Fodor and Sag. She also argues (persuasively in our opinion) that such interpretations cannot quite be handled by a mechanism of quantifier adjunction (this problem was pointed out as early as 1982 in Heim (1982)). Heim's theory allows the variable introduced by an indefinite to be adjoined (in logical form) to positions above the boundary of the clause containing the indefinite, but this process leaves the descriptive content of the indefinite inside the clause. For instance, (3.23a) would get a logical form with truth conditions as in (3.27):

(3.27) $(\forall x)(prof(x) \rightarrow (\exists y)(\forall z)(stud(z) \rightarrow (book(y)\ \&\ recom(x,y)\ \&\ read(z,y)$
$\rightarrow reward(x,z)))))$

This not only looks odd, it also makes false predictions about the conditions under which (3.23a) is true. For (3.27) is compatible with a situation in which no professor rewarded any student, although all students had read all recommended books. (3.27) is true in such a scenario so long as the universe of discourse contains at least one thing that isn't a book, an assumption that is easily satisfied. (In fact, it is hard to think of a plausible case in which it would not be true.)

Abusch modifies Heim's account into one in which the descriptive material of the *NP* gets moved to the position of the (wide or intermediate scope) existential quantifier which binds its variable. Within a DRT-like framework this modification amounts to the following: The discourse referent introduced by an indefinite *may* be placed in a higher DRS-universe than the universe of the sub-DRS corresponding to the clause containing the indefinite, but with the proviso that the descriptive content of the indefinite also gets processed within the DRS of the higher universe. The condition that the descriptive material is also to be interpeted as part of the higher DRS had, to our knowledge, not been made explicit previously within the DRT-literature, but it is entirely in the general spirit of the DRT conception of noun phrase interpretation. As an example, the DRS representing the intermediate scope interpretation of (3.23a) has the following form:

(3.28)



Abusch's proposal has come under attack in its turn, and for two separate reasons. First, it has been noted that the proposal overgenerates: While "intermediate" readings of indefinites are possible, as Abusch's examples unequivocally show, the "intermediate scope" phenomenon is not as general as her theory seems to predict. Secondly, there is a problem with the interpretation of plural indefinites, to which we will refer as the "Ruys problem". (After Eddy Ruys, who discovered it, cf. Ruys (1992).) We discuss the Ruys problem in Section 3.5. The remainder of this section is devoted to the first difficulty.

Kratzer (1998) observes that the availability of intermediate readings of indefinites depends significantly on the presence of an element (typically, and in her examples, an anaphoric pronoun) that is interpreted as "bound" by the operator in the scope of which the *NP* is interpreted to lie. She cites the following pairs as illustrations:

(3.29) ($Kr.5$) *a.* Every professor$_1$ rewarded every student who read some book *she*$_1$ had reviewed for the New York Times.
b. Every professor$_1$ rewarded every student who read some book *I* had reviewed for the New York Times.
($Kr.6$) *a.* Each teacher$_1$1 overheard the rumour that some student of *his*$_1$ had been called before the dean.
b. Each teacher$_1$ overheard the rumour that some student of *mine* had been called before the dean.
($Kr.7$) *a.* Every professor$_1$ got a headache whenever some student *he*$_1$ hated was in class.
b. Every professor$_1$ got a headache whenever some student *Mary* hated was in class.

In contrast with the *a*-sentences, Kratzer says, an intermediate reading for the *b*-sentences is "hard or impossible". It seems to us that "hard" is the more appropriate term here, with the possible exception of (Kr6.b), where an intermediate reading does seem virtually impossible. This, however, may well be due to an additional effect produced by the definite article *the* in *the rumour*: Without an explicit anaphoric connection to the variable bound by *every professor*, as in (Kr6.a), a functional interpretation for *the rumour ...* may be especially hard, and this may interfere with an intermediate scope reading for *some student of mine* which would force such an interpretation on the definite *NP*. In fact, in the variant (Kr6'.c), with *a rumour ...* in stead of *the rumour ...*, the intermediate scope reading seems to qualify once more as "hard" rather than impossible; but the facts are difficult to assess.

(3.30) ($Kr.6'$) *c.* Each teacher$_1$ overheard a rumour that some student of *mine* had been called before the dean.

Clearer data showing that unconstrained scoping of indefinites cannot be right have to do with conditionals. In the folowing example, taken from Chierchia (t.a.), neither wide scoping nor intermediate scoping get the truth conditions right.

(3.31) (Ch.58) If a student cheats on the exam, every professor might institute ethics proceedings.

Here the wide scope reading would say that there is a student such that if that student cheats on the exam, then very professor might institute ehtics proceedings. Since the phrase *every professor* can be interpreted as taking scope over the conditional, there is another wide scope reading: Some student is such that it is true of every professor that if the student cheats on the exam, that professor might institute ethics proceedings.[5] This paraphrase has truth conditions that are not easy to distinguish from the first paraphrase, and they are equally inappropriate. However, because of the wide scope option for *every professor* with respect to the conditional, we have in principle also an intermediate scope option for *a student*: Every professor is such that there exists a student such that the professor might institute ethics proceedings in case the student cheats on the exam. This too is a reading the sentence doesn't appear to have. The problem with all three non-existent readings is that they are too weak. Students who do not cheat on the exam can be found in lots of situations in which (3.31) might be used, in which the case the matrix following the existential quantifier would be vacuously satisfied, and the sentence come out true for the wrong reason.

Schwarz (2001), continuing the discussion of Chierchia (t.a.), points out the absence of intermediate readings for "non-specific" indefinites such as *a N* and *some N* in positions where *specific* idefinites such as *a certain N*, *some particular N* allow for an "intermediate" interpretation":

(3.32) (Sc78) *a*. No student has studied every article that some professor has published.
b. No student has studied every article that a certain professor has published.
(Sc79) *a*. At most one boy ate every cookie a girl from his class had brought.
b. At most one boy ate every cookie a certain girl from his class had brought.
(Sc80) *a*. No student read every paper that deals with some topic she doesn't care about.
b.No student read every paper that deals with a certain topic she doesn't care about.

Here each of the *b*-sentences allows for an interpretation which assigns it the truth conditions determined by intermediate scoping of the indefinite. But for the *a*-sentences such a reading seems well-nigh impossible. Note that the quantifiers which have wide scope with respect to the intermediately scoped indefinite are all downward entailing.

3.5 The Ruys Problem

There is also a second problem which arises not only for "intermediate scope", but equally for "wide scope" readings of indefinites. This problem has to do with the interpretation of certain plural indefinites. The paradigmatic example, a close variant of (3.25a), is due to Eddy Ruys (Ruys (1992)):

(3.33) If three relatives of mine die, I will inherit a house.

As Ruys observed, this sentence permits a specific interpretation, according to which it says of some particular set of three relatives that if they die, the speaker will inherit a house. (Of course

[5] That this option exists is shown by sentences like *If you talk to him, every professor turns out to be much less of an ogre than he may seem from a distance.* It seems quite possible to interpret *him* as anaphoric to *every professor*, with the resulting interpretation that *Every professor has the property that if you talk to him, then he proves to be less of an ogre.* The sentence is perhaps not the absolutely optimal vehicle for this propositional content, but it seems well within the bounds of grammatical tolerance.

the sentence also has an interpretation which says that the speaker will inherit a house when any three relatives of his meet their end; e.g. the speaker has fifteen relatives, and as soon as any three of them die, a house will be his.) Abusch's theory can handle both of these interpretations — so far so good. But it is not clear how the account should cope with the following fact which Ruys noted: Plural definite and indefinite *NP*s generally allow for both "distributive" and "collective" interpretations. In the present case, in view of the inherently distributive meaning of *die* — dying is something that everyone does on his own, even in cases of collective suicide — distribution over the set introduced by the plural *NP* is obligatory. That is, the truth conditions of the wide scope interpretation of (3.33) can be stated as in (3.34):

(3.34) $(\exists X)((\forall x)(x \in X \rightarrow rel(x, sp))\ \&\ |X| = 3 \rightarrow ((\forall x)(x \in X \rightarrow die(x)) \rightarrow (\exists z)(house(z)\ \&\ inherit(sp, z))))$

N.B. We have used a capital variable X to indicate that its value is a set (or "non-atomic individual" in the sense of Link (1983); cf. also Kamp and Reyle (1993), Ch.4.). We haven't bothered to unfold the relational predicate *relative of mine*. *sp* stands for the speaker.

Ruys's observation is that while distribution over the set is possible in the way indicated in (3.34), it is not possible to distribute over X at the level of the existential quantifier. That is, (3.33) does not have the reading given in (3.35), according to which the single death of any one of the three relatives in question will suffice to put the speaker in possession of a house.

(3.35) $(\exists X)((\forall x)(x \in X \rightarrow rel(x, sp))\ \&\ |X| = 3\ \&\ (\forall x)(x \in X \rightarrow (die(x) \rightarrow (\exists z)(house(z)\ \&\ inherit(a, z))))$

The puzzle to which this observation gives rise is the following: If it is assumed that the distribution expressed by the second quantifier $(\forall x)$ is due to the indefinite *NP*, then it is hard to see (on Abusch's account, but on many others as well) why (3.35) should be blocked.[6] One way out of the difficulty might be to locate the source of the distributive option not in the plural *NP* itself, but somewhere else. Thus one might hope to make an inherent lexical distributivity of *die* responsible for this possibility in the case of (3.33). If that were right, then we would have an explanation why distributivity in this sentence can only happen within the antecedent of the conditional; for that is where *die* belongs and remains, whether the indefinite is given a wide scope reading or not.

Unfortunately, this doesn't seem the way out. It has been argued by Reinhart that in certain sentences it must be the plural indefinite itself which is responsible for a distributive reading. An example is (3.36).

(3.36) A guard was posted in front of three apartment blocks.

This sentence has a reading on which it says that there were three apartment blocks such that a guard was posted in front of each of them. According to this reading the subject phrase in (3.36) not only ends up within the scope of the object phrase, but also within the scope of the distribution over the set X representing the object phrase. In this case it cannot simply be an inherent ambiguity of the verb (i.e. with respect to the argument position occupied by the *PP in front of three apartment blocks*). For that wouldn't explain how the subject can end up within the scope of the distribution as well. In fact, in the case of (3.36) it seems very hard to maintain that something other than the *NP* itself (or the set it introduces) carries the distributive option.[7]

[6] Abusch is aware of this issue, but testifies to an opposite judgment of the facts. For her the wide scope distributive reading is apparently possible, and her treatment of distributive interpretations of plural indefinites reflects this (and is accordingly straightforward).

[7] It is noteworthy that the phenomenon illustrated by (3.33) is also found in sentences where the *VP* is genuinely ambiguous between what a collective and a distributive interpretation. Consider for instance (3.37).

(3.37) If three relatives of mine consent to endorse a loan I have applied for, then I will be able to take over the practice.

This sentence has an interpretation in which (i) it concerns some particular set X of relatives; moreover, the sentence can be read as saying about the relatives in X either (ii.a) that if they jointly endorse one and the same

One account of indefinites that has been proposed to get us out of this predicament is to interpret them in terms of *choice functions*. The earliest proposal to this effectis Egli (1991). This publication was succeeded by other publications, both from what may be called the 'Konstanz' group (see e.g. von Heusinger (2000) and the references cited there), and from the 'Utrecht' group (with Reinhart (1997) and Winter (1997), Winter (1998) as representative publications). The first choice function proposal that is relevant to our concerns here is Reinhart (1997). The choice function account of indefinites discussed in this section is closest to that of Winter (1997). Although we ourselves have reservations about certain aspects of the choice function approach (about which more below), there is one respect in which we think that Reinhart et al. have hit the nail on the head. This is their insistence that, in one important sense, the so called "wide scope" and "intermediate scope" indefinites never leave the clauses to which they belong. It is for this reason that even if the indefinite which in a sentence like (3.33) is responsible for the possibility of a distributive reading, distributivity will only occur within the clause in which the indefinite occurs, notwithstanding the indefinite's "wide" or "intermediate" scope interpretation.

It will be useful in this connection to have a look at sentences which are like (3.33), (3.37) and (3.36), except that the plural indefinite has been replaced by a plural definite:

(3.38) *a.* If those three relatives of mine die, I will inherit a house.
b. If these three relatives of mine consent to endorse a loan
I have applied for, then I will be able to take over the practice.
c. A guard was posted in front of the three apartment blocks.

With regard to the question that concerns us these sentences are like their indefinite counterparts. The definite plurals only seem to allow for a "wide scope" reading. This is unexpected and in keeping with standard views about the referential status of such *NP*s. But — and this is the relevant point — they no more allow for wide scope distribution than the indefinite plurals in (3.33), (3.37) and (3.36). We will refer to this observation as "Ruys' observation for definite plurals".

With definite *NP*s like those in (3.38) there is a natural explanation for Ruys' observation. It is suggested by the long-standing practice of representing such *NP*s as constants (or, sometimes, as more complex terms) in predicate logic translations. Thus, (3.38.a) might be translated as in (3.39).

(3.39) $die(A) \rightarrow (\exists z)(house(z)\ \&\ inherit(sp, z))$

where A is a constant denoting the set referred to by *those three relatives*.

This doesn't solve the Ruys problem automatically, but it may point in the direction of a solution. The idea is this. First, it would be natural to assume that in a preliminary symbolisation like (3.39) it is the set-denoting constant A which triggers the optional distribution. If, moreover, we assume that it is the *particular occurrence* of A in (3.39) which triggers distribution, and, finally, that the distribution has to be executed in the *local* context of this occurrence, then we are close to the prediction we want. That is, if we assume that the local context of the occurrence of A in (3.39) is the antecedent of the conditional, and not the conditional as a whole, then Ruys' observation follows.

Unfortunately, it is not so obvious how the notion of the local context of an occurrence of a constant should be defined. But it is at this point that DRT promises to be of some help. Let us begin by drawing attention to a feature of the DRT treatment of anaphoric pronouns. In the version of DRT presented in Kamp and Reyle (1993) pronominal anaphora is treated by introducing a new discourse referent for the pronoun and a condition which stipulates coreferentiality between this discourse referent and the discourse referent representing the pronoun's antecedent. The new discourse referent is introduced locally. In the DRT of Kamp and Reyle (1993) this means: into the

loan, the speaker will be able to take over the practice, or (ii.b) that the speaker will be able to proceed if each of them endorses a different loan he has applied for. This ambiguity surely is one which concerns the interpretation of the *VP*. At the same time we observe the same restriction that we also noted in connection with (3.33): While there is an interpretation of (3.37) according to which the sentence is about some particular set of three relatives there is no interpretation according to which it says that for some set X of three relatives it is the case that even if only one of them approves the relevant loan, the speaker will be able to acquire the practice.

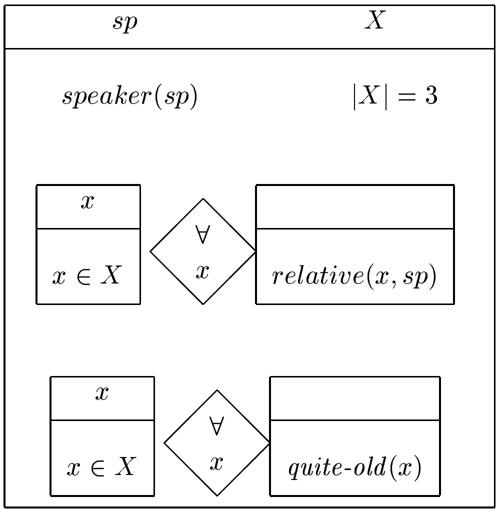
universe of that (sub-)DRS which contains the pronoun at the point when it is interpreted. This is so irrespective of what DRS universe the antecedent discourse referent belongs to.

As an example consider the following "discourse" variant of (3.33)

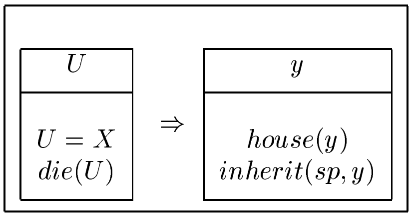
(3.40) Three relatives of mine are quite old now. If they die, I will inherit a house.

Using the construction algorithm of Kamp and Reyle (1993) we get (3.41i) as the DRS for the first sentence of (3.40) and (3.41ii) as the extension of this DRS incorporating the second sentence.

(3.41) (i)

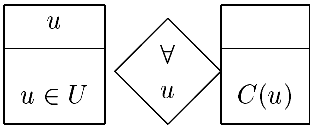


(ii)



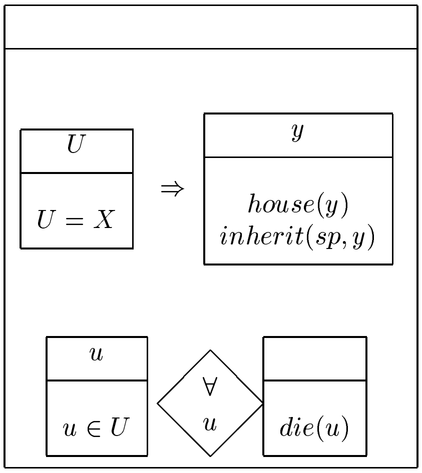
It seems a plausible assumption that for such representations it is the discourse referent which represents a given plural *NP* that (optionally) triggers distribution. In (3.41.ii) this is the discourse referent U. And it is also natural to assume that in such representations distribution, with respect to any condition $C(U)$, takes the form of replacing $C(U)$ by the condition (3.42) (cf. Kamp and Reyle (1993), Ch. 4).

(3.42)

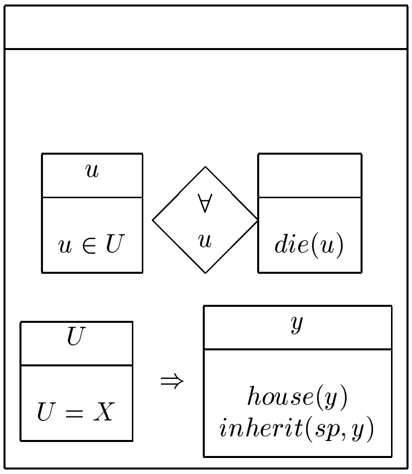


It follows from general well-formedness constraints on DRSs that this replacement will occur within the DRS whose universe contains U. For the case we are looking at this will mean that distribution over the condition $die(U)$ will be possible only within the antecedent of the conditional. Thus we get the optional representation given in (3.43), while the inadmissible wide scope distribution, according to which one death is good enough for a house, is blocked. This is just what we wanted.

(3.43) (*i*)



(*ii*)



Note that the DRT formalism gives us a very straightforward and precise way of defining the notion of "local context". The local context of a discourse referent δ within a DRS K is that sub-DRS K' of K such that δ belongs to the universe of K'.[8] However, for our present purposes we strictly speaking do not need this definition, since, as noted in the last paragraph, local distribution is guaranteed in any case. In order that an account of distributivity along these lines blocks the unwanted wide scope distributions, all that we have to see to is (i) that distributivity is connected with the right discourse referents, and (ii) that these discourse referents end up in the right (sufficiently "local") universes.

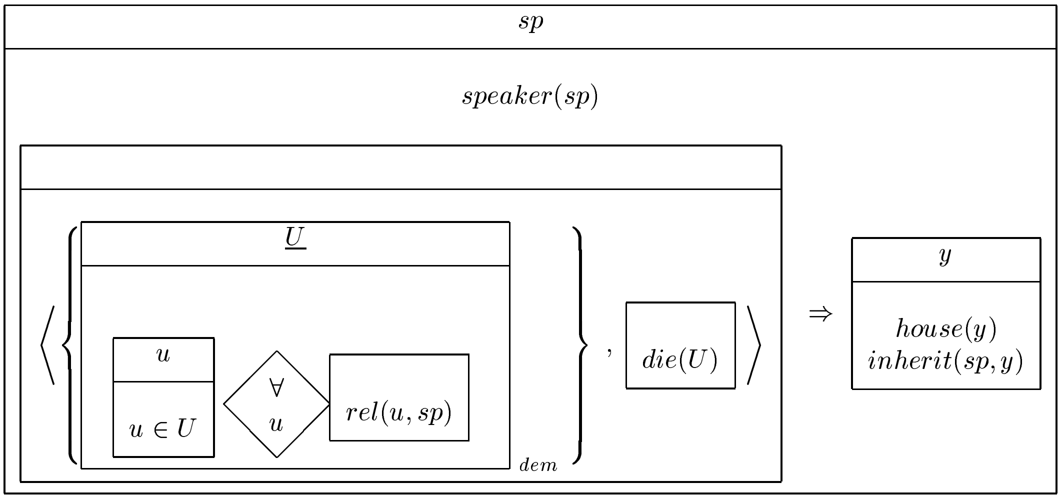
For the case we have just looked at — that where the *NP* which allows for a distributive reading is a plural pronoun — things come out right because of the decision to treat anaphoric pronouns as involving the local introduction of a new discourse referent together with an identity stipulation. The current treatment of other types of definite *NP*s (non-anaphoric pronouns, definite descriptions, demonstratives, proper names) as local presupposition triggers (cf. e.g. Sandt (1992), Kamp (2001c)) produce the same locality effects we have just observed for *they* in (3.40).[9] This is true in particular for the definite descriptions in (3.38). By way of example we present the analysis of

[8]We are making the linguistically harmless assumption that no discourse referent occurs in more than one universe within a single DRS.

[9]The reason for adopting this analysis in Kamp and Reyle (1993) was not motivated by the Ruys problem (of which we were insufficiently aware at the time), but by a desire to make the treatment of the definite types of *NP*s as similar as possible — in an endeavour to render those interpretation aspects under which interpretations of the different types diverge as clearly visible as possible. Given for some types of NPs (indefinites and quantifying NPs) the introduction of new discourse referents is "de rigueur", uniformity suggested that introduction also be postulated for anaphoric *NP*s, instead of their taking over the antecedent discourse referent into the argument positions of the

(3.38.i). This analysis follows the general recipe for dealing with presuppositions which is spelled out in Kamp (2001c): First we construct a *preliminary* representation of the sentence, in which the presuppositions are explicitly represented and locally adjoined. (In the representation we present the only presupposition displayed is the one generated by the demonstrative NP *those relatives of mine*.[10]) In a second step the presuppositions are justified with respect to the given context representation, and if justification is successful, the context representation and the non-presuppositional part of the representation are merged. The preliminary representation is shown in (3.44).

(3.44)



Here the structure within curly brackets is the displayed presupposition of the sentence. (Since presuppositions usually come in bunches, the general form of preliminary representations is that of non-presuppositional parts with sets of presuppositions prefixed to them. In the case at hand the set is a singleton, and it is prefixed to the antecedent of the conditional.) The subscript *dem* indicates that the presupposition was triggered by a demonstrative NP. This information has to be encoded, because the justification rules for the various types of definite NPs differ from each other, and the justification mechanism must be able to recognise from its i*NP*ut (e.g. from (3.44)) which justification principles should be applied.[11]

Although there are subtle differences between the justification rules for different *NP* types, there is nevertheless quite a bit that all these justification procedures have in common. First, all such presuppositions have a distinguished discourse referent δ, which represents the (denotatum of the) *NP*. Second, justification generally takes the form of either (i) finding in the context a discourse referent α which can be seen or made to satisfy the qualifications for being δ's antecedent or (ii) "accommodating the referent of the *NP*" by introducing a new discourse referent α together with the qualifications mentioned in (i). In either case, we will assume, the effect of justification is that the discourse referent δ gets added to the universe of the DRS to which the presupposition is left-adjoined and the equation "$\delta = \alpha$" gets added to the condition set of this DRS. This produces the same kind of configuration that we have observed in (3.41.ii), with the desired consequences for

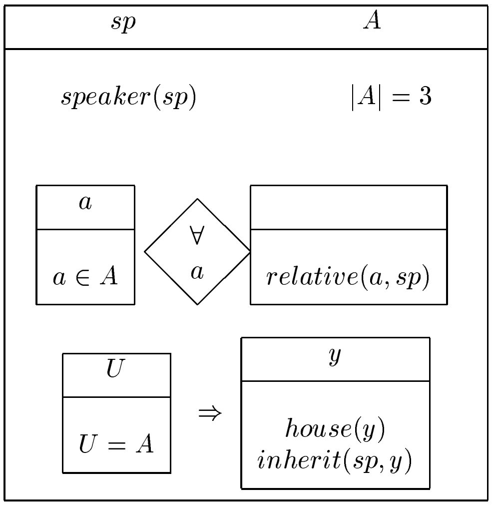
pronoun (cf. Kamp (1981)). In the meantime the uniform procedure has proved its usefulness in various ways, most notably in the treatment of anaphora as a species of presupposition as first proposed by Sandt (1992) and Zeevat (1992). Its usefulness in connection with Ruys' problem is yet another bit of collateral confirmation that this is the right analysis.

[10] Srictly speaking this is not quite right. Here as with virtually any other sentence the total number of presuppositions is larger than 1. For instance, the verb *inherit* carries the presupposition that the inheritor does not already possess that which he subsequently inherits. Similarly (*mutatis mutandis*) for *die*. No attempt is made (here or later) to come up with exhaustive representations of presuppositions.

[11] About the difference in justification principles for pronouns and definite descriptions much has been said in the literature. But of course there exist (often quite subtle) differences between all the various definite *NP* types. For instance, in English it is necessary to distinguish at least between the "bare demonstratives" *this/these* and *that/those*, complex demonstratives beginning with these words, posessive phrases and proper names. For many other languages, however, the correct identification of the justification principles for the different types of definites can be much more complex. German, for one, is a language with a much richer repertoire of definites than English, and with a subtle division of referential and anaphoric labour between them.

distributivity. Thus, justification of the presupposition with distinguished discourse referent U in (3.44) will lead to the representation in (3.45).

(3.45)



As before, distribution over the subject of the if-clause will now be possible, but once again this must take the form of distribution over U, and such distribution will be allowed only within the local context set by the antecedent of the conditional in (3.45).[12]

The strategy that these considerations suggest for dealing with Ruys' problem for plural indefinites is that these *NP*s also remain in situ in the relevant sense, irrespective of whether they are given a narrow or non-narrow scope interpretation. This, we take it, is the important insight behind the choice function analyses for indefinites. Before we turn to these, however, we want to push a little further ahead with our exploration of definites.

3.6 Functional Interpretations of Definite Descriptions

With definite *NP*s the most common interpretation is the referential one, according to which the *NP* denotes a particular referent. In such cases, we already saw, the *NP* is essentially scopeless — its reference is independent of any other operators in the sentence, and in that sense the *NP* seems to have maximal scope. For some types of definites, e.g. proper names, this is always so, but for others, definite descriptions among them, "narrower scope" interpretations (both "narrow" and "intermediate") are also possible if the conditions are appropriate. Here are a couple of examples:

(3.46) *a.* Each professor rewarded every student who had read the book he had recommended.
b. Each professor rewarded every student who had read the recommended book.
c. Each professor rewarded every student who had read the book that was published by Macmillan.
d. Every teacher overheard the rumour that his student had been called before the dean.
e. Every teacher overheard the rumour that the/my student had been called before the dean.
f. Every colleague was convinced that if his friend came to the party, it would be a disaster.
g. Every colleague was convinced that if my friend came to the party, it would be a disaster.

[12]Note that nothing speaks against distributing over U in constructing the preliminary representation. The general constraint that this cannot give rise to conditions in which U occurs as argument but are not within the scope of the DRS universe containing U will insure that the distribution cannot get a wide scope which is empirically impossible.

The majority of these sentences allow for interpretations of the definites occurring in them (those with *book* in (3.46a-c), with *student* in (3.46d,e) and with *friend* in (3.46f,g)) according to which they have non-maximal scope. For instance, (3.46a) allows for an intermediate reading for *the book he had recommended*, just like (3.23a) allows for an intermediate scope interpretation with the corresponding indefinite. In this case it is hard to get a wide scope reading. Such a reading would require that the pronoun he be interpreted as not anaphoric to the subject NP. In a context in which no alternative anaphoric antecedent is offered, such an interpretation is clearly dispreferred. Unequivocally available non-maximal scope interpretations are also possible for (3.46.d) and (3.46.f). We take it that the same is true for (3.46.b). For the remaining sentences the verdict seems less clear. (3.46.e) resembles the sentence which Fodor & Sag used in support of their claim that there are no intermediate readings for indinites. We saw that only a small change — viz when *the rumour* is replaced by *a rumour* — is enough to alter that judgement. For (3.46.e) too, a small change has such an effect: (3.46.d) clearly does allow for an intermediate reading. But even for (3.46.e) itself those who are inclined to exclude an intermediate reading should be careful. And a similar caution is needed in connection with the remaining sentences in (3.46) — (3.46.c) and (3.46.g). Here too it might well be thought at first sight that an intermediate interpretation is impossible. But in all these cases it seems to us that in special contexts the intermediate reading does become available. And even when such a context is not given, it is just about possible to accommodate one. (It is just that these contexts are outlandish enough for no-one to think of them when the sentences are offered to him in vitro.)

Here is a try for the *the*-version of (3.46.e). Suppose that the sentence is part of a larger discourse as in (3.47).

(3.47)

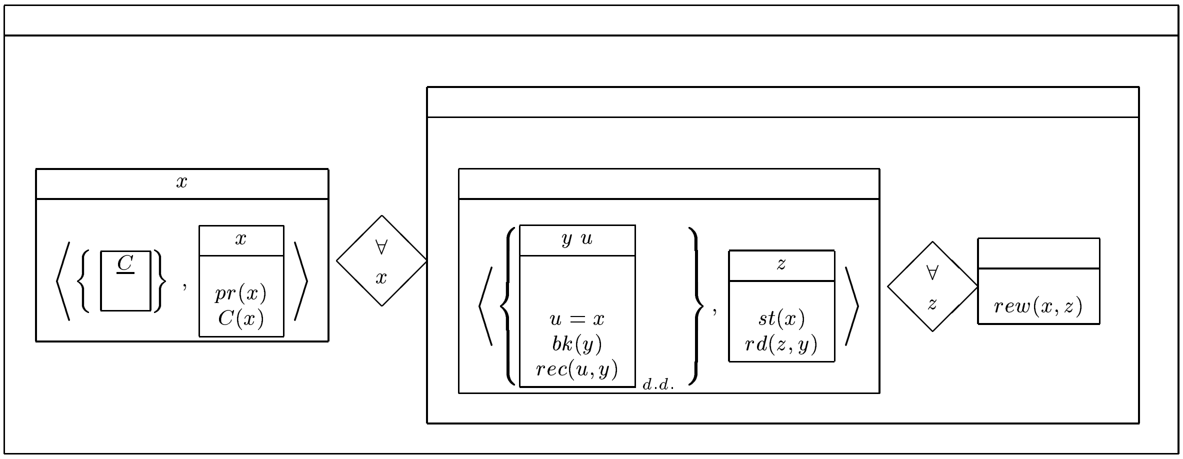
> Tensions with the notoriously conservative central administration had been mounting in general and there were particular problems, partly going back a long way back in time, with our department. And now it was beginning to affect our students too. Each of us, the teachers of our department, had one student in their classes who was clearly smarter than all the others, and who at the same time was very much more active politically. By Monday last week each teacher had overheard the rumour that the student had been called before the dean. We were all furious of course and decided it was time for the department to take action collectively.

Admittedly the intended interpretation - that each teacher had overheard the rumour of her/his classes had been called before the dean is still somewhat strained — one would still prefer a possessive pronoun instead of the definite article if this is the intended meaning. But it seems to us that the interpretation is just about acceptable.[13]

Some won't be convinced by this example. And making up contexts in which the definites of the other sentences we have just mentioned become amenable to an intermediate interpretation is an equally delicate matter. But this is not the focus of our attention. What we are after is the more general observation that the accessibility of such "non-maximal scope" interpretations depends to a significant extent on the contextual availability of some appropriate function from the range of some quantifier of the sentence to entities that qualify as referents of the definite NP in question. Cases of this sort may not be as compelling as those where the descriptive content of the definite description makes the dependence on other objects explicit, as we find with the sentences in which the description contains a pronoun that is naturally interpreted as anaphoric to a quantifying NP. But, we want to suggest that these two types of case are variants of the same basic pattern - that where the presupposition of a definite description which occurs within the scope of a quantifying NP is resolved by appeal to a function, rather than to a single entity. To make this proposal more concrete, let us look at an explicit treatment along these lines of, first, (3.46.a) and then, in this order, (3.46.c) and (3.46.b)

[13] In German, which generally has a grater tolerance for the definite article where English shows a clear preference for possessives, the direct equivalent of (3.46.e) is much easier as part of the discourse in (3.47).

(3.48) ("almost preliminary" representation of (3.46.a))



In (3.48) we have assumed that the pronoun *he* has already been resolved as anaphoric to the subject *NP*. (Hence the term "almost preliminary" in the caption.) In a truly preliminary representation u would have appeared as the distinguished discourse referent of its own presupposition, which would then have led to the resolution which in (3.48) has already been carried out.

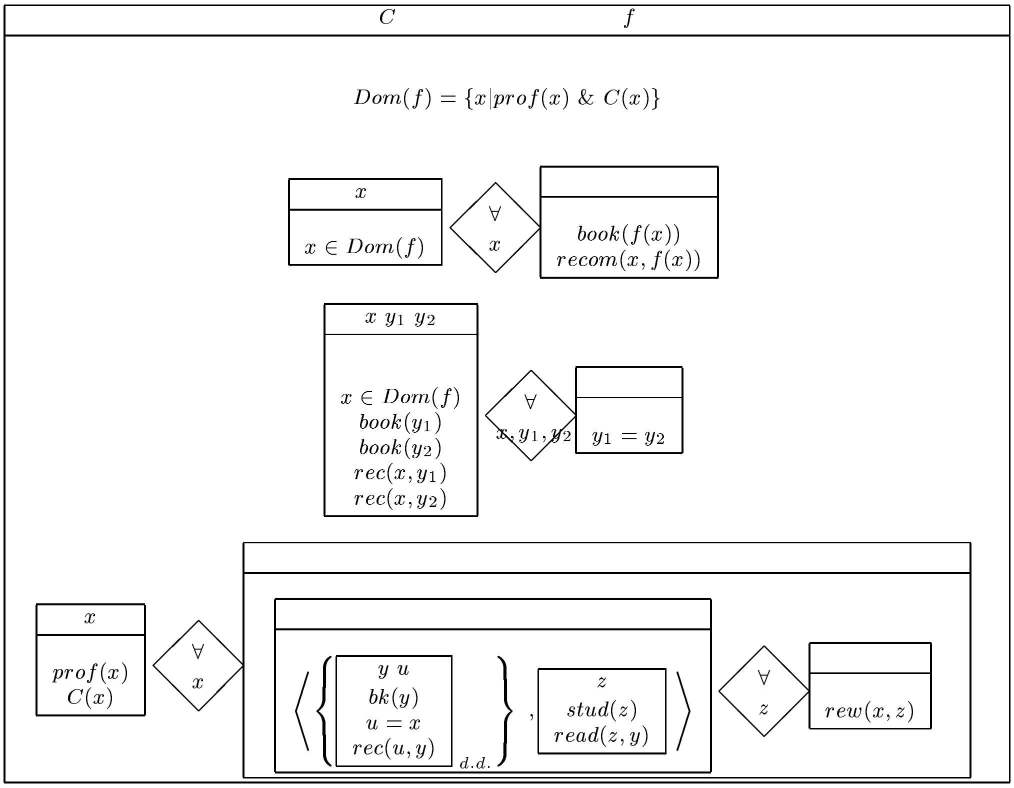
Instead we have displayed in (3.46) a presupposition which had been ignored so far, that for the restrictor of the subject quantifier. We take it to be a widely accepted insight that natural language quantifiers are as often as not interpreted as subject to implicit domain restrictions, which are to be inferred from general contextual knowledge or are imposed the actual discourse context, or both. This kind of contextual dependence is especially prominent for adverbial quantifiers, but nominal quantifiers are affected by it too. Exactly what mechanisms drive the contextual resolution of implicit quantifier restrictions is not yet very well understood, but that context makes itself felt in this way is no longer in doubt. The reason for including the presupposition here will be apparent shortly.[14]

Since we have not been given any context in which (3.46.a) is used, justification of the presupposition in (3.48) can only take the form of wholesale accommodation. However, since the possible denotation of the distinguished discourse referent y depends on the values of x over which the quantifier *each professor* ranges, what needs to be accommodated is a function from the range of the quantifier over x to entities which satisfy all the conditions mentioned in the presupposition for y. It is to be noted that the content of this accommodation depends on the resolution of C. For the determination of C determines what the domain is on which the function must be defined. Let's assume that C is somehow determined. Then the accommodation of the presupposition of the definite description takes the form of assuming a function f that is defined on the set of all professors who satisfy C and which assign to each such professor x a unique book which x had recommended.

[14]Of course the quantifying phrase *every student* also comes with a restrictor presupposition. We have not displayed this second restrictor presupposition in (3.47) because it is not relevant to the question we are in the process of addressing. But for a proper analysis of the sentence this second domain restriction is obviously important. Also important is that the presupposition must be left-adjoined to the embedded quantifier which this second quantifier phrase, so that it (ie. the presupposition) also occurs within the scope of the quantifier *each professor*. (A natural interpretation of the embedded quantifier is that it ranges over all students of professor x.)

The result of this accommodation is given in (3.49).[15]

(3.49)

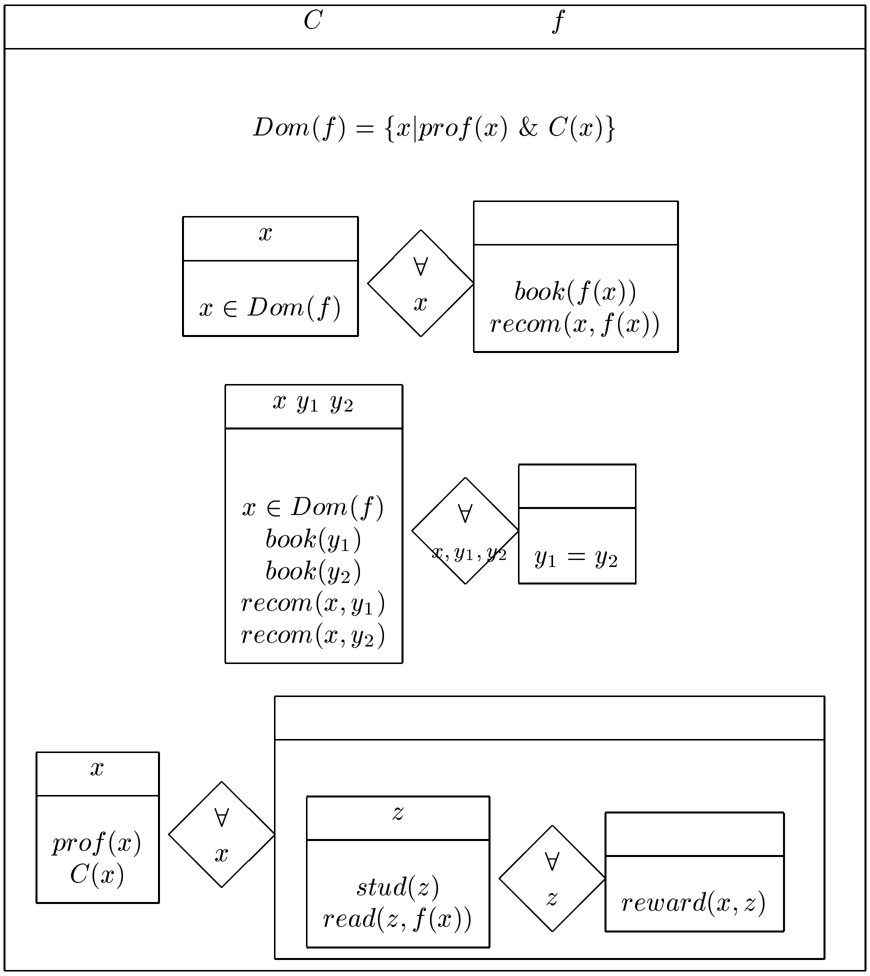


Justification of the presupposition in (3.48) can now take the following form. Applying f to any x in its domain yields as value a y which satisfies all conditions in the presupposition's Condition Set. Therefore we may identify the value of the distinguished discourse referent y of the presupposition

[15]Strictly speaking the uniqueness condition which has been included in the accommodation of f is redundant insofar as the standard interpretation of a function constant in predicate logic is a function in any case. We have added the condition as a reminder that what has to be accommodated is a function and not just a relation with the given domain. The need for a function (and not just for a relation) derives from the uniqueness implication carried by the singular definite description for whose interpretation f is needed. In (3.48) we have assumed that this condition is implicit in the justification rules hidden behind the subscript *d.d.*. But this is not a matter of principle, and in our next example we will deal with it in a slightly different way.

with $f(x)$.[16] The result is the representation in (3.50).

(3.50)



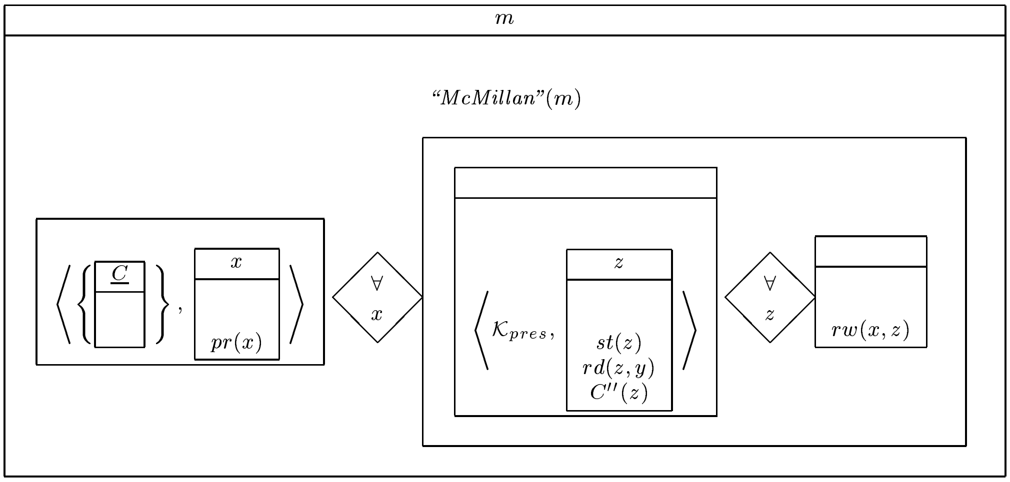
This, we maintain, is the way in which (3.46.a) gets the functional interpretation which it evidently has. It is also, we would like to claim, the way in which *the student* in (3.46.e) gets its intermediate interpretation in the elaborate context (3.47), assuming that it can be so interpreted. As we intimated above, the real problem to which this analysis of dependent interpretations of definites gives rise is: Under which grammatical and contextual conditions are such functional interpretations legitimate? Another one of the sentences in (3.46) for which this question arises is (3.46.c). Here the content of the description does not force a dependent interpretation, and perhaps its most prominent interpretation is that where it refers to one particular book: the unique book, from among some set of books satisfying some further implicit condition C', that was published by MacMillan. However, besides this interpretation a dependent reading seems to be possible as well. This interpretation assigns to each of the professors a particular, unique book published by MacMillan — maybe the book which that professor managed to get published by this "coveted" publishing house and of which she or he is accordingly especially proud (or whatever). In this case the assumption of some implicit condition C'' seems quasi-inevitable (indeed: not only for the dependent interpretation which we are after right now but also for the independent interpretation we mentioned first), and so this time we have made C' and its presupposition explicit in the preliminary representation as well. This presupposition has been adjoined to the one for the definite

[16] Definite descriptions are often to be interpreted also as involving an implicit restrictor. It is only when this restrictor is taken into account that the uniqueness condition becomes true. In a representation which does justice to this further element of contextual dependence the variable y would be subject to an additional condition $C'(y)$ and this condition would also act as restrictor in the uniqueness condition involving y_1 and y_2.

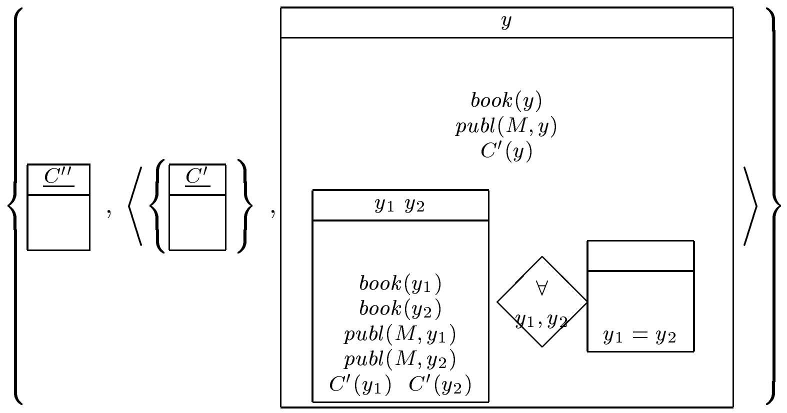
description. (So it is a presupposition of a presupposition.) In addition we have this time also made the restrictor presupposition for the quantifier *every student* explicit, with C'' as the contextually resolvable restrictor predicate. This presupposition is left-adjoined to the quantifier which *every student* introduces, just as the presupposition for the definite description *the book...* (So these two presuppositions now form a presupposition set together.) Adjoining the presupposition concerning C'' in this embedded position (and not for instance at the same level as the one concerning C) is necessary inasmuch as the intuitively most natural resolutions of this presupposition seem to be those which make C'' dependent on x — e.g. C'' might be taken to be the set of students which take a particular class with x (say, Comp. Lit 101).

(Strictly speaking, the name *MacMillan* should have given rise to a presupposition as well, coadjoined with the one for C', but we have not bothered to display this one. The presuppositional structure $\mathcal{K}_{pres}$ from the nuclear scope of the first quantifier is shown separately, due to its complexity and to considerations of typesetting.)

(3.51) *a.*

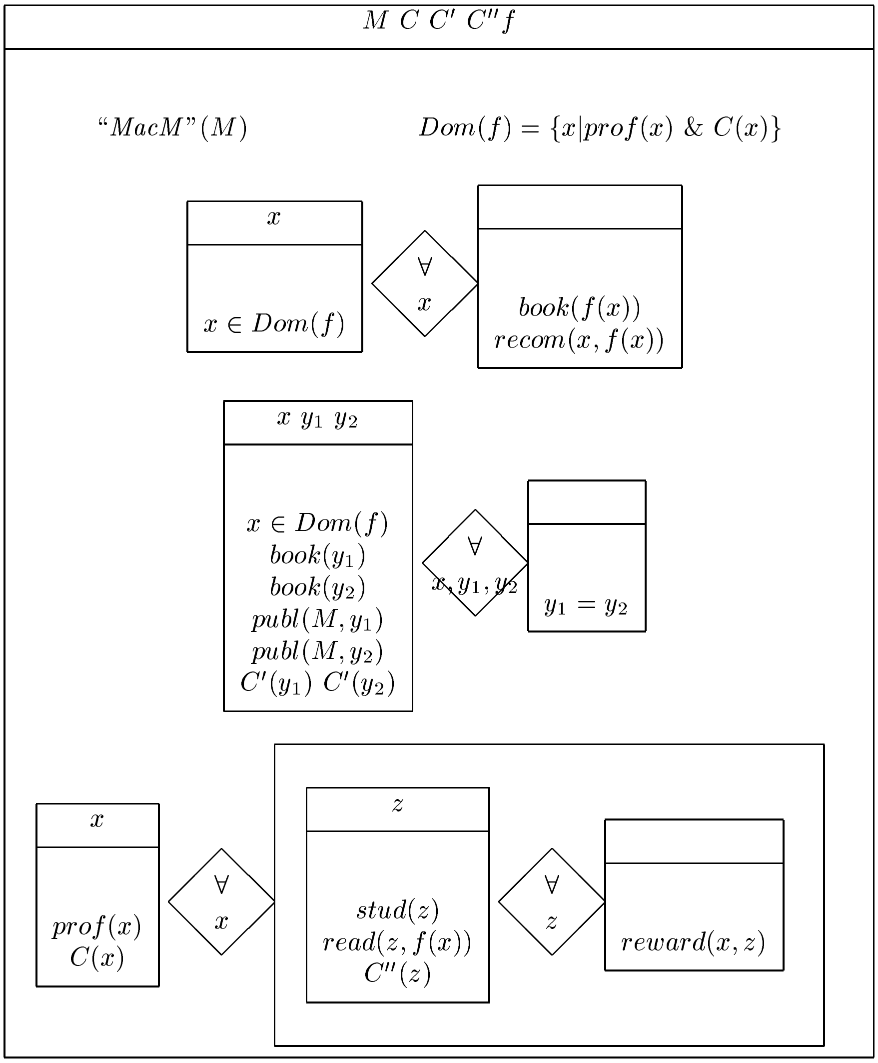


b. $\mathcal{K}_{pres}$:



Let's assume once more that all four presuppositions (as well as the one for *MacMillan* which (3.51) does not display) are accommodated. Moreover, we assume that all five are accommodated "globally" (i.e. at the top level of the representation) and that the one for the definite description is accommodated via a function. The result is much as it was in the case of (3.46.a) (cf (3.50)).

(3.52)



We noted that (3.46.c) has also an interpretation in which the definite description denotes one particular book, with the property that each professor rewarded every student who had read that particular book. But in addition it seems also possible to interpret the description as dependent on z as well as on x — e.g. as the unique book published by MacMillan that was on the reading list that x had given to z. A similar option also exists in the case of (3.46.a), though there its rationale is slightly different from what it is in the case of (3.46.c). The verb *recommend* is ambivalent between a two-place predicate (x *recommends* y) and a three-place predicate (x *recommends* y *to* z). Moreover, the third, "beneficiary", argument need not be syntactically realised even in cases where it is intended semantically. In such cases it often has to be recovered from the context, by a process that seems to be a kind of null-anaphora resolution. In (3.46.a) this resolution can be to the quantified variable z. So here the narrow scope interpretation of the definite description results from a lexical interpretation decision, together with a resolution the need for which this decision carries in its wake. Much the same considerations also apply to the prenominal participle recommended in (3.46.b). Prenominal past participles have syntactically non-realised agent arguments. So *recommended* can be construed as having two null-arguments, the Agent/Subject and the Beneficiary. Either or both can be interpreted "non-specifically", i. e. as referring to some unspecified "some people or other", or resolved anaphorically; and the latter case the natural resolution is of the Agent to x and the beneficiary to z. (Although pure grammar also allows the reverse resolution.) So, lexical underspecification allows for a substantial spectrum of semantic representations in this case, with the three to which we have been paying special attention — (i) the *recommended book means* "the book generally recommended by some unmentioned person or institution"; (ii) the phrase means "the book recommended by x to the students generally"; and (iii) it means "the book recommended by x to z" — perhaps the most prominent but not the only ones possible.

We have been going to such considerable lengths about some of the sentences in (3.46) because in connection with what we will have to say about indefinites (our primary topic) it will be important to have a sense of the spectrum of strategies which interpreters may and do employ in the accommodation of information that allows them to assign dependent and non-dependent interpretations to definite descriptions. As mentioned above, we still have a very incomplete picture of the repertoire of strategies that can be used for this purpose. But the remarks above shows some of the diversity of clues and considerations that can be invoked for this purpose.

3.7 In Loco Treatments of Indefinite *NP*s. Choice Functions

After this extensive foray into dependent interpretations of definite descriptions we return at last to our proper subject.

As we noted above, Ruys' observation suggests strongly that the *NP*s to which the observation applies should be given an analysis which interprets them from the very positions which they occupy according to generally agreed principles of syntax. The *NP*s directly affected by Ruys' observation are all those which, in a DRT-based analysis of reference and quantification, introduce discourse referents for sets (of two or more elements). These *NP*s are, again in DRT terminology, the plural definites and indefinites. However, once the need for "interpretation in loco" has been recognised for those *NP*s, the suspicion must be that this principle should apply not just to those, but to *NP*s generally.[17]

In the last section we have seen how the principle of "interpretation in loco" can be made to work for definite plurals and got a glimpse of the often complex moves that may be needed to arrive at an intuitively plausible reading. But as far as indefinite *NP*s are concerned, the idea of local interpretation has barely been touched on. The only account along these lines which has been given a brief run-down was the Fodor & Sag-account according to which indefinite *NP*s are ambiguous between existential quantifiers and individual constants. We have noted some of the problems with this account, but perhaps the most serious one, from the general perspective that informs our own work is that it is couched in the traditional static, sentence-oriented semantics which was the standard at the time when the account was conceived. Precisely when it comes to indefinites, the perspectives underlying static semantics (such as classical Montague Grammar) and Dynamic Semantics (such as DRT) are irreconcilable. So we would have had a hard time swallowing the Fodor & Sag theory even if it didn't have the specific problems that have already been pointed out.

Abusch's theory, which we did not present, is compatible with a dynamic perspective. In fact, the theory is formulated in an essentially dynamic setting and as she herself indicates, one could reformulate within DRT if one wants to. However, her account is not one of local interpretation, inasmuch as the discourse referents introduced by indefinite *NP*s will, in cases of specific interpretation, be lifted to higher DRS universes than that corresponding to the *NP*'s syntactic position. This is different for the various proposals for treating indefinites as Choice Functions. Although most of these were not formulated within a Dynamic Framework, they are, as far as we can see basically compatible with the Dynamic approach — in what way we will explain as soon as enough has been said about how the Choice Function analyses work.

Before we say anything about particular Choice Function analyses of indefinites, first a remark on terminology. The term "choice function" belongs to set theory and there it is closely related to the Axiom of Choice. A choice function is a function whose domain is a family of non-empty sets and

[17] In fact, not just to the singular definites and indefinites as well as to the plural ones, but also to quantificational NPs. However, the latter never posed any problem in this regard. Rather, it was the need to interpret quantifying NPs in situ (as shown by their obeying the typical island constraints on quantifiers) that gave rise to the problems around specific indefinites. If one thinks of indefinites as quantifiers, then it becomes a mystery why they should be subject to fewer restrictions than other quantifiers. Hence the theory of Fodor & Sag, and all that came after.

which assigns to each in the family a member of that set. (The Axiom of Choice asserts that there exists a choice function for each family of non-empty sets.) Hilbert and Bernays, in their classical work (Hilbert and Bernays (1970)) made use of choice functions to interpret certain formal terms (so-called "epsilon-terms", whose semantic and logical behaviour shows a certain resemblance with that of indefinite *NP*s in natural languages such as English or German. Epsilon-terms are closely related to iota-terms, terms which behave like definite descriptions. Both kinds of terms result from applying a term-forming variable-binding operator — ε or ι — to a formula (which should be thought of as expressing a predication on the variable which the operator binds). Thus, the general form of an iota-term is $(\iota x)A(x)$ and that of an epsilon-term $(\varepsilon x)A(x)$. $(\iota x)A(x)$ denotes the unique object satisfying A (provided such an object exists; if this is not the case, then special provisions are needed, but these do not matter here). Similarly, $(\varepsilon x)A(x)$ denotes some object d which satisfies A, provided there are objects satisfying, with once again special provisions for the cases where this is not so, which we ignore as well. To fix the denotation of the epsilon-terms for all the "normal" cases (i.e. those where the extension of $\{x|A(x)\}$ is non-empty, one assumes a choice function on the power set of the universe of discourse. This function will map each non-empty extension $\{x|A(x)\}$ onto an element of that extension. By stipulation this element is the denotation of $(\varepsilon x)A(x)$.

Given this semantics for the Hilbert epsilon-symbol ε, the idea that a similar treatment might just be what is needed for the (at least superficially similar) words *a* and *some* is certainly not farfetched. However, as we will see presently, in the actual proposals that have been made along these lines, it easily leads to a kind of overkill — which wouldn't be too bad, if it didn't have a tendency to detract from the real issues.

The first Choice Function account developed in order to deal wih the problem of specific indefinites is that of Reinhart (See Reinhart (1997) as well as Winter (1997) and Winter (1996), Winter (1998)). Reinhart saw that interpreting indefinites as choice functions might give us just the kind of eating one's cake and having it that an in situ treatment of non-narrow scope indefinites seems to require. In her choice function analysis of indefinites, the denotation of an indefinite results from applying a choice function f to the extension of the simple or complex predicate $[P]$ which makes up the descriptive content of the *NP* (that is, of its N' part). The term $f([P])$ remains in situ, but the function variable f can be bound in various places where it has the term occurrence(s) in its scope and thus be assigned different scopes. A simple example will help to see what this comes to. Sentence (3.53.i) allows for two possible interpretations of the indefinite *an uncle of mine*. In the theory under consideration they are represented by the logical forms (3.53.ii) and (3.53.iii). (3.53.ii) gives the (less probable) narrow scope reading and (3.53.iii) the wide scope reading.

(3.53) (*i*) If an uncle of mine dies, I will inherit a house.
(*ii*) $(\exists f)(CF(f)\ \&\ die'(f(\{y|uncle'(y,sp)\}))) \rightarrow (\exists h)(house'(h)\ \&\ inh.'(sp,h))$
(*iii*) $(\exists f)((CF(f)\ \&\ die'(f(\{y|uncle'(y,sp)\}))) \rightarrow (\exists h)(house'(h)\ \&\ inh.'(y,sp)))$

(*sp* is an individual constant denoting the speaker and CF is a predicate true of all and only truth functions.)

The idea behind these logical forms is that it is the term $f(\{y|uncle'(y,sp)\}$ which represents the indefinite *NP*, and it is in this sense that the theory offers an in situ analysis of indefinites. (Note that in the two logical forms the term (i.e. the *NP* representation) occupies precisely the same position.) The reason why the two logical forms nevertheless capture the distinction between the two possible scope assignments for the indefinite is that the position of the quantifier on f determines where in the semantic evaluation of the sentence a commitment is made to some particular uncle. In (3.53.ii), where the scope of the quantifier is restricted to the antecedent of the conditional, the proposition expressed by the antecedent is that there is some possible choice from the set of speaker's uncles such that the chosen uncle dies — in other words, the proposition that there is some uncle of the speaker who dies. In (3.53.iii), where the quantifier has scope over the entire conditional, the choice is made before the conditional is decomposed into ist antcedent and consequent, with the effect that what is said is that there is an uncle such that the conditional is true.

This analysis is like Abusch's in that it badly overgenerates so long as no further constraints are imposed on where the choice function variables may be bound. But it has the advantage of leaving the indefinites in situ, so that a solution to Ruys' problem seems within immediate reach. To extend the analysis so that it can reap the fruits of this aspect is not completely trivial. Here is one way of doing this. It is of our own making, but, we trust, consistent with the general spirit of the enterprise.

As we have seen, Ruys problem arises for plural *NP*s, so what we need is an extension of the Choice Function approach from singulars to plurals. The setting for doing this which we prefer ourselves is the mereological treatment of singulars and plurals of Link (1983), so that is the framework we will assume. (However, there is no difficulty in recasting what we will propose in a framework which assigns the denotations of plurals and singulars distinct types, as in Winter (1998).

In Link's mereological semantics the denotations of a singular *NP* such s *Bill* or *Bill's mother* and plural *NP*s such as *Bill's siblings* or *the inhabitants of Carcassonne* are all part of the same ontological category, which comprises both individuals and groups or collections of them. The difference between single individuals and groups of individuals now takes the form of the individuals being atoms — there are no other elements of the ontology that are of the same sort that are properly included in them, whereas the groups are non-atomic because they include each of the individuals which compose them. Given such an ontology each predicate P of individuals can be extended to a predicate P^* which is true of all and only those members of the ontology (non-atomic as well as atomic) which are composed of elements of the extension of P. For instance, given that $mother'$ is a predicate of individuals the extension of which consists of individual people (women with children), $mother'^*$ will be that predicate which is true of any group of people consisting entirely of such individuals i.e. of mothers). The denotations of singular *NP*s and plural NPs can now be distinguished in that the former will always consist exclusively of atoms whereas the latter will consist exclusively of non-atoms. One way to secure this is to see the singular–plural distinction as involving a pair of opposing semantic features (+/- *atomic*) which combine with predicates on the entire ontological domain. Thus if P is such a predicate, then the extension of $\langle P, +atomic\rangle$ is $\{x|P(x)\ \&\ Atom(x)\}$ (where, to be pedantic, $Atom$ is a predicate true of all and only the atoms) and the extension of $\langle P, -atomic\rangle$ is $\{x|P(x)\ \&\ \neg Atom(x)\}$. We can extend this way of differentiating between singulars and plurals to the denotation of singular and plural *NP*s by stipulating that the number feature combines with the nominal head. Thus the nominal part of a singular *NP* like *a/the mother* will be taken to be of the form $\langle mother'^*, \pm atomic\rangle$. Since the denotation of the phrase will have to satisfy its nominal predicate, the denotation of a singular *NP* will necessarily be an individual. Similarly plural *NP*s such as *mothers/ the mothers/ three mothers/ the three mothers* will have the nominal head $\langle mother^*, -atomic\rangle$, so that the *NP*s will al denote non-atomic elements of the extension of $mother^*$, i.e. groups consisting of two or more mothers.

The Choice Function analysis can now be extended in the following straightforward manner. A choice function f is a function defined on the entire domain consisting of atomic and non-atomic elements and maps each non-empty subset of that domain onto one of its members. This means in particular that when a subset X consists exclusively of individuals, then $f(X)$ will also be an individual, similarly when X consists wholly of non-atoms, then again the same will be true for $f(X)$. In particular, when f is applied to the non-empty extension of a predicate of the form $\langle P, +atomic\rangle$ it wil return an individual, and when it is applied to the non-empty extension of a predicate of the form $\langle P, -atomic\rangle$ the return is group of two individuals or more. And by the same token, f will supply individuals as denotations for singular indefinite *NP*s and groups as denotations for plural ones.[18]

It may be overzealous to show how this extension allows us to deal with the Ur-example of the Ruys problem, our (3.33), repeated here as (3.54).

(3.54) If three relatives of mine die, I will inherit a house.

[18] Moreover, cardinal words such as *one, two, three, ...* should be treated in this way of dealing with plurals and singulars as additional predicates (just as intersective adjectives). Thus the extension of the nominal *three mothers* will consist of all groups of mothers whose cardinality is 3, etc. Note that the cardinal *one* becomes pleonastic on this analysis. It restricts the extension of the predicate to "groups of one", i.e. to atoms. But since the grammar of English limits the use of *one* to singular *NP*s, this constraint is imposed in any case by the grammatical number of the phrase. There are important differences between English indefinites beginning with *one* and those beginning with *a*, just as there are important differences between phrases beginning with *a* and those beginning with some, but these are issues that do not belong right here. (For observations about the difference between *a* and *one* see Kratzer (1998). For the difference between *a* and *some*, see Kamp (2001b).)

In (3.55) we give the two logical forms, for the narrow scope and the wide scope intepretation of the indefinite *three relatives of mine*, which we can write down now that the notion of a Choice Function has been extended in the way we have just done.

(3.55) (*i*) $(\exists f)(CF(f)\ \&\ die'(f(\{y|\langle relative^*, -atom\rangle(y,sp)\ \&\ three'(y)\}))) \rightarrow (\exists h)(house'(h)\ \&\ inh'(sp,h))$

(*ii*) $(\exists f)((CF(f)\ \&\ die'(f(\{y|\langle relative^*, -atom\rangle(y,sp)\ \&\ three'(y)\}))) \rightarrow (\exists h)(house'(h)\ \&\ inh.'(sp,h)))$

As we said before, the Choice Function method seems to offer a way out of Ruys' problem in that it distinguishes between (i) the term which represents the indefinite *NP* (and which remains in situ) and (ii) the scope of the quantifier which binds f (and which can be situated wherever the scope which the given interpretation assigns to the indefinite, requires it to be). It seems to offer a way out in that distribution can now be tied to the term $f(\{y|\langle relative'^*, -atom\rangle(y,sp)\ \&\ three'(y)\})$ rather than to the variable f by itself. However, as we noted above in discussing the merits of the Fodor & Sag theory in relation to the Ruys problem, there still remains a non-trivial difficulty in defining the "local context" of a term, which we need to know exactly what scope is predicted for the distribution operations which such terms may trigger. In fact, this difficulty appears to be exactly the same whether we re dealing with the complex terms of the present account or with the individual constants proposed in the account of F&S.

Thus the progress we have made so far appears to be rather limited. The Choice Function account just described shares with the Fodor & Sag theory the potential advantage of an in situ analysis of indefinites. However, as we have just seen, both theories have a non-trivial problem with defining the scope restrictions tha the distribution triggering terms impose on the distributions they trigger. An apparent plus of the new theory in comparison with the F&S theory is that it does not have to postulate as radical an ambiguity as that between an existential quantifier and an individual constant. Rather, the different options are now explained as different scope options for the same binding operator (the quantifier binding f). Moreover, the account seems in principle compatible with the established island constraints for quantifiers. For, it seems reasonable to argue, the quantifier which binds f is not like the quantifiers expressed by the genuine quantifying determiners. Those quantifiers bind the variables which act as predicables of the nominal content of the *NP* (e.g. in occurrences of *every student*, *every* binds the variable z such that *student(z)*). The variable bound by the choice function quantifier is not of this kind. What it binds has a quite different status — that of a (possibly contextually anchored) commitment to select elements from arbitrary non-empty extensions.[19]

A further advantage of the new theory is that it allows for intermediate scope readings, something which F&S consciously excluded, but, as we now know, on the basis of view of the empirical facts that does not stand up to closer scrutiny. However, as things stand, the undergeneration problem of the Fodor & Sag theory has now been replaced by an overgeneration problem, as the choice function quantifiers can, without additional constraints, go in many more places than the data license.

3.8 Choice Functions or Skolem Functions?

Earlier we mentioned overkill. What we had in mind can best be explained by looking at an example. The following sentence is from Heim (1982):

(3.56) If a kitten likes a friend of mine, I always give it to him.

It originally served the purpose of showing that the variable/discourse referent representing an *NP* should not be given wider scope than the predication expressed by the nominal part of the *NP*:

[19] In this respect choice function accounts jibe with the view on noun phrases that informs DRT: Noun phrases come with a basic tripartite categorisation: (i) definite, (ii) indefinite and (iii) quantificational. Moreover, the indefinites are much more like definites than like quantifying *NPs*, something which manifests itself among other things in that it is only the definite and indefinite plurals which give rise to Ruys' problem, because it is they, and not the quantificational NPs, which introduce sets (or non-atoms), with distribution over those sets as an additional option.

the predication should always be treated as restrictor on the "binding" of the variable, whatever form that binding may take.[20] The claim is clearly right. We take it that it has been generally accepted. In these notes it has been taken for granted. The reason why we are citing the sentence is a different one. According the interpretation of (3.56) which Heim and Abusch had in mind, one of the indefinites, *a friend of mine*, is assigned scope over the quantified conditional as a whole, whereas the other, *a kitten*, is interpreted as having its scope confined to the if-clause and thus to the restrictor of the adverbial quantification. There can be no doubt that the sentence has this interpretation, even if it is not the only one possible.

If the Choice Function analysis is to do justice to this reading, it will have to supply to choice function variables, not one. For it is only in this way that it can capture the difference in scope of the two indefinites. To be exact, the logical form, fashioned after those in (3.55), will have to be as in (3.57).

(3.57) $(\exists f)(CF(f)\ \&\ (\forall t)(\exists g)(CH(g)\ \&\ like'(f(\{x|\langle friend'^{*}, +atom\rangle(x, sp)\},$
$g(\{y|\langle kitten^{*}, +atom\langle(y)\}, t)) \to give(sp, y, x, t))$

(Here *always* has been analysed as a quantifier over times and the semantics of the verbs *like* and *give* have been accordingly adjusted, in that a time argument has been added besides the arguments realised by actual phrases. That is surely not the best analysis possible for adverbial quantifications like that in (3.56), but the inadequacies have nothing to do with the point at issue.)

In (3.57) the overkill we mentioned is in the duplication of the choice functions.[21] f is defined not just for the set $\{x|\langle friend'^{*}, +atom\rangle(x, sp)\}$, but for all other non-empty sets as well, including $\{y|\langle kitten'^{*}, +atom\rangle(y)\}$. And the same is true of g: it is defined not only for $\{y|\langle kitten'^{*}, +atom\rangle(y)\}$, but also for $\{x|\langle friend'^{*}, +atom\rangle(x, sp)\}$ and all other non-empty sets. It is apparent that all the information these functions carry — all those values which they assign to non-empty sets other than the one to which they are actually applied in the logical form in which they figure — is of no import. All that the functions f and g in (3.57) do is to partition articulate the denotation of the *NP* that gives rise to the introduction of the function into (i) the extension of the descriptive content of the *NP* and (ii) an operator which picks an element from that extension. This makes it possible to distinguish formally between the operator and the result of applying it to the set, and

[20] The sentence is cited and discussed in Abusch (1994), with the same purpose.

[21] We want to make it clear that the objection we have just voiced does not apply to all proposals for the use of choice functions in the analysis of natural language. It is directed only against those in which each expression whose analysis is supposed to involve a choice function is assumed to give rise to its own choice function variable - so that we end up with as many different choice functions as there are expressions that make use of them.

In particular, the objection doesn't apply to the proposal of Egli and Von Heusinger that choice functions may be used in the analysis of definite descriptions. It is a familiar observation that the descriptive content of most singular definite descriptions we encounter in ordinary discourse doesn't suffice by itself for the selection of a unique satisfier. In such cases a classical account of the reference of definite descriptions — according to which the description (properly) refers to an object only then when that object is the unique satisfier of its descriptive content — can be saved only by assuming that the predicate P which appears as the nominal part of the description is augmented by a tacit contextually determined restriction C. In other words, $\iota x.P(x)$ may not have unique satisfier, but $\iota x.(P(x)\ \&\ C(x))$ does. An inspection of texts in which we find several incomplete descriptions, with different predicates P, supports the view that different descriptions require different contextual augmentations C.

If we make the not unreasonable assumption that it is just the overt descriptive content of the description which determines what the contextual augmentation is which secures the uniqueness of its referent, then we can capture the effect of augmentation formally by assuming the existence of a single function F from predicates to predicates which assigns to each descriptive content predicate P the corresponding contextual restriction predicate C as value. The referent of any description of the form *the P* will then be the unique satisfier of the predicate $iotax.(P(x)\ \&\ (F(P))(x))$. A further simplification of this idea is to take F to depend only on the extensions of the argument predicates P. Moreover, if we ignore the possibility that even the contextual augmentation might not be sufficient to secure a unique satisfier, we can take the function to directly return this satisfier itself as value (rather than the contextual augmentation by which this satisfier is determined). In this way we arrive at the notion of a single choice function, which determines the semantic values of any number of different expressions.

It is an empirical question whether the assumptions that have to be made to represent context dependence of definite descriptions in the manner sketched in this footnote, are all empirically justified. But wheter that be so or not, it is clear that this is a proposal which uses the notion of a choice function is used in an entirely legitimate way, which fully accords with its use within mathematics (see Egli (1991), Egli and von Heusinger (1995) or Egli and von Heusinger (2000)).

thus to distinguish between two positions — that where the operator is bound and that where the application result appears. This is a way of eating one's cake and having it. But it is a rather cheap one — too cheap to get us very far.

In fact, the Choice Function account of Reinhart and Winter operates in the way illustrated by (3.57) not just when different scope assignments of two or more indefinites make this necessary, but generally. For instance, the reading of (3.56) in which both indefinites are assigned a scope that is restricted to the if-clause, is represented by a logical form which, like (3.57), has two choice function quantifiers, but now both within the scope of the arrow.

Of the original spirit of a choice function, which globally fixes selections from a whole family of non-empty sets all at once, little is left this way, and one can't help feeling that for the account we have just presented the term "Choice Function analysis" is something of a misnomer. Moreover, it has been suggested that it is this feature of the present Choice Function theory — that each indefinite introduces its own choice function, with no connection between them — is responsible for the overgeneration which the theory shares with the account of Abusch. Some such criticism, we believe, is at least in part behind the proposal made in Kratzer (1998). Kratzer proposes a far more constrained use of choice functions, which seems to us to be much more faithful to the idea of global selection. This makes it possible in principle to make do with a single choice function for several indefinites. It is difficult to tell, whether this is really part of her intention since in the paper Kratzer (1998), which has been our only source of access to this proposal, the examples all concern a single indefinite at a time. The choice functions of Kratzer's proposal are assumed to be contextually fixed. So the symbols representing choice functions in logical forms act as constants, not as bound variables. In this respect the account is reminiscent of that of Fodor & Sag. It is reminiscent of F&S also in that it assumes the same sort of ambiguity for indefinites: between (i) existential quantifiers that obey the scope constraints of other quantifiers and (ii) terms which involve an application of the one contextual choice function.

If Kratzer's account amounted just to this, her theory and that of Fodor & Sag would be likely to be equivalent. For a single choice function f will assign to each of the indefinites of a given sentence that get a term interpretation a term of the form $f(a)$, for varying a, whereas in Fodor & Sag it will get interpreted by its own separate constant c. If anything, the new theory will be even more restricted than the old one, for it isn't self-evident that different terms of the forms $f(a), f(b)$, etc offer the same degree of semantic flexibility that comes with fully independent constants $c, d, \ldots$

It would have been odd if Kratzer's theory had been retrograde to that extent, and it emphatically isn't. It isn't for two separate reasons. The first is that the choice functions of the theory allow for "intermediate scope" interpretations of indefinites - which, as we have seen, are unobtainable within the F&S theory. The "choice functions" of Kratzer's theory are able to provide this flexibility because strictly speaking they aren't just choice functions. Choice functions, as we have defined the term, are functions from sets to members thereof. The functions used in Kratzer's theory are choice functions in that they take sets as arguments and return members of those sets as values. They differ from "pure" choice functions in that they may have other arguments as well.

In order to be more explicit we consider the following sentence, first presented as (3.23.a).

(3.58) (3.23.*a*) Each professor rewarded every student who had read a book
she had recommended.

The *NP a book she had recommended* contains the pronoun *she* which is naturally interpreted as anaphoric to the subject *NP each professor*. If the pronoun is interpreted this way, then the descriptive content of the indefinite becomes dependent on the value of the variable bound by the subject determiner *each*. So we may expect that depending on what that value is the set of objects satisfying the descriptive content of the indefinite — the set of books which d had recommended, where d is any given value of the subject variable — will vary with d. So a function which assigns members of non-empty extensions to non-empty extensions might return different books for different professors. So it should be possible for a choice function interpretation of the indefinite to return different values for different professors. So, it might seem that we get the effect of an intermediate scope reading for the indefinite (i.e. with scope between that of the quantifier *each professor* and that of the quantifier *every student*) even without existentially binding the choice function variable at this intermediate position. However, as Kratzer correctly observes (and a number of people did before her), this won't quite do. For it is possible that two professors A and B recommended the same set of books but that the book such that A rewards every student who has read it is nonetheless different from the book such that B rewards every student who has read that book. In such cases a function which operates just on extensions (i.e. on the sets of recommended books) will necessarily return the same book of A and for B. So the true dependency of the book on the individual professor cannot be captured this way.

For this reason Kratzer introduces a more general (and thereby more flexible) notion of "choice function". For instance, the function which interprets an indefinite like that of (3.23.a) will have besides its set argument also an argument for the individual on whom the value may depend. In the present case this is the variable for the subject *NP*. So we get as logical form for (3.23.a) a formula like (3.57)

(3.59) $(\forall x)(prof'(x) \rightarrow (\forall z)(stud'(z) \ \& \ read'(z, f(x, \{y|book'(y) \ \& \ recom'(x,y)\})) \rightarrow rew(x,z)))$

Kratzer argues that such "generalised choice functions", which have other arguments besides the extensions of the descriptive contents of the indefinites for which they serve to supply the denotations, are needed and justified whenever the indefinites imply additional arguments. One form this implying may take is when the descriptive part of the indefinite contains an anaphoric link to some quantifying *NP*; this is what we found in the example we just considered. But it may take other forms as well. Another form Kratzer mentions is the presence of *certain*: *certain* is a context-sensitive adjective such as, for instance, *local* (as analysed in Mitchell (1986) or Partee (1989)); it has an implicit argument which can either get a value from the utterance context, but it can also be linked to some "quantified local context". In semantic representation such links take the form of the implicit argument being bound by some other operator within the semantic representation of the utterance in which the indefinite occurs. In the case of *certain*, where the implicit argument is understood as the one who is in a position to identify the denotation of the indefinite of which certain is part, local binding is especially prominent where the "local context" can be identified with the intentions of some particular individual or individuals. Thus among the cases where indefinites "take intermediate scope" we find in particular those where the indefinite contains certain and occurs within the scope of some attitude predicate. One example that is overtly of this form is the sentence in (3.60.a). But many assertions which involve human agency in some way or other allow for an interpretation in which intentions play some role, so we get besides examples like those in (3.60.a) also the likes of (3.60.b), which is similar to the sentence (3.23a) we have already discussed. Here the "bound" interpretation of *certain* is possible because it is natural to think of each professor having a particular book in mind which she likes very much or thinks very important or of which she knows that reading it requires a special effort.

(3.60) *a.* Every woman in the neighbourhood thinks that her husband is dating a certain real estate agent.
b. Each professor rewarded every student who had read a certain book.

In what other ways can indefinites imply the presence of a non-overt argument? This is not easy to decide. Kratzer (1998) seems to suggest that sometimes English indefinites with *a* or *some* (rather than *a certain*) also allow for such an interpretation. But the paper is not very explicit on this point, leaving largely unarticulated what features must be present in an indefinite or in its linguistic environment for this to be possible. The examples in (3.61), in which the definite descriptions of (3.45.b.c) have been replaced by corresponding indefinites, indicate that both the *NP* itself and the environment in which it occurs play a part.

(3.61) *a.* Each professor rewarded every student who had read a highly recommended book.
b. Each professor rewarded every student who had read a book that was published by Macmillan.

As we have seen already, an important feature of the *NP* itself is the presence, within its *N*-part, of a predicate with an implicit argument. According to Kratzer indefinites beginning with *a certain* constitute a prime example, as *certain* is just such a predicate. (3.61.a) suggests that the participle *recommended* can also facilitate a dependent interpretation. But we should be wary of jumping to premature conclusions. For (3.61.b), in which the N-part of the indefinite doesn't contain a predicate with an implicit argument in any straightforward sense of the word, also seems to permit an intermediate scope interpretation. Here, it seems to be the implicit intentionality of the context of the indefinite which makes the intermediate scope interpretation possible: Each professor, the sentence allows us to imagine, has managed to get a couple of books published by MacMillan, and of these there is in particular one of which she is especially proud, or some such story. Of course, how easy it is for the interpreter to make such background assumptions that support an intermediate scope interpretation will depend also on the context in which the sentence is uttered. On the other hand, it appears that if we drop *highly* from *a highly recommended book* in (3.61.a), then the intermediate scope interpretation becomes much harder; the sentence still seems fine, but the preferred interpretation now seems to be the narrow scope one, with the wide scope/referential interpretation a not very good second. We have no good explanation why this should be.

These two somewhat arbitrarily chosen examples are a strong indication to us that there is much that has to do with this aspect of the interpretation of indefinites of which we are still ignorant, let alone that we could explain it. This is one domain in need of further investigation.

From a methodological perspective, we are still facing, in connection with the generalised notion of choice function, the same question that we raised earlier: What work, if any, does the choice function aspect of these functions really do for us? Once more the question depends on whether we take each single individual to introduce its own choice function variable. If this is assumed, then we think the following reassessment is in order. The functions we need for the interpretation of indefinites needn't be choice functions at all. What may be needed are functions of one or more arguments to capture the dependence of the indefinite's denotation on the values of other bound variables. It is these arguments which create the intermediate scope effects even if we assume that the function itself always has maximal scope. But once the dependence has been accounted for in this way, the set argument is otiose and we may as well do without it. What we are left with are functions which would be more appropriately called Skolem functions, after the familiar procedure from predicate logic, according to which any formula of the form $(\forall x)(\exists y)A(x, y)$ can be rewritten equivalently as $(\exists f)(\forall x)A(x, f(x))$. The function f which verifies the formula $(\forall x)A(x, f(x))$ is called a Skolem function. And it is with a function playing just this role that we are left when we drop the set argument from the functions postulated in the "choice-function" analysis under discussion.

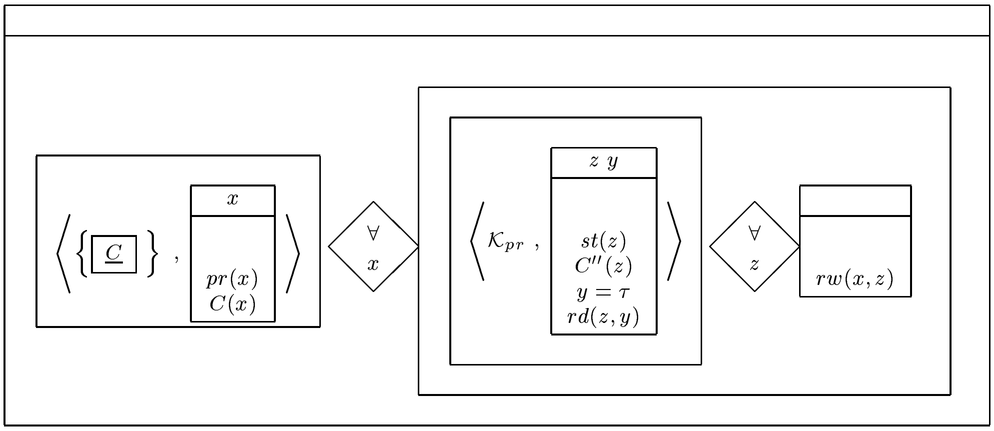
Of course, dropping the set argument does not mean that the descriptive content of the indefinite no longer has any part to play in its interpretation. But the question is *where* it should be taken to play this part. In relation to this question our analysis of "intermediate" definite descriptions is suggestive. There, we saw, the descriptive content of the description serves to define the value of the accommodated function for all the different arguments in its domain. In the case of indefinites we cannot expect the descriptive content to provide a definition of this value. (More strongly, the use of an indefinite determiner carries the opposite implication, viz. that the descriptive content is *not* enough for this purpose.) But it will still impose constraints on the possible values: The value must lie within extension of the descriptive content of the indefinite. What this suggests is a kind of "presupposition-like" analysis for those indefinite *NP*s which in the proposal of Kratzer would receive a non-quantificational analysis - which resembles the presuppositonal analysis of those definite descriptions which get a non-maximal (i.e. dependent) interpretation. Let us look at one example to see what this suggestion comes to in the representation format we have been using.

We consider the following variant of (3.45.c), in which the definite description *the book that was published by MacMillan* is replaced by the indefinite description *a book that was published by MacMillan*:

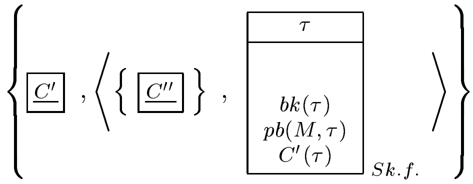
(3.62) Each professor rewarded every student who had read a book
that was published by Macmillan.

This sentence permits an intermediate interpretation for the indefinite and it is this interpretation which the following representations are intended to capture. Our first representation is the counterpart of the one given in (3.51). In (3.51) the definite description the book published by MacMillan has given rise to a locally adjoined presupposition. In the following diagram (3.52), which gives the result of the next stage in the interpretation process, this presupposition has been accommodated at the top level, and the accommodation has taken the form of accommodating a function which assigns each value of the higher quantifier over professors a possibly distinct book. We will assume at this point that the "Skolem function" interpretation of the indefinite description *a book published by MacMillan* proceeds in a largely analogous way. Again a kind of "presupposition" gets adjoined at the level where the *NP* is processed, and in the next step something like "accommodation" will convert this "presupposition" into the declaration of a function. (Warning: note our use of scare quotes around both "presupposition" and "accommodation". We will explain our use of these quotes below diagram (3.64).) One difference between the interpretation of the indefinite in (3.63) and that of the definite in (3.51) is that we take the indefinite to introduce a variable y which is locally bound but set equal to the functional term τ, with which "accommodation" still has to deal. The reason for this cannot be fully explained here. It has to do on the one hand with the continuity that should be preserved between *a*-*NP*s which do get Skolem function interpretations and those which do not, and on the other to allow for the possibility of capturing the interpretational differences which exist between different types of indefinite *NP*s, in particular between those beginning with *a* and those beginning with *some*.[22]

(3.63) *a.*



b. $\mathcal{K}_{pr}$:

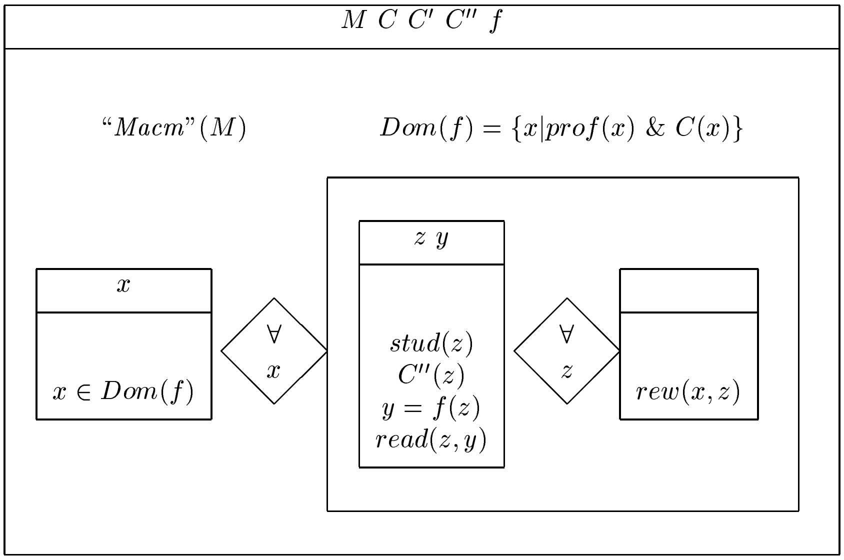


As announced, the result of "accommodating" τ which is displayed in (3.64) closely resembles (3.52). The only difference is that the descriptive content of the *NP* — which in (3.63) takes the form of the condition on τ — now only constrains the values of f, rather than defining them. (As a consequence, the accommodated contextual restrictor C' isn't as indispensable here as it is in the interpretation of (3.45.c), but it seems to us that additional restrictions are equally possible in the

[22] See Kamp (2001b), which is devoted in its entirety to some of the differences between *some* and *a*. Another reason for proceeding in this manner has to do with the role which words like *certain* and *particular* play in indefinite *NP*s. Kratzer, as we noted, begins her discussion of such interpretations by looking at indefinites beginning with *a certain*. Such indefinites, she points out, are particularly good candidates for a functional analysis, since *certain* has (like, for instance, the adjective *local*) a non-overt argument. In the case of certain this argument represents a source where identifying information about the referent cold be found. We already pointed out that the post-verbal indefinite *NP*s of presentational there-sentences must, in our account of such sentences, be analysed as bound by the *there*-be construction. This is true also for indefinites of the form *a certain* + *N*. The analysis we present here is capable of accommodating the superficially conflicting requirements of local binding on the one hand and the non-narrow scope character imposed by *certain*.

case of indefinites. So we have included it in our analysis of (3.62) as well.)

(3.64)



On the face of it the similarity between (3.64) and (3.52) seems very close. But it is easily misleading. For the interpretational situations which these diagrams reflect are importantly different. In (3.52) we are looking at the result of accommodating a definite *NP*. As implied in the early parts of this Chapter, the idea behind presupposition accommodation is that the common context of speaker and hearer ought to be one in which the presupposition is satisfied. So the hearer adjusts his own conception of the context in such a way that the presupposition is satisfied. The resulting context is what he takes the speaker to have assumed.[23] What is depicted in (3.63) is conceptually quite different. The speaker's use of an indefinite *NP* comes with the implication that he takes the context not to furnish the means for identifying its referent. So the "accommodation" of the indefinite of (3.62) which is displayed in (3.64) should not be seen as an adjustment of context. There will of course be many instances where the recipient of a sentence containing a functionally interpreted indefinite will assume that the speaker has a particular function in mind. We discussed this phenomenon in connection with non-functional indefinites in connection with (3.1) in Section ??. There is no reason why the same thing shouldn't happen with functionally interpreted indefinites, and it is easy enough to think of examples where this does happen. However, even in such cases there remains the crucial difference with the accommodated presuppositions of definites that this hypothesis need not, and in certain cases should not, be construed as part of constructing the actual content of the verbal message (cf. our discussion of (3.1.a).)

We see it as a plausible assumption that the actual content of a sentence such as (3.62) (on the functional interpretation with which we are concerned) is that there exists some function with the displayed properties. We will see in the last section of this chapter why this assumption is important.

3.9 The Travels of Local Existential Quantifiers. A Case Study: Kratzer on *because*

Replacing the individual constants of Fodor & Sag by Skolem functions (or generalised choice functions) is one way of accounting for intermediate scope interpretations of indefinites. But the main focus of Kratzer (1998) is on another type of mechanism that can produce this effect. Like Fodor

[23] It has often been pointed out that speakers pointedly exploit the accommodation mechanism by slipping into their utterances information that they know to be new in the guise of presuppositions. The speaker trusts that the hearer will accommodate these and thereby take the new information on board. While this contention is clearly right, it does not change the basic nature of presupposition accommodation: What the hearer does in accommodating a presupposition is correct what counts as an inadequacy in his "starting position" for the interpetation of the current utterance.

& Sag, Kratzer takes indefinites to be ambiguous between a function-based interpretation and the classical interpretation as an existential quantifier subject to the usual scope restrictions for English quantificational *NP*s. Even if we interpret indefinites in this latter way, Kratzer shows, other components of the sentential environment in which they occur may trigger interpretation rules which have the effect of "lifting" the quantifier into a higher position.

It isn't possible to do justice to the full range of mechanisms which Kratzer considers in this connection, but in any case this range probably not complete (nor is it presented with a claim to exhaustivity). What follows, then, is a condensed report of her observations on one construction, which strikes us as a good illustration of the complexities that a comprehensive theory of the semantics of indefinites must be able to handle (even if it is aimed exclusively at English).

At issue are sentences with subordinate clauses beginning with the conjunction *because*. The simplest kinds of examples which demonstrate the central problem that Kratzer has noticed in connection with this sentence connection are tthe following:

(3.65) *a.* Mary fell because a friend of hers did.
b. Mary joined the tennis club because a friend of hers did.

Both sentences are naturally understood to express a causal relation between two events, one described in the main clause and the other in the *because*-clause. Logical forms which capture this intuition are those in (3.66), or alternatively the DRT-based representations in (3.67)

(3.66) (*i*)
$$(\exists e)(\exists e')(\exists y)(\textit{friend-of}(y,m)\ \&\ \textit{falling-of}(e,m)\ \&\ e \prec n\ \&\ \textit{falling-of}(e',y)\ \&\ e' \prec n\ \&\ CAUSE(e',e))$$
(*ii*)
$$(\exists e)(\exists e')(\exists y)(\textit{friend-of}(y,x)\ \&\ jointhetc(e,m)\ \&\ e \prec n\ \&\ (jointhetc(e',y)\ \&\ e' \prec n\ \&\ CAUSE(e',e)))$$

(3.67) (*i*)
$$\boxed{\begin{array}{c} m\ y\ t\ e\ t'\ e' \\ Mary(m) \quad \textit{friend-of}(y,m)\ \ t \prec n\ \ e \subseteq t\ \ t' \prec n\ \ e' \subseteq t' \\ e{:}\,fall(m) \quad e'{:}\,fall(y) \\ CAUSE(e'e) \end{array}}$$

(*ii*)
$$\boxed{\begin{array}{c} m\ y\ t\ e\ t'\ e' \\ Mary(m) \quad \textit{friend-of}(y,m)\ \ t \prec n\ \ e \subseteq t\ \ t' \prec n\ \ e' \subseteq t' \\ e{:}\,jointhetc(m) \quad e'{:}\,jointhetc(y) \\ CAUSE(e'e) \end{array}}$$

The question is: How do we get to these representations from the syntactic forms of the sentences (3.65.a,b)? On the face of it *because* appears as a binary connective which joins two sentences, main clause and *because*-clause, into a single complex sentence. In the linguistic and philosophical literature there are two familiar strategies for representing such constructions: either (i) as involving the application of a two lace sentential operator to a pair of sentences, or (ii) as relations between two propositions (those expressed by main clause and because-clause). For present purposes these come the same thing; we will adopt the first mode of analysis.

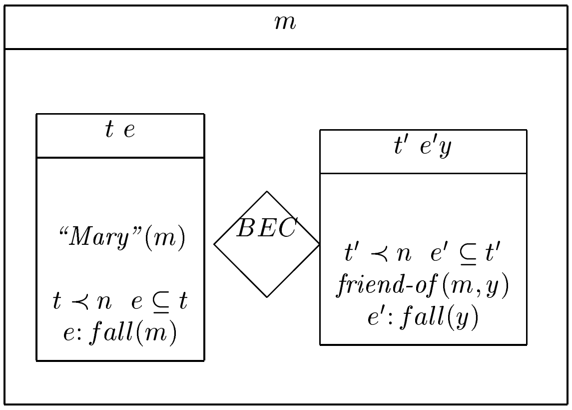
For (3.65.a) this analysis yields a logical form like that in (3.68). A completely analogous representation is obtained for (3.65.b).

(3.68)
$$((\exists e)(\textit{falling-of}(be,m)\ \&\ e \prec n) BECAUSE\ ((\exists e')(\exists y)(\textit{friend-of}(y,m)\ \&\ \textit{falling-of}(e,y)\ \&\ e \prec n))$$

(Here we have followed the usual practice of using "infix" notation for the sentential connective $BECAUSE$, in which the connective is placed in between the two sentences it connects.)

Once more we add a DRT-based version, in which because is represented as a connective between DRSs:[24]

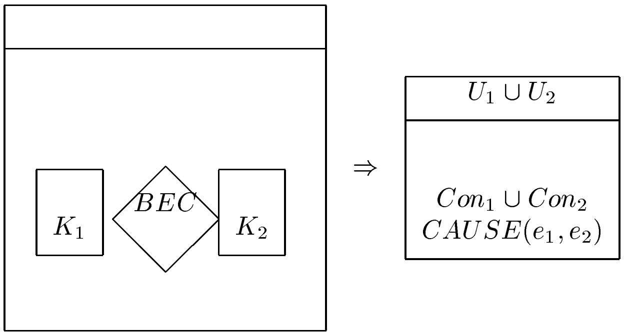
(3.69)



To proceed from such a representation to the representations in (3.66) or (3.67) we need a meaning postulate. In trying to formulate such a postulate we will focus on (3.69) and (3.67). Each of the two DRSs connected by $BEC(AUSE)$ in (3.69) contains an event variable which is bound by the tense.[25]. In the left hand DRS this is e, in the right hand one it is e'.[26] Let us call such an event variable the principal event variable of the representation of its clause. The meaning postulate we propose for getting from (3.69) to (3.67) can then be stated as follows:

> Let K_1 $BEC(AUSE)$ K_2 be a DRS condition and let e_1 and e_2 be the principal event variables of K_1 and K_2, respectively. As usual, U_i and Con_i are the universe and the condition set of K_i. Then we have the following meaning postulate:

(3.70)



This meaning postulate says that whenever $K_1 BECAUSE K_2$ is the case, then the principal event described by K_2 causes the principal event described by K_1. It is easily verified that when the postulate is applied to (3.69), the result is (3.67.i). In this way we move from a representation in which the variable representing the indefinite *a friend of hers* is, like the principal event variables, within the scope of the operator $BECAUSE$ to a representation in which it (with the principal event variables) has maximal scope.

In the same way we get from (3.67.ii) to a representation of the same form as (3.69) for sentence (3.65.b). But there is nevertheless an important difference between (3.65.a) and (3.65.b). In (3.65.b)

[24] In the standard terminology of DRT the part below $Mary(m)$, consisting of the operator $BEC(AUSE)$ and its two DRS arguments, is a (complex) DRS-condition.

[25] In general: the information located at *Infl*. (There are also uses of *because* in which its complement takes the form of the preposition *of* + a gerund.)

[26] In the present example both these variables represent the events directly described by the main verbs of the respective clauses. In general, however, the event variable directly linked with the information in Infl need not be the one corresponding to the event argument of the main verb. See e.g. Reyle, Rossdeutscher and Kamp (2000). This point will become relevant below.

the main clause describes an action, and in view of this the *because*-clause can be interpreted as describing the *reason* for this action. Within the philosophy of mind and action there has been a long-lasting debate over the question whether or not reasons are causes. It wouldn't do to enter into that debate here. However, apart from other considerations of a more philosophical nature, the way we use the word *because* (and many other words from the causal vocabulary as well), suggests that reasons constitute a special kind of causes. This is what we will assume.

Even if reasons are a special kind of causes, they have a logic which sharply distinguishes them from other causal relations. In order for a cause to count as a reason it must have been perceived by the agent in some form and given rise to a propositional attitude. It is this attitude which then, via some process of practical reasoning, impels the agent to perform the action which is described as standing to the perceived event or state of affairs in a cause-effect relationship. It may be matter for debate whether sentences like (3.65.b) are interpretable as describing reason-action relations. But if they are so interpretable, then it is a natural assumption that the propositional attitude which leads to the action should explicitly figure in the interpretation. More explicitly, the because-cause of a sentence like (3.65.b) should in that case be interpretable as describing what the content of this attitude is. And once we make this assumption, then, we wind, new ambiguities rear their heads.

To see this, let us reconsider (3.65.b) in this new light. The representation which captures the "reason" interpretation will make use of the same notational devices which we have been using in the representation of propositional attitudes and attitude attributions in Section 3.1. We will assume, without argumentation, that the attitude which acts as reason has the attitudinal mode of belief. (This may not be adequate in all cases of because-sentences which can be interpreted as reason-stating, but it will do for the cases considered here.) (3.71) gives our proposal for the representation of reason-interpretations of because-sentences in schematic form.

$$(3.71)\quad \begin{array}{|c|} \hline a\ t\ e\ t'\ e'\ s\ x_1^1,\ldots,x_n^1 \\ \hline \\ [Agent(a)]\ \ tRn\ \ e \subseteq t\ \ t'Rn\ \ t' \subseteq s \\ Con_1^1,\ldots,Con_m^1 \\ s\colon Att(a, \{\langle BEL, K_2\rangle\}, \_\_) \\ REASON(s,e) \\ \hline \end{array}$$

In this representation, a represents the agent of the action described in the main clause (with $Agent(a)$ as a dummy condition which in applications of the schema will be replaced by whatever the sentence offers as information about the agent); e represents the action this clause describes (e is the principal event variable of the main clause); t is the location time of the event this variable represents; the condition tRn schematically represents the temporal relation between location time and the utterance time n — what this relation R is will vary with the tense of the main clause and possibly other aspects of temporal reference; s represents the attitudinal state of a at the relevant time; the condition $REASON(s,e)$ says that this state is the reason for the action e which a performed. (A proper analysis of this relation would involve important decisions about the nature of practical reasoning and of the ways in which intentions act as the motives of actions and is out of the question here. The predicate $REASON$ serves as an abbreviation of all that. The discourse referents $x_1^1,...,x_n^1$ and the conditions $Con_1^1,...,Con_m^1$ are additional constituents of the DRS of the main clause, whereas K_2 is the DRS of the *because*-clause. The attitude predicate Att used here is the 3-place version, with an unspecified third argument. This is to indicate that the *because*-clause may but need not necessarily give rise to a link in this position. We will see the point of this presently.

When we apply (3.71) to the special case of (3.65.b), the discourse referent a gets instantiated by m, and the dummy condition $agent(a)$ by $Mary(m)$. Furthermore, the DRS for the because-clause now replaces K_2. One possible outcome is given in (3.72)

$$
(3.72)\quad
\begin{array}{|c|}
\hline
m\ t\ e\ t'\ s \\
\hline
Mary(m)\ \ tRn\ \ e \subseteq t\ \ t' \prec n\ \ t' \subseteq s \\
e{:}\,jointhetc(m) \\
s{:}\,Att(m, \{\langle BEL, \begin{array}{|c|}\hline t'\ e'\ y \\ \hline t' \prec n\ e' \subseteq t' \\ friend\text{-}of(m,y) \\ e'{:}\,jointhetc(y) \\ \hline\end{array} \rangle\}\ , \_\_) \\
REASON(s,e) \\
\hline
\end{array}
$$

In (3.72) the content of the belief which the represented interpretation construes as reason for Mary's action of joining the tennis club is obtained by giving both the event variable e' and the variable y for the indefinite *a friend of hers* narrow scope. That is, the motive for Mary's action which this representation captures could be paraphrased as "Well, if a friend of mine joins the tennis club, then I should too." This is certainly one way in which (3.65.b) can be construed, but it is not the only one. A *de re* construal of the indefinite is also possible. The resulting interpretation is to the effect that there is a friend of Mary's such that it is that friend's joining the tennis club which induces Mary to do likewise — a paraphrase might be: "Well if Susan joins the tennis club, that I cannot stay behind." The representation of this interpretation is given in (3.73).[27]

(3.73)

$$
\begin{array}{|c|}
\hline
m\ t\ e\ t'\ s\ y \\
\hline
\\
Mary(m)\ \ tRn\ \ e \subseteq t\ \ t' \prec n\ \ t' \subseteq s \\
\textit{friend-of}(m,y) \\
s{:}\, Att(m, \left\{ \begin{array}{l} \langle [ANCH,\ y'] \begin{array}{|c|}\hline y' \\ \hline \\ \\ \hline \end{array} \rangle\ , \\ \\ \langle BEL, \begin{array}{|c|} \hline t'\ e' \\ \hline \\ t' \prec n\ \ e' \subseteq t' \\ e'{:}\, jointhetc(y') \\ \hline \end{array} \rangle \\ \\ \end{array} \right\}\ ,\ \langle y', y \rangle) \\
REASON(s,e) \\
\hline
\end{array}
$$

The distinction between the representations in (3.67.i,ii) on the one hand and those in (3.71)–(3.73) on the other correspond to what Kratzer calls the "transparent" and the "opaque" reading of *because*. And they confirm her observation that the opaque interpretation gives rise to scope possibilities for indefinites which we do not get on the transparent reading. (We want to note in passing here that in our opinion (3.65.b) also permits a "transparent" interpretation. (This interpretation treats the event mentioned in the *because*-clause as a cause. It seems to us that such an interpretation is compatible with seeing the event as a reason, but as not entailing it.) The corresponding representation is the one given in (3.67.ii); it is obtained by applying (3.70) to a representation for (3.65.b) which is like (3.69).

How do we get to representations like (3.72) and (3.73)? If we follow the line of theorising adopted above, then the answer should be that once again the transition will have to be licensed by a meaning postulate. This meaning postulate will have to be good deal more complex than the one we gave in (3.70) and it will require also some new notation. For instance, since the postulate should be applicable only in those cases where the main clause event is interpretable as a voluntary action, stating the postulate will require a predicate which designates this property. We will not state such a postulate here, but leave that as a (non-trivial) exercise.

There is a more general question that we want to raise in connection with what has just been said: What does that tell us about the principles which govern the interpretation of indefinites in such sentences? If we are right in assuming that both what has just been called the transparent and the opaque interpretations of *because*-sentences — as represented in (3.67), (3.71)–(3.73) — are obtained

[27]There is yet another interpretation, according to which Mary's belief is not only *de re* with respect to her friend, but also with respect to the event of that friend's joining the tennis club. We won't give an explicit representation for that interpretation, but the reader should have no difficulty in constructing one on the pattern of (3.73). In Kratzer's treatment of *de re* attitudes the possibility of an attitude being *de re* with respect to an event plays an important role; and if we read her correctly, there even is a sense in which she wants to reduce all cases of *de re* to cases of this sort (where "event" is to be replaced by a somewhat more general notion of "situation"). Trying to discuss the merits of this reduction, and of Kratzer's form of Situation Semantics within which it is embedded would get us too far off track. So we have chosen the option of recasting her ideas in the formalism used here, in the hope of preserving the essence of what is relevant for our present concerns.

via meaning postulates, then the following conclusion suggests itself: No special interpretational device is needed for indefinites in *because*-clauses. The narrow scope existential interpretation will give rise to representations of the form shown in (3.69). Further interpretational moves, involving meaning postulates of the sort we have discussed, may lead from there to representations of the sorts displayed in (3.72) and (3.73).

It should be noted, however, that we have not been fully explicit about how one gets to a *de re* interpretation like the one in (3.73). What we have said still leaves more than one option. One is that that the meaning postulate leading from representations of the form of (3.69) to those falling under (3.71) has an element of non-determinism, so that it may yield either an interpretation of the type of (3.72) or one of the type of (3.73). This, however, would be a way of building the possibility of two different interpretations of indefinites into the meaning postulate. That is still something other than building it into the syntax-semantics interface principles which yield representations of the form of (3.69), but it is something that we might nevertheless see as making the option between a narrow and a non-narrow scope interpretation of indefinites in *because* environments into an aspect of the grammar in some sense. Another option is to make the meaning postulate responsible solely for representations of the form of (3.72), but then to allow for a further pragmatic mechanism of the sort discussed earlier that yields to a corresponding *de re* attribution as the most likely explanation of why the *de dicto* attribution that is part of the (3.72)-type representation should be true.

We do not know how to decide between these options, and must leave this decision to further research. Once again it may be worth pointing out that much the same interpretive options that we have found for (3.65.b) also seem to exist for sentences in which the *because*-clause is a *there*-sentence. Thus (3.74) can be understood both in a *de re* and a *de dicto* sense, just as (3.65.b):

(3.74) Mary joined the tennis club because there was a friend of hers who did.

For the same reason that was pointed out in connection with (??) the semantic representation should treat the contribution made by the indefinite in this sentence as taking the form of a narrow scope existential quantifier. Of course, this is warranted by our assumption that the basic representations of *because*-sentences take the form of (3.69). But it serves to underscore the fact that for sentences like (3.74) at least the *de re* option must be the effect of interpretational moves which follow the construction of this basic representation.[28][29]

We have devoted this section on *because* as an illustration of the difficulties which any attempt to identify the range of mechanisms responsible for the (appearance of) wide and intermediate scope

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[28] A further complication in the interpretation of *before*-sentences may be worth mentioning here as well. Kratzer draws attention to a contrast we get when the *because*-clause contains a quantifying *NP* such as *none of her friends* or *few of her friends*. Consider the sentences in (3.75).

(3.75) *a.* Mary fell because none of her friends did.
b. Mary joined the tennis club because none of her friends did.
c. Mary was picked because none of her friends volunteered.
d. Mary volunteered because none of her friends did.

For (3.75.b) and (3.75.d) there is a very strong tendency to assign *because* an "opaque" reading, according to which the knowledge that none of her friends joined the tennis club, or volunteered, was the reason for Mary to join, or volunteer. Such examples easily lead to the impression that we are dealing here with a lexical ambiguity in the word *because*, with one of its possible readings being eliminated in sentences such as (3.75.b,d) for reasons which have to do with the form and/or content of the because-clause. However, (3.75.c) seems to show that also with non-agentive event descriptions (such as *was picked*) *because*-clauses with downward-entailing quantifiers can make good sense. Such sentences allow, like e.g. (3.65.a), only for a transparent reading, which does not impute any reasons for actions. It is to be noted that, as it stands, the DRS notation we have been using does not lend itself to an adequate representation of the transparent interpretation of (3.75.c) along the lines of those in (3.67). What we need is an "event" to occupy the first argument slot of the predicate $CAUSE$. In the case of (3.75.c), what we need is not so much an "event" in the narrow sense of the word, but rather a state of affairs, to the effect that none of Mary's friends volunteered. So, before or during the transition from a (3.69)-like to a (3.67)-like representation the introduction of a variable representing this state of affairs must be possible. There is no particular problem about introducing mechanism which does this. But it is a mechanism which to our knowledge the available DRT sources do not supply. In particular it is not included in either Kamp and Reyle (1993), or in Reyle et al. (2000).

[29] The effects of transparent and opaque reading of *because* on the possibility of intermediate scope interpretations for indefinites becomes dramatic when we consider main clause subject *NP*s in the plural. We get additional ambiguities if this subject NP is one which permits a distributive interpretation but does not require one. As an example consider

readings of indefinites. We hope that this discussion has made it even clearer than it may have been already that we cannot rely on our intuitions on possible meanings of sentences with indefinites in any straightforward and direct way. Several mechanisms seem at work, some directly concerned with the indefinites themselves and others with aspects of the linguistic environments in which they occur, which jointly or severally produce the interpretations which are judged possible.

As far as the interpretation mechanisms for the indefinites themselves are concerned, we have now encountered several. We recall those which in the light of the discussion up to this point appear most likely to be on the right track

(3.77)

(i) The classical standard: Existential quantification with scope determined in the same way as for other nominal quantifiers.

(ii) "Choice Function" treatments with severely limited options for binding of the function variable (e.g. contextual resolution, as in Kratzer (1998) or maximal scope existential quantification as in Matthewson (1999)). As we have argued, in many and perhaps all cases, the set argument of these functions is not really needed. What we are left with, if this argument is ignored are 0- or more-placed Skolem functions (where presumably the 0-place functions can be identified with the individual constants in the theory of Fodor & Sag).

(iii) *De re* interpretation of indefinites in overt or implicit attitude contexts. What we have said on this score so far suggests that *de re* interpretations of indefinites are not due to a grammatical option (let alone a real ambiguity in the relevant indefinite determiners *a, some, a certain,*...), but rather to a widely available strategy for hypothesising how given *de dicto* attributions could have been justified or true. Nevertheless the question remains in our mind whether there the occurrences of indefinites in attitude contexts may not be subject to a special interpretation regime, that applies to such contexts but not to others.

One of the problems with this list of principles is an appearance of prolixity. It is easy to think of sentences in which there is overlap of principles: More than one could be invoked to explain why a given non-narrow scope interpretation is possible. Actually we are inclined to think that this feature of a theory in which all these principles figure doesn't necessarily speak against it; it seems to us quite plausible that in certain areas of language there is this kind of overdetermination: several interpretational paths lead to one and the same interpretation in the end.

If this is the right picture in principle, however, there still lies a daunting task before us, which consists in getting as complete an overview of the network of principles and strategies — some part of grammar and some beyond — which support the full range of interpretation for indefinites in different contexts (both in the sense of sentential environment and in that of the wider context of use.

One of the principal worries for a theory which takes such a spectrum of principles on board is the danger of overgeneration. We criticised the theories of Abusch and Reinhart–Winter on precisely these grounds. But if we are not careful in the exact formulation of a theory which includes versions of the principles listed above, there is a good chance that this objection may be just as applicable to it. In this context it is especially important to find data which show that certain occurrences of indefinites do not allow for certain interpretations. In the next and last section we will look at some further observations in this direction which have been made in very recent work.

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the sentences in (3.76):

(3.76) *a.* Two children fell because a friend of theirs did.
b. Two children joined the tennis club because a friend of theirs did.

Exercise: Construct representations for all the possible readings of these sentences.

3.10 Skolem Functions with Non-Maximal Scope: Recent Observations of Chierchia and Schwarz

Chierchia (t.a.) is concerned exclusively with functional interpretations of indefinites. Besides making a number of points about the logic of choice function analyses to which we have drawn attention in the preceding sections, he focuses on two aspects of "long distance" indefinites. First, he notes that in certain contexts, involving downward-entailing operators, the functions interpreting such indefinites must be allowed to be bound at intermediate positions. This evidence points towards the theories of Reinhart and Winter, which permit such binding, as opposed to Kratzer and Matthewson, who argue for contextual anchoring and maximal scope existential quantification of the function variable, respectively.[30] Chierchia then asks the question whether if we have to allow for binding of the function variables at all sorts of sites, we still need the Skolem arguments which Kratzer argued for. These arguments are indispensable when one insists on maximal quantification of function variables, or assumes that they are not quantified at all but subject to contextual anchoring. But if quantification can take place anywhere, then it is no longer all that clear what good the Skolem arguments do. However, as Chiercha has noticed, non-narrow scope interpretations of indefinites trend to be constrained by Weak Crossover, in much the same way that has long been known in connection with anaphoric pronouns. To be precise, the non-overt arguments of Skolem functions that must be assumed in a Kratzer- (or Matthewson-) type analysis, are subject to the crossover constraints we also find for overt anaphoric sentence elements.

In this brief review of these two features of long distance indefinites we have turned things around. We will first list and discuss those instances of crossover violations which we see as most important for our own purposes, and then turn to the downward entailing contexts which show the need for non-maximal quantification.

3.10.1 Chierchia on Weak Crossover

The constraint known as "Weak Crossover" was first observed in connection with anaphoric pronouns. In order that a pronoun can be interpreted as anaphoric to a certain quantifying *NP* it is necessary that the pronoun be "in the scope" of this antecedent in syntactic form. Exactly how this syntactic notion of "being in the scope of" is to be made precise depends somewhat on the syntactic theory that is presupposed. Because crossover phenomena were first discussed within the transformational paradigm (which shortly afterwards turned into what has become known as G(overnment and) B(inding), the constraint is commonly stated in terms of C-Command: The pronoun's antecedent must C-Command the pronoun. This configurational condition must be satisfied at a certain level of syntactic processing. In GB this level is that of S-Structure. Since the general architecture of S-Structure representations (viz. that of syntactic trees decorated with syntactic features) is used very widely in syntactic theory and since it is this tree-architecture which is necessary and sufficient for defining the relation of C-Command, the formal characterisation of Weak Crossover configurations is much more widely applicable than just in GB (or in the syntactic theories which have directly preceded or followed it). We will assume that the Command constraint applies to the syntactic structures which we assume serve as inputs to the process which constructs semantic representations.[31]

[30] It has already become a more or less established practice to cite Matthewson in discussion of the kind we ar engaged in here. In the light of this it should be emphasised that Matthewson was explicitly concerned with a certain particle in a language (Lillooet Salish) which is very far removed from English, and that she presents her analysis explicitly as pertaining to that particular case. This is not to say that this isn't an important contribution to our general understanding of how indefiniteness in different human languages can work. But the impression should be avoided that the outcome of a debate over the behaviour of certain expressions of English could throw doubt on her proposal, let alone refute it.

[31] The term "(Weak) Crossover" belongs to a conception of syntax in which the antecedent of the pronoun is in a position such that the pronoun is not in its scope at Surface Structure and then gets "moved across" the position of the pronoun in a transformation which is part of the transition from Surface Structure to LF (Logical Form). According to this conception, LF serves among other things the purpose of assigning the various scope-bearing constituents of the sentence positions which directly reflect their logical scope relations, so that a genuine semantic representation can be read off more or less immediately from the sentence structure at LF. It is plain on logical grounds that at LF

Chierchia observes that Weak Crossover also applies to many cases where an indefinite is given a non-local interpretation. His first example is the pair of sentences given here as (3.78.a,b)

(3.78) *a.* A technician inspected every plane.
b. A certain technician inspected every plane.
c. Every plane was inspected by a technician.
d. Every plane was inspected by a certain technician.

Chierchia observes that (3.78.a) admits of an interpretation in which the direct object has scope over the subject, so that the sentence does not entail that one and the same technician inspected every plane. In contrast, he notes, (3.78.b) does not permit such an interpretation; this sentence can only mean that a single technician did all the inspecting. A naïve reaction to this observation would be to say that indefinites beginning with *a certain* always have maximal scope. But we have already encountered many examples which show that that is not so. And this point is confirmed by (3.78.d), which allows, just like (3.78.b) and its *certain*-free counterpart in (3.78.c) an interpretation which is compatible with different technicians for different planes. In the light of these data the explanation which Chierchia offers seems right: That which in (3.78.b) blocks the interpretation in which the quantifier contributed by *every plane* has scope over the variable contributed by the indefinite is a Weak Crossover violation to which this interpretation would give rise; and the interpretation would give rise to a crossover violation because it would have to interpret the hidden argument of certain as linked to (syntacticians would say "coïndexed with") the variable bound by *every*: The tacit argument of *certain* would have to be construed as anaphoric to the direct object *NP*, which would produce the configuration which the Weak Crossover constraint prohibits.

It is worth the effort to see exactly on what assumptions this explanation hinges. The first assumption is that when an *NP* with *a certain* is given a dependent (and thereby non-maximal scope) interpretation, then the tacit argument of *certain* must be interpreted as bound by the *NP* on which the interpretation of the indefinite is meant to depend. A wide scope interpretation of the direct object in (3.78.b) isn't excluded on principle, no more than this is the case in (3.78.a). However, if the direct object is assigned scope over the subject, then binding of the tacit argument of *certain* by the quantifier *every* is excluded because of the crossover violation. Consequently, the argument must be bound in some other way, i.e. to some element presumed to be present in the context. This has the effect that the denotation of the indefinite gets fixed via this contextual element, so that we do not get the denotational variability that is normally available for an existentially quantified

a quantifying antecedent of a pronoun must have scope over it, for otherwise it could not bind the variable which replaces the pronoun in semantic representation. Within such a syntactic architecture Crossover constraints take the form of prohibitions against transformations (or, in GB, applications of the rule "Move α") in which the pronoun's antecedent moves from a position where it does not have the pronoun in its scope to one where it does (and should have). It is worth remarking that it should come as no surprise that Weak Crossover constraints do not hold for (almost all) definite antecedents. The reason is that in most cases a definite *NP* gets interpreted as having a referent which is salient in the verbal or non-verbal context. In such cases the pronoun can be construed as anaphoric to the explicit or implicit element of the context to which the definite *NP* which appears as its overt anaphoric antecedent is understood to refer. In such cases the relation between the pronoun and its antecedent *NP* acts more like a pointer towards the "real antecedent" of the pronoun than as a binding relation in the strict sense of the word. Since the contextual element to which the antecedent *NP* point is in any case in a position which may be regarded as having "scope over" the pronoun, there is no violation of crossover constraints in such a case even if the pronoun does not appear within the scope of the pointing *NP* in the surface form of the sentence. A notoriously delicate category in connection with crossover phenomena are the indefinites. For those who, like us, are convinced that the indefinites form a distinct category of *NP*s, different from the quantifying *NP*s on the one hand and from the definite *NP*s on the other, it is plausible that the reasons for crossover constraints applying to indefinite antecedents should be separately addressed. Reflection on those reasons makes the observed facts appear quite natural: Crossover configurations with indefinite *NP* as pronominal antecedents are acceptable when and only when the indefinite is given a specific interpretation. That crossover doesn't matter when the indefinite antecedent is interpreted specifically is plausible especially in those situations where the specific interpretation has a referential character (those cases for which Fodor & Sag, if we understand them rightly, intended their logical forms in which the indefinite is replaced by an individual constant). For in such situations the same considerations seem to apply as for antecedents that are definite *NP*s. As a matter of fact, it has been one of the main concerns of this chapter to present arguments to the effect that the notion of specificity is far more complex than many discussions of the notion thus far have taken care to acknowledge. In the light of this the problem of pronouns with "specific" indefinite antecedents in non-commanding positions deserves to be given a new and close look. But this is a topic for some other occasion.

phase within the scope of some other quantifier. Hence the difference with (3.78.a), where the scope-inverted interpretation does allow for this possibility of denotational variability, so that there may have been different technicians to inspect different planes.

In other words, the direct object in (3.78.b) may be construed as having wide scope over the subject, but only when the tacit argument is not construed as bound by the direct object quantifier. In that case it must be construed as bound by some contextual element, and that interferes with a dependent interpretation of the subject. Hence the difference between (3.78.a) and (3.78.b). The difference between (3.78.b) and (3.78.d) is explained by the fact that the every *NP* is in a commanding position with respect to. the indefinite from the outset, so that the crossover problem does not arise and the tacit argument of *certain* can be construed as bound by *every*.

Thus, in his assumptions about *certain*, Chierchia closely follows Kratzer: *certain* always has a tacit argument, which has to be interpreted in some way. And like an adjective such as *local*, the binding can be sentence-internal or through linking to some element in context. The second assumption is that the interpretation of this tacit argument is subject to crossover constraints just as overt pronouns. (We will have cause to return to this second assumption below.)

There is a further aspect to the sentences in (3.78) which holds some interest from our point of view. We have informally described the semantic contribution of *certain* in *a certain*-indefinites as an indication of some "source of identification" for the indefinite's denotation(s). In the examples of this which we have been considering up to now this "source" was always some individual who the interpretation would make responsible for the relevant identifying information. (3.78.b) and (3.78.d), however, show that the notion of "source" is to be understood in a more general (and more abstract) sense than this. Even the different planes of which the sentences in (3.78) speak can apparently play this role.

In fact, it is not entirely clear how the role which the different planes play in the interpretation which (3.78.d) permits but (3.78.b) does not, relate to the intuition we have tried to articulate that *certain* points to some source of information. The issue becomes apparent when we consider sentence like those in (3.79).

(3.79) *a.* Both the airline and the manufacturer knew that every plane was inspected by a certain technician.
b. Both the airline and the manufacturer knew that a certain technician had inspected every plane.

(3.79.a) seems to allow for an interpretation in which not only the dependence of technicians on planes but also a further dependence on epistemic subjects are involved. The intended interpretation is the following. We assume that the quantifier every is restricted to the set of planes by the given airline that were produced by the given manufacturer. The scenario we have in mind is one where the airline has a complete list of the planes in question in which each plane is assigned one of the technicians in its (i.e. the airline's) service. And the airline has made sure that each of the planes has in fact been inspected by the technician which the list assigns to it. Similarly, the manufacturer has its own list of the planes, in which each plane is paired with a technician that it (i.e. the manufacturer) employs. And the manufacturer too has made sure that all the inspections have been carried out. In this scenario (3.79) permits, it seems to us, an interpretation in which the identification of the individual technicians to which *certain* is taken to provide a pointer involves two elements — (i) the inspected plane and (ii) the relevant company. The interpretation can be paraphrased as follows: "The airline knew for each of the planes which one of its technicians had inspected it and the manufacturer also knew for each plane which one of íts technicians had inspected that plane".

Again, this interpretation is not available for (3.79.b). If Chierchia is right — and we are assuming that he is — then this shows that the dependence of the indefinite on the *every*-phrase which is involved in the interpretation we maintain is possible for (3.79.a) involves binding of a tacit argument of *certain*. The question that the examples in (3.79) induce as to ask is: "Is this the only tacit argument of *certain* which the described interpretation of (3.79.a) involves; or does certain allow in sentences like this one for additional arguments?" We do not know the answer to this question. We suspect that only one tacit argument of certain is part of its "grammar", so to speak, but that other arguments may be taken on board when interpretation requires this. So we leave the matter as an open problem.[32]

The question of the status of the tacit argument (or arguments) of *certain* becomes relevant also in connection with examples which Chierchia discusses, where the indefinite at issue does not begin with *a certain*, but with *some*.

(3.80) *a.* Every student was examined by every professor competent in some research area.
b. Every professor competent in some research area examined every student.

The contrast we can observe between (3.80.a) and (3.80.b) parallels that between (3.78,a) and (3.78.b). Again (3.80.a) allows for an interpretation according to which for each student there is a research area such that every professor competent in that area examined that student. (3.80.b) doesn't have this interpretation. given what has been said about (3.78) it seems natural (and in fact almost inevitable) that we blame the difference once again on Weak Crossover. What we want as part of the interpretation, and what we can get in (3.80.a), is an intermediate scope assignment to the indefinite: It should have wide scope with respect to *every professor* while narrow scope with respect to *every student*. If it is Weak Crossover that explains why such an interpretation is possible in the case of (3.80.a) but not in the case of (3.80.b), then it follows that the required interpretation of the indefinite takes the form of a functional interpretation, with the function taking the bound variable of *every student* as argument. The function argument is then improperly bound in (3.80.b) but not in (3.80.a).

This observation is important in that it shows that at least in sentences of the sort exemplified in (3.80) intermediate scope interpretations of indefinites must take the form of a functional interpretation, where the function has an argument slot for the variable that is bound by the quantifier within whose scope the indefinite is interpreted to occur. It is important for a number of different reasons. First it shows that even indefinites which do not contain a word like *certain* that requires interpretation of its tacit argument (or of one of its tacit arguments) can be interpreted as functions which have such arguments, and moreover that they must be given such an interpretation in at least some of the cases where they are assigned an intermediate scope interpretation. This fact adds a further complication to the question about the nature of these arguments, which we left for future research a couple of paragraphs above.)

Secondly, the observation is of considerable methodological importance in the light of two other general points about non-local interpretations of indefinites which we have been concerned to bring to the fore in these notes. On the one hand, we noted in our discussion of Kratzer's observations about *because* that non-local scope effects may rise even in cases where the indefinite itself receives a perfectly ordinary, old-fashioned local existential quantifier interpretation in virtue of the fact that other constituents may trigger meaning postulate that can yield a subsequent lifting of this quantifier from its initial position. On the other hand we will see in the next two sections that the binding possibilities that ought to be available for the function variables that choice and/or Skolem function treatments of non-local indefinites naturally raise the question if the functional aspect of the interpretation could not be dropped altogether in such cases. Chierchia's observations about the Weak Crossover constraints that these interpretations appear to be subject to constitute strong evidence that this move would be wrong.

We conclude this first part of our discussion of Chierchia's remarks on Weak Crossover with a couple of examples which show — now no longer surprisingly perhaps — that the Weak Crossover Constraint is also operative in connection with indefinites in which begin with *a* (rather than *some*

[32] We suspect that the question of additional arguments for *certain* also has ramifications that connect it with the general problem (which we have touched on more than once and ot which we will return again in the next section) where in our over-all theory of interpretation the different interpretation mechanisms should be located. Recall the earlier remarks on specific use and the related notion of specific interpretation of indefinites and those on the status of de re interpretations of attitude-attributing sentences.

or *a certain*).

(3.81) *a.* Everyone was sad that a Vermeer had been stolen from the Isabella Stewart Gardener Museum.
b. That a Vermeer had been stolen from the Isabella Stewart Gardener Museum upset everyone.

(3.81.a) allows for an interpretation where different persons are sad about the disappearance of different paintings. (The scenario being that both "The Concert" and "Lady Seated at a Virginals" have been taken from the Museum). (3.81.b) does not allow for such an interpretation: Here either everyone is upset by the disappearance of "The Concert" or everyone is upset at the disappearance of "Lady Seated at a Virginals". (In addition there is of course also in both cases the *de dicto* interpretation according to which the source of sadness or dismay is for all involved the existential proposition that there was a Vermeer that was stolen from the ISG.)

One important question which these observations about Weak Crossover have brought into the open is when the interpretation of an *NP* forces the assumption of a tacit argument upon us. The intermediate scope interpretations of indefinites with *a* and *some* that we have considered show that interpretation may carry such an obligation even though there is no particular element of the *NP* itself which suggests such an argument.

On the other hand we have seen, in the examples concerning a certain, that there are expression which carry a tacit argument on their sleeve. In such cases the need to give this argument some interpretation may prove an additional constraint of what interpretations are possible. (Cf. (3.78.b) and the discussion following it.) We want to look at one more case of this, in which the tacit argument provider is the ambiguous participle *recommended.* We have looked at this word both as a constituent of definite and of indefinite *NP*s. What happens when we place these *NP*s in positions where they are or are not subject to the strictures of Crossover? (3.82) gives a few relevant sentences.

(3.82) *a.* Each professor rewarded every student who had read a highly recommended book.
b. Every student who had read a highly recommended book was rewarded by each professor.
c. Each professor rewarded every student who had read the highly recommended book.
d. Every student who had read the highly recommended book was rewarded by each professor.

(3.82.a,b) illustrate the same facts which we have now been able to observe more than once: (3.82.a) has a reading according to which for each professor there was a particular book that professor had highly recommended and for which it was true that every student who had read that book was rewarded by that professor. It is consistent with what we have noted before about *recommend* that we may either take the books in question to have been recommended by each professor to whosoever, or we may take them to have been recommended by each professor to each student individually - the tacit "recipient" argument of recommended may be made explicit in the interpretation but it needn't. Neither of these two intermediate readings is possible for (3.82.b). The most natural interpretation of (3.82.b), it seems to us, is the one where some unnamed authority has highly recommended a certain book to the community at large and every student who has read that book was rewarded by every professor. Perhaps the sentence also has an interpretation which allows a highly recommended book to be paraphrased as "a book highly recommended to that student", but (for reasons which do not understand) that reading is not very prominent. However, to take the individual professors to be the individual recommendors seems completely out in the case of (3.82.b).

What about (3.82.c,d)? Again, and unsurprisingly, (3.82.a) has an "intermediate" reading, where *the highly recommended book* is interpreted as the book which each professor had highly recommended (either to the students generally or to each student individually). Is this reading also possible for (3.82.d)? We are not quite sure. If it is possible at all, then it is surely not very prominent. Let's suppose that the verdict should be negative. Then the conclusion will have to be that the functional presupposition accommodation which we proposed earlier for such definite descriptions (see (3.49) is also subject to Weak Crossover constraints. Should the intermediate interpretation for (3.82.d) be declared possible (even if only barely so), whereas the parallel interpretation is judged entirely impossible, then the difference would have to be explained by drawing attention to the different stages at which the functional dependency comes into play. With the definite *NP*s this stage is that of presupposition justification, something which happens after the syntax-semantics interface principles have already done their work and a first representation has been put into place. The non-local interpretation of an indefinite, on the other hand is part of applying the syntax-semantics interface principles themselves. If we assume that it is only at this first stage that the Weak Crossover constraint is operative — and such an assumption would not seem implausible given its syntactic character — then the difference in possibilities would be explained.

Unfortunately, for the case we have just looked at the judgements seem very delicate, and more evidence would be needed before a more definite conclusion about the relation between Weak Crossover and the interpretation of definites.

Summing up and repeating, we have included the discussion of Chierchia's Weak Crossover observations in order to highlight two points. The first is that intermediate scope interpretations of must involve functional dependencies on non-overt arguments. This leads to the conclusion that such interpretations must involve functions even in cases where strictly truth-conditional considerations do not force such a conclusion upon us. The second is that the tacit arguments which intermediate interpretations force us to adopt can be very different as regards their source. In some cases the argument is there in any way, with sentence-internal binding as one of its interpretational options — but when that option is not chosen then another one is required, with the effects we observed for the sentences in (3.78). In other cases, however, it is the intermediate interpretation of the indefinite which forces the interpolation of a function argument even if there is nothing in the indefinite that requires that assumption; consequently no such argument plays a role when the indefinite is interpreted in another way (i.e. either locally or "referentially"). These two alternatives raise the general question to what possible sources syntactically non-overt arguments in semantic representation may be due. This is an intriguing problem, and it is evidently important for the interpretation of indefinites. But we cannot do more at this point than draw attention to it.

3.10.2 Chierchia: Downward Entailing Contexts

Many of Chierchia's examples involve downward entailing contexts created by quantifying phrases which are downward monotone in their right (i.e. nuclear scope) argument. (3.83) is one of them.

(3.83) Not every linguist has discussed every conceivable solution
which some linguistic problem might have.

Chierchia argues persuasively that this sentence has an interpretation on which it is verified by the existence of at least one linguist and one problem such that the linguist discussed all conceivable solutions to that problem. On the other hand the sentence isn't verified (on the intended interpretation) by the existence of a linguist who has failed to discuss all conceivable solutions to all linguistic problems. (The existence of linguists of this latter kind is a foregone conclusion; if that were good enough to verify (3.83), then the sentence would be quasi-tautologous; but intuitively it isn't.) The second observation establishes that the interpretation in question does not involve narrow scope for the indefinite *a linguistic problem*, for on a narrow interpretation of that phrase the almost trivial non-existence of linguists who discussed all solutions to all problems would have been enough to verify (3.83).

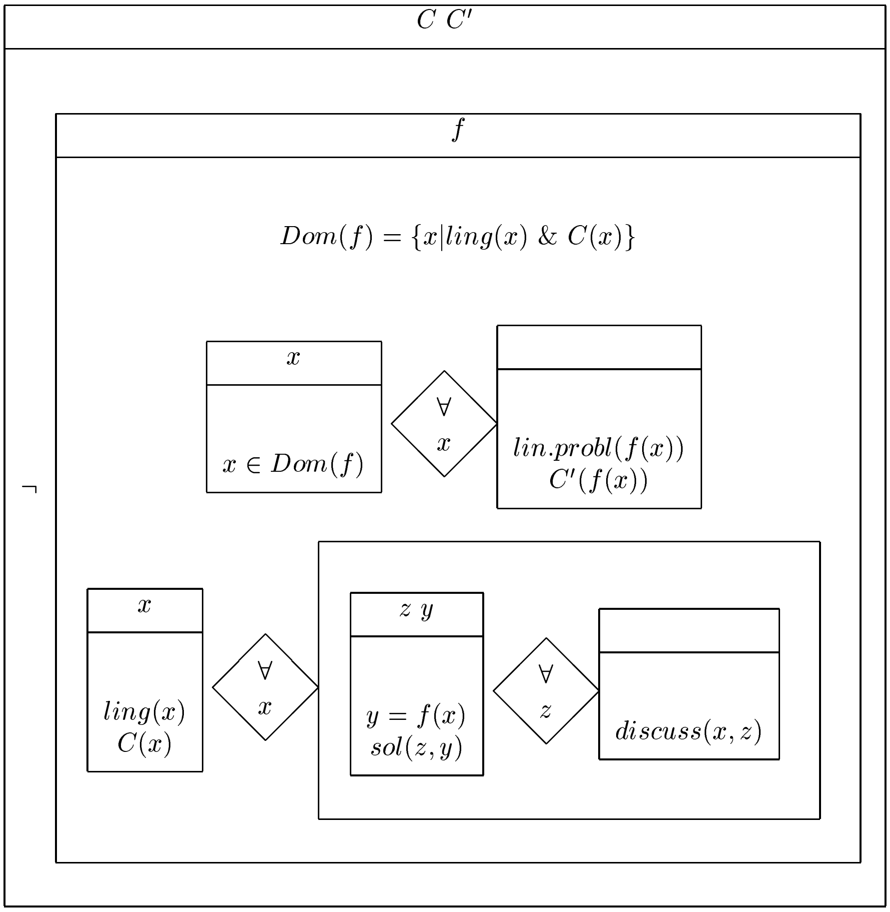
On the other hand, wide scope existential quantification of the function variable also yields counterintuitive truth conditions. This way the sentence comes out as almost necessarily false, since it will in practice always be possible to find a function which assigns every linguist a problem such that he didn't discuss who made it to fame a problem of which he or she has not discussed all conceivable solutions. This shows that it is clearly wrong in this case to existentially bind the function variable so that the quantifier has scope over the entire sentence, unless additional (contextually motivated) restrictions are imposed on the quantified variable. However, Chierchia argues persuasively that on any natural understanding of how such restrictions could come about, such restrictions won't really help. It doesn't follow directly from what has been said so far that we also get the wrong truth conditions when we assume that function variable is not existentially quantified, but rather anchored in the context (as it is on Kratzer's account). Again Chierchia argues convincingly that this alternative won't do either. Even without going through his careful argumentation one can, it seems to us, perceive that the conclusion is right: The natural interpretation of (3.83) is one that is captured by the following predicate logic representation:

(3.84) $(\forall x)((ling(x) \to (\exists y)(lingprob(y)\ \&\ (\forall z)(sol(z,y) \to disc(x,z))))$

Neither wide scope existential quantification nor contextual anchoring of Skolem functions can do justice to these truth conditions.

One way in which we can get these truth conditions is by assuming that the "accommodation" of which we showed an example in (3.64) may take place within the scope of the outer negation of (3.84). A representation to that effect in the style of (3.64) is given in (3.85).[33]

(3.85)



It is not difficult to verify that (93) captures the same truth conditions as (3.84).

How could a representation like (3.84), with its "intermediate accommodation" of f, be justified? Here we recall what we said on page 54 about the difference between functional interpretations of definite and indefinite descriptions (and our use of scare quotes around the terms "presupposition" and "accommodation" in connection with the latter). As we have argued elsewhere,[34] it is a universal

[33] In this representation we have ignored the contextual restrictor C'' on the quantifier *every solution*. The reason is that in our informal discussion of (3.83) we have been assuming that every conceivable solution to the problem in question was included. (The word *conceivable* suggests this very strongly.) So what has been at issue is an interpretation in which C'' is interpreted as vacuous. One way to express this is to simply eliminate it from the representation which results after the decision to interpret C'' as vacuous has been made.

[34] See Kamp (2001c), Kamp (2001a).

property of presupposition accommodation that it should happen at the level of the global context. For the rationale behind presupposition accommodation is to readjust one's notion of the context to what one takes to be that of the speaker. But in this respect, we noted, the interpretation of indefinite *NP*s is fundamentally different from that of definite *NP*s. The interpretation of indefinites doesn't require contextual adjustment since they come with the contention that the recipient cannot identify an intended referent. In other words, the speaker's intention is to be understood naturally (and arguably necessarily) as existential in just this sense: The context, as presumed by the speaker provides no means for identifying a referent for the indefinite. This consideration would apply to all manner of indefinite interpretations, including those with which we are concerned in this chapter, in which indefinites are assigned wide scope or intermediate scope.

Given this, it should not come as a surprise that when sentences which give rise to such interpretations are negated, then it should be possible to interpret the result as involving negation over the entire interpretation of the negated sentence, including those quantifiers that are involved in interpreting its indefinites when assigning a meaning to the unnegated sentence. Of course this possibility does not follow from anything that has been said so far. But there is a massive amount of evidence that negation can incorporate even aspects of interpretation that one might consider as lying beyond the boundaries of semantic interpretation in the stricter sense of being grammar-driven.[35] In the light of that evidence the assumption that the results of functional interpretations of indefinites can be captured be an outer negation too do not seem outlandish.

There arguably remains a problem in the case of (3.83): How do we motivate an analysis in which the negation in this sentence does get wide scope. For it is quite clear that *not* in (3.83) is a constituent of the subject *NP* and, more precisely, acts as a modifier of the determiner *every*. Clearly an argument is needed to get the negation into the sentence-governing position which it occupies in (3.84). We take this to be a problem, however, that is orthogonal to what is at issue here. The problem how apparently embedded occurrences of negation words and particles get to the scope positions which they evidently must occupy in logically transparent semantic representations arises generally, and has nothing to do with the intrpetation of indefinites as such.

We mention this complication, which may strike some as rather far-fetched, because the same issue would have to be faced also in connection with downward monotone quantifiers whose determiners are not as obviously composed of a quantifying determiner and a negation word as the combination *not every*. Chierchia observes that we get exactly the same possibilities for interpreting the indefinite in the sentences in (3.86) as in (3.83)

(3.86) *a.* No linguist has discussed every conceivable solution which some linguistic problem might have.
b. Few linguists have discussed every conceivable solution which some linguistic problem might have.
c. At most three linguists have discussed every conceivable solution which some linguistic problem might have.

In order to subsume a solution that these sentences pose (on the intuitively plausible, non-trivial interpretations which they clearly have), we might argue that here too we find quantifying phrases whose determiners can be analysed as consisting of a (i) a monotone increasing determiner and (ii) a negation particle which has either been cliticised onto it (in the case of no) or else has become part of it by some kind of lexical incorporation at the level of meaning (in the case of *few*). Quite possibly one can make a case for this line of analysis that will stick — for no the prospects seem somewhat better than for *few* — but alas, no matter how valiantly we argue the case, the real problem won't go way that way. For as Chierchia points out, the interpretational possibility which (3.83) illustrates, is found not only when the outer operator involves an explicit or implicit form of negation, but also with other downward entailing contexts. The example he gives is (3.87).

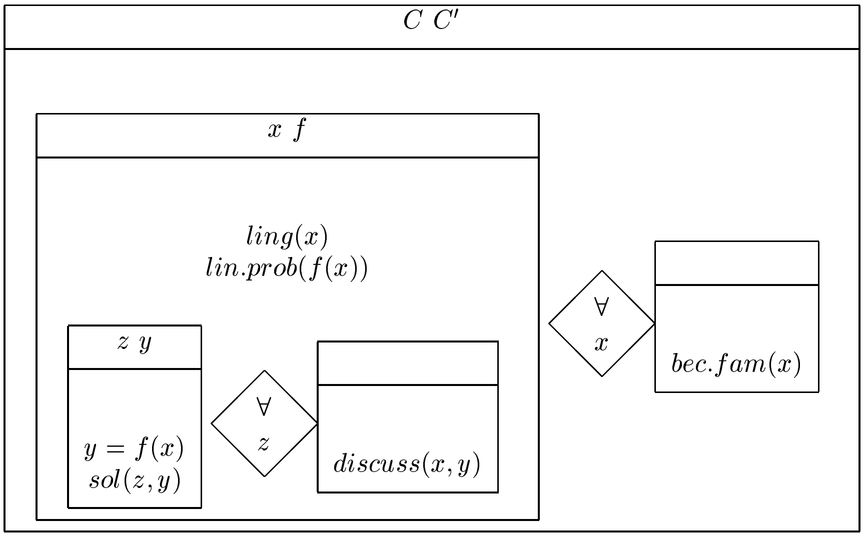
(3.87) Every linguist who discussed every conceivable solution which some linguistic problem might have has become famous.

[35] See in particular Horn (1989)

This sentence shows that what we have observed in connection with (3.83) and (3.87) cannot simply be pinned on the special properties of negation. So we have to face once again the question: How is one to explain the management of the function variable for the indefinite *some linguistic problem* in all these different sentences?

Here is a tentative suggestion. In the representation of (3.87) the function variable f is to be "declared" within the universe of the DRS determined by the scopally highest operator among those which bind f's arguments. In the case of (3.87), where the phrase which contains both the lower quantifier (i.e. *every conceivable solution*) and the indefinite *a linguistic problem* in the syntactic scope thereof is part of the restrictor of *every linguist*, this "solution" takes the form shown in (3.88):

(3.88)

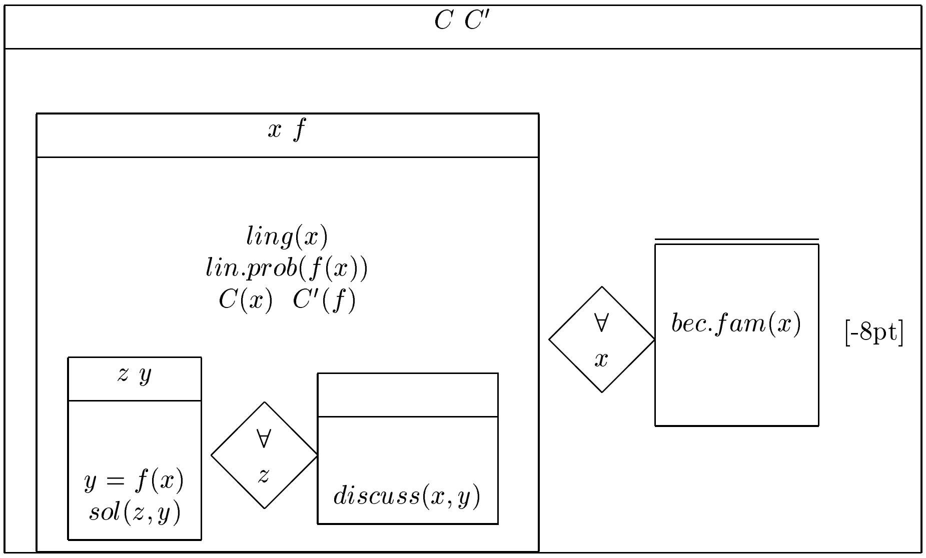


The force of this representation is that each linguist satisfying C for whom there is a linguistic problem such that the linguist has discussed all its conceivable solutions has become famous. This is just as we wanted it. But what is its justification?

Just as with the representation we proposed for (3.83) there is nothing in what we have said earlier from which the legitimacy of handling f in this manner can be seen to follow. It is true that the representation in (3.88) is farther removed from our earlier proposal to deal with functional interpretations of definite descriptions (cf. (3.52)) than is (3.85) or the earlier representation (3.64). However, as we pointed out in discussing (3.64), from a conceptual point of view the interpretation of indefinites is very different from the interpretation of definites and the similarity between (3.64) and (3.52) is a merely superficial one, with no real substance behind it. In (3.64) (and, derivatively, in (3.85)) we chose the representational form which apparently works well in the case of definites and for which there exists independent justification there, in the hope that what seems to serve us well in the case of definites can be made to do the same in connection with indefinites. However, now that especially the discussion of (3.85) has emphasised how scant the parallels between the interpretation of definite and indefinite descriptions really are, there does not seem any reason to prefer the kind of representation used in (3.85) to the one of (3.88).

Once we allow for binding of function variables as in (3.88), the question of spurious arguments raises its head once more, and this time not in relation to the set argument (of the choice functions that were at issue when we discussed Reinhart, Winter and Kratzer), but with regard to those arguments which make the functions that are under discussion now look like Skolem functions. In this connection there is a crucial difference between (3.88) and (3.85). In (3.85) the argument x of f is essential to the meaning the representation expresses, but not so in (3.88). (3.88) could be replaced by (3.89) without change in truth conditions:

(3.89)



However, even if the argument x of f in (3.88) is not indispensable for reasons of truth conditions, it is important for another reason. Chierchia proposes the following empirical generalisation governing the possible positions in which the function variables that are introduced to interpret indefinites can be existentially quantified. His proposal is the one we already mentioned informally: Quantification of such a variable[36]

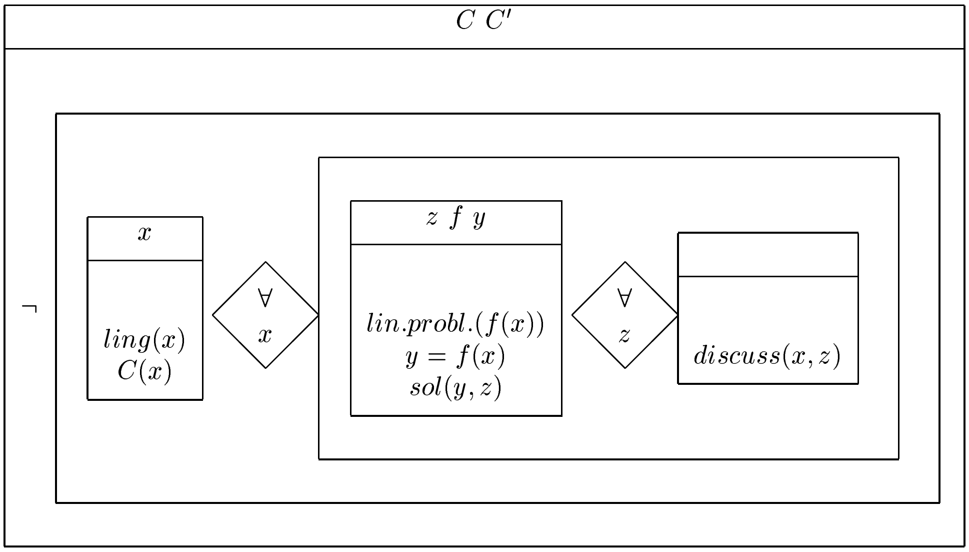
(3.90) (i) is always existential;
(ii) takes place (either at the global level or) in the immediate scope of the (highest) operator which binds an argument of the function variable.

We will presently address the question how tenable this generalisation is. But even if it might require certain modifications, there is a general point connected with it that such a modification is unlikely to change. For as been noted earlier, some restrictions to where the function variables for non-local scope indefinites are needed, lest our procedure seriously overgenerate. And we suspect that (3.90) is on the right track at least insofar as it makes the possible binding sites for the function variable dependent on where its arguments are bound.

As a matter of fact, the proposals we have exemplified in (3.85) and (3.88) show between them that (3.90) needs modification, or at the very least some clarification. For as far as we can see both proposals are needed. We cannot do without the proposal of (3.88) to deal with (3.87). As regards (3.83) (and similarly for the sentences in (3.86)) an alternative treatment to the one shown in (3.85) might seem possible: Instead of the function declaration above the duplex condition for *every linguist*, we introduce f between it and the duplex condition for *every solution*; the representation

[36] The attribute "highest" in point (ii) in (3.90) is an addition sprung from our own fantasy. Chierchia doesn't consider cases where f has more than one argument. That such cases do occur is demonstrated by our example (3.45.b), where one interpretation takes the participle recommended as making available two tacit arguments. If one assumes that the functions which interpret indefinites never have more than one argument, then the second disjunct of (ii) can be replaced by the simpler condition that the function variable is bound in the immediate scope of the operator which binds its variable.

is shown in (3.91)

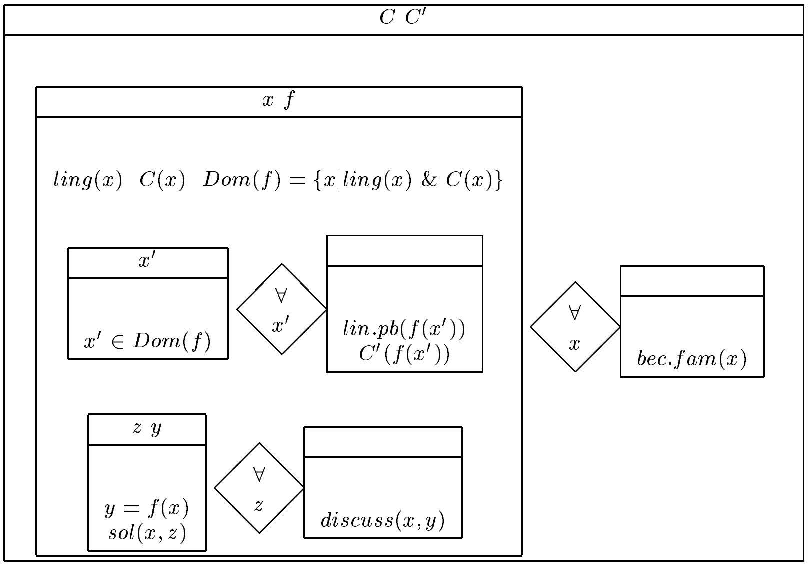
(3.91)


This representation also captures the truth conditions of the intended interpretation of (3.83) correctly. However, we will see below that the proposal of (3.88) doesn't work for all cases.

The alternative in (3.91) also raises a problem for (3.90). For how are we to fit both the placement of f in (3.91) and its placement in (3.88) within the constraint expressed in the second disjunct of (3.90.ii)? True, we already have a problem with (3.90) anyway, as it isn't obvious how the constraint can accommodate both (3.88) and (3.85). So, if we want to save (3.90) while holding on to both interpretation procedures exemplified by these representations, the second disjunct of (3.90.ii) will have to be altered. Before we propose such an modification, first a remark on the formal similarities and differences between the two proposals before us. At first sight they may seem some distance apart. In (3.85) the function variable comes with a full specification of its domain as well as a "type declaration" for the function values. (In (3.85) this type declaration is given in the form of the condition $lin.prob(f(x))$.) In (3.88) only the type declaration has been given, and indeed that is all that is required. We could of course have added as complete a characterisation of f in (3.88) as was done in (3.85), but because of the place where f is declared in (3.88) this seems quite superfluous. For it is only the function value $f(x)$ which is needed.

Note however that this simplification only applies to the argument variable that is bound by the highest binder, with which the function variable shares its universe. If the function has additional variables, which are bound by operators further down the scope hierarchy, then their domains will have to be made explicit as part of the function declaration in just the way that is done for x in (3.85). We therefore get an equivalent but formally more uniform account if we insist on a similar treatment of the highest variable, even if with sentences such as (3.87) this seems to lead to a certain measure of excess. (3.92) is the result of recasting (3.88) in this spirit:

(3.92)



After this revision of the treatment of sentences like (3.87) it becomes easier to revise (3.90) in a way which allows for the two cases exemplified in (3.85) and (3.92).

(3.93)

1. the binding of function variables which interpret indefinite *NP*s is always existential;
2. binding always takes the form of (1) adding the function variable to some DRS universe U_K and (2) adding to the Condition Set of Con_K conditions which specify the domain of the function and declare the type of the function values. Declaration may occur in either of the following positions:
   (a) immediately above the highest operator binding an argument of the function variable;
   (b) in the restrictor DRS of the highest binder.
   (i) applies when the indefinite interpreted with the help of the function is part of the material that goes into the nuclear scope of the highest binder; (ii) applies when the indefinite is part of the material that goes into the restrictor.
   (c) In addition the function variable may be declared at the global level (i.e. at the top of the sentence representation)

3.10.3 Downward Entailing Contexts and Attitude Contexts

How well does this revised generalisation capture the facts? There are reasons for doubting that it still leaves something to be desired. Problems that we have been able to discern are of two sorts. First, as shown by the sentences in (3.94), new problems arise when the sentences we have been looking at are embedded in propositional attitude contexts. Secondly, the sentences in (3.95), in wich some as been replaced by a certain, demonstrate that the form of the indefinite *NP* also can make a significant difference.

(3.94) *a.* Mary believes that every linguist has discussed all conceivable solutions that some linguistic problem might have.
b. Mary believes that not every linguist has discussed all conceivable solutions that some linguistic problem might have.
c. Mary believes that every linguist who has discussed all conceivable solutions that some linguistic problem might have has become famous.
d. Mary believes that not every linguist who has discussed all conceivable solutions that some linguistic problem might have has become famous.
e. Mary doubts that every linguist has discussed all conceivable solutions that some linguistic problem might have.
f. Mary doubts that not every linguist has discussed all conceivable solutions that some linguistic problem might have.
g. Mary doubts that every linguist who has discussed all conceivable solutions that some linguistic problem might have has become famous.
h. Mary doubts that not every linguist who has discussed all conceivable solutions that some linguistic problem might have has become famous.

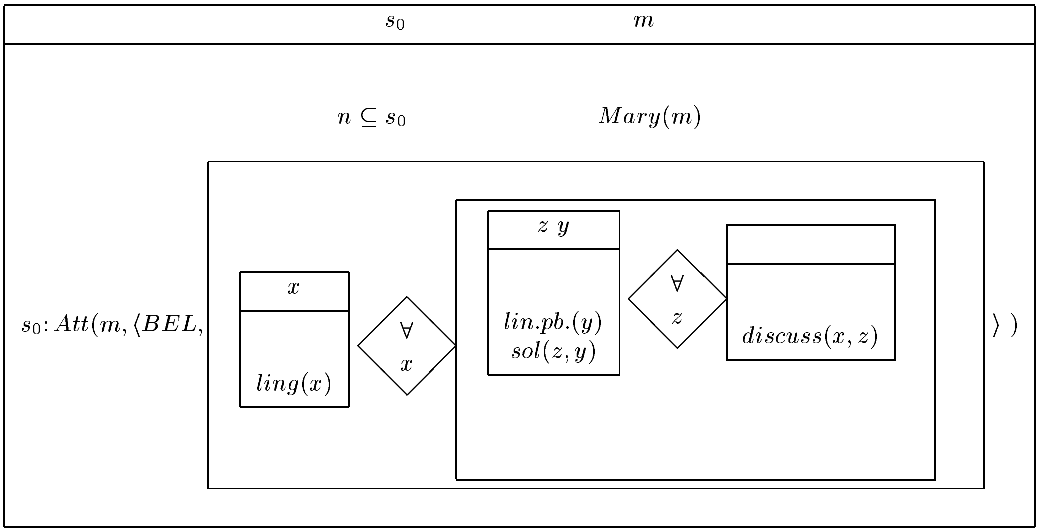
(3.95) *a.* Not every linguist has discussed all conceivable solutions that a certain linguistic problem might have.
b. Not every linguist who has discussed all conceivable solutions that a certain linguistic problem might have has become famous.
c. Mary believes/doubts that not every linguist has discussed all conceivable solutions that a certain linguistic problem might have.
d. Mary believes/doubts that not every linguist who has discussed all conceivable solutions that a certain linguistic problem might have has become famous.

Before we subject these sentences to a (brief) fact finding exploration, first an observation about the sentences in (3.83), (3.86) and (3.87) to which the preceding discussion has been devoted. We have been focusing on the intermediate readings of these sentences. But as was noticed in passing, all these sentences also seem to allow for a maximal scope interpretation of the indefinite, according to which one particular problem is at issue — the same for all solutions and all linguists. (Admittedly this reading is not very prominent with plain *some* as determiner, in contrast, say, to *some particular* or *a certain*; but we believe that the reading is there nevertheless and that it emerges more clearly in suitable contexts.) In the following discussion we will refer to this reading as the "referential" one and will talk about the readings on which the preceding discussion was trained as "functional" readings.

First the sentences in (3.94). All of them seem to admit of both *de re* and *de dicto* readings. Moreover, these two possibilities seem to be orthogonal to the distinction between a referential and a functional reading for the embedded sentence. Take for instance (3.94.a). The complement of the attitude verb *believe* in this sentence allows for three different interpretations of the indefinite: (i) the linguistically unimpeachable but content-wise implausible narrow scope reading, according to which every linguist discussed all conceivable solutions to all linguistic problems; (ii) the functional reading to which our discussion of the the sentence has thus far been devoted; and (iii) the referential reading, which as we said seems somewhat awkward but without being impossible. For the last two of these there appear to be two further options: a *de re* and a *de dicto* interpretation. The *de re* and *de dicto* readings which correspond to the "referential" interpretation of the indefinite in the complement are of a kind that has already been discussed at some length, and probably need no further comment. Just for the record: the *de re* interpretation says that there is some particular problem of which Mary believes that every linguist has discussed every conceivable solution to it. The *de dicto* referential interpretation says that Mary believes that there exists some problem such that every linguist has discussed all its conceivable solutions.

What deserves special emphasis is that a similar distinction between *de re* and *de dicto* can be made with regard to the functional interpretation of the indefinite. The belief that the *de dicto* interpretation attributes to Mary is to the effect that there is some function from linguists to linguistic problems such that every linguist discussed all the conceivable solutions to the corresponding problem. The belief attribution made by the *de re* reading is that there is some particular function which Mary knows or can specify and of which she believes that each linguist has discussed every conceivable solution of the problem which we get when we apply that function to that linguist.[37] While space-consuming (but on a CD-Rom this should not be much of an issue) it may, we think, be useful to present the representations of these five readings within the notation we have been developing as we have been going along. The representations are ordered as we have listed the different readings, starting with the narrow scope one.[38]

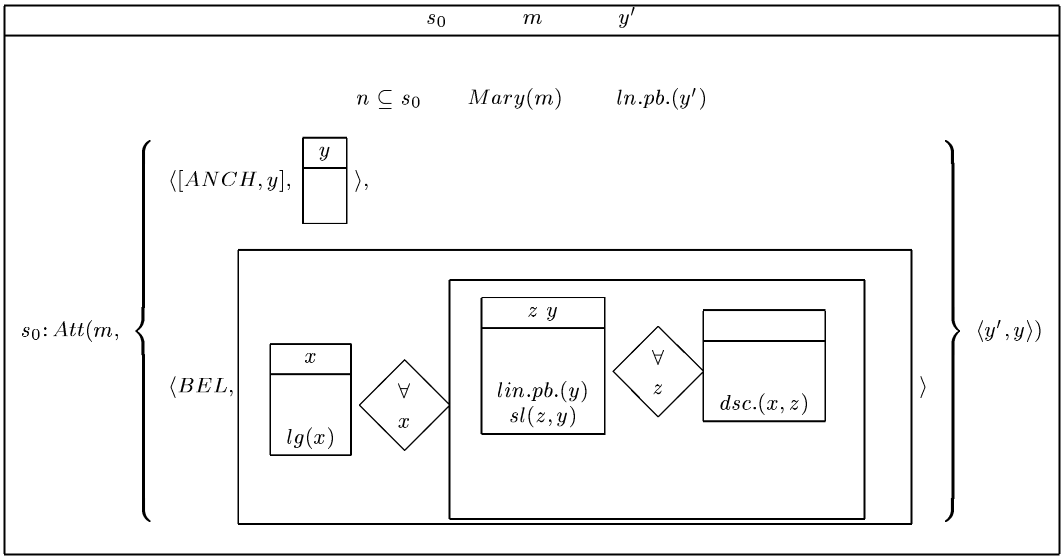
(3.96)



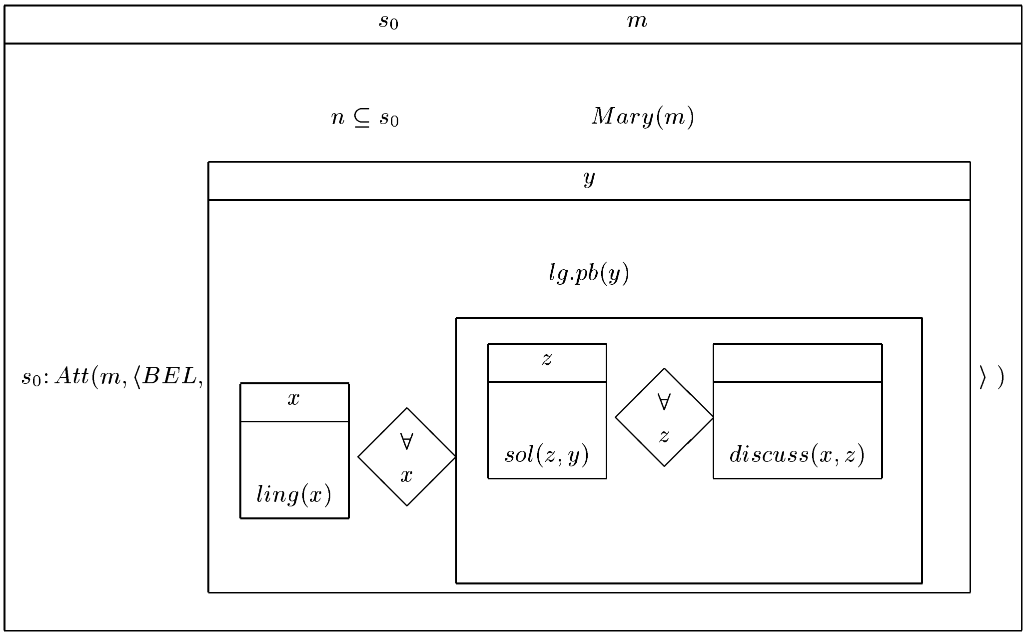
[37]It should be admitted that this *de re* functional interpretation is not easy to get for the sentence in question, in which the indefinite in question, *some linguistic problem*, begins with *some*. The interpretation would be much more readily available, if the *NP* were *some particular linguistic problem,* or *a certain linguistic problem*. We will return to this difference in the final section of this Chapter, in which we discuss some recent work of Bernhard Schwarz.

[38]In these representations we have combined the representational mode of attitudinal predicates, in with temporal relations are explicitly represented, with the time-free representation for complex quantificational structure which we have been using in our discussion of Chierchia. The result has a feel of inconsistency about it: The main clause, which includes the attitudinal verb, is given a representation which in which temporal relations are made explicit, whereas reference to time is entirely absent from the representation of the characterisation of the content of the attitude. However, it seemed to us that the most perspicuous way to proceed in these closing pages of Ch. 3 was to combine the representations of the complement sentence and of its attitudinal hull with as little modification as possible. Adapting the representations of the attitude contents by building reference to time into them too should at this stage of our explanations be a feasible task for anyone who feels an urge to do so. The points which the representations in (3.89) are meant to make explicit are not affected. In order to make the main point of the representations somewhat easier to apprehend we have also suppressed all reference to the contextual domain restrictors C, C' and C''.

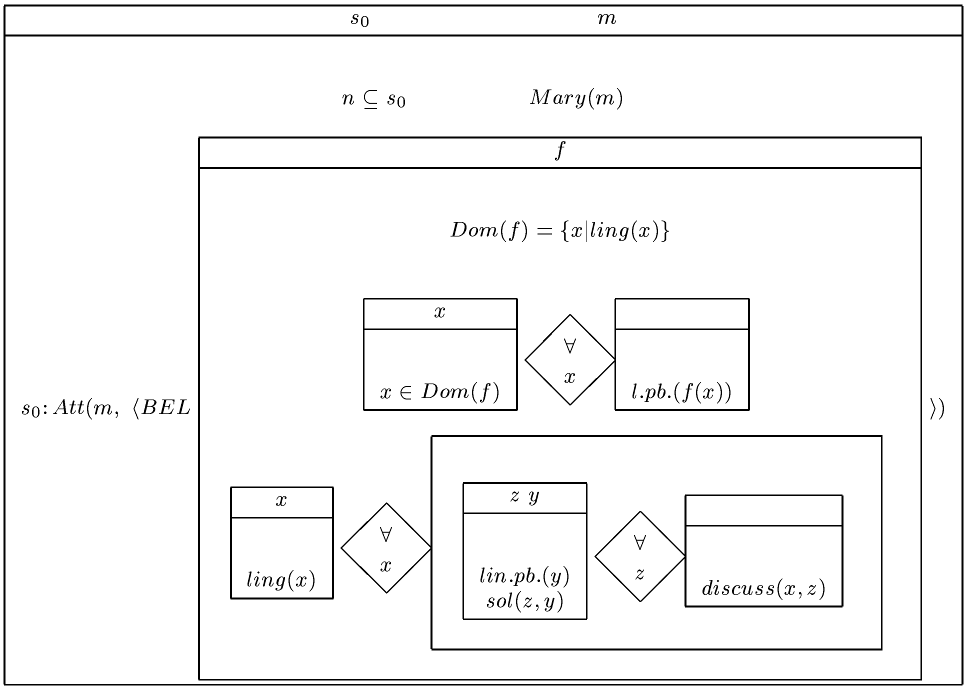
(3.97)


s_0 m y'
$n \subseteq s_0$ $Mary(m)$ $ln.pb.(y')$
s_0: $Att(m,$
$\langle[ANCH, y],$ y $\rangle,$
$\langle BEL,$
x
$lg(x)$
$\forall$ x
z y
$lin.pb.(y)$
$sl(z, y)$
$\forall$ z
$dsc.(x, z)$
$\rangle$
$\langle y', y \rangle)$

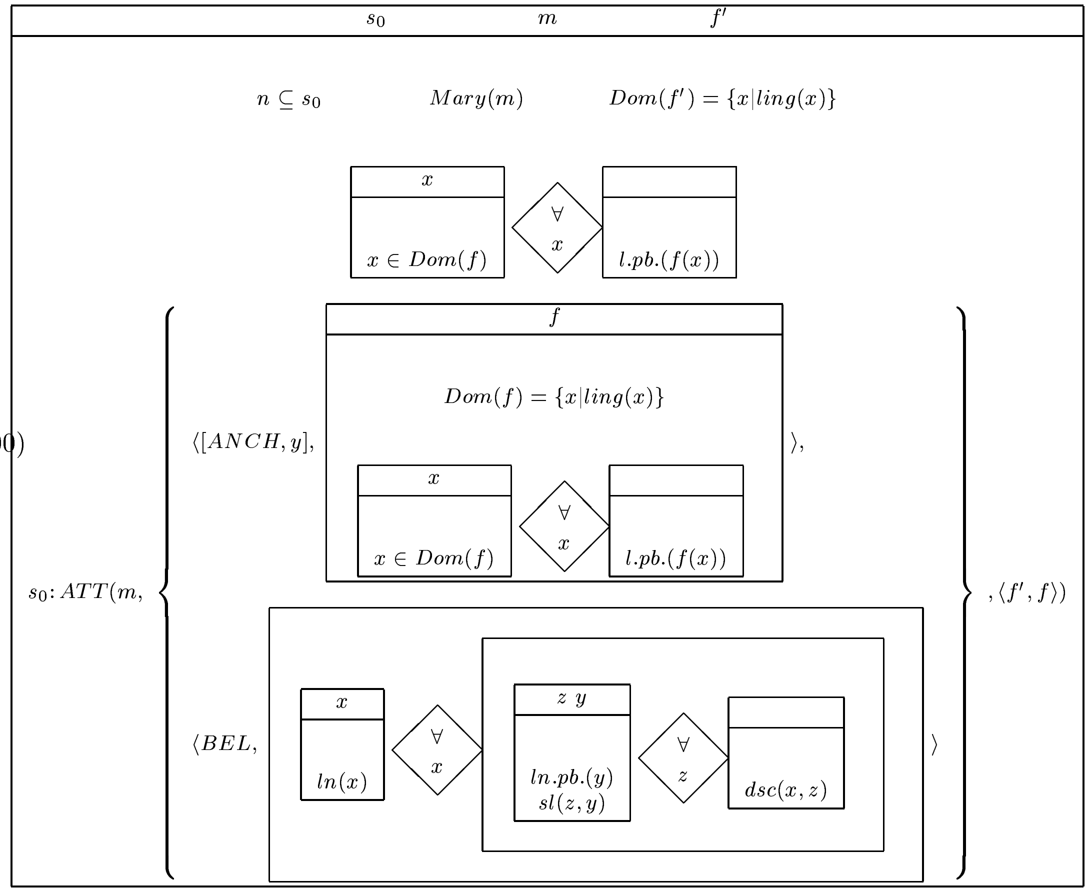
(3.98)


s_0 m
$n \subseteq s_0$ $Mary(m)$
s_0: $Att(m, \langle BEL,$
y
$lg.pb(y)$
x
$ling(x)$
$\forall$ x
z
$sol(z, y)$
$\forall$ z
$discuss(x, z)$
$\rangle$)

(3.99)



(3.100)



Most of what can be found in these representations should be familiar by now. There is only one novel point. This is the anchoring information in (3.100), which represents Mary as having an anchored representation f for a function from linguists to linguistic problems. There are, we believe at least two different forms that such an anchor can take. One presupposes that the subject Mary has anchored representations for each of the linguists in question. (In this case we would expect some contextual constraint C on the quantifier *every linguist*, but that raises further questions about anchoring for which our remaining adrenaline proved insufficient. The readers may sort this out for themselves.) Moreover with each of these anchored linguist representations she associates some linguistic problem she can identify. Besides this "list"-anchoring of a function from linguists to linguistic problems there exists, we assume, also the possibility of another, "intensional" anchoring of functions. In this case the anchor takes the form of explicitly connecting two concepts, the domain concept (here: linguist with or without a further restriction) and a functional specification concept which assigns to each member of the domain a unique value. An example of such a concept would be "the problem which x first worked on when starting to do research for the Ph.D.". In (3.100) no distinction is made between these two anchoring types. But we have assumed that a minimal condition which must be part of any internal anchor for such a function is that the anchored function variable represents a function of the right sort — one with the right domain and the right kind of values.

What can we say about principle (3.93) in the light of these different interpretations of (3.94.a)? This is not so clear, and for more than one reason. On the one hand it may seem that (3.100) is a counterexample, since there the function variable f' is not bound "immediately above" the binder of its one argument. (This binder is the universal quantifier which binds x within the representation of the content of the belief.) In fact, such a conclusion would have been even more plausible if we had represented this fifth reading in the intensional predicate logic formalism used in (3.102), for in such a formalism there would have been only one function variable. In (3.100), however, there are two such variables, f' and f, and the second of these is bound in a position that agrees with (3.93). In fact, the presence of these two variables connected with the same *NP* in the represented sentence indicates that (3.93) isn't really designed to deal with the representation of *de re* interpretations in the formalism we have been using.

We might extend (3.93) to our way of representing propositional attitudes by stipulating that it is always the "inner" one of the pair of variables that our formalism uses for the representation of *de re* attitudes to which the principle is to be applied. On this modification all representations in (3.96)–(3.100) are in agreement with it. And moreover, there won't be a problem with iterated attitude contexts, which, it seems to us, permit cascades of *de re* interpretations of functions, just as it has been generally assumed that we get cascaded intepretations for "referential" indefinites. (For instance, the sentence in (3.101) allows for a reading in which Bill has an anchored representation f_b of a function f from linguists to linguistic problems of which he assumes that Mary has an anchored representation f_m to which she attributes the property that each linguist x discussed all solutions to $f_m(x)$.

(3.101)Bill is convinced that Mary believes that every linguist has discussed
all conceivable solutions that some linguistic problem might have.

In our mode of representation the interpretation of *some linguistic problem* involves the three variables f_m, f_b and f, with only the first conforming to the strictures of the modified (3.93). In addition, (3.101) has an interpretation according to which Bill assumes that there is some function f of which Mary has an anchored representation f_m and about which she believes that every linguist x has discussed every solution to the function value $f(x)$. The representation of this interpretation will involve two function variables f and f_m. And finally, of course, there is the "pure *de dicto*" functional interpretation according to which Bill attributes to Mary the belief that there exists some function from linguists to linguistic problems such that every linguist discussed all solutions to the problem to which the function maps the linguist. In this case there is only one function variable involved. Evidently the modification of (3.93) gives the right result for these other two interpretations as well. For the third one, with its one function variable, this is true already for the unmodified (3.93), and for the second one it follows if we interpret the modified version once more applying to the "inner" variable f_m.[39]

But perhaps this tinkering with Chierchia's generalisation is misguided. Perhaps the principle should be regarded as inapplicable to representations of *de re* attitudes for a more fundamental reason. Once again we must not allow ourselves to lose track of the question where the various representations that capture what we recognise as possible interpretations of a sentence belong. More than once did it seem necessary to raise this question, and we have raised it especially in connection with *de re* interpretations of attitude attributions. It should be raised also in connection with the representations in (3.96)–(3.100). Here is one possibility: The *de dicto* representations (3.96), (3.97) and (3.96iv) are the result of applying the principles of the syntax-semantics interface. The representations (3.97) and (3.100) are the effect of additional hypotheses which a recipient may be inclined to make on the strength of (3.97) and (3.99), respectively, but they do not count as semantic representations in the strict sense. If this is what we assume, then the the range of options displayed in (3.96)–(3.100) need not be seen as a counterexample to (3.90), provided we see this generalisation as pertaining to the syntax-semantics interface only.

Note well, we only state this as a methodological implication: If *de re* interpretations are taken to belong to a different level of information processing, then it may be possible to maintain (3.93)

[39] For those who prefer the more traditional notation of intensional predicate logic (cf. (3.3) on page 18), sentences like (3.101) present a more serious challenge to the binding site constraint (3.93). For instance, the "doubly *de re* functional" interpretation of (3.90) will get in this notation the following logical form:

(3.102) $$(\exists f)(Dom(f) = \{x|ling(x)\} \;\&\; (\forall x)(ling(x) \rightarrow ling.prob(f(x))) \;\&$$
$$BEL(b, {}^\wedge BEL(m, {}^\wedge(\forall x)(ling(x) \rightarrow (\forall z)(sol(z, f(x)) \rightarrow discuss(x, z))))))$$

Here the variable f is of the type of 1-place function, defined on the set of linguists. It is quantificationally bound in a position that is clearly much higher than that of the relevant binder of x, which is located inside both occurrences of the belief predicate. This would seem to be a clear violation of what (3.93) is meant to express. One possible escape from this is to assume that in *de re* interpretations the person to whom the *de re* attitude is attributed is an argument to the function term which interprets the indefinite. This gives for the second (singly *de re* functional) interpretation of (3.90) the logical form in (3.103.i) and for the doubly *de re* functional interpretation, which we just represented as (3.102) the logical form in (3.103.ii)

(3.103) (*i*) $$BEL(b, {}^\wedge(\exists f)(Dom(f) = \{\langle x, m\rangle|ling(x)\} \;\&\; (\forall x)(ling(x) \rightarrow ling.prob(f(x, m))) \;\&$$
$$BEL(m, {}^\wedge(\forall x)(ling(x) \rightarrow (\forall z)(sol(z, f(x, m)) \rightarrow discuss(x, z)))))$$
(*ii*) $$(\exists f)(Dom(f) = \{\langle x, b, m\rangle|ling(x)\} \;\&\; (\forall x)(ling(x) \rightarrow ling.prob(f(x, b, m))) \;\&$$
$$BEL(b, {}^\wedge BEL(m, {}^\wedge(\forall x)(ling(x) \rightarrow (\forall z)(sol(z, f(x, b, m)) \rightarrow discuss(x, z))))))$$

This may seem farfetched and designed to remove an irritating obstacle by whatever it takes. But note that when Bill's attribution involves not just the one subject Mary, but two or more, then we can get interpretations in which different functions are attributed to the different subjects. Examples are the sentences in (3.104).

(3.104) *a.* Bill is convinced that both Mary and Sue believe that every linguist has discussed all conceivable solutions that some linguistic problem might have.
b. Bill is convinced that each of his colleagues believes that every linguist has discussed all conceivable solutions that some linguistic problem might have.

(3.104.a) for instance has an interpretation according to which Bill attributes one particular function f_m to Mary with respect to which she has, according to him, the belief that each linguist discussed every conceivable solution to the problem that f_m assigns to him, and attributes to Sue another function f_s with analogous purport. One way to capture this is to assume that there is a function whose domain is the set $X \otimes \{m, s\}$ (where X is the set of linguists and $\{m, s\}$ the doubleton consisting of Mary and Sue). And the analogous interpretation of (3.104.b) would involve a function defined on the set $X \otimes U$, where U is the set of Bill's colleagues. Using the same notation as in (3.103) we would get for this interpretation of (3.104.b) the logical form in (3.105).

(3.105) $$(\exists f)(Dom(f) = \{\langle x, b, u\rangle|ling(x) \;\&\; coll(u, b)\} \;\&\; (\forall x)(ling(x) \rightarrow ling.prob(f(x, b, u)))$$
$$\&\; BEL(b, {}^\wedge(\forall u)(coll(u, b) \rightarrow BEL(u, {}^\wedge(\forall x)(ling(x) \rightarrow$$
$$(\forall z)(sol(z, f(x, b, u)) \rightarrow discuss(x, z)))))))$$

However, this isn't the only way in which the interpretation of (3.104.b) that is in question could be formalised. For instance it would also be possible to say that for each colleague u of Bill there is a function f_u with regard to which Bill attributes to u the property of believing that every linguist ... . And in any case, none of this acrobatics succeeds in obliterating the feeling that *de re* interpretations of propositional attitude attributions constitute a case in their own right.

in the form we have stated it. We have found reasons for assuming that *de re* interpretations are at least in some cases the result of processes which should be seen as following the application of the syntax-semantics principles. But whether all instance where an indefinite is given a *de re* interpretation should be classified in this way is a question which we do not feel confident to answer.

In the light of what we have seen in this section about the binding of function variables, a similar question to the one asked in the last paragraph should be raised regarding Kratzer's assumption that "choice functions" are contextually anchored. There can be no doubt that when I hear you say "All my colleagues has read all publications which they collected about some very hard problem.", there is a good chance that I will take your utterance to be based on a particular function, from colleagues to problems, which you have in mind. But what is the status of the "interpretation" of your words which this assumption produces in mine? Again, it isn't clear that what we have in such a case can be considered an interpretation in a strictly linguistic sense. As with *de re* "readings" of attitude attributions, we are not able to do more than raise the question. But nevertheless we think it is important to point out how difficult it is to evaluate many of the claims that have been made about the interpretations of indefinites so long as these questions have not been properly addressed.

We leave it as an exercise for the reader to identify the possible readings for each of the remaining sentences in (3.104) and to construct representations for those. We add (superfluously perhaps at this point) that the judgements as to what readings are possible for sentences of this general sort are delicate and tend to vary from person to person (and even, for the same person, from mood to mood). Every competent judge of the language should feel his own master in this. What matters more than "getting the correct set of readings" is the conviction that the representations one comes up with correctly reflect the meanings one intuits.

3.10.4 Schwarz: *Some, A* and *A Certain* in Downward Entailing Contexts

One of the reasons why judgements are difficult is that they vary subtly with the form of the indefinite *NP* whose interpretation is at issue. As further documentation of this we have listed in (3.105) variants of some of the sentences from (3.87), in which *some* has been replaced by a certain. One curiosity we ourselves perceive when comparing the sentences in (3.105) with their counterparts in (3.94) is that the functional reading and especially the referential one seem to become significantly easier in the non-embedded sentences (3.95.a,b), but that there is less of a difference in this regard between the attitude attributions in (3.95.c,d) and the corresponding sentences with *some* in (3.94). Precisely because judgements are so difficult in this domain, we do not want to set too much store by this impression. But we note nonetheless that this may be indicative of the interpretational mechanisms of attitude attributions are different from the ones that are involved in non-local scope interpretations of indefinites in sentences in which propositional attitudes play no part. But here too the reader is asked to make up his own mind, and to make up his representations accordingly.

The differences between the sentences in (3.95) and their counterparts in (3.94) belong to an aspect of the semantics and pragmatics of indefinites which we have barely touched in these notes, and on which not very much sytematic work appears to have been done so far generally: How is the range of possible interpretations of an indefinite *NP* in a given position affected by the form of that *NP* itself. True, there are incidental remarks on this aspect of the problem of indefinite interpetation in many papers, and especially the word *certain* has been in for a good deal of scrutiny. (Recall Kratzer's observations about *certain* which were briefly mentioned in Section 3.8.) A recent study of the difference between English *a certain* plain *some* and plain *a* (by "plain *D*" we mean "*D* not followed by a "specificity marker" such as *certain*, *particular*, *specific* and perhaps other adjectival expressions with a similar effect) is Schwarz (2001).[40]

We already mentioned some of Schwarz's examples as a kind of foretaste in Section 3.4, where they were listed as (Sch 78)–(Sch 80). (The numbers are those under which these sentences appear

[40] At this moment, when these notes are getting transferred onto CD, the paper has not yet appeared in print.

in Schwarz's paper.) We repeat them here as (3.106)–(3.108).

(3.106)*a.* No student has studied every article that some professor has published.
b. No student has studied every article that a certain professor has published.
(= (Sch78))

(3.107)*a.* At most one boy ate every cookie a girl from his class had brought.
b. At most one boy ate every cookie a certain girl from his class had brought.
(= Sch79)

(3.108)*a.* No student read every paper that deals with some topic she doesn't care about.
b. No student read every paper that deals with a certain topic she doesn't care about.
(= Sch80)

In relation to these sentence pairs Schwarz argues that the *a.*-sentences systematically differ in their possible interpretations from the *b.*-sentences. The *b.*-sentences, with an indefinite for the form *a certain N*, permit a functional interpretation in the sense of Kratzer. For instance, the speaker of (3.107.b) may have a certain function in mind (e.g. the one which maps every student (possibly within a contextually restricted class C) to that student's adviser for the Ph.D.). Moreover, it is possible for the recipient of (3.107.b) to assume that the speaker has such a function in mind and that the sentence serves to convey the proposition which is expressed when *a certain professor* is interpreted by that particular function. Even if there are some students who read every paper published by some other professor than the student's thesis adviser, the sentence could still pass as true: If the recipient were to ask the speaker what she meant be some professor and the answer would be: "Well, I didnt say so explicitly, but (of course) what I had in mind was each student's adviser.", then it would be a legitimate reaction for the recipient to say: "Ah well, then I can see that what you said was right." and dismiss the putative counterexamples mentioned. Such a reaction would not have been appropriate, Schwarz argues, if the speaker had asserted (3.107.a). While this sentence has the intermediate reading according to which it means that for no student there was a professor such that the student had read all papers of that professor, any student for whom there is a professor such that the student has all that professor's papers would be counterexample, no matter how firmly the speaker may have been thinking of some particular student-to-professor function.

We are persuaded that Schwarz's observation is basically correct and also concur with his conclusion that this shows that the interpretation principles for *some* and a certain cannot be the same: Indefinite *NP*s beginning with *a certain* permit an Skolem function interpretation (or, for those who want to insist on this, a Skolemised choice function interpretation) where the function may be understood as contextually anchored, with the speaker's intentions playing a crucial part in what counts as context. Indefinite *NP*s beginning with plain *some* do not permit such an interpretation. Such indefinites do allow non-local scope interpretations. We have seen that when these interpretations are construed as involving variables for Skolem functions, then the sites where these variables may be quantified are severely restricted. The formulation we ended up with was one where the binding was in the immediate scope of the highest operator binding an argument of the function. We have seen that under this restriction the argument of this highest binder is no longer needed for the sake of truth conditions. But it is needed as a scope marker. Moreover, the discussion of cross-over effects revealed that the argument also has a certain presence in that it resists crossover configurations between the functionally interpreted indefinite and the *NP* which binds the argument. And, finally, we have seen that any mechanism for assigning non-locally scoped interpretations to indefinites has to deal with the Ruys problem, which arises for all possible types of indefinites, just as it arises for all possible types of definites. For all these reasons it won't do to reduce the non-local interpretation of *some*-indefinites to a repertoire of non-local quantifications of an individual variable representing the denotation of the indefinite, irrespective of what restrictions we might impose on where binding of that variable may take place.

What we are left with at this point is rather less than a theory. It appears that both for indefinites beginning with *a certain* and for indefinites beginning with plain *some* a mechanism of functional interpretation must be acknowledged. But the binding conditions for the function variable are different. The function variables introduced in interpretations of *some*, must be bound within the immediate scope of the highest argument binder. The variables introduced by interpretations of a certain allow for this kind of binding too. But in addition they also permit a kind of "non-quantificational binding" in the form of contextual anchoring.

What about indefinites with plain *a*? With regard to the issue to which this discussion of Schwarz (2001) has been devoted *a* is on the side of plain *some*. In fact, one of the examples cited, viz. (3.107), shows that *a*-indefinites can, like *some*-indefinites, get non-local scope, but that they do not allow — again like indefinites with *some* — for the contextually anchored functional interpretations that are possible for *a certain*. As between *a*- and *some*-indefinites, it appears to be on the whole somewhat harder to get non-local interpretations for indefinites with a than for the ones with *some*. But as (3.107.a) indicates, non-local scope interpretations are possible for the former too, especially when the descriptive content of the *NP* is "heavy" or "specific" enough (whatever that may mean precisely). However, the really striking differences between *a* and *some* are to be found in a different empirical domain, where the issue is not between local and wider-than-local binding, but rather between local and what might be called "sub-local" binding, in which the binder is a clause mate of the indefinite which binds its variable and thereby, in some sense, absorbs or incorporates it. Such forms of sub-local indefinite-binding are the topic of the next two chapters. In these chapters we will touch on the differences between *a* and *some* only occasionally. For a more systematic attempt to address these differences see Kamp (2001b).

Before we leave the subject of specific indefinites, there is one last remark we want to make about the contextually anchored functional interpretations postulated by Kratzer. We have just reported Schwarz's conclusion that such interpretations do exist, albeit only for certain types of indefinites, such as, in particular, those beginning with *a certain*. The possibility of assigning sentences with *a certain*-indefinites such an interpretation raises an important philosophical question which leads us back to the remarks we made earlier on about specific uses of indefinites and about their specific interpretation. (See Def.1 ff. on p.32) There we argued that when the speaker utters a sentence like (3.1.a), repeated here as (3.109),

(3.109)(3.1.*a*) There was a student who was looking for you this morning.

it is likely that the speaker has used the indefinite specifically and that the hearer takes him to have used it so. Moreover, in most such situations it is reasonable to assume that the utterance causes a shared belief to this effect and that this shared belief leads to a vicarious anchor of the hearer's discourse referent for the indefinite to the presumed speaker's object of acquaintance that prompted the indefinite's use. But we also said that, as will be argued in detail in Chapter 5, the variable which the indefinite introduces in the interpretation of (3.109) must be construed as bound by there is. Consequently, if the hearer construes an anchored representation for this utterance, this representation must have a different status form the proposition expressed by the utterance in virtue of its syntactic form.

And indeed — though this is a slightly different and thus additional point — it seems to us that in connection with (3.109) there is much to be said for the position that the actual content which the utterance transmits is the existential (and thus non-singular) proposition that is expressed by the semantic representation which we will propose for it in the last chapter. What the speaker has actually said is that there was a student around that morning who was looking for the hearer, and that is substantial information enough as it stands.

With a sentence like (3.106.b) we are arguably in a situation that resembles the one just describes in significant respects. Again it is reasonable for the hearer to assume that he hasn't been told all that the speaker knows, and he may construct a kind of dummy (or incomplete) representation for the proposition which he assumes the speaker really has in mind. But there is one big difference with the case of (3.109). In the case of (3.109) there is a substantive proposition conveyed by the sentence because of its form; in the case of (3.106.b) there is quasi nothing. For as we have seen, a non-maximal scope interpretation of the indefinite which is absurdly strong and which no right-minded interpreter will go for. The only viable interpretation is that where the indefinite is interpreted by a function which is either bound contextually or assigned maximal scope existential quantification. The former of these options amounts to the dummy interpretation; the latter gives, as we have also seen, an interpretation which is ludicrously weak, in fact very nearly a tautology. In other words the only message of substance that the utterance conveys is a proposition which the sentence doesn't actually express but only hints at. What the hearer gets out of the communication is thus something that is inherently incomplete. he may guess which function the speaker had in mind, or he may ask the speaker, or he may approximate the result by making an educated guess at a certain set or range of functions which is likely to include the one which the speaker had in mind. But without furhter ado he doesn't really know what he has been told.

From a perspective according to which utterances express propositions, in virtue of their form and the contextual environment in which they are inserted, this situation seems incongruous. What we have here is a case where the words themselves show that they are not up to what according to this perspective should always be their task. In such a case communication will only become perfect only when further mental acts (of guessing after the intended function) or communicative acts (asking and answering a question) follow. We should not, however, go overboard in our conclusions form such cases. They do exist. But, at least as far as we can see, this does not alter the fact that in essence the perspective of which we spoke in the opening sentence of this paragraph is correct. It is unqualifiedly applicable in all but a few marginal instances. And if if that weren't so, then even those few marginal instances which seem to challenge it, could not be.

3.11 Summary of Chapter 3

Quite a number of different issues have been brought up in this Chapter and it is likely that the reader will have lost track of:

1. the over-all structure of our argumention through the Chapter;
2. what to us are the central issues and the main conclusions, and
3. what we consider the most important tasks for future work on matters of specificity.

Point 1. We started off with a discussion of the role of specificity in linguistic communication. We drew attention to parallels between what we termed the *specific use* of an indefinite and the *interpretation* of an indefinite as *specifically used* on the one hand and *de re* construals of indefinites in the complements of attitude attributing predicates on the other. We presented a DRT-based formalism developed for the purpose of representing both *de re* readings of attitude reports and argued that the same representational structures can serve as reresentations of the thought which a recipient who interprets a given indefinite as used specifically attributes to the speaker.

We noted that this way of understanding the notion of specificity raises serious questions for the over-all architecture of a theory of language interpretation: In some cases, we said, it appears necessary to distinguish between the syntactically determined semantic content of a sentence and the thought which an interpreter who takes an indefinite to be specifically used attributes to the speaker, which he thus reconstructs on the basas of the actual words that reach him and which in some form he may also adopt himself — taking it as the message the words were really meant to convey.

We then proceeded to put some of theories of specific indfinites to a quick review, beginning with that of Fodor & Sag. This theory takes indefinites as ambiguous between a quantificational interpretation, subject to the usual scope constraints on quantifier phrases, and a use which, it is proposed, is best captured by the analogy with individual constants in classical predicate logic. We then reviewed some of the evidence which shows that this theory is too restrictive, focusing initially on Abusch's demonstrations of the existence of "intermediate scope" indefinites — something which on the F& S theory should be impossible. We then proceeded to review arguments from the literature showing that Abusch' theory errs in the opposite direction, in that it over- rather than under-generates. In addition, we discussed at some length another difficulty for Abusch's account, the so-called Ruys Problem. We presented this as the central motive for wanting a treatment of indefinites that is in some sense in situ, and the attempts of Reinhart and Winter to provide such an account by adopting an interpretation of indefinites in terms of Choice Functions. This approach provides an adequate solution to the Ruys Problem, but it suffers from the same overgeneration problems as Abusch's.

Making use of observations of Kratzer, Chierchia and others we then proceeded to argue that the Choice Function concept is in any case not the right way to solve the problem that Reinhart and Winter were addressing (even if the overgeneration problem is ignored). As may have been first observed by Von Fintel, Choice Functions don't quite deliver what they should unless they are generalised to "Skolem Choice Functions", which may have additional arguments besides the set argument that justifies their classification as choice functions. However, we saw, once these other arguments are taken on board, the set argument does no longer seem to do any real work,and might as well be dropped. (The functions which result have a beter claim to being called "Skolem functions" than "choice functions", so that is the term we have been using preferentially from that point on.) Moreover, a discussion of functionally interpreted definite descriptions showed us another way of understanding the role that the descriptive predicates of descriptions play in their interpretation: Rather than providing the needed set arguments to which Choice Functions must be applied in order to yield the terms that give the *in situ* interpretation of the indefinite, they serve as *defining conditions* (in the case of definites) or *constraining conditions* (in the case of indefinites) on the values of the relevant functions.

We then disussed an influential paper by Kratzer, which returns to a theory closely similar to that of Fodor and Sag. Kratzer liberalises the F&S theory in that she allows functional constants instead of the individual constants of F&. (On the view of what functions are involved we have advocated Kratzer's constants are Skolem constants in what is essentially the sense of this term in formal logic.) Kratzer only discusses Skolem constants of one argument, but there is no reason why more-place functions should not be needed as well, and in fact we provided evidence that they are needed. The proposal of F&S thus appears as properly included in that of Kratzer in that the only Skolem constants it admits are 0-place.

Non-zero place Skolem constants enable Kratzer to account for some of the "intermediate scope" readings of indefinites. At the same time she argues that certain other cases of what appear to be intermediate scope interpretations of indefinites may be caused by other aspects of the sentence in question than the indefinite itself; in such cases it is possible to explain the apparent "intermediate scope" effect on the basis of the assumption that the indefinite gets a local existential interpretation. By way of illustration of this complicating factor we gave a reconstruction in our own terms of one case of this sort that Kratzer dicsusses in detail — the interpretation of *because*-clauses in intentional and non-intentional contexts.

After this interlude we returned to those cases where indefinites can get an intermediate scope interpretation, and where a Skolem-functional interpretation seems required. The need for an interpretation via Skolem functions in such cases is documented by the Weak Crossover constraints observed by Chierchia. At the same time Chierchia noted that intermediate scope interpetations of indefinites within the scope of downward entailing operators or contexts require non-maximal binding of the Skolem function variable. These are cases, in other words, where Kratzer's proposal, in which only Skolem constants are allowed, won't do, and the same is true of any thory which insists that the Skolem function variables interpreting indefinites can only be bound at the highest possible site (so that all other operators of the sentence end up within its scope).

Our discussion of intermediate scope interpretations and non-maximal binding of the function variable concluded with recent observations by Schwarz, which not only reinforce those of Chierchia's but also systematise earlier (but less systematic) observations on the differences between the different forms of indefinites, in particular in terms of whether they begin with *a certain,* "plain" *a* or *"plain" some.*

Points 2. & 3. We included Shwarz's results as a pointer towards one of the two general issues that we believe will need much closer attention in the future than they have had so far. How does the form of an indefinite *NP* influence its possible interpretations? Schwarz raises this question only in connection with the indefinite *NP*s of English. It is clear that the problems these present us with are hard and fascinating enough. But what offers itself to a longer and wider perspective is a cross-linguistic investigation which includes the indefinites of several, and eventually many languages. As with any other aspect of language such a cross-linguistic enterprise amounts to upscaling by a very large factor, the size of which can't even be reliably estimated. Mercifully, moving from a one-language to a multi-language perspective is something which can be done gradually and at a pace which is in keeping with the demands of careful, in depth analysis. And in which order we proceed, both with regard to the languages we include in our studies and the theoretical topics we decide to subject to crosslinguisti scrutiny, is itself a matter of a delicate application of our perception of theoretical issues — and one which on the other hand can have momentous consequences for the further development of linguistic theory.

In the light of this, it is by no means self-evident that the crosslinguistic study of the specific and non-local scope uses of indefinites ought to have a high priority. We believe, however, that this is a highly significant topic for crosslinguistic research. We hold this belief since we expect from such research further insights into the ways in which different human languages draw the line between what is incorporated into their "grammar" (that to which we have been referring in the course of this chapter as the "Syntax-Semantic Interface properly speaking") and what is left to extra-linguistic inferences on the part of the interpreter.

This last motivation brings us to what we see as the other major issue on which the study of specific indefinies forces us to focus. This is the distinction which it seems to us must be acknowledged between semantic content as it emerges from application of the syntax-semantics interface principles to the syntactic structure of an uttered sentence and the (more or less conventionalised) further inferences which the recipient is likely to draw (and which he may, as a competent speaker of the language, be expected to draw.) The way we have formulated this question makes it into a clear case of the demarcation between semantics and pragmatics, as that issue is usually understood. And it is possible tht some semanticists will feel that this is therefore an issue with which they will have no commerce. But the matter is a matter of language interpretation, so no overarching theory of interpretation in verbal communication can afford to ignore it. And if it is to be addressed properly, then, we contend, we will need the quite rich modes of description and representation which we haven't hesitated to use in this chapter. We see the linguistic problems about indefinites we have reviewed in part as a justification for the representation formalism which we have employed and of which we have thereby shown the principal features. And we end with a plea for its admission within linguistic theory.

Chapter 4

Existential Constructions, Incorporation

4.1 Introduction

The first part of this course has presented some properties of indefinites that makes them exceptional among *NP*s, such as their ability to outscope quantifier islands:

(4.1) *a.* Every professor heard the rumour that a student of mine was called before the dean (Fodor and Sag (1982))
b. Every professor had a headache whenever every student he hated read a paper he recommended (à la Abusch (1994))

Another property of indefinites is that they can have a referential use or (which amounts roughly to the same thing) they can have a so-called episemic-specific construal, when the speaker has a particular individual in mind when uttering a sentence that contains an indefinite. In the terminology of the preceding chapter, such an indefinite (better said the discourse referent introduced by it) has a so-called anchor. So, epistemic-specific indefinites may be termed as *anchored* indefinites.[1]

(4.2) Mary believes that her husband is seeing a real estate agent (namely, Tam Jo)

As remarked in the first part of these notes, it is possible for the hearer to anchor the indefinite to the same individual the speaker has in mind (or at least to recognize that the speaker has such an individual in mind). In the literature wide scope indefinites have often been conflated with specific or anchored indefinites. It is important to note, however, that these two are distinct. For instance, as remarked in Ioup (1977), an indefinite may have narrow scope *and* be anchored:

(4.3) Mary believes that a dragon (namely, the Seven Headed One) ate her flowers

(4.3) can have a de dicto reading, but the indefinite may nevertheless be anchored. Of course, in this case the anchor is internal and not external.

It will be seen presently that indefinites in the constructions studied here show a similar dissociation between scopal properties and anchored readings.

The second part of this course is about weak or bound readings of indefinites. The context is that of existential constructions, such as English *there*-sentences (cf. Milsark (1977), Reuland and ter Meulen (1987)). Existential sentences, e.g. (4.4a), are typically not about any particular individual.

[1] It has also been established that specific indefinites are but a subset of anchored indefinites. Anchored but non-specific indefinites are those for which the hearer has an anchored representation, while s/he does not perceive the speaker to have used such an indefinite with a particular individual in mind.

According to conventional wisdom, such sentences are used to assert nothing more than that the set of entities with a particular property is empty or that it is not empty. That is, indefinites in such environments are usually taken to stand in a stark contrast with indefinites in 'ordinary' contexts.

Existential sentences are peculiar, first of all, because they do not admit all types of *NP*s (this is the so-called Definiteness Effect or Definiteness Restriction; cf. Milsark (1977), Reuland and ter Meulen (1987)). Traditionally, *NP*s admitted in such sentences have been called *weak*; *NP*s excluded from this construction have been called *strong*:

(4.4) *a.* There is are some/many/few/no/∅ cats on the roof
b. ∗There are all/most cats on the roof
c. ∗There is it/the cat/that cat/Macavity on the roof

An additional property of existential sentences is that the readings available to weak *NP*s are much more restricted than in 'ordinary' contexts. For instance, they can only have narrowest scope.[2] This contrasts rather sharply with the scopal freedom of indefinites in the usual type of environment (as seen for instance in (4.1) above). In the 'ordinary' sentence (4.5a), the indefinite can have wide scope both relative to the attitude verb and to the universal quantifier. In the existential sentence from (4.5b), the indefinite can only have narrow(est) scope.

(4.5) *a.* Every professor had a headache whenever a student he hated was in class
b. Every professor had a headache whenever there was a student he hated in his class

(Abusch (1994))

If the first part of these notes has presented wide and intermediate scope, specific readings of indefinites as one end of a possible spectrum, this part may then be conceived as being about the other, 'weak', non-specific end of the spectrum. Only, the spectrum metaphor is not entirely accurate: narrowest scope readings in existential constructions are nevertheless compatible with specific construals — if 'specific' is understood as 'epistemic-specific', or being anchored, and not as having wide(st) scope. As remarked already in Fodor and Sag's original paper, the indefinite in (4.6a) can very well have a specific reading. This is indicated by the continuation (4.6b). We will return to the issue of specific readings in existential sentences later on.

(4.6) *a.* There is a student of mine smoking behind the woodshed
b. Only he can blow those smoke-rings

The analysis of existential constructions that will be presented in the following chapter is seen as a consequence and as a special instance of the DRT analysis of indefinites and of their interaction with (potential) binders in their environment.

The premiss we accept is that indefinites introduce a free variable/discourse referent. The hypothesis is then that this variable is prone to binding/dependencies by *the right sort* of verb or construction. (What we mean by 'the right sort of' will become clear in this chapter.) The assumption is that the verb or verbal complex contains some sort of binding mechanism that serves to 'capture' the variable contributed by the weak *NP*, and that this binding is the factor responsible for the Definiteness Effect. Consequently, weak *NP*s are defined as those that can be bound in such constructions. Strong *NP*s are those that cannot be bound by the verb or verbal complex — either because their discourse referent is bound by their determiner, or because they are bound to some non-local antecedent.[3]

The benefits or gains of this methodology are mostly empirical:

[2]On other restrictions on available readings, e.g. in the case of *many*, see Herburger (1997).
[3]That is to say, quantificational and anaphoric binding are the same as far as existential constructions are concerned (with subtle differences, of course).

- One can derive the semantic effects that accompany these constructions (e.g. narrow scope or event dependent readings — these will be illustrated in later examples).
- There is the possibility of accounting for crosslinguistic parallels (and variations) in a uniform and principled manner.
- Existential constructions under this view fall under the header of so-called 'A-quantification' or 'A-binding' (Partee (1995)), as opposed to 'D'-binding (binding by a determiner such as *every*). With 'A-quantification', the quantifier is an adverb, an affix, or an 'argument structure adjuster', and it can bind (selectively or nonselectively) variables contributed by other, independent XPs.

  The following are typical and familiar instances of A-quantification, in that adverbs of quantification are seen to quantify over the variables contributed by indefinites:

  (4.7) If a farmer owns a donkey, he (always/usually/sometimes) beats it

  (4.8) Riders on the Thirteenth Avenue line seldom find seats

  (Lewis (1975): ex. (9): 4)

  (4.9) Men seldom court women with spectacles

  (Dorothy Parker, Westerståhl–Peters)

- Our proposal can be regarded as a generalisation of Milsark (1977) or Williams (1984) (see also Rullmann (1989)): we take existential sentences to contain a binding mechanism (roughly, the equivalent of an existential quantifier), which is responsible not only for the exclusion of strong *NP*s from existential sentences, but also for the narrow scope and Weak Crossover properties of weak *NP*s in such environments.

(4.10)	*a.*	??Her mother knows that there is a kid smoking behind the woodshed	WCO
	b.	There is always a cat that lands on its feet	not in restrictor
	c.	Tom believes that there is a mouse in the cellar	narrow scope

- The binding mechanism adopted here is anaphoric rather than genuinely quantificational. The verb(al) complex and the weak *NP* are both taken to introduce a discourse referent; these referents are equated by means of a procedure based on term unification.[4]

  Schematically:

(4.11)	*There are*	*two cats*	*on the roof*
	$\ldots\tau,\beta\ldots$	$\ldots X\ldots$	$\ldots l\ldots$
		$\beta = X$	$\tau = l$

  Hungarian:

(4.12)	*Talált*	*két macskát*	*a kertben/Marinak*
	S/he found	two cat-Acc	the garden-in/Mary-Dat
	"S/he found	two cats	in the garden/for Mary"
	$\ldots\gamma,\beta\ldots$	$\ldots X\ldots$	$\ldots l/m\ldots$
		$\beta = X$	$\gamma = l/\gamma = m$

[4]In addition, we take the verb(al) complex to introduce a distinguished pronoun-like variable that is unified with the coda discourse referent in *there*-sentences, and with a Possessor, a Beneficiary or a Goal location in the case of Hungarian or with English *have, find* and *acquire*.

Added benefit: this method explains why the entry for a simple verb does not contain (for instance) the quantifier *most* — as opposed to genuine A-quantification with incorporated or 'split' frequency expressions in West Greenlandic (Bittner (1995)). The expressions in (4.13) and (4.14) correspond to *almost always* and to *usually* in virtue of their lexical meanings. Our observation is that the binder that resides in English *there be* cannot be a genuine, determiner-like quantifier like *most*, since the binding itself takes the form of substitution via unification.

Incorporated frequency expression:

(4.13) Nujappiaraq balloni-si gaannga-mi
boy-ABS$_1$ balloon$_2$-get-when.iter-3sPROX$_1$
minuttit qulit maatinnagit
minutes ten within
qaartuur-**tuaanna-ngajap**-p-a-a.
break-**always-almost**-Ind-[+tr]-3s$_1$.3s$_2$
"When a boy gets a balloon, he almost always breaks it within
ten minutes"

(Bittner (1995) Ex. (4): 60)

'Split' frequency expression (the adverb is separate from the verb, but it agrees with the marker **tar** on the verb):

(4.14) *a.* Piniartu-p puisi pisara-annga-gu
Hunter-ERG$_1$ seal-ABS$_2$ catch-when.iter-3sOBV$_1$.3sOBV$_2$
nuli-ata **amirlanir-tigut**
wife-3s$_1$-ERG$_3$ **most-AQ**$_4$
pilat-**tar**-p-a-a
flense-**TAR**$_4$-IND-[+tr]-3s$_3$.3s$_2$
b. "When a hunter$_1$ catches a seal$_2$, his$_1$ wife **usually** flenses it$_2$"
c. For most pairs $\langle x, y\rangle$, if x is a hunter, y is a seal, and x catches y, then x's wife flenses y.

(Bittner (1995) Ex. (26a-c): 68)

A side note on binding by verb stems as opposed to binding by other elements, e.g. prefixes incorporated into the verb: Some Slavic prefixes, such as *po-*, can act upon the internal argument variable in a way that amounts to (direct) quantification or temporal distribution. The Czech examples below are meant to illustrate this; on the temporal distributor *po-* see also Galton (1984). This is to be understood in opposition with binding by the verb *stem* itself, as (we argue) is the case with the Definiteness Effect.

Czech:

(4.15) Petr nam **na**-vypravěl přihody ze svych cest
Petr 1Pl-Dat PR-told-3Sg adventures-Pl-Acc from his travels
"Peter told us about his **many** travel adventures"

(Filip (1996) Ex. (3): 44)

(4.16) Petr nam **do**-vypravěl přihody ze svych cest
Petr 1Pl-Dat PR-told-3Sg adventures-Pl-Acc from his travels
"Petr finished telling us about (**all**) his travel adventures"

(Filip (1996) Ex. (4): 45)

(4.17) Jana **po**-rozbijela (∗najednou) šalky v myčce
Jana PR-broke-3Sg (∗all at once) cup-Pl-Acc in dishwasher
"Jana broke (all) the cups in the dishwasher"
(**gradually**, each (group) after the other)

(Filip (1996) Ex. (17a): 47)

According to our hypothesis, in existential sentences binding is anaphoric, not quantificational. Hence, the predicted range of verb–argument 'bindings' is the one seen in (4.18). In other words, we take the two variables to stand only in the relations attested between anaphor and antecedent. These are identity, maximality (as with E-type pronouns), and, possibly, the subset- or part of-relation (as with partitives or so-called non-monotone anaphora, signalled in English by a fall-rise intonation contour).

(4.18) $=, (\subseteq?), MAX/\Sigma$

4.2 Existential Constructions

4.2.1 Preliminaries

This part introduces a number of constructions and verb classes that can be labelled as existential (or, with some English verbs, as quasi-existential). These comprise English *there*-sentences (with an outlook on Dutch *er*-sentences), Hungarian Definiteness Effect verbs and some of the English counterparts of these verbs. We conclude with a generalisation, namely, that these verbs or verbal constructions can be classed as opaque. Discussion will include a brief comparison with better-known opaque verbs such as *seek* or *believe.*

4.2.2 The 'Classical' Definiteness Effect

The Data

As noted in the introduction to this chapter, English sentences of the form *There is/are NP XP* are peculiar in that they do not accept all types of *NP*s (Milsark (1977), Reuland and ter Meulen (1987)):

(4.19) *a.* There are some/two/many/few/no/∅ cats in the garden
b. There is a cat/some cat in the garden

(4.20) *a.* ∗There is the cat/every cat/that cat/it/Macavity in the garden
b. ∗There are all/most cats in the garden

*NP*s accepted in (typical[5]) *there*-sentences will be called *weak. NP*s that are not (always) accepted in existential constructions have been called *strong.* The phenomenon itself is usually called the Definiteness Effect, or the Definiteness Restriction.

In English a number of intransitive verbs can occur in *there*-sentences. These are typically unaccusative motion verbs, whose Goal location serves as a distinguished reference location. By contrast, intransitives with a distinguished *Source* are not acceptable in English *there*-senteces (cf. Levin and Rappaport-Hovav (1995)):

(4.21) *a.* There appeared an orchid in my garden
b. ∗There disappeared an orchid from my garden

[5] A less typical *there*-sentence is one that involves a so-called list reading: *There are the papers to grade.* Cf. Ward and Birner (1995) or McNally (1998).

A similar pair is, for instance, *arrive/depart*.[6]

On its so-called noncustodiary use *have* also shows the Definiteness Effect (Partee (2000)):

(4.22) *a.* John has some/two/few/no/∅ cats
b. John has a cat

(4.23) *a.* ∗/#John has the cat/every cat/that cat/Macavity
b. ∗/#John has all/most cats

Existential sentences in other Germanic languages are similar to English *there*-sentences, in that they too contain a sentence-initial expletive (with an original locative meaning). In these languages a substantially wider range of verbs can appear in existential constructions. For data and discussion, the reader is referred, among others, to Vangsnes (1994), Lodrup (1994), Maling (1987), Platzak (1983) or Rullmann (1989). Here we present a small sample of Dutch sentences based on Rullmann (1989). Note that Dutch admits transitive verbs in existential sentences, and that the argument 'prone' to the Definiteness Effect is the (grammatical) subject (though the object *NP* shows some sensitivity as well).

(4.24) *a.* Jon zegt dat...
"John says that...
b. er mensen dronken waren
there were people drunk"
c. er iemand bloemen gekocht heeft
someone has brought flowers"
d. ?er iemand het huis bekeken heeft
somebody inspected the house"
e. ∗er Piet een huis bekeken heeft
Intended: Peter inspected a house"
f. ∗er het huis door iemand is bekeken
Intended: the house was inspected by someone"
g. ∗er elke jongen/de meeste jongens dronken waren
Intended: each boy was/most boys were drunk"

(Based on Rullmann (1989))

From the other Germanic languages, Swedish is like English and Icelandic is like Dutch in allowing or disallowing transitive verbs in existential constructions:[7]

(4.25) *a.* Swedish ∗Det åt en man en pudding
b. English ∗There ate a man a pudding
c. Icelandic thornaeth borethaeth maethur búething

(Platzak (1983))

In Hungarian the Definiteness Effect is lexical, in that it is triggered by certain verb classes, and not by a particular syntactic construction.[8] Rather, in Hungarian the verbs themselves are capable to determine the word order possibilities of their Theme arguments.

[6] Apparently, Dutch does not have this contrast, in that verbs of departure and disappearance can also occur in existential sentences. For examples see the footnote on page 124.

[7] The special characters of Icelandic in example (4.25c) could not be rendered, for lack of the appropriate fonts.

[8] Presentation will be based on Szabolcsi (1986), Kálmán (1995), Bende-Farkas (forthcoming).

(4.26) and (4.27) show the Definiteness Effect with the verbs *van* 'be', *kap* 'receive', *ír* 'write' and *vesz* 'buy'.

(4.26) *a.* *Van* könyv/két könyv/(némi) tej
Is book/two book/(some) milk
"There is a book/two books/some milk"
b. ∗*Van* a könyv/Mari könyve/minden könyv
Is the book/Mari book-Poss3Sg/every book
"There is the book/Mary's book/every book"

(Szabolcsi (1986) ex. (7): 324)

(4.27) *a.* *Kaptam/írtam/vettem* könyvet/két könyvet
Got-1Sg/wrote-1Sg/bought-1Sg book-Acc/two book-Acc
"I received/wrote/bought a book/two books"
b. ∗*Kaptam/írtam/vettem* minden könyvet/a könyvet
Got-1Sg/wrote-1Sg/bought-1Sg every book-Acc/the book-Acc
Intended: "I received/wrote/bought every book/the book"

(Based on ex. (8) from Szabolcsi (1986):324-325)

The following subsection is devoted to a discussion of the lexical and discourse factors involved in the Hungarian Definiteness Effect. The point being, the Definiteness Effect is not an inalienable property of the above-listed verb classes.

4.2.3 The Definiteness Effect in Hungarian

Generalities

As mentioned in the previous subsection, in Hungarian the Definiteness Effect is lexical. (4.26) and (4.27), repeated here as (4.28) and (4.29) show the Definiteness Effect with the verbs *van* 'be', *kap* 'receive', *ír* 'write' and *vesz* 'buy'.

(4.28) *a.* *Van* könyv/két könyv/(némi) tej
Is book/two book/(some) milk
"There is a book/two books/some milk"
b. ∗*Van* a könyv/Mari könyve/minden könyv
Is the book/Mari book-Poss3Sg/every book
"There is the book/Mary's book/every book"

(Szabolcsi (1986) ex. (7): 324)

(4.29) *a.* *Kaptam/írtam/vettem* könyvet/két könyvet
Got-1Sg/wrote-1Sg/bought-1Sg book-Acc/two book-Acc
"I received/wrote/bought a book/two books"
b. ∗*Kaptam/írtam/vettem* minden könyvet/a könyvet
Got-1Sg/wrote-1Sg/bought-1Sg every book-Acc/the book-Acc
Intended: "I received/wrote/bought every book/the book"

(Based on ex. (8) from Szabolcsi (1986):324-325)

We think that the Hungarian data are remarkable for four reasons:

First, they show that although constructions can differ cross-linguistically as to the division of labour between the syntax and the lexicon, they nevertheless show remarkably similar meaning effects. In other words, the Definiteness Effect is on a par with causative and resultative constructions, whose linguistic form may vary considerably, even though their semantic properties are remarkably stable (cf. for instance Alsina (1997), Alsina (1992), Butt (1995), or Bittner (1999)).

Second, the sheer size of the relevant verb class(es) is remarkable: it includes practically all verbs of possession change, creation verbs, verbs of bringing or arrival, not to mention stative verbs that express existence or availability.

Third, the Definiteness Effect is not an inherent, invariant property of these verbs. Rather, it depends on a number of lexical factors such as aspect and argument linking. The presence of these conditions indicates that the Definiteness Effect is not an arbitrary phenomenon, rather, its presence hinges on the way an event is described (e.g. a particular way of representing an event can determine which of its participants is expressed with a direct object in the sentence).

Four, the Definiteness Effect disappears in case the event described is not new in discourse. In particular, there is no Definiteness Effect in the presence of Focus, since Focus causes the verb to be presuppositional. This phenomenon (and similar data attested in English) lends support to those analyses that take the Definiteness Effect to be a novelty constraint (these include Ward and Birner (1995), Blutner (1993) or McNally (1998)). The Hungarian data show that this constraint is operative just in case the main eventuality is itself new in discourse.

These points will not be discussed at length in these notes (especially the fourth point). The reader is referred to Szabolcsi (1986), Kálmán (1995) or Bende-Farkas (forthcoming).

Details

Anna Szabolcsi's first classification of Hungarian Definiteness Effect verbs is the following:

EXIST: *van* 'be', *akad* 'happen, chance to be', 'occur', *tart* 'keep';

BECOME AVAILABLE IN A PARTICULAR FASHION: *érkezik* 'arrrive', *jön* 'come', *történik* 'happen', *kerül* 'become available',...

COME INTO EXISTENCE IN A PARTICULAR FASHION: *születik* 'be born', *épül* 'become/get built', *alakul* 'be formed/incorporated', *keletkezik* 'come into existence/emerge (natural phenomena such as storms, lightning)', *történik* 'happen', ...

CAUSE TO BECOME AVAILABLE IN A PARTICULAR FASHION: *kap* 'get', *talál* 'find', *szerez* 'obtain', 'acquire', *hoz* 'bring', *vesz* 'take', 'buy', *lop* 'steal', *ad* 'give', *kerít* 'make available', 'acquire', ...

CAUSE TO BECOME EXISTENT, IN A PARTICULAR FASHION: *rajzol* 'draw', *fest* 'paint', *főz* 'cook', *süt* 'bake', *eszik* 'eat', *épít* 'build', ...

(Based on Szabolcsi (1986):323-324)

The common traits of these classes are existence and availability. Other components of these verbs' meanings (e.g. causation) are not relevant for the Definiteness Effect. A generalisation inherent in this classification (and which was made explicit by Szabolcsi herself) is that verbs of creation ('verbs of becoming existent') share their relevant properties with 'make available' verbs such as *kap* 'receive' or *talál* 'find'. Later in this chapter the similarities between two verb classes will be detected in the case of English as well.

Necessary and Sufficient Conditions for the Hungarian Definiteness Effect

It has to be stressed once more that the Hungarian Definiteness Effect with event verbs is not an inherent property of these verbs; rather, a number of conditions are to be met.

1. The presence of a (deep) object: the Definiteness Effect is shown with unaccusatives (e.g. *érkezik* 'arrive') or with transitives (e.g. *kap* 'receive'). With transitives it is only the object *NP* which is subject to the Definiteness Effect. This is shown in (4.30), where the subject and the indirect object can very well be a quantifying *NP*, but the object *NP* cannot.

   (4.30) Minden tanár minden diáknak ajánlott egy/∗minden könyvet
   Every professor every student-Dat recommended one/every book-Acc
   "Every professor recommended a book/every book to every student"

2. The verb can be called a 'light' verb, because it needs to be preceded by a secondary predicate (cf. Komlósy (1994)). In existential sentences we assume a covert perfectivity operator, which becomes unified with the internal argument *NP*—cf. the following chapter. So, in existential sentences the 'secondary' predicate is either the covert perfectivity operator or the internal argument *NP* — the two can be taken to form a chain, anyway, in that their representations contain variables that are bound to each other.

   There is no Definiteness Effect with 'ordinary' complex predicates (prefixes, resultatives, ...), as shown in (4.31):

   (4.31) *a.* ∗János írta a(z) (összes) regényt $\emptyset_{Perf}$
   John wrote+Def3Sg the (all) novel-Acc
   Intended: "John wrote the novel/all novels"
   b. János meg-írta a(z) (összes) regényt Prefix
   John MEG-wrote+Def3Sg the (all) novel-Acc
   "John wrote up the novel/all the novels"
   c. János kézzel írta a(z) (összes) regényt Instrumental
   John hand-with wrote+Def the (all) novel-Acc
   "John wrote the novel/all novels by hand"
   d. János hosszúra írta a(z) (összes) regényt Resultative
   John long-onto wrote+Def3Sg the (all) novel-Acc
   "John wrote the novel/all novels to be long"

3. The internal argument of the verb denotes what comes into existence or what becomes available because of the event. That is, there is no Definiteness Effect if the direct object denotes something like a Source or Container (Kálmán (1995)). For instance, the direct object of *fúr* 'drill', 'bore through' can denote the hole or orifice created, or the 'container'; there is no Definiteness Effect if the direct object denotes the container (Hungarian counterparts of *drill a hole* vs *bore through the wall*). The same contrast can be seen with the Hungarian counterparts of *cut (somebody's) hair* vs *cut a hairdo* or *cut a stick from a tree*. With verbs of creation theres is no Definiteness Effect if the direct object denotes the (previously existing) model (*draw a dragon* vs *draw a girl s/he has seen*).

   Conclusion: the Definiteness Effect is there on a 'presentational' reading or perspective only. By this we mean that the event indeed describes what is newly created, made available or introduced into discourse participants' knowledge states.

4. The verb has a telic/terminative construal; that is, there is no Definiteness Effect on progressive or process readings.

   (4.32) *a.* Főztem a levest
   Cooked+Def1Sg the soup-Acc
   "I was cooking the soup"
   NOT "I cooked the soup"
   b. Hoztam a széket/őt/Annát
   Brought+Def1Sg the chair-Acc/him/Anna-Acc
   "I was bringing the chair/him/her/Anna"

   Conclusion: the factor responsible for the Definiteness Effect 'lives' in a state description, at least in Hungarian and in English. According to Szabolcsi (1986), the idiosyncratic semantic content of Hungarian verbs is 'bleached'. What is 'retained' is the final state, which is precisely about something newly created or made available. According to us, the term 'bleaching' is perhaps too strong, but with these verbs the final state (consequent state, in our terminology) is indeed the most prominent component of their meanings. In the analysis, the representation of the consequent state will be the same for all verbs (apparently some fine-tuning is still required to obtain the interpretational differences between creation verbs and so-called make available verbs like *talál* 'find').

5. The verb has a distinguished Goal argument, which can be linked to a location, to a Beneficiary, or to a Possessor. The event describes what is new at that Goal; there is no Definiteness Effect if the verb lacks this construal, or if it lacks a Goal argument. For instance, *lő* 'shoot' is a Definiteness Effect verb, and it can only mean 'shoot for some purpose/for someone'. Other meanings related to the concept of shooting have to be rendered with prefixed verbs (e.g. *meg-lő* 'wound by shooting', *le-lő* 'eliminate by shooting', *bele-lő* 'shoot into').

   There is no Definiteness Effect with the one unprefixed verb of departure, viz *távozik* 'depart', 'leave'. The point is, there is no Definiteness Effect if the distinguished 'location' argument is a Source and not a Goal:

   (4.33) *a.* Távozott minden vendég
   Departed every guest
   "Every guest departed"
   b. *Érkezett minden vendég
   Arrived every guest
   Intended: "There arrived every guest"

   There is a subclass of Hungarian verbs that are atelic, non-Definiteness Effect verbs, but which do show the Definiteness Effect in the presence of an overt Beneficiary. For instance, *vasal* 'iron' is atelic without a Beneficiary, and does not show the Definiteness Effect. The expression[9] *vasal magának* 'iron him/herself' on the other hand can be telic, in which case it does show the Definiteness Effect:

   Without a Beneficiary: only durative/atelic aspect, no Definiteness Effect:

   (4.34) *a.* János (egy órán át/*egy óra alatt) vasalt egy inget
   John (one hour-on through/one hour under) ironed one shirt-Acc
   Only: "John was ironing a shirt (for an hour)"
   Not: "John ironed a shirt (in an hour)"
   b. János vasalta az inget/a Mari ingét
   John ironed+Def3Sg the shirt-Acc/the Mary shirt-Poss3Sg-Acc
   Only: "John was ironing the shirt/Mary's shirt"
   Not: "John ironed the shirt/Mary's shirt"

   With a Beneficiary: only telic aspect; Definiteness Effect:

   (4.35) *a.* János (???egy órá-n át/egy óra alatt) vasalt magának egy inget
   John (one hour-on through/one hour under) ironed self-Dat one shirt-Acc
   "John ironed himself a shirt in an hour"
   Not: "John was ironing himself a shirt for an hour"
   b. János vasalt magának egy inget/*minden inget
   John ironed self-Dat one shirt-Acc/every shirt-Acc
   "John ironed himself a shirt/intended: every shirt"

   Conclusion: the relevant state description says (in Hungarian and, as one will see shortly, English as well) that there is something new at the Goal (see also Freeze (1992)).

6. The event discourse referent contributed by the verb is new, not presupposed or backgrounded. For instance, there is no Definiteness Effect if the sentence contains Focus (Szabolcsi (1986),

[9]In lack of a full theory of double object constructions and *VP*-shells for Hungarian, we use the neutral term 'expression'. Also, we wish to remain agnostic as to whether the presence of an overt Beneficiary is sufficient to coerce the verb *vasal* 'iron' into a double object verb, or whether the Beneficiary has adjunct status here.

Kálmán (1995)). The reason, according to us, is that Focus triggers a presupposition–assertion division in which the verb will contribute to the presupposition part.

(4.36) *a.* Minden verset [János]$_F$ írt
Every poem-Acc [John]$_F$ wrote
"For every poem x, it is John who wrote x"
b. Hans [a szamaras mondat-ok-ról]$_F$ írta a cikket
Hans [the donkey-with sentence-Pl-about] wrote the paper-Acc
"Hans, his paper was about [donkey sentences]$_F$"

Similarly, there is no Definiteness Effect in relative clauses (Kálmán (1995)), in ellipsis or in sentences that stand in an Elaboration relation to a preceding event description (Bende-Farkas (forthcoming), Ch. 4).[10]

Some of the properties listed here are especially relevant, either for crosslinguistic comparison, or because they reveal how one language or another may choose to represent eventualities in discourse:

- Verbs of 'making available' are like creation verbs (this was first discussed in Wacha (1974); see also Szabolcsi (1986)). Roughly, this amounts to the dependency of their internal argument on the event described by the verb: the availability of the individual in question is conditioned by the event. In simpler terms, Themes of 'make available' verbs correspond to discourse entities that become available ***and*** known because of the event, and because of the utterance of the existential sentence. Intuitively, existential sentences with 'make available' verbs describe the way a discourse entity is introduced into the information state of a discourse participant. The parallel with creation verbs means in intuitive terms the following: The existence of a 'created' object (i.e. the presence of a semantic object in some universe) is conditioned by a creation event; with 'make available' verbs, what depends on the event and its description is the presence of a *discourse entity* in the discourse participants' knowledge states. That entity is introduced into these partial models of contexts as part of an event description. To stress once more, being like a creation verb is not an interpretational property of 'make available' verbs. Rather, it is a discourse property: knowing about a discourse entity depends not only on the event, but also on the utterance of the existential sentence itself.

  This parallel has precise linguistic correlates, which were first discussed in Wacha (1974). The analysis of Szabolcsi (1986) also exploits this parallel, in the discussion of possible readings in the presence of Focus. According to our reconstruction, Szabolcsi took both creation verbs and 'make available' verbs to be so-called one time only predicates (de Swart (1992), Szabolcsi and Zwarts (1993)). We will return to this issue in Part 4.2.5.

- A recurrent theme in this subsection has been a very systematic (and, for our purposes, very convenient) parallel between the meanings of Hungarian and English existential sentences. This parallel serves as the starting point of the unified analysis from the following chapter. Existential sentences in both languages are taken to say that there is something new (the Theme discourse referent) at some distinguished Goal (a reference location or a Beneficiary). In other words, in both languages the Definiteness Effect will be located in a state description which contains a distinguished Goal variable and a Theme discourse referent, which will be dependent on the state discourse referent contributed by the verb(al complex).

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[10] (α) *a.* minden levél, amit János írt *rel. clause*
every letter that-Acc John wrote
"every letter that John wrote"
b. János talált egy macskát és Mari a kölykeit *gapping*
John found one cat-Acc and Mary the kitten-Poss3Sg-Pl-Acc
"John found a cat and Mary its kittens"
c. Érkezett egy orvos, és hozta magával a feleségét is *Elaboration*
Arrived one doctor, and brought+Def3Sg himself-Dat the wife-Poss3Sg-Acc too
"There arrived a doctor, and he brought along his wife as well"

It has to be noted, however, that this striking similarity in the semantics is due to a syntactic 'accident', namely, to the fact that English does not admit transitive verbs in *there*-sentences. The reason for this is that (as in other Germanic languages) the expletive binds the *subject*. Thus the 'real' meaning of the state description contributed by *there be* is that the *subject* is in some state. And, since English admits only *be*, *seem* and certain unaccusatives in *there*-sentences, the subject *NP* can just as well serve as Theme.

If English *there* could combine with transitives (that is, if English were like Dutch or Icelandic), then the direct object (which is so often Theme or Patient) would not have to obey the Definiteness Effect: that is, the parallel between English and Hungarian (or, the parallel between English *there*-sentences and English *have*) would vanish.

To sum up in examples, the following array of examples show the actual situation. In English (4.37a) the deep object shows the Definiteness Effect, just as in Hungarian (4.37b–c). To stress our point once more, English Themes can be said to be subject to the Definiteness Effect *just because* there is no other argument in the sentence.

(4.37) *a.* E: There arrived a man/∗every man
b. H: Érkezett egy férfi/∗minden férfi
"There arrived a man/∗every man"
c. H: János talált egy macskát/∗minden macskát
"John found a cat/every cat"

(4.38) show other Germanic languages (cf. also the earlier example (4.25)), and a fictitious language, Dutch-English. If English were like Dutch or Icelandic, and transitive verbs could occur in *there*-sentences, then the parallel with Hungarian would vanish — see the asymmetry between Dutch-English (4.38e) and Hungarian (4.38f).

(4.38)	*a.*	Swedish	∗Det åt en man en pudding
	b.	English	∗There ate a man a pudding
	c.	Icelandic	thornaeth borethaeth maethur búething
	d.	Dutch	Er heeft een man een pudding gegeten
	e.	Dutch–English:	There ate a/∗every man a/every puding
	f.	Hungarian	Egy/Minden pasas evett egy/∗minden pudingot
			One/Every guy ate one/every pudding-Acc

4.2.4 Semantic Properties of Existential Sentences

The Checklist

The following is an inventory of semantic properties that accompany existential sentences. Some of these are presented here as part of the argumentation. Others (we think) constitute a kind of benchmark: they are to be accounted for by any analysis of the Definiteness Effect.

- Indefinites in English existential sentences can only have narrow scope (Milsark (1977), Heim (1987), Abusch (1994)). The situation in Hungarian is the same. As remarked in the introduction to this chapter, this contrasts rather dramatically with the scopal freedom of indefinites in other environments.

(4.39) *a.* Macavity thinks that a mouse is in the attic
b. Macavity thinks that there is a mouse in the attic

(4.40) János azt hiszi, hogy Mari festett egy tájképet
John that-Acc believes+Def3Sg, that Mary painted one landscape-Acc
"John believes that there is a landscape Mary painted"
Not: "A landscape, John believes that Mary painted it"

- In English and in Hungarian, an indefinite from an existential sentence may not occur in the (mostly implicit) restrictor of an adverb of quantification (Kim (1996)) — unless the (expletive+) verb is there as well (as in (4.5b)).

(4.41) *a.* A cat always lands on its feet
b. Cats always land on their feet
c. There is always a cat that lands on its feet

((4.41b) is from Schubert and Pelletier (1989))

Taken together, (4.41c) and (4.5b) offer the following generalisation: in existential sentences the indefinite has to be in the same quantificational 'niche' as the verb (+expletive).

- Indefinites in English, Dutch or Hungarian existential sentences are prone to Weak Crossover (Rullmann (1989), Bende-Farkas (1999)). This indicates the presence of a binder in the construction.

(4.42) *a.* (?)Her mother knows that a kid is smoking behind the woodshed
b. ???Her mother knows that there is a kid smoking behind the woodshed

(4.43) ???An hour after she left her home, there was a friend of mine in my doorway

Dutch:

(4.44) Een uur nadat hij uit zijn huis vertrokken was, stond
One hour after he from his house left had, stood
(∗er) een oude studiengenoot bij mij voor de deur
(ER) one old fellow-student with me before the door
"An hour after he left his house, an old fellow student
was at my door"

(Rullmann (1989): ex. (50))

Hungarian:

(4.45) *a.* A tulajdonos-a$_i$ mondta, hogy egy macska$_i$ a fán van
The owner-Poss3Sg said+Def3Sg, that one cat the tree-on is
"Its owner said that one of the cats is in the tree"
b. ???A tulajdonos-a$_i$ mondta, hogy van egy macska$_i$ a fán
The owner-Poss3Sg said+Def3Sg, that is one cat the tree-on
Intended: "Its owner said that there is a cat is in the tree"

- Specific indefinites (English, Hungarian):

It was noted in Fodor and Sag (1982) that specific indefinites may appear in *there*-sentences (see in particular the continuation (4.6b) to (4.6a); (4.6a) is repeated here as (4.46a)).

(4.46) *a.* There is a student of mine smoking behind the woodshed
b. There is a cat I like meowing on the roof

For Fodor and Sag an example like (4.46) was taken to show that indefinites in existential sentences correspond to discourse-new entities, even though from the speaker's point of view they may correspond to familiar ones. To be precise, sentences like those in (4.46) show exactly the need to distinguish between these two kinds of ±novelty.

Note also that an example like (4.46a) undermines Fodor and Sag's thesis viz specific indefinites have wide(st) scope. The reason is that it is an independently attested property of there-sentences that the *NP* can only have narrow(est) scope (see (4.39)). The conclusion for us is that specificity (understood as speaker reference) is distinct from scope (see also the typology and discussion in Farkas (1996)).

The direct object of *have* can also be an anchored indefinite. The following dialogue is perfectly felicitous if at least **B** has identifying knowledge for the referent of the indefinite in **A**'s sentence (say, s/he knows that Fred has been assiduously courting Esmerelda, and had promised not to marry anyone else).

(4.47) *a.* **A:** Fred has a wife now
b. **B:** So, has she consented?

It has to be noted, however, that not all types of anchored indefinites are possible in existential sentences. *NP*s with *some*, for instance, are at least inappropriate, or odd. To be precise, the observations concerning (4.48) are the following: *some*-indefinites cannot have the anchored construal that is so often preferred in ordinary contexts; moreover, *some*-indefinites are quite inappropriate in existential sentences (unless *some* is coerced to mean *some kind of*).

(4.48) *a.* ???Fred has some wife
b. ??There is some fly in my soup

((4.48b) is from Farkas (2001))

It seems to us that with *a*-indefinites, anchoring depends simply on the speaker's choice: that is, there is nothing in the *semantics* of the indefinite article *a* that would force it to, or prevent it from, having an anchored construal in an existential sentence. With *a*, anchoring is just an additional factor that does not interfere with semantic composition.

Some on the other hand can be inappropriate in an existential sentence for at least two reasons: First, as noted in Farkas (2001), it is mildly presuppositional, which makes it less compatible with the existential construction. Second, as proposed in Kamp (2001b), *some NP*s can be seen as quantificational, which renders them incompatible with existential constructions. (And then it does not even make sense to inquire about their ±anchored status.)

At any rate, what needs to be retained from this brief discussion is that the anchoring of *a*-indefinites is apparently quite independent from their being bound by the existential construction, or their being compelled to have narrowest scope only.

- Non-restrictive relative clauses:

It is argued in Rullmann (1989) that indefinites in existential sentences cannot be modified by nonrestrictive relative clauses. This problem is related indirectly to that of having specific indefinites in existential sentences: the reason is that it is typically only referring expressions that allow for nonrestrctive relative clauses. If it can be shown of a type of expression (or an expression occurring in a certain construction) that it disallows nonrestrictive relative clauses, this can be taken as proof of this expression being nonreferring (in that construction).

Dutch:

(4.49) Ik hoopte dat (∗er) een student, wiens moeder ik
I hoped that (ER) one student, whose mother I
trouwens nog van vroeger kende, op bezoek zou kommen
b.t.w. still from earlier knew, would visit
"I hoped that a student, whose mother by the way I used
to know, would visit"

(Rullmann (1989))

According to Rullmann, the impossibility of nonrestrictive relative clauses indicates a nonreferential/nonspecific construal for the indefinite, since usually it is referring expressions that can be modified by restrictive relative clauses (and quantificational expressions that cannot):

(4.50) John/This boy/*Every boy, whose mother by the way I used to know,
will visit us tomorrow

From these examples, Rullmann concludes that indefinites in existential sentences are not referring expressions, and goes on to postulate that they are quantificational (in his analysis for Dutch, they are bound by *VP*-level existential closure).

It seems to us, however, that if the indefinite gets a specific construal, non-restrictive relative clauses become more acceptable:

(4.51) There is a student of mine, whose mother, by the way,
I also happen to know, smoking behind the woodshed.

In Hungarian, non-restrictive relative clauses in existential sentences are quite acceptable. But this may be due to their relative independence in this language (dislocation?). This is shown by the contrast between (4.52a-b): in the second sentence the locative phrase *az erdőben* 'in the forest' (when uttered with a 'normal' prosodic contour, i.e. not dislocated itself) prevents the relative clause from being dislocated.[11]

(4.52) *a.* János talált egy macskát, amelyik egyébként a szomszédé
John found one cat-Acc, which b.t.w. the neighbour-Poss3Sg
"John found a cat which, by the way, is the neighbour's"
b. ???János talált egy macskát, amelyik egyébként a szomszédé az erdőben
John found one cat-Acc, which b.t.w. the neighbour-Poss3Sg the forest-in
"John found a cat which, by the way, is the neighbour's, in the forest"

The conclusion from Weak Crossover and non-restrictive relative clause data is that indefinites in *there*-sentences are bound, but this binding does not (necessarily) affect their (additional) specificity properties. Specificity understood as anchoring (or 'epistemic specificity', a term coined by Donka Farkas) is distinct from (quantificational) binding, or from exceptional scopal freedom.

Some Options; Conclusions

Given the checklist of semantic properties or side-effects presented here, the question now is what strategy to choose for the analysis. In principle, one has the following options in analysing Definiteness Effect constructions:

1. Generalised Quantifier Theory (Barwise and Cooper (1981), Keenan (1987); see also Ed Keenan's course at ESSLLI). According to this theory, the weak–strong distinction among *NP*s is definable in terms of the mathematical properties of the generalised quantifiers denoted by these *NP*s.
2. The ± presuppositional strategy: Strong *NP*s are presuppositional; they are not admissible in existential sentences because the construction does not admit presuppositions of a certain type (cf. de Jong and Verkuyl (1985), Lumsden (1998), Zucchi (1995)).

[11] Our suspicion with such relative clauses is, however, that they may be a special form of Elaboration, which *is* allowed *after* an existential sentence, cf. fn. 6.

3. Novelty/familiarity; added assumption sometimes: the construction does not admit familiar discourse referents/bound variables. (Blutner (1993), McNally (1998), Ward and Birner (1995)).
4. Existential constructions are quantificational, in that *there (be)* contains an existential quantifier. This quantifier can bind weak *NP*s, because these are not quantificational. Strong *NP*s on the other hand are quantificational: hence, if they could be bound by the quantifier in *there (be)*, that would amount to re-quantification. (Milsark (1977), Szabolcsi (1986), van Geenhoven (1996), van Geenhoven (1998), Blutner (1993).)

The present approach is a version of Strategies 3 and 4. This choice is motivated by the following.

– In English, there is a marked contrast in the acceptability of ± anaphoric definites in *there*-sentences (Ward and Birner (1995)): Uniquely referring, non-anaphoric expressions are usually accepted in *there*-sentences. They become unacceptable just in case they have an antecedent in immediately preceding discourse:

  (4.53) *a.* I met the President of France the other day
  b. #/ ∗ There is the President of France in the pub

  (4.54) *a.* The dean is a Mathematics professor
  b. #/ ∗ There is now the dean to meet

  These data indicate that in English one of the relevant factors for the Definiteness Effect is indeed the discourse novelty of the relevant discourse referent, and not ±definiteness as a grammatical feature.

  In Hungarian and in other Germanic languages (as discovered by ESSLLI participangs), however, uniquely referring definites are quite robustly unacceptable in existential sentences. Apparently, in these languages the Definiteness Restriction is exactly what its name suggests, viz it is not (primarily) a novelty constraint.

– Scope facts and Weak Crossover data are indicative of variable binding within the construction.

– So are the so-called opacity properties of existential constructions (more about these in 4.2.5.

– The Definiteness Effect is cancelled if the verb conveys presuppositional/backgrounded information; we take this to be a constraint on the primary Definiteness Restriction itself.

  In Hungarian the presence of Focus cancels the Definiteness Effect, as shown in the earlier example (4.36), and also in the following minimal pair:

  (4.55) *a.* ∗Van minden macska a tetőn
  Is every cat the roof-on
  Intended: "There is every cat on the roof"
  b. [TEGNAP]$_F$ volt minden macska a tetőn
  [YESTERDAY]$_F$ was every cat the roof-on
  "It was yesterday that every cat was on the roof"

  English *have* can admit strong object *NP*s just in case the entire *VP* is anaphoric — this is shown in (4.56b).

  (4.56) *a.* Mary had a lover and a husband
  b. She had the lover before (she had) the husband

  (Irene Heim: p.c.)

A similar example has been brought to our attention by Barbara Partee:

(4.57) *a.* There is a certain boy in our class who has a sister
b. It is John who has the sister

(Variation on an example by Barbara Partee (p.c.))

Note that the data showing the cancellation of the Definiteness Effect cannot be accounted for by the Generalised Quantifier approach: according to Generalised Quantifier Theory, weak and strong *NP*s have invariant mathematical properties that qualify them (once and for all) as good or bad candidates for existential sentences, irrespective of the context (i.e. irrespective of the discourse properties of the verb or verbal complex itself).

The same holds, mutatis mutandis, for definite descriptions, and the fact that their acceptability in English existential sentences depends on their ±anaphoric status. Generalised Quantifier Theory (at least on its conservative, static versions) is insensitive to the discourse ±novelty of *NP*s. The presupposition strategy will likewise fail to distinguish between ±anaphoric definite descriptions, unless it is fine-grained enough to distinguish between accommodated and anaphoric presuppositions, or background knowledge and the representation of preceding *linguistic* context (see the discussion from Chapter 5 in Bende-Farkas (forthcoming)). Another shortcoming of the presupposition approach is that it treats quantificational *NP*s and definite descriptions or pronouns on a par. The problem here is that, unlike definites, quantificational strong *NP*s are robustly and invariantly ungrammatical in existential sentences.

Returning to the assumptions underlying our analysis, we have to remark that these assumptions are fairly well circumscribed. We assume that

- the binder lives in the verb/in *there be*; with event verbs, the locus of the binder is the consequent state description;
- binding is the result of a special composition method that yields something very much like an incorporated construction or a complex predicate (cf. van Geenhoven (1998)); rationale: scope and opacity tests, Hungarian 'morphosemantics';
- strong *NP*s are excluded because of binding failure(s);
- the binding mechanism is anaphoric rather than quantificational. We do not simply adopt van Geenhoven's original incorporation schema, for reasons discussed in the Appendix to the next chapter. In a nutshell, the original formal implementation of incorporation faces a number of empirical problems, and there are also problems of a formal nature that concern scope and conjunction.

4.2.5 A Generalisation: Opacity

In this part we formulate a generalisation about certain verb classes (including the expletive + copula complex as a species of complex verb). The generalisation extends to certain English verbs that correspond to some subclasses of Hungarian Definiteness Effect verbs. These are verbs of creation (cf. von Stechow (2000)) and 'verbs of result' like *acquire* and one construal of *find* or *choose* (cf. Burton (1995) and Moltmann (1997)).

For a more detailed discussion on these 'additional' verb classes the reader is referred to the literature. Here, it is sufficient to note that the internal arguments of these verbs exhibit an event-dependency that is in many ways similar to the 'robust' Definiteness Effect of *there be* and also to Hungarian. Their properties will be discussed in tandem with those of the other verbs/constructions.

(4.58) *a.* John baked a cake
b. John found/acquired a wife

Obviously, (4.58a) does not mean that there was a (pre-existing) cake that John subjected to baking. Likewise, the individual denoted by the object *NP* in (4.58b) became John's wife after and because of the (some?) event described by the sentence.

Returning to the main discussion, our main point here is that English *there*-sentences, as well as verbs like *acquire*, *find* and verbs of creation, create opaque contexts for the relevant *NP*. This claim is supported by several arguments:

1. All these verbs or constructions test positive for most of the standard opacity tests. This will be shown below.

2. Creation verbs and verbs of result (*acquire*) place a temporal constraint on (the denotation of) their internal argument. With creation verbs, the event described by the verb provides the lowest temporal bound of the lifespan of the individual(s) in question. With the *acquire* class, the verb provides the lower bound of the interval during which the relevant individual has the property contributed by the N'. (In simpler terms, the individual denoted by the object *NP* of the sentence (4.58b) becomes John's wife *after* and *because of* the relevant event.) That is to say, these verbs describe events that cause something to exist or to have the N' property.

3. The opacity shown by Hungarian 'make available' Definiteness Effect verbs and English *there be* and *have* may be called *discourse opacity.* This is understood as the informal paraphrase of Hungarian Definiteness Effect verbs from Part 4.2.3: a discourse entity becomes available and known because of the event described by the sentence, and because of the utterance of the sentence itself. This is to be understood in a negative manner: these sentences do not provide links to preceding context, and the relevant discourse entity cannot introduced independently of the existential construction. These constructions have the effect of delimiting context in a certain manner; they then describe what is new in that context.

With *there*-sentences, and with the other types as well, one accompanying phenomenon of opacity is discourse novelty, or, in the terminology of McNally (1998), reference to 'nonparticulars'. Reference to nonparticulars (as we understand it) is for all practical purposes a so-called attributive reading (Donnellan (1966)).[12] Attributive readings can be noted with all the verb subclasses studied here. In the case of a *there*-sentence, attributiveness amounts to saying that a property is instantiated by some individual or other, whose identity may be of no concern. This is supported by certain opacity tests given below, in particular, by the felicitousness of impersonal *pro*-forms (in (4.65)), and the inappropriateness of discourse-linked *wh*-phrases (in (4.66)).

Attributivity is understood in opposition with so-called referential readings of indefinites. As remarked in Fodor and Sag (1982), it is usually inappropriate to deny an existential sentence with a(n individual) pronoun. Instead, the expletive+verb complex is to be negated. We take this as an indicative of the presence of, or preference for, an attributive reading:[13]

(4.59) *a.* There is a student smoking behind the woodshed
b. #No, he isn't.
c. No, there isn't

In more 'syntactic' terms, attributive readings may amount to saying that on this version of opacity the property contributed by the internal argument plays a more prominent role than its

[12] Caveat: it has to be a *narrow scope* attributive reading.

[13] Recall that specific indefinites are in fact possible in *there*-sentences, as seen in (4.46). (4.46a) (*There is a student of mine smoking behind the woodshed*) can in fact be continued with *No, he isn't*, as remarked by Fodor and Sag. But this, we think, does not diminish the status/strength of the main observation concerning opacity. Rather, it serves to show that epistemic specificity is an additional property that (full *NP*) indefinites can have in virtually *any* environment. The reader can check that, apparently, specific readings are possible with the other classes as well:

(β) **A:** John has now got/acquired a wife
B: So, has she finally consented?

We deem that such dialogues are possible, provided discourse participants have a given/salient individual in mind. See the condition on the specific use of indefinites in (3.11) on page 25, and also the discussion on Esmeralda and Fred in footnote 1 on that page.

individual discourse referent. Anticipating the analysis, we can say then that the internal arguments in these constructions resemble secondary predicates rather than standard arguments.

Where logical properties are concerned, this subspecies of opacity is understood as a *discourse-level* dependency on the event description provided by the verb, not necessarily as failure of substitutibility of equivalent terms.[14]

Scenario: all and only secretaries are chimney-sweeps:

(4.60) *a.* There is a secretary in the garden ⇔
b. There is a chimney-sweep in the garden

Apparently, not all verbs behave in this manner. That is, *find* or *acquire* do not really allow for substitution of equivalent terms:

(4.61) *a.* John acquired a secretary ⇔ ?
b. John acquired a chimney-sweep

Irony?

(4.62) *a.* Has John acquired a secretary yet?
b. Well, he has one of those chimney-sweeps

Supposing that all eligible males are stockbrokers:

(4.63) *a.* Mary acquired a husband entails
b. Mary acquired a stockbroker for a husband

Another property of this subspecies of opacity is that it need involve only the 'main' discourse referent of the *NP*, and not the entire *V+NP* complex — unlike other opaque verbs:

(4.64) *a.* Mary acquired a lawyer who was licensed in California
b. Mary acquired a lawyer who was licensed in the most populous state in the U.S.
c. Mary believes that John is from the most populuous state in the U.S.

Subtitutibility aside, these classes exhibit other diagnostics of opacity (see also Moltmann (1997)):

Impersonal *pro*-forms and relative pronouns:

(4.65) Mary found what John has found: an efficient secretary
Mary has what John does not have: a Russian Blue cat

Discourse-linked *wh*-phrases are disallowed (the reader can construct his/her own examples with the other verbs):

(4.66) *a*1. #Who is there in the pub?
*a*2. #Which students are there in the pub? (own example)
b. What kind of people are there in the pub?

(Heim (1987))

Scope and anaphora: internal arguments of these constructions/verbs are not exportable. This could be seen with *there*-sentences (and with Hungarian verbs) in the previous part. (4.67) contains some additional examples.[15]

(4.67) *a.* John thinks that there is a cat in the garden. #It is black.
b. Every cat knows that there is a mouse in the attic. #It likes corn.
c. John thinks that Mary acquired/found a husband. #He is a stockbroker
d. John thinks that Mary painted a picture. #It is a still-life.

[14] Or lack of existential import, obviously. The reader can construct his/her own examples.
[15] Strictly speaking, the narrow scope property is one of the consequences of the (quasi) Definiteness Effect that will be introduced in a minute.

In this respect, this type of opacity is different from 'standard' opacity, in that for the usual type of opaque verb wide scope readings are not blocked. (Cf. *Every cat thinks that a mouse is in the attic. They are plotting to catch it together.*)

In addition to these properties, a property all these verbs share is a (quasi) Definiteness Effect. (4.68) shows that (i) it is present with creation and result verbs as well, and that (ii) with these verbs it is indeed a *quasi* Definiteness Effect, in that it is not quite robustly grammaticalised.

(4.68) *a.* #Mary acquired/found every disciple
b. #Gereon baked every cake (Arnim von Stechow, p.c.)

A comparison with the more usual opaque verbs or constructions reveals that the ±quantificational or weak–strong distinction is relevant for both types, but in different ways.

(4.69) *a.* Ede resembles a syntactician de re/de dicto
b. Ede resembles every syntactician de re only

(Based on Zimmermann (1992/93))

(4.70) *a.* $\lambda P.\lambda x.[resemble(x, P)]$
b. $[resemble(e, syntactician')]$
c. $\exists x.[syntactician \ \& \ resemble(e, \lambda z.[z = x])]$

It has been shown in (Zimmermann (1992/93)) that the ±quantificational distinction between *NP*s is relevant for 'classical' opaque verbs like *seek* or *resemble.* Only, with these verbs say, a universal quantifier serves only to eliminate one reading, whereas with quasi Definiteness Effect verbs a quantifying *NP* is ungrammatical, or it is acceptable only in certain contexts (this is the case with English *find* and *acquire*, see exx. (4.75) and (4.76)).[16]

We propose, then, that the distinctive property of this type of opacity is precisely the (quasi) Definiteness Effect, with all that this term implies. Intuitively, the quasi Definiteness Effect amounts to the event dependency and discourse novelty of the internal argument *NP*. This results, among other things, in the prominence of attributive readings, and in the severely restricted scope possibilities for these *NP*s.
A property all these verbs share with verbs of creation is their so-called one time only property. 'One time only' means that an individual can be subjected to an event type only once; typical cases are verbs of destruction, or certain verb phrases with a definite object *NP*, as in *receive this letter* (cf. de Swart (1992), Szabolcsi and Zwarts (1993), see also the uniqueness of objects/uniqueness of events postulates from Krifka (1992)).

The one time only property for Hungarian 'make available' Definiteness Effect verbs was first shown by Anna Szabolcsi. Now we extend it to English existential constructions as well.

We contend, however, that non-creation verbs (*there be*, *have*, Hungarian 'make available' verbs, as well as verbs of result) have this property only as regards discourse.

The one time only property is detectable as narrow scope relative to the presupposition triggered by *again.* Roughly, sentences with *again* presuppose an earlier eventuality of the same type as the eventuality described by the verb (phrase) modified by *again.* In addition, *again* may have in its 'scope' one or more other constituents. If this is the case, a sentence with *again* says that the two events share some of their participants. (Cf. Kamp and Roßdeutscher (1994b), Kamp and Roßdeutscher (1994a), von Stechow (1996).) For instance, the sentence *John caught a mouse again* can mean either that there were at least two mouse catching events by John with possibly distinct mice, or that there is a mouse that was caught earlier (by John or by someone else), and now John has caught it again.

Against this background, the characteristic of existential constructions is that their Theme argument must have narrow scope relative to the presupposition of *again.* That is, an existential

[16]The attentive reader may have noticed that we have avoided discussing definite descriptions. This is because of their special status in opaque contexts.

sentence with *again* (where *again* modifies the relevant *VP*) cannot mean that there is an individual θ involved in an earlier event e_1 and in a later event e_2.[17]

(4.71) *a.* A cat is on the roof again
b. There is a cat on the roof again
c. There is a cat which is on the roof again [PUZZLE]

(4.72) *a.* John has a cat again
b. John baked a cake again
c. John acquired some admirers again

Hungarian:

(4.73) *a.* János újra hozott/kapott/talált egy macskát
John again brought/received/found one cat-Acc
"Again there is a cat John brought/received/found"
b. #Mi lehet vele, hogy mindig az útjába akad?
What can-be with-3Sg, that always the way-Poss3Sg-into chance-3Sg
"Why does it always come across him?"

All the 'opaque' examples above involve two representations of the *VP*, s.t. one has the status of a presupposition and the other is assertional. The point is, the object *NP* also has to contribute two distinct discourse referents (except for (4.71a, c), of course). Intuitively, (4.71b) does not say that a cat is such that it was on the roof some time ago and now it is there again. Rather, what it says is that there was an earlier state of there being a cat on the roof, which is now followed by another state of there being a cat on the roof. The other 'opaque' sentences can be paraphrased in a similar manner.

Note, however, that these sentences can in fact be true in scenarios where both events (the presupposed and the earlier one) involve one and the same individual. Yet this is precisely the information that these sentences do not convey. That is, these sentences are not one time only once their truth-conditions are taken into account — unlike creation verbs, which are one time only also in the interpretation. This is the reason why we hold that the one time only property that accompanies this type of opacity is representational and not interpretational.

The relevance of the one time only property is empirical rather than 'formal'. That is to say, the formal 'solution' for this property will seen to follow from the 'core' properties of the analysis, without further assumptions or stipulations.

This property is in fact a derivative on the over-all novelty constraint of (quasi) existential constructions. Moreover, narrow scope of the *NP* relative to *again* is but a special case of these *NP*s having narrow scope relative to any operator or quantifier.

In spite of its derivative status, the one time only property has received such a lengthy discussion because (historically) it has provided empirical support for the observation that 'make available' verbs are like verbs of creation.

A further property of these verbs is that their (quasi) Definiteness Effect hinges on the novelty of the event discourse referent itself. This has been known by Hungarian linguists for some time (see the brief discussion on Hungarian on page 98), and it can easily be shown to hold for English as well (with the exception of *there*-sentences).

The point is, if the *VP* can be understood as anaphoric and/or backgrounded, there is no Definiteness Effect:

Intuitively, (4.74b) is fully acceptable because both *VP*s (in fact the entire clauses) (i) have an antecedent in preceding discourse, and (ii) they are backgrounded, in the sense that Focus is on

[17] The condition on the syntactic status of *again* becomes apparent if we consider an example like (4.71c), where *again* is part of a relative clause within the *NP*. Here, the discourse referent contributed by the *NP* 'outscopes' again.

before — that is, the new information conveyed by the sentence is the temporal relation between two familiar states.

(4.74) *a.* Mary had a husband and a lover
b. She had the husband before she had the lover

(Irene Heim (p.c.))

One can see the same effect with *acquire* in (4.75):

(4.75) *a.* Mary had several loyal disciples.
b. She acquired each of them after a seminar she gave.

A sentence like (4.76) can be appropriate given its information structure. In case it does not have a proper discourse antecedent, the relevant information has to be known to discourse participants.[18]

(4.76) Gereon baked every cake WITHOUT BAKING POWDER

With *there*-sentences, however, anaphoricity does not 'rescue' strong *NP*s. This is seen in (4.77):

(4.77) *a.* There was a student in the pub
b. *There was he for an hour

Our conjecture is that the 'persistence' of the Definiteness Effect in (4.77b) may be due to the fact that with *there*-sentences the Definiteness Effect is triggered by a syntactic factor, tailor-made, as it were, precisely to bind an indefinite, and to introduce a *new* eventuality discourse referent.

The following, however, *is* acceptable:

(4.78) *a.* Are the Tübingen frisbee team in the pub?
b. No, there is only Gráham$_F$/their cáptain$_F$ there

So, what we see is that anaphoricity does not suspend the Definiteness Effect in *there*-sentences, but overt Focus and a Focus-sensitive operator does. Presumably *only* is similar to an exception phrase here (on account of the similarity of (4.78b) to *There is no-one except Graham in the pub.*)

Conclusions; Anticipating the Analysis

To sum up our conclusion in one paragraph, existential sentences involve some form of 'binding' by the verb or expletive+verb complex. This binding creates a (selectively) opaque context. The internal argument *NP* is more like a secondary predicate to the verb than a proper argument (proper = having type e).

If this is indeed the case, then what one can do is to resort to or to develop a method of semantic composition that resembles complex predicate formation. This has in fact been proposed for existential constructions in van Geenhoven (1996), and is nothing but Semantic Incorporation. We do not simply accept and extend the original schema from van Geenhoven (1996), for reasons detailed in the Appendix to the following chapter. Rather, we develop our own method of semantic composition.

Our version of incorporation has two components. First, as with other opaque verbs or constructions, the entry of the verb is to be completed by a property (relation) constant supplied by the internal argument *NP*.[19] This, however is insufficient in itself (since it allows the verbs to combine with quantificational *NP*s). Second, we postulate an additional binding mechanism that binds the *NP* to the verb. In the case of *there be*, *have* and Hungarian this takes the form of a strict argument realisation rule. With English verbs of result this is considerably looser. When such verbs have nonrelational object *NP*s, these *NP*s retain their freedom, as opposed to the prefixless Hungarian

[18] So, in cases like (4.76) we take English Focus to be genuinely presuppositional. On the relationship between English Focus and presuppositions see Rooth (1999).

[19] That is, we accept Zimmermann's analysis of opaque verbs as subcategorising for a property type (internal) argument.

counterparts of these verbs. (Or, indeed, as opposed to an English existential sentence: ∗*There is every cat on the roof*, or ∗*John has every car*.)

(4.79) *a.* John acquired every bond
b. ∗János szerzett minden kötvényt
John acquired every bond-Acc
Intended: the same as sentence *a*

Moreover, as noted in Burton (1995), the appropriate relation constant can be supplied by context; for instance, in the context of a dancing event the following sentence can be understood as *Mary acquired a secretary* for a dancing partner:

(4.80) Mary acquired a secretary

To conclude, we take the attributive readings that accompany this version of opacity to be due to the verb's expecting a property or relation constant from its internal argument, and to a number of other factors, including binding of the relevant individual discourse referent. To stress once more, the verb's expecting a higher order referent is not a sufficient condition for the Definiteness Effect, however. (It is not the only necessary condition, either.)

The other conditions are the following:

1. A strict argument composition rule that identifies the source of that constant as the descriptive content of the internal argument *NP*.
2. A binding mechanism responsible for the unacceptability of ∗*There is every house on the market*, but which is absent from *Mary acquired every house on the market*, and
3. The novelty of the relevant event discourse referent. As regards event novelty and the impossibility of *there*-sentences to be 'anaphoric' (cf. (4.77)), we hypothesise that the role of the expletive *there* is precisely to keep the state contributed by *be* from being anaphoric.

4.3 Incorporation

In this part we introduce incorporating constructions. Beside genuine incorporating structures, we review a number of cases of what may be termed as abstract incorporation, or so-called incorporation by jutxtapposition (Mithun (1984)). In this latter case, a noun and verb are related to each other in a manner that resembles incorporation, yet they retain their autonomy in the syntax/morphology. The survey of the data is followed by a discussion of the semantic properties of incorporating structures, and by a comparison of existential and incorporating constructions.

4.3.1 Introduction: the Data

'Incorporation' as understood here amounts to compounding a verb root with a noun root.[20] The output is one morphological word. (West Greenlandic, Iroquoian languages, Oceanic languages.)

West Greenlandic:

(4.81) Kaage-liur-p-u-t
cake-make-IND-[-tr]-3Pl
"They made a cake/cakes"

(van Geenhoven (1998), ex. (1): 1)

[20] So, strictly speaking, it is *noun* incorporation. Using the simple term 'incorporation' is harmless, however, since we do not consider other incorporated categories.

In the literature the term 'incorporation' has also been applied to cases where a (usually bare) noun and a verb form one unit at some level of linguistic representation, but they do not necessarily form one morphological or even syntactic unit. (In Mithun's terminology, this is incorporation by juxtapposition.) This is the case, for instance, in Turkish (Kornfilt (1990)), Armenian (Vaux and Sigler (1997)), Hindi (Dayal (1999) Mohanan (1995)), Hungarian (É.Kiss (1998b)), or Dutch (van der Does and de Hoop (1998)). Under certain conditions verb and noun may not even be adjacent (as in German or Hungarian). To wit, here is a sample of Hungarian examples that all involve the event of book-writing.

The basic, or default case is when the bare noun immediately precedes the verb:

(4.82) János könyvet írt
John book-Acc wrote
"John was book-writing

Given the right conditions, however, the nominal can be separated from the verb:

(4.83) *a.* $*$[Regényt]$_T$ írt János
[Novel-Acc]$_T$ wrote John
Intended: "Some novel, John wrote (it)"
b. [Regényt]$_{CT}$ (azt) írt János (de verset nem)
[Novel-Acc]$_{CT}$ (that-Acc) wrote John (but poem-Acc not)
"As for novels, John has written some"
(but he may have written no poetry)
c. [Regényt is]$_Q$ [János]$_F$ írt
[Novel-Acc too]$_Q$ [John]$_F$ wrote
"Novel-writing, too, it was John who did it"
d. [Regényt]$_F$ nem írt még János
[Novel-Acc]$_F$ not wrote yet John
"It is a novel/novels John has not written yet"

In (4.83b-d) the nominal occurs in the so-called Contrastive Topic, Quantifier and Focus positions, respectively. This is due to some 'secondary' meaning effects that compel the nominal to occur where it occurs (on the semantics of these positions see e.g. Szabolcsi (1997a)). In (4.83b) it is, for instance, contrast with other genres or with other writing activities. In (4.83c) it is the presence of the discourse particle *is* 'too' that compels the nominal to be in the so-called Quantifier position. The case with the nominal in Focus, in (4.83d), is obvious. Bare nominals may not occur in Topic position, as shown in (4.83a). The reason for this is that these nominals are not referential, and may not get specific or generic readings (É.Kiss (1998a)).

Apart from these cases, which are conditioned by semantic factors, the nominal has to be separated from the verb in the case of negation, for instance (cf. Ackerman and Webelhuth (1997)):

(4.84) *a.* János nem írt regényt
John not wrote novel-Acc
"John has not written novels"
b. $*$János nem regényt írt
John not novel-Acc wrote

In German matrix clauses verb and incorporated element have to be separated, because of the *verb second* constraint:

(4.85) *a.* Franz spielt immer Flöte
Franz plays always Flute
"Franz is always playing the flute"
b. $*$Franz Flöte spielt immer
Franz flute plays always
Intended: same as above

Some other cases of incorporation by juxtapposition are the following:

Hindi:

(4.86) anu kitaab paRh rahii hai
Anu book read-PR-PROG
"Anu is reading a book/the book"

(Dayal (1999): (10))

If we understand correctly, in Hindi bare nominal objects that lack case marking have to precede the verb. They can have either an indefinite or a definite reading. The indefinite reading is said to involve incorporation, the definite one is said to come without incorporation. In Hindi, apparently, case marking is one of the relevant factors for the specific/existential contrast, since the Accusative case marker *-ko* has been known to trigger specific readings. A case-less numberless nominal, as in (4.86), can still more or less freely alternate between a definite and an indefinite, incorporated reading.

Armenian: non-specific plural subjects of certain verbs do not trigger plural agreement on the verb, and they are themselves without number marking:

(4.87) *a.* (ays) vec gaduner-a definite, Pl
this 6 cat-pl-dt
"these/the six cats"
b. vec gadu indefinite, no number
6 cat
"(some) six cats (or other)"

(Vaux and Sigler (1997): (15))

According to the authors, sentences with so-called non-agreeing nouns are existential constructions and involve some form of incorporation.

(4.88) *a.* pem-in vara-n dasa gin ga-nasdi-r
stage-Gen-dt on-dt 10 woman imp-sit-pst-3Pl
"There were sitting on the stage ten women"
b. pem-in vara-n dasa gin-ner ga-nasde-i-n
stage-Gen-dt on-dt 10 woman-Pl imp-sit-pst-3Pl
"Ten women were sitting on the stage"

(Vaux and Sigler (1997): (21))

4.3.2 Variations in Semantic Properties

To the best of our knowledge, the *semantic* properties of incorporated nominals may vary according to the following parameters:

1. argument or modifier status;
2. ±novelty or (in)definiteness;
3. ±licensing of pronominal anaphora.

In addition, nominals with an indefinite construal have to have narrow scope — see e.g. the Chamorro examples below.

±Argument status: Classifier incorporation

Usually, the acceptability of so-called classifier incorporation in a language is taken as a diagnostic of the modifier status of the incorporated nominal. Classifier incorporation amounts to there being another, non-incorporated constituent in the sentence that serves as argument for the verb; the incorporated nominal is seen as a modifier of the verb, and usually corresponds to a superordinate concept relative to the independent constituent. In the Mohawk example below, for instance, the incorporated nominal corresponds to *fish* and the other constituent to *bullhead*:

Mohawk:

(4.89) Kikv rabahbot wa-ha-its-a-hninu' ki rake'-niha
this bullhead fact-MsS-fish-buy-punc this my-father
"This bullhead was (fish-)bought by my father"

(Baker (1995) (12): 10.)

Chamorro: Ladusaw (1999):

(4.90) Si Julia gäi-patgun yu'
Julia agr-have-child me
"I am Julia's child" (lit. Julia has me as child)

So, incorporated nominals in (at least) Mohawk and Chamorro can function as modifiers to the verb.

Hungarian lacks classifier incorporation, as seen from (4.91). Presumably this is the case in the other languages with abstract incorporation as well. We conjecture that in these languages the nominal has argument status. (At least in Hungarian numberless, Accusative or Nominative bare nominals are internal arguments for transitives and unaccusatives.)

(4.91) *a.* ∗János macskát tart egy cirmost
John cat-Acc keeps one tabby-Acc
Intended: "For a cat, John keeps a tabby"
b. ∗Vendég érkezett egy hölgy
Guest arrived one lady
Intended: "A lady arrived as a guest"

Novelty

In most of the languages we know of, incorporated nominals may not correspond to familiar discourse entities. In the West Greenlandic example below, the incorporated nominal *puurtugar* 'parcel' from the *b*-sentence may not be anaphoric to the *NP* from the *a*-sentence.

(4.92) *a.* Qaammatit qassit matuma siurnagut Juuna puurtukka-mik
months several of.this before J-Abs parcel-INST
allakka-nil-lu nassip-p-a-ra
letter-INST-and send-IND-[+tr]-1Sg.3Sg.
"Several months ago I sent Juuna a parcel$_{(i)}$ and some letters...
b. Ullumi aatsaat puurtugar-si-v-u-q, ...
today first parcel-get-IND-[-tr]-3Sg, ...
#Only today he got the parcel$_i$,..."

(van Geenhoven (1998) (4): 3-4)

In Mohawk, however, definite construals of the incorporated nominal <u>are</u> possible:

(4.93) Wa'-ke-nakt-a-hninu'
fact-1Sg-bed-∅-buy-punc
"I bought the/a bed"

(Baker (1995) (1): 5.)

In Dutch there can be ('full *NP*') definites and indefinites that participate in abstract incorporation with their verb. This is shown in (4.94). According to van der Does and de Hoop, these *NP*s (including the definites) are not referential; rather, they are more like idioms. The sole difference between incorporated indefinites and definites is that the latter may scramble.

(4.94) *a.* dat ik altijd de bus neem
that I always the bus take
"that I always take the bus"
b. dat ik de bus altijd neem
that I the bus always take
"that I always take the bus"
c. dat ik altijd een enkeltje neem
that I always a single take
"that I always take a single [ticket]"
d. ∗dat ik een enkeltje altijd neem
that I a single always take
Intended: same as sentence *c*

(van der Does and de Hoop (1998))

In Hindi the same nominal may have a definite or an indefinite construal. There is consensus among linguists who work on Hindi (cf. for instance Mohanan (1995) or Dayal (1999)), however, that the definite construal does not involve incorporation.

(4.95) *a.* anu kitaab paRh rahii hai
Anu book-read-PROG-PR
"Anu is reading the book/a book"
b. $read(a, \iota x.[book(x)])$
c. $\exists x.[book(x) \wedge read(a, x)]$

(Dayal (1999))

What one sees from this small sample of data is that, typically, incorporated nominals have an indefinite construal. This is by no means always so, however.[21]

Anaphora:

Languages with genuine and abstract incorporation vary as to whether incorporated nominals allow or disallow pronominal anaphora.

Pronominal anaphora is possible in West Greenlandic:

(4.96) *a.* Aani qimmi-qar-p-u-q
A-Abs dog-have-IND-[-tr]-3Sg
"Aani has a dog"
b. Miki-mik ati-qar-p-u-q
M-Inst name-have-IND-[-tr]-3Sg
"It is called Miki"

(Bittner (1994): 64)

[21] The devil's advocate: what about incorporated pronouns, such as Hungarian *ismer-lek* 'I-know-you', where the 'object' pronoun agrees with a second person object, or *nek-e-d-jött* 's/he bumped into you', where the ending *-d* on the prefix *-nek-* indicates a second person singular Patient?

Hungarian, Armenian and Hindi disallow pronominal anaphora with numberless (bare) nominals. In all three languages, plural marking licenses pronominal anaphora.

Hungarian:

(4.97) *a.* János kismacskát talált.
John kitten-Acc found
"John has found some kitten(s)"
b. ∗Fekete volt
Black was
Intended: "It was black"

(4.98) *a.* János kismacská-k-at talált.
John kitten-Pl-Acc found
"John has found some kittens"
b. Feketék voltak
Black-Pl were
"They were black"

Armenian:

(4.99) *a.* shad hay ga-∅ hon
much Armenian exist-3Sg there
"There are many Armenians there"
b. #payc irenk/anonk/∅ hay-a-xos čen
but 3Pl-Nom/3Pl-Nom/pro Armenian-cx-speak neg-be-3Pl
"But they are not Armenian speakers"

(Vaux and Sigler (1997): (17a–b))

(The authors do not provide an example with a nominal marked for plural, but it is clear from their presentation that plural marking does license pronominal anaphora.)

Hindi:

(4.100) *a.* anu apne bete ke liye laRkii dekh rahii hai
"Anu is girl-seeing for her son."
b. vo ∗uskaa/laRkii-kaa swabhaav jaannaa caahtii hai
"She wants to find out ∗her/the girl's temperament"

(Dayal (1999): (32a))

(4.101) *a.* anu apne bete ke liye laRkiyaan dekh rahii hai
"Anu is seeing girls for her son."
b. vo unkaa/laRkiyon-kaa swabhaav jaannaa caahtii hai
"She wants to find out their/the girls' temperament."

(Dayal (1999): (32b))

Apparently, in these three languages the relevant factor for anaphora is number marking (in Hindi, this is to be understood in conjunction with the absence of the case marker *-ko*). We propose that in these languages numberless nominals do not introduce proper discourse referents, and that plural suffixes have a role comparable to that of determiners.

Scope

Incorporated nominals (on their indefinite construal) usually have narrow scope:

In West Greenlandic, for instance, the nominal has narrow scope with respect to the negative affix *-nngi-*:

(4.102) Juuna Kaali-mit marlun-nik allagar-si-*nngi*-l-a-q
J-Abs K-Abl two-Inst-Pl letter-get-NEG-Ind-[-tr]-3Sg
"It is not the case that Juuna got two letters from Kaali"
Not: "There are two letters from Kaali that Juuna didn't get"

(Bittner (1994): 188)

In the case classifier incorporation presumably the scope of negation is to be extended over the independent constituent as well. Possibly, this is the reason for the ungrammaticality of (4.103) below, as opposed to the acceptability of (4.104) and (4.105):

Chamorro:

(4.103) *Si Julia täi-patgun yu'
Julia agr-not-have-child me
Intended: "I am not Julia's child"

(4.104) Si Carmen täi-primu pali'
Carmen agr-not-have-cousin priest
"Carmen has no cousins who are priests"

(4.105) Si Dolores täi-patgun ni un granu
Dolores agr-not-have-child not a piece
"Dolores has no children at all"

(Ladusaw (1999))

4.4 How Far Can an Analogy Be Carried?

In Section 4.2 existential constructions were said to resemble complex predicates, or incorporating constructions (since this 'complex predicate' would be made up of a nominal and a verbal component). This analogy is attractive, since existential sentences and incorporating structures share a number of properties: typically, an incoroprated nominal has an existential construal and has narrow(est) scope, just like weak *NP*s in existential sentences. Also, one has the intuition in both cases that the nominal/the *NP* is more like a modifier or a secondary predicate than an argument in the traditional sense of this term.

What one can do, then, is to analyse existential constructions as involving Semantic Incorporation as originally proposed in van Geenhoven (1996) for West Greenlandic (and generalised to English existential constructions in the same work and in McNally and van Geenhoven (1997)). In a nutshell, an incorporating verb is analysed as requiring a property type internal argument and having existential closure over that argument:[22]

(4.106) *a.* There is: $\lambda P.\lambda\mathcal{L}.\exists x.[P(x) \wedge \mathcal{L}(x)]$
b. a cat: $\lambda y.[cat(y)]$
c. There is a cat: $\lambda\mathcal{L}.\exists x.[cat(x) \wedge \mathcal{L}(x)]$

(van Geenhoven (1996))

[22]For a fuller discussion of van Geenhoven (1996) and van Geenhoven (1998) see the Appendix in part 5.3.1.

A closer look at the data (e.g. the sample presented in the previous section) reveals that Semantic Incorporation in general (i.e. independently of its particular formulation in (4.106) is only a necessary but not a sufficient condition for a construction to count as existential.

1. Incorporated nominals are not uniformly indefinites (see the Mohawk and Dutch examples (4.93) and (4.94)).

2. In Hungarian bare nominals incorporate into their host verb, without yielding Definiteness Effect constructions. There is no Definiteness Effect if the verb has a process construal, and certain verbs (those from the *bring*-class (cf. Bende-Farkas (forthcoming)) have precisely this construal with a bare nominal:

   (4.107) János (egy órá-ig/∗egy óra alatt) széket hozott
   John (one hour-till/one hour under) chair-Acc brought
   "John chair-brought" OK: for an hour/Out: in an hour

3. There is no Definiteness Effect in Hungarian if the internal argument does not denote something newly created or made available by the event (Kálmán (1995), Bende-Farkas (forthcoming)). This is the case e.g. with the verb *fúr* 'drill', 'bore through', when its direct object denotes the thing subjected to drilling (viz *falat fúr* lit. 'wall-drill'). The point here is that with some verbs one can have incorporated nominals that do not contribute to an existential construction (as opposed to *lyukat fúr* 'hole-drill', for instance).

4. (4.106) yields wrong results with Hungarian bare nominals, because it incorrectly allows the nominal to be an antecedent for pronominal anaphora.

   As shown in (4.97), (4.99) and (4.86), in Hungarian, Armenian and Hindi bare nominals cannot antecede pronouns. (4.106) on the other hand predicts that bare nominals always license pronominal anaphora.

   The more general problem with (4.106) is that it treats full indefinites and bare nominals on a par, wheres the data from these three languages show precisely the inadequacy, or limitations, of this move. This entails that the weak–strong distinction is not to be reduced to the ±predicative distinction (a reduction that (4.106) relies on).

5. As noted for Hungarian, and for English *have*, *acquire*, there is no (quasi) Definiteness Effect if the relevant *VP* is anaphoric, presuppositional or backgrounded:

   (4.108) *a.* Mary had a husband and a lover
   b. She had the husband before she had the lover

   (Irene Heim (p.c.))

   We wish to say that (4.108b) remains an incorporating construction, in spite of the fact that it contains definite *NP*s. But then what one has here is a case of genuine incorporation with no (surface) Definiteness Effect.

To conclude, we wish to stress once more that although the incorporation analogy is attractive for the analysis of existential sentences, it is insufficient. In particular, it has to be supplemented with a stronger binding mechanism (than the one implicit in (4.106)) and with a novelty or foregroundedness condition on the main event description of the construction. In the following chapter we propose a unification based binding procedure. The ± the novelty or presuppositionality of event descriptions and its relevance for the Definiteness Effect will be set aside for further research.

Chapter 5

The Definiteness Effect as Incorporation

5.1 Introduction

This chapter presents an analysis of English *there*-sentences and Hungarian existential sentences that contain event verbs. The analysis builds on the insights formulated in the previous chapter:

Existential constructions are a subspecies of opaque constructions. This type of opacity could be termed 'discourse opacity'.[1] The internal argument *NP* is more like a secondary predicate than a 'proper' argument; and its discourse referent is bound, as demonstrated by scope and Weak Crossover data.

In terms of a formal analysis of opacity, we accept Ede Zimmermann's proposal (Zimmermann (1992/93)), viz opaque verbs subcategorise for a property type internal argument: Accordingly, (5.1) represents the first approximation in the entries assigned to Definiteness Effect verbs or verbal complexes: The verb *find* on its quasi Definiteness Effect verb construal would be analysed in the same manner as *seek*, i.e. as expecting a property type object *NP*, and containing no variable binding device:

(5.1) *a.* $\lambda P.\lambda x.[seek(x, P)]$
b. $\lambda P.\lambda x.[find(x, P)]$

This is clearly insufficient, since (as discussed in Zimmermann (1992/93) and in the previous chapter) *seek* does admit quantificational object *NP*s, whereas *find* does so only under special circumstances.[2]

As a second approximation, the Semantic Incorporation schema (van Geenhoven (1998), also (4.106) from the preceding chapter) could be generalised to cover English creation verbs or Hungarian Definiteness Effect verbs. In this case the verb still expects a property type internal argument, but this argument is existentially closed by the verb:

(5.2)
a. $\lambda P.\lambda x.\lambda \mathcal{L}.[P(x)\ \&\ \mathcal{L}(x)]$ *there be*
b. $\lambda P.\lambda x.\exists y.[find(x, y)\ \&\ P(y)]$ *find*

(5.2) is (*i*) still insufficient, and (*ii*) it is inadequate. The problems concerning the formalisation are discussed in the Appendix to this chapter. Empirical problems related to (5.2) were discussed among the conclusions of the preceding chapter; here we would like to repeat these conclusions:

[1] With the proviso that with creation and *acquire*-type verbs one has to speak of an opaque *interpretation* as well.
[2] On the de re reading of *seek*, the object quantifier scopes over the verb's entry, and P is bound to a 'dummy' property $\lambda z.[z = x]$, where x is the variable introduced and bound by the quantifier. (Cf. (4.70) on page 107). This clearly should not work with *find*.

(4.106) and (5.2) assume a very tight correspondence between incorporating and existential constructions at the level of Logical Form. In fact, the two become indistinguishable. This is problematic for two reasons.

(i) There are incorporating constructions that do not qualify as existential constructions. In the preceding chapter several Hungarian examples could be seen that did not count as existential, for reasons of aspectual class or thematic structure. The single schema (5.2) is not fine-grained enough to capture this. Of particular interest in this respect is the case of Hungarian incorporating verbs whose 'basic' aspectual class is atelic or durative. These verbs show the Definiteness Effect only on their telic construal, yet they incorporate bare nominals on their atelic construal (e.g. a construction like *be chair-bringing* is not existential).

In spite of these differences we do maintain that some version of incorporation is involved in the semantic composition of existential constructions, even if the two construction types are not identical. Hence, the task is to distinguish existential and non-existential incorporation. This could be schematised in the following two entries for Hungarian *hoz* 'bring'. We use λ-terms for expository reasons, in order to maintain a uniform presentation:

(5.3) a. $\lambda P.\lambda x.\lambda\gamma.\exists\varepsilon.[P\text{-}bring(\varepsilon, x, \gamma)]$ *atelic*
b. $\lambda P.\lambda x.\lambda\gamma.\exists\varepsilon\exists s.\mathcal{B}y.[P - bring(\varepsilon, x, \gamma) \wedge AT(s, y, \gamma) \wedge s = RES(\varepsilon)]$ *telic*

(5.3a), shows the atelic, non-Definiteness Effect entry for *hoz*. It resembles Zimmermann's translation for opaque verbs, in that the Theme is expected to contribute a property, and no additional binding is involved. The variable ε designates a process:[3] (5.3a) says that there is a process of P-bringing to the Goal γ. The notation P-*bring* is intended to emphasise the compound-like nature of these constructions.

(5.3b) shows the telic, Definiteness Effect construal of the same verb. A so-called consequent state (Moens and Steedman (1988), Kamp and Roßdeutscher (1994b)) s is introduced, and is taken to be the locus of the Definiteness Effect. In addition to the property variable P, an individual variable y will correspond to the direct object; only, y is bound by the 'binder' $\mathcal{B}$. It needs to be stressed once more that the actual format of (5.3b) serves only expository purposes: we do not attempt to use it in semantic composition, because this would lead to the same problems that the initial Semantic Incorporation schema (4.106) faces. Rather, (5.3b) is more like a hint at what we aim to achieve in a very different framework, in which we rely on unfication rather than on λ-abstraction.

(ii) The original Semantic Incorporation schema requires that *NP*s be reduced to the type of properties (this is a widely shared assumption in the literature, cf. Milsark (1977), McNally and van Geenhoven (1997), Blutner (1993), or Donka Farkas' and Henriëtte de Swart's course at *ESSLLI*: Farkas and Swart (2001)). A consequence of this move is that bare nominals and full *NP*s become indistinguishable. In light of the data from Hungarian and Hindi, this is not desirable for an analysis that relies on incorporation for existential constructions. In Hindi and Hungarian bare nominals and full *NP*s differ, for instance, in their capability to license pronominal anaphora.[4] The schemata (4.106) or (5.2) predict, incorrectly, that bare nominals do license pronominal anaphora.[5] A unified analysis of bare nominal incorporation and existential constructions has therefore to introduce sufficiently fine-grained distinctions among variables and varieties of binding.[6]

In view of these considerations, we propose a version of incorporation based on term unification. Accordingly, sentence-internal semantic composition will take the form of anaphora resolution: both the verb and the *NP* are taken to come with 'their' discourse referents, which then get merged. Another ingredient of the analysis is the distinction between proper discourse referents and referents that are mere placeholders (see also Kamp and Roßdeutscher (1994b) and Farkas and Swart

[3]There is no deep reason for using the Greek letter ε, other than the need to distinguish processes from culminated events, which are usually rendered with a Latin e.

[4]An even more intriguing case is that of Armenian, where full *NP*s may or may not license pronominal anaphora. Cf. Vaux and Sigler (1997), and see also example 4.87 on page 112.

[5]Assuming a dynamic logic, of course.

[6]The (obviously unattractive) alternative is to assign two entries to each Hungarian verb, depending on the category of its internal argument *NP*.

(2001)). A specialty of existential constructions will be a distinguished variable introduced by the (expletive+verb), which will be responsible for binding the referent introduced by the *NP*. This referent will be a placeholder, like the other arguments of verbs; only, it will have quantificational force.

The framework we employ is a version of bottom-up DRT (developed first in Kamp (2001c); see also the course on presuppositions at *ESSLLI*), where variables come with explicitly stated Binding Conditions, and where composition is driven by matching the conditions imposed on placeholders and the referents they are to be merged with.

This chapter is structured as follows: Section 5.2 contains the bulk of the analysis proper: 5.2.1 introduces the 'informal' components and assumptions of the analysis. 5.2.2 introduces the terminology and tools of term unification and the DRT framework we will use. Part 5.2.3 introduces the representations of the most important constituents in existential sentences. 5.2.4 shows how these representations are unified (and how unification fails with strong *NP*s). This part can be seen as a compendium of the 'benchmark' cases of the Definiteness Effect. Much of the material, however, is in the form of exercises, which are meant to make the reader more familiar with the details of the method proposed here. The chapter concludes with an Appendix, which contains a discussion of two similar approaches from the literature: Semantic Incorporation as proposed in van Geenhoven (1996) and van Geenhoven (1998), and the proposal in Blutner (1993), which shares a number of assumptions with the one presented here, even if the technical details are quite different.

5.2 Incorporation as Unification

5.2.1 Introduction

This brief part elaborates on some of the more specific assumptions of the analysis to be presented in the following subsections.

- The distinctive property of weak *NP*s (or exceptional strong *NP*s licensed in *there*-insertion contexts) is the discourse-new or hearer-new status of the main discourse referent. As shown later, novelty lives in the representation module, and not in the interpretation.

- Novelty also means unbound status, which is based on the premiss that indefinites are not quantificational. As motivated by the scope and Weak Crossover data, the new discourse referent contributed by the *NP* gets bound by the (expletive+) verb.

- Strong *NP*s are those whose discourse referent is bound, either by their determiner or to an antecedent in preceding context.

- *There* is taken to contribute a locational discourse referent τ, which needs to be bound, either in the discourse, to a familiar coda, or by a quantifier; this is consonant with the crosslinguistically motivated syntactic proposal from Freeze (1992). In coda-less, or more 'abstract' existential sentences τ can be taken to be a domain or a world variable (on coda-less sentences see also Paducheva (2000) or Kamp (2001b)).

- Following Freeze (1992), we take the relevant state to say that the discourse referent contributed by the *NP* is '*AT*' the distinguished referent τ; only, *AT* will be defined as a function from state-location pairs.

- *There be* is also taken to expect a property type argument; in our implementation, the representation of *there be* contains an unstored place holder variable P that is unified with the predicate contributed by the *NP*. This is consonant with the analysis of opaque verbs in Zimmermann (1992/93), and makes the descriptive content of the *NP* dependent on the state contributed by *there be*. This serves to capture the event- or state dependent readings of *NP*s in these contexts.

- The coda (if locative) has the status of a Topic. in existential sentences it is a 'plain' Topic. It is a Contrastive Topic in presentational sentences — which will be ignored here (*There is Jóhn drunk at the BÀR(B-accent)* — cf. Comorovski (1995)).
- The method for semantic composition is higher order term unification. That is, verb and *NP* are both taken to contain the requisite terms, which are then matched with each other. Unification has the status of a lexicon–syntax–semantics rule:
  - If the relevant syntactic configuration is $[There - V][NP]$, then unify the representations contributed by these constituents;
  - or, if the main verb of the sentence is *have*, with an *NP* (and not a small clause) as complement, then unify the contribution of *have* and that of the *NP*. The same goes for Hungarian verbs. Where English creation verbs and verbs of result are concerned, this has to be weakened somewhat (cf. Burton (1995), Bende-Farkas (forthcoming)).

Novelty

It has been shown in the descriptive work of Ward and Birner (1995) that *NP*s in existential sentences introduce discourse-new or hearer-new discourse referents (this in fact goes back to Ellen Prince's work — see e.g. Prince (1978), Prince (1981)). This is first illustrated in (5.4):

(5.4) *a.* John met a man in the library yesterday
b. ∗There is the man John met in the library sitting on the fence

The following sentence contains a specific indefinite: this example shows that what is relevant for existential sentences is the hearer-new status of the discourse referent (see also Fodor and Sag (1982), and the remarks in the preceding chapter).

(5.5) There is a man I know in the library

The necessity of hearer-new status is made evident by the case of definites in English. In English, definites are (exceptionally) licensed in (certain) *there*-insertion contexts just in case they are not anaphoric (disregarding list readings). This, too, was reported in Ward and Birner (1995).

(5.6) *a.* I spoke to the President of Peru yesterday
b. #There is the President of Peru in this picture

The point is, (5.6b) on its own is felicitous, because the content of the description by itself suffices to denote a unique referent. If, however, it is preceded by a sentence like (5.6a), it is no longer acceptable, precisely because such a context makes the definite in the second sentence anaphoric.

It turns out, however, that English is quite exceptional in admitting unique, non-anaphoric definites in *there*-sentences, either on an existential or on a list reading. Discussions with Scandinavian and Dutch course participants at *ESSLLI* have revealed that in these languages definites in such environments (the equivalents of English *there*-sentences) are simply ungrammatical, regardless of their ±anaphoric status. Here this is shown in the Dutch examples (5.7) and (5.8).

(5.7) ∗Er is/zit de President van Peru in de kroeg
"There is/sits the President of Peru in the pub"

List reading:

(5.8) *a.* ∗Er is Bill
"There is Bill"
b. D'r is Bill
—same—

(Kamp (2001b))

List sentences in Dutch require a different expletive (*d'r*, presumably a reduced version of the adverb *daar*). This may indicate that in Dutch at least, list readings are a different construction.

Hungarian, too, disallows definites in existential sentences:

(5.9) *a.* ∗Van a perui elnök a kocsmában
Is the Peruvian president the pub-in
Intended: "There is the President of Peru in the pub"
b. ∗Van (a?) Bill
Is (the) Bill
Intended: "There is Bill"

Apparently, in English the Definiteness Effect hinges on the (discourse) semantic property of novelty. In the other languages, it seems, what is relevant is definiteness as a grammatical category.

The remaining examples provide more details concerning the issue of discourse novelty:

(5.10) and (5.11) are meant to illustrate that bridged definites and *covert* partitive readings are disallowed, as well.

(5.10) *a.* A couple entered the pub
b. ∗#There is the man sitting at the bar

(5.11) *a.* Five students entered a pub
b. Two girls are at the bar now
c. There are two girls at the bar now
d. Two of the girls are at the bar now

In (5.11b-d), the *NP*s are intended to denote a subset of the set of five students mentioned in the first sentence. The point of this example is that the 'simple', unmodified *NP two girls* from (5.11b) cannot have this construal (see Rullmann (1989) for the same effect in Dutch *er*-sentences).

Possessive descriptions with synthetic Genitives are accepted in English existential sentences just in case the possessor is a weak *NP* (Barker (2000)):

(5.12) *a.* There is a linguist's bicycle in the garden
b. ∗#There is the linguist's bicycle in the garden
c. ∗There are all linguists' bicycles in the garden

We follow Barker in taking the ±novelty or ±quantificational properties of the entire possessive description to be inherited from the possessor Determiner.

Possessive descriptions with analytic, *of*-genitives are acceptable under roughly the same conditions as synthetic Genitives (Poesio (1994)). These are problematic for the novelty account of the Definiteness Effect, because the head noun is marked explicitly as a definite. If the possessor is a weak *NP*, one has to assume local accommodation for the possessor, and the definite is bound in the context of the original context updated by the possessor.[7]

(5.13) *a.* (?)There is the bicycle of a linguist in the garden
b. There is the father of a linguist in the dean's office
c. There is the editor in chief of *The Economist* in the pub

It was stated earlier that novelty is a property of the representation. This can be demonstrated with the case of existential sentences where *again* modifies the main verb. In such cases the presupposition of *again* has wide scope over the *NP* as well (this was discussed in the preceding chapter). The

[7]The question mark in front of (5.13a) indicates that this sentence was found a bit strange by our informants. Such sentences were said to improve in case the relevant relation involved per def. a unique possessee; hence the contrast between (5.13a) and the other two sentences.

sentences in (5.14) can be true in scenarios where the same cat participates both in the 'asserted' and in the 'presupposed' eventuality, but these sentences do not convey this information. The point is, the 'Theme' discourse referent in the assertion part will have to be new, and hence distinct from the corresponding discourse referent from the presupposition, even if both happen to be mapped onto the same individual in the model.

(5.14) *a.* There is a cat on the roof again
b. John has a cat again
c. János újra talált egy macskát
John again found a cat-Acc
"John has found a cat again"

In the representations for (5.14a-c), the presupposition of *again* will contain a copy of (the representation of) the relevant V', which includes a copy of the discourse referent contributed by the *NP*. Being in the 'scope' of *again* was found to be a characteristic property of creation verbs and existential sentences in the preceding chapter.

Our original point with (5.14) is not that novelty *can* be defined in the representation language, but that it *has* to be defined there. The representation of all three sentences of (5.14), contains a 'presupposed' and an 'asserted' discourse referent for *a cat*, say, x_p and x_a. These need to be kept distinct in the representation, even though both can be mapped onto the same individual in the model. If novelty 'lived' in the interpretation, the denotations of the two referents were forced to differ, excluding precisely cases when the two events involve the same individual, but the sentence fails to convey this information.

To see that this is so, suppose that one wants to mark the value of the 'asserted' discourse referent x_a (i.e. $f'(x_a)$) as new, where f' is an assignment function that extends the domain of the immediately preceding function f at least with $\{x\}$. Then it will necessarily differ from the value of the presupposed referent ($f(x_p)$), and this is precisely what we do not want.

Conversely, if one sets out from the identity of the two individuals, then one is committed to the familiarity of $(f)(x_a)$. Or, what one gets is a reading where the NP 'outscopes' *again*: (5.14a), for instance, will be taken to mean *A cat is on the roof again.*

These observations are relevant in the light of some interpretational definitions of novelty from the current literature.[8]

It is not only in existential sentences that novelty is a representational property. Quite generally, one can speak of novelty relative to a new 'subject' (Ede Zimmermann (p.c.), Dekker (1996)). The formal, or technical problem is the same as with (5.14). Only, this time it surfaces as the relationship between two overt indefinites.

In the following discourse (provided there are sufficient intervening sentences between (5.15a-b) and (5.15c)), the indefinite from (5.15c) can refer to any of the men picked out by the previous indefinites (of the form *a man/n men*) refer to. Yet this indefinite is appropriate because it introduces a new *subject*, that which has the property of (being a man) and ordering a glass of Unicum.

(5.15) *a.* A man and a woman entered the pub
b. Five men were leaning against the bar
...
c. At nine o'clock sharp, a man ordered a glass of Unicum

The Coda

According to Levin and Rappaport-Hovav (1995), locative inversion sentences and *there*-sentences have a 'perspectivising' effect, by highlighting or distinguishing a particular location. In linguistic

[8]According to Krahmer (1995), for instance, non-familiarity is defined as follows:
$[\![Familiar(x,\Phi)]\!]^{-} = \{g \mid |\hat{x}.[\![\Phi]\!]_g| \neq 1 \& \forall v \in Dom(g)(v \neq x \Rightarrow g(v) \neq g(x))\}$

(Krahmer (1995) Df. (7) on p. 160.)

terms this is manifest in the marked preference for this location to have a Goal role in an event that takes place there (as opposed to being the Source):

(5.16) a_1. ?We were chatting in the living-room,
a_2. We were chatting in the garden,
b. when out of the window (=from indooors) jumped a handsome young man

(Levin and Rappaport-Hovav (1995): 6.4.)

The same Source–Goal asymmetry holds for *there*-sentences with verbs other than *be*:

(5.17) *a.* There arrived a man to/at the party
b. ∗There departed a man from the party

(Levin and Rappaport-Hovav (1995))

Intuitively, such constructions describe what is newly available at the Goal (and not what is removed from it).[9] The reader may recall from the preceding chapter that Hungarian Definiteness Effect verbs describe change in the same manner, which suggests a fairly robust parallel between existential constructions in the two languages. They also suggest that in *there*-sentences the coda has a Topic discourse function.

This is further supported by (*i*) the suspension of oddness judgments with 'empty domain' *NP*s in *there*-sentences (Lappin and Reinhart (1987)), and also by (*ii*) the distribution of *NP*s within locative codas.

(*i*) It was noted in Lappin and Reinhart (1987) (see also Reinhart (t.a.), Abusch and Rooth (t.a.)) that in existential sentences the oddness judgments of 'empty domain' *NP*s are suspended. According to Lappin and Reinhart this is due to the Topic discourse function of the coda. That is, Lappin and Reinhart derive the lack of oddness judgments in *there*-sentences from the Topic status of the coda, which they take for granted. Here, this point is reversed, so to speak: the fact that oddness judgments are suspended is taken as an indicator of the status of the coda. In (5.18) **F** indicates falsity and **O** oddness.

(5.18) *a.*	Two American kings were at the party	**F; O**
b.	There were two American kings at the party	**F (O)**

(5.18b) is said to be evaluated relative to a domain restricted to the coda set, and not necessarily relative to the entire bulk of discourse participants' background knowledge. Abusch and Rooth disagree with the assessment procedure proposed in Reinhart (t.a.), but they agree with Reinhart that in existential sentences the coda has a Topic discourse function.

(*ii*) A final argument for assigning Topic status to the coda comes from the distribution of *NP*s that can be part of coda *PP*s. What we find is that this distribution is conditioned (ultimately) by the information structure articulation of the sentence, which is indicative of the (implicit) question it is an answer to.

In existential sentences of the usual kind the coda is relatively unstressed, and the main stress of the sentence falls on the 'logical subject' *NP*. We take such sentences to answer questions like *What's new here?* or *What is there/what can you see at ...?*.

[9] In Dutch, however, verbs of destruction and disappearance can occur in existential sentences. This is shown in the following piece of discourse:

α *a.* De aardbeving was zeer hevig.
"The earthquake was very severe"
b. Een groot aantal huizen verdwenen onder de grond zonder een spoor achter te laten.
A large number of houses vanished without a trace
c. Er verdween zels een hele boomgaard.
An entire orchard disappeared
d. Er waren verschillende kostbare schilderijen verdwenen.
Several valuable paintings disappeared

In such sentences $MON \downarrow$ *NP*s and *NP*s with modified numerals (*at least n*) are strongly dispreferred:[10]

(5.19) *a.* There is a cat on a roof
b. on the roof
c. ?on at least two roofs
d. on every roof/most roofs

(5.20) *a.* There is a cat ∗on no roofs
b. ∗on few roofs
c. ∗on at most two roofs

The sentences in (5.19) and (5.20) show the following:

In the 'usual' type of existential sentence

(*a*) The coda has scope over the *NP*; this is apparent from the universal quantifier in (5.19d), and from the slight oddness of the modified nominal *at least two roofs*, of which it has been attested independently that it rarely takes inverse scope (Liu (1990)). The wide scope of the coda can also be seen from examples like *There are no cats on a roof*, where negation in the 'logical subject' *NP* has narrow scope relative to the coda.

(*b*) $MON \downarrow$ *NP*s in the coda are ungrammatical, or at least semantically ill-formed (in affirmative sentences). This we take to be an indication of the 'aboutness' function of the coda, which is indeed a characteristic feature of Topics. This is further supported by the special status of bare plurals in the coda *PP*. ((5.21) was inspired by Hungarian: the reader may recall from the preceding chapter, for instance, that Hungarian bare nominals may not be Topicalised.)

(5.21) *a.* #There are two cats on roofs
b. There are cats on roofs

For the time being, the Topic status of a locative coda will amount to being assigned wide scope relative to the rest of the existential sentence, and to binding the variable introduced by the expletive. At present, however, the Topic status we assign to the coda is little more than a work hypothesis, as we are aware that in the relevant examples another factor may be involved. This is what may be called 'congruence':

(5.22) *a.* ???There is a cat on few roofs
b. (?)There are cats on few roofs
c. There is a cat on two roofs
d. There are cats on two roofs

What we see in (5.22) is that (*i*) sometimes a sentence does not seem to have the scope options it may in principle have (as in (5.22c)), and (*ii*) expressing the intended scope variant is more appropriate with some other, scopally 'marked' element (e.g. a bare plural, as in (5.22b) or (5.22d)). These issues will have to be set aside, however.

There is quite a large number of cases when the distribution of *NP*s in locative coda-*PP*s is considerably more varied than in the 'usual' type of existential sentence. These are sentences that (*i*) are typically partial answers to questions like *How many X-s are there at which location?*, or *What kind of X-s are there at which location?*. Or, (*ii*) these can be sentences with contrastive or corrective Focus:[11]

(5.23) *a.* There were several guards in front of government offices, but
b. there were guards in front of NO buildings that belonged to the opposition

[10] Sentences like (5.19d) were already discussed in Keenan and Faltz (1985).

[11] The prosodic contour of the sentences below has remained unmarked on purpose.

(5.24) *a.* There are two chimneys on (the) roofs of 18th century French manor houses
b. (and not on (the) roofs of humble cottages in 16th century Flanders)

These data are remarkable, because the information structure articulation of *there*-sentences is usually thought to be rather constrained: existential sentences are taken to express propositions about what is 'new', usually at some fixed, contextually given location, or in the world at large (cf. Ladusaw (1994) or Kim (1996)). The examples above (even when they do convey new information or do not count as presuppositional) suggest that at least the relevant *questions* or *alternatives* are salient in discourse. In these notes we will set these cases aside and focus on the 'usual' type of existential sentences.

To conclude, this preliminary part has discussed issues that are (technically speaking) not central to the unification-based analysis which forms the core of our proposal. Nevertheless they are important, for the following reasons.

Where novelty is concerned, (*i*) we subscribe to the view that the Definiteness Effect is in some sense a novelty constraint. The analysis we propose is based on binding, and weak *NP*s will be those that can be bound by the (expletive+)verb. But this is a logical issue, and one of its facets is that the *NP*s that are amenable to this form of binding are the ones that introduce a novel discourse referent. (*ii*) We take novelty to pertain to the level of DRS-es, since it is clear that two distinct *and* novel discourse referents may in fact denote the same individual, while they are not bound to each other at the DRS-level.

The discussion on the role of the coda, tentative as it has been, is relevant because it may help to elucidate the 'perspectivising' effect of the coda noted in Levin and Rappaport-Hovav (1995). This effect would tally with a Topic status for this element. Empirical evidence so far has concerned the Source/Goal asymmetry in English, the suspension of oddness judgments with 'empty domain' *NP*s (such as *two American kings*), and the limited distribution of *NP* types in the 'usual' type of existential sentence. If more robust evidence could be found, this would be crucial in uncovering the semantics of existential sentences.

5.2.2 Unification with Store Variables: Basics

1. A *substitution* θ is a finite set of the form $\{v_1/t_1, \ldots v_n/t_n\}$, where the v_i-s are variables (distinct from each other), and each t_i is distinct from the corresponding v_i; the elements v_i/t_i are called bindings for v_i.

2. Given a substitution θ and an expression (term or atomic/quantifier-free formula) E, $E\theta$, the *instance* of E by θ is the expression obtained from E by simultaneously replacing each occurrence of the variable v_i in E by the term t_i.

3. Given a finite set S of expressions $\{E_1, \ldots E_n\}$, then $S\theta$ is $\{E_1\theta, \ldots E_n\theta\}$.

4. If S is a finite set of simple expressions (terms or atomic formulae), a substitution θ is a *unifier* for S if $S\theta$ is a singleton.

(Lloyd (1987):20–23)

The *unification* of a set S of formulae $\{\varphi_1, \ldots \varphi_n\}$ with unifier θ is the conjunction (or merge, in DRT) $\varphi_1\theta$ & … & $\varphi_n\theta$. In DRT this can be generalised to 'simple' (quantifier-free) DRS-es.

The method we will use here is a bit more involved, but it still relies on term unification. The reason is that we take the semantic information attached to nodes in syntactic trees to be considerably richer than a 'plain' DRS. In doing this we follow Kamp (2001c). The contribution of a node consists in an ordered pair $\langle$*Store, Content* $\rangle$, where *Content* is a DRS, and *Store* consists in

- a variable,
- a constraint (a DRS), and

- a Binding Condition corresponding to the status of that variable (depending on syntactic category, argument/adjunct status and, with *NP*s, determiner type).

When merging semantic information related to two nodes the union of store sets and the merge of content DRS-es is taken. Content-DRS-es will show a head–argument asymmetry; this will become apparent as the first examples are introduced. Within stores, variable pairs are unified, if and when permitted by Binding Conditions.

5.2.3 Discourse Referents and Placeholders

The mechanism we propose for the way in which the meanings of *there*-sentences are composed from the meanings of their grammatical constituents is nonstandard in two different respects. First, we assume that from a semantic point of view *there* and the verb *be* form a constituent *there be*. Here we will present the meaning of this "constituent" as given (as if the combination was an idiom, for which a separate semantic interpretation is provided by the lexicon). We leave it open whether it it would be possible to give a motivated account of how this meaning can be obtained from separate semantic representations for *there* and *be*. The semantic representation of *there be* we assume is that in (5.26).

Secondly we will make use of a special 'unification-like' mechanism for combining the meaning of *there be* with that of the object phrase. We will, that is, specify a mechanism of identificaton of particular 'variables', whose identity is determined by their 'origin' — i.e. in terms of the syntactic constituents from which they are derived in the process of constructing the semantic representation.

Presupposed by this mechanism is a distinction between 'real' variables which correspond for present purposes to the discourse referents of classical DRT, as in Kamp and Reyle (1993), and 'dummy' variables, which serve to mark the argument positions of predicates.[12] These dummy variables are for the most part replaced by 'real' variables in the course of semantic composition, and consequently will have been eliminated by the time the semantic representation of the sentence has been computed. The distinction was first introduced into DRT in Kamp and Roßdeutscher (1994b), where 'placeholders' served to mark semantic argument positions of lexical predicates. When the predicate (e.g. a verb) appears in a sentence, those argument positions which are filled by argument phrases occurring in the sentence are replaced by the discourse referents which those phrases introduce; and eventually those argument positions which are not filled in this way — the 'implicit' arguments of the given predicate token — are quantified existentially, but in such a way that no new discourse referent is made available for subsequent pronominalisation.

The mechanism we will define here is closely reminiscent of this. As in Kamp and Roßdeutscher (1994b), we will use dummy variables as place holders for arguments of predicates. These differ from 'real' variables in that they do not give rise to store elements (and thus will not be part of the final sentence representation in the form of discourse referents or bound variables), but there is one exception to this: the dummy variable marking the internal argument positions of Definiteness Effect verbs does get entered into the store, with a Binding Condition to the effect that it is to be eventually turned into an existential quantification with narrowest possible scope. This is shown in the semantics of *there be*, which has a store element for the variable β which stands proxy for the *NP* of the *there*-sentence, and will thus have to be replaced by the variable that the subject of such a sentence introduces.

Following Kamp and Roßdeutscher (1994b), we assume that the syntactic structure of the sentence establishes which argument phrases correspond to which argument positions. We won't go into the details of this process of 'q- linking', but assume that the syntactic input to the process which assigns a semantic representation contains an explicit representation of the argument links. In particular, we take it for granted that it is the variable β in (5.26) that is linked to the grammatical subject of a *there*-sentence (and similarly for the other cases of Definiteness Effect predicates with which we are concerned). In addition, 'argument linking' for *there be* also involves a link between the predicate variable P in the representation of *there be* and the noun (the N'-part) of the subject.

[12] What we call 'dummy' variables or 'placeholders' corresponds to D. Farkas and H. de Swart's 'thematic arguments', cf. Farkas and Swart (2001)

This additional link corresponds to the intuition that *there be* and other definiteness effect predicates are 'incorporating': the argument slot with respect to which the predicate is a Definiteness Effect predicate makes a slot available for the property contributed by the argument phrase. However, the present treatment differs from the standard versions of incorporation (as in van Geenhoven (1998)), in that the predicate does not only present a slot for the property but for the bearer of the property as well.[13]

Combining the representation for *there be* with that of the *NP* now takes the following form. As with normal cases of argument instantiation, the linked discourse referents are substituted for the place holders to which they are linked, and then the two representations are merged. As usual, merging means that the two store sets are united into a single store, and that the two DRSs are merged in the familiar way. (i.e. universe with universe and condition set with condition set). The one difference with ordinary cases of argument instantiation is that it is now possible for the discourse referent y which is linked with β to occur in two different store elements, its own store element and the one for β which is supplied by *there be*. In principle this may render the merge incoherent, for the two store elements may impose on y conflicting binding requirements. In fact, this is precisely what happens when the *NP* comes with a Binding Condition of its own which is incompatible with the narrow existential Binding Condition on β. Examples are the Binding Conditions for Quantificational *NP*s and those for (anaphoric) Definite *NP*s. In the former case y will be bound by the *NP*'s Determiner and in the latter, there is a requirement of 'Discourse Linking' which is equally incompatible with the requirement on β. Compatible with the BC on β are only the existential Binding Conditions of indefinites. These are weaker than the Condition on β in that they do not specify where their variable is to be bound, and are thus subsumed under the latter condition when merging occurs.

Nevertheless, even in such cases where the Binding Condition of the referential argument y of the argument phrase is subsumed by that for β, y may make an independent contribution to the resulting representation. To see this, compare the following Hungarian sentences, in which *van* 'be' is combined with (i) a bare singular N and (ii) a 'full indefinite' with the determiner *egy* 'one'.

(5.25) *a.* Macska van a tetőn. #Fekete/#Feketék
Cat is the roof-on. Black/Black-Pl
"There is/are some cat(s) on the roof. It is/they are black"
b. Van egy macska a tetőn. Fekete.
Is one cat the roof-on. Black.
"There is a cat onp the roof. It is black"

The two sentences differ in that the second but not the first allows for subsequent pronominalisation of the subject, as shown in (5.25). The explanation we want to give of this difference is that the full *NP* *egy macska* 'a cat' introduces a "genuine" discourse referent y with an existential Binding Condition, whereas the bare singular noun only introduces a place holder δ, with no Binding Condition of its own (this will be shown in (5.33)). Combining the representation of *there be* with either *NP* as subject is possible. But the effects are subtly different: Combination with the bare singular *macska* 'cat' yields a representation in which β is replaced everywhere by δ, and in which the store contains just one Binding Condition for δ, viz the one which comes with β. The subject is not represented by a real discourse referent in this case and thus provides no antecedent for a subsequent pronoun.[14] Combination with an *NP* beginning with *egy* 'a(n)'/'one' leads to replacement of β by the genuine discourse referent y, and even though the Binding Condition on β has the

[13]Lastly there also is a link between the state variable s from the representation of *there be* which represents the state of the argument satisfying the predicate and the state s' contributed by the argument phrase, which represents the state of the referential argument y satisfying the nominal predicate (labelled by) N. This is a feature which on our account *there*-sentences share with copula constructions: In both cases the state expressed by the verbal predication and the state of satisfying the N-predicate coincide, with the effect that satisfaction of N is always simultaneous with the state contributed by the verb.

[14]An additional obstacle for pronominalisation is the fact the δ is unmarked for number, whereas a pronoun has to 'know' the number feature of its antecedent. The deeper reason for this is that in Hungarian the marked number is the plural, and the singular could more appropriately termed as 'numberless'. This is to be understood in contrast with English, where it is the plural which is unmarked.

effect that y gets existentially bound with narrow scope, this still means that the subject leaves an antecedent behind for subsequent pronouns.

Let us repeat the main feature of this analysis. What we have presented is a slight extension of the usual argument linking process, which in one form or another is found in any explicit account of the syntax-semantics interface. The extension consists in argument linking being no longer confined to cases where the place holder is unbound (i.e. produces no element in store); it now also arises in one other case, viz. where the place holder is subject to existential binding of its own. We conjecture that all cases of the Definiteness Effect involve existential place holder binding of this kind. It is an interesting question whether there are other extensions of argument linking, which involve other types of place holder binding. But at the moment we have no evidence of such cases.

# # #

As noted, *there be* is taken to form one semantic constituent, and is assigned the following representation:

(5.26) *a.* *there be:*

$$b. \quad \left\langle \left\{ \begin{array}{l} \langle t, \quad , BC_{t.loc}\rangle, \\ \\ \langle s, \boxed{t \subseteq s}, BC_{e_m}\rangle, \\ \\ \langle \tau, \boxed{\tau = \mathcal{L}(s)}, BC_{pron}\rangle, \\ \\ \langle \beta, \boxed{\beta = AT_f(s)}, BC_Q\rangle \end{array} \right\}, \boxed{\begin{array}{c} s\colon P(AT_f(s)) \\ (\beta = AT_f(s)) \end{array}} \right\rangle$$

In (5.26b), the set of triples on the left is the variable store that comes with the verbal complex *there be*, and the DRS on the right hand side represents the 'content' contributed by it. The store contains the temporal location variable t (assumed to come with main verbs), the state discourse referent s, the variable τ, which is a pronominal placeholder for the coda, and the individual discourse referent β. The status of β is particular, in that it is both a placeholder and a bound discourse referent in its own right. *There be* also expects a property type discourse referent, as noted by the variable P. This is to be supplied by the descriptive content of the *NP*: note that P is made part of the state description — on our analysis this is the first condition on incorporation.

- β is not a mere placeholder, but a (bound) discourse referent in its own right. This is reflected by its status as a store element. It might be thought that this is a DRT+storage rendering of van Geenhoven's Semantic Incorporation schema (4.106). This is not quite true, however, since on this analysis the *NP* too contributes a discourse referent, which will be identified with β. That is, (5.26) is more like the analysis from Blutner (1993) (the Appendix also contains a discussion of Blutner (1993)). (5.26) differs from both van Geenhoven (1996) and Blutner (1993) in that (*i*) weak *NP*s introduce their own discourse referents (contra van Geenhoven's analysis), and (*ii*) *there be* too introduces (and binds) a discourse referent (contra Blutner).

- β is defined as maximal and unique relative to the tokens s and τ. This is intended to capture the 'attributive' and event (state-)dependent character of the *NP* and its discourse referent.

  This property of the *NP* is implemented by defining β as the value of a function AT_f from states (or state-location pairs) into individuals. Alternatively, β can be taken as the sum of all individuals in state s, at location τ, and with property P. **Exercise:** In logic it is customary to connect functors to predicates (similar in 'content') by means of meaning postulates. Define a meaning postulate that connects the function AT_f to a predicate AT_P.

- Something not quite apparent from (5.26) on its own is that the state discourse referent s will in turn be merged with a state variable, say, s', contributed by the *NP* (see e.g. Musan (1995), Musan (1996)). Motivation for this move is found in e.g. Musan (1996). It has to be noted that (in the interpretation) s' will not correspond to the entire life-span (say S) of the individual(s) denoted by the *NP*. Rather, it will in fact be a substate s' of S overlapping the time of the main predication.

Hungarian *hoz* 'bring' on its terminative construal is assigned the entry in (5.27b)..[15] Basically, (5.27b) has two features relevant for the analysis: First, it has a complex subevent structure, which is necessary because of the relationship between the Definiteness Effect and aspect (it may be recalled from the previous chapter that Hungarian verbs show the Definiteness Effect only when they have a telic/terminative construal). Second, the precondition state in (5.27b) is identical in content and in binding properties to the representation of English *there be*. This is motivated by the striking similarities between the two languages, in spite of the divergence in pre-semantic division of labour (in that in English and other Germanic languages the Definiteness Effect is most robustly and conspicuously tied to a syntactic configuration, whereas in Hungarian it is purely lexical).

As we noted in the previous chapter, the similarity between Hungarian and English is due to the fact that English *there*-sentences do not allow transitive verbs. If they did, some similarities between the two languages (e.g. scopal behaviour) would be preserved, but there would no longer be a likeness in argument linking (because then it would be the subject and not the direct object that would show the Definiteness Effect). From another point of view, one could say that what would then remain intact would be the *lexical* parallels between Hungarian Definiteness Effect verbs and English (quasi) Definiteness Effect verbs (*have, find, acquire, bake . . .*).

In (5.27b) α is a placeholder for the subject,[16] β is the 'quantified' placeholder for the internal argument familiar from (5.26b), and γ is the Goal location — cf. the preceding chapter for a discussion on the necessity of postulating a distinguished Goal argument for Definiteness Effect verbs. *ec* corresponds to a complex event (see e.g. Kamp and Roßdeutscher (1994b), Moens and Steedman (1988), or Pustejovsky (1991)). $\oplus_e$ is an operation that 'joins' (sub)events into such event complexes.

(5.27) *a.* *hoz* ('bring'):

$$b. \quad \left\langle \left\{ \begin{array}{l} \langle t, \;\; , BC_{t.loc} \rangle, \\[6pt] \langle ec, \boxed{ec = \varepsilon \oplus_e s}, BC_{e_m} \rangle, \\[6pt] \langle s, \boxed{\begin{array}{c} t \subseteq s \\ s = RES(\varepsilon) \end{array}}, BC_{subev} \rangle, \\[6pt] (\langle \varepsilon, \ldots \rangle), \\[6pt] \langle \beta, \boxed{\beta = AT_f(\gamma, s)}, BC_Q \rangle \end{array} \right\}, \boxed{ec\!: \boxed{\begin{array}{c} \varepsilon\!: \alpha \textit{ P-bring to } \gamma \\ s\!:\; P(AT_f(\gamma, s)) \end{array}}} \right\rangle$$

The event description associated with *hoz* is a complex *ec* that consists in a process ε and a consequent state s (the 'consequent state' status of s is encoded in the condition $s = RES(\varepsilon)$).

The representation of *hoz* lacks a precondition state:[17] of course, the real-world preconditions of (real world) events are the same for English *bring* and Hungarian *hoz* (viz that prior to the event,

[15]The atelic/durative construal of this verb can be obtained from (5.27b) by 'removing' the consequent state (including β!) from the event structure *ec*. See also the **exercise** on page 130.

[16]Hungarian is pro-drop. Therefore α may be a genuine discourse referent, contributed by the pronominal inflectional suffix on the verb. In this case it has to be part of the main store. Nothing hinges on its actual status, however.

[17]This is to be understood contrastively: the subevent structure of English or German event verbs is uniformly assumed to contain the description of the state that precedes the event, cf. Dowty (1979/1991), Pustejovsky (1991), Kamp and Roßdeutscher (1994b), Sæbø (1996).

the Theme is NOT at the Goal location γ). Only, the entry for *hoz* (and entries of Definiteness Effect verbs in general) has been proved to lack this information. This obviously is related to the 'out of the blue' manner in which these verbs describe events.

Note that the description of the process ε too expects a property argument (see also (5.3)). On the atelic construal of the verb, P is assumed to be contributed by a bare nominal. **Exercise:** on the basis of (5.27b), construct a representation for the atelic construal of *hoz* 'bring', and check that on this atelic construal *hoz* cannot combine with a full *NP*. The reason: the entry for process *hoz* alone contains no individual discourse referent. The referent β is introduced only in the consequent state. Thus, process-*hoz* enters such combinations as *széket hoz* 's/he is chair-bringing'.

The consequent state description for *hoz* is for all practical purposes the same as the state description for *there be*. The only notational difference is that for Hungarian the Goal variable is noted as γ and not as τ, as a reminder of Jackendoff's generalised Goal (Jackendoff (1990/91)). In the case of verbs like *hoz* (those that can have a process construal) the consequent state is said to be contributed by a covert perfectivity operator. But this operator is in fact a hybrid, since it also contains 'nominal' information (the referent β and, in proper *VP*s, the descriptive content of the internal argument *NP*). This yields a configuration like the following:

(5.28)	*a.*	$[e_i V]$	NP_i
	b.	$[e_i$ *talált*$]$	*két macskát*$_i$
		$[e_i$ *found-3Sg*$]$	*two cat-Acc*$_i$

In contemporary syntactic terms, the internal argument *NP* can be said to be part of a chain, s.t. the preverbal, covert part of the chain contains both nominal information and consequent state-information.[18] This is precisely our 'perfectivity' operator.

There are Hungarian Definiteness Effect verbs that are inherently telic. *Talál* 'find' or *kap* 'receive' are such verbs. For these verbs the perfective operator is assumed to be part of their lexical entries.

As said earlier, the consequent state of Hungarian Definiteness Effect verbs is for all practical purposes the same as the state description contributed by *there be*, including the function AT_f responsible for the event-dependency of β. AT_f guarantees this property at the level of discourse, relative to the variable token s (and, indirectly, relative to the entire event complex ec).

At this point one may ask the question how the (discourse level) one time only property of existential constructions is guaranteed by (5.26b) and (5.27b). One may think that the relevant factor is the function AT_f. AT_f however works in reverse: instead of guaranteeing that it is only once that some entity undergoes an event or is in some state (or is mentioned as undergoing or being in one), it guarantees that every event or state token has a Theme β which is unique relative to that token. It does not exclude a referent β appearing in a similar role in relation to other event or state tokens.

Instead of At_f, then, what really guarantees the one time only property is the novelty/binding requirement on the variable that β unifies with. Since β can unify with free (=novel) variables only, this means that every event/state token that comes with such a binding discourse referent β_i will combine with an *NP* that contributes a new discourse referent. Assuming the contrary, i.e. that there is a discourse referent (say, u), which is bound to two such binders ($\beta_{1,2}$) will contradict the properties that the βs have ex hyp. (The argument is similar to our argument from the preceding subsection viz novelty lives in the representational component.) Note also that the one time only property is but a consequence of the binding properties of β. [19]

Under this analysis the one time only property is representational, and nothing is said about the way it may 'persist' in the interpretation. Better said, there is nothing in the interpretation that would prevent two discourse referents $u_{1,2}$ (bound to 'their' respective $\beta_{1,2}$s) from denoting the same

[18] (5.28) corresponds to Anna Szabolcsi's proposal from Szabolcsi (1986). Only, her proposal is almost purely syntactic, whereas on the present analysis the chain in (5.28a) has a precise semantic correlate.

[19] As remarked in the preceding chapter, the empirical status of this property does not match its 'theoretical' or logical status: A phenomenon which may seem striking at first sight, and which offers a testable clue for underlying semantic properties is in fact nothing but a formally not too interesting derivative of what is taken to be the 'core' property, viz binding by β.

individual. This is not necessarily a drawback of the analysis, since our aim has been to capture the ways in which make available and creation verbs can be said to form one class. That is, our analysis says, correctly, that the same cat can be found twice, but it does not exclude the same house being built twice.

The distinctive properties of creation verbs within this class may be defined (in future work) if the following are kept in mind: First, these verbs are one time only as regards the interpretation. Second, they obviously differ from make available verbs in that the life-span of the referent of the internal argument is determined by the event (and not only knowledge about that referent, as with make available verbs). We assume then that Hungarian creation verbs like *ír* 'write' or *épít* 'build' have entries like (5.27b), plus an additional postulate that guarantees the 'strengthening' of the relevant properties. In fact, we have the following options:

(*i*) The second author's proposal is to modify the general format of (5.27b) by adding a so-called precondition state s_0, which has the status of a presupposition (cf. Kamp and Roßdeutscher (1994a), Sæbø (1996)). That state can be taken to be the opposite of the consequent state, i.e. to say that at s_0, the distinguished referent β is NOT AT the Goal γ. Now with creation verbs γ is a world variable: hence, with such verbs the (predicate version of) AT translates as an existence predicate. Therefore the precondition state of a creation verb says only that the theme does not exist prior to the event.

(*ii*) Another option is to resort to another, more traditional sort of meaning postulate, which says that the Theme's existence is caused by the event in question, and that all times at which the Theme exists are included in the consequent state of the verb. **Exercise**: On the basis of these informal paraphrases construct a representation for *kap* 'receive' and for *ír* 'write'.

English verbs of result (*find, choose, acquire*) resemble their Hungarian counterparts in their opacity or quasi Definiteness Effect properties, just in case their internal argument is a relational *NP* (whose 'other' argument may be bound to the Beneficiary, which is usually the subject).[20] On our analysis, these verbs expect a relation constant R to complete their consequent states (see also Burton (1995)), and in this they resemble *have* or their Hungarian counterparts. Unlike Hungarian verbs, however, they are said to contain a precondition state (cf. *Mary saw a house she liked.* can serve as antecedent for *She finally acquired it when the owner agreed to sell.*) Another difference between Hungarian verbs and English *acquire* type verbs is that in the English case the internal argument discourse referent is not bound (hence the absence of β from the store) and it is not unique relative to the variable token s. This may seem like a considerably weakened analysis, but the reader can check as an **exercise** that it yields the right opaque or quasi Definiteness Effect properties.

(5.29) *a.* *acquire:*

b.
$$\left\langle \left\{ \begin{array}{l} \langle t, \quad , BC_{t.loc}\rangle, \\ \langle ec, \boxed{ec = s_0 \oplus_e \varepsilon \oplus_e s}, BC_{e_m}\rangle, \\ (\langle s_0, \boxed{s_0 = PRE(\varepsilon)}, BC_{subev}\rangle,) \\ (\langle \varepsilon, \ldots\rangle), \\ \langle s, \boxed{\begin{array}{c} t \subseteq s \\ s = RES(\varepsilon) \end{array}}, BC_{subev}\rangle, \\ (\langle \gamma, \boxed{\gamma = G(ec)}, BC_{pron}\rangle) \end{array} \right\}, \boxed{ec\colon \boxed{\begin{array}{c} s_0\colon \neg R^*(\alpha,\beta) \\ \varepsilon\colon DO(\alpha,\varphi) \\ s\colon R^*(\alpha,\beta) \\ (\gamma = \alpha) \end{array}}} \right\rangle$$

[20] Disregarding cases like *Mary acquired a new house/a new secretary.* Here the adjective *new* is seen as the source of opacity, cf. Moltmann (1996). Indeed, *new* has this effect with other verbs, which do not necessarily share the properties of *acquire.*

5.2.4 Composition

This part presents worked-out cases of combining a Definiteness Effect verb(al complex) with an *NP*. We will first review the 'classical' cases of weak and strong *NPs*. We will then devote some time to possessive descriptions, negation and conjunction.

As said before, the method of composition we resort to is unification rather than λ-abstraction. On this version of DRT, unification means the substitution of one term for another, as in the definitions on page 126, and, in addition, taking the unions of the store sets and the condition sets contributed by constituents. The subsitution of one variable for another is driven by the matching of the Binding Conditions these variables come with.

Indefinites:

A preliminary of our analysis is that *NP*s are assumed to contain a state variable which intuitively corresponds to the time span of the applicability of the descriptive content to the *NP*'s discourse referent (cf. Musan (1996)):

(5.30) *a.* *two cats:*

b.
$$\left\langle \left\{ \begin{array}{l} \langle t_X, \quad , BC_{n.pr.t.} \rangle, \\ \langle s_X, \boxed{t_X \subseteq s_X}, BC_{n.t.dep.} \rangle, \\ \langle X, \boxed{\begin{array}{c} |X| = 2 \\ s_X\!: cat^*(X) \end{array}}, BC_{indef} \rangle \end{array} \right\}, \boxed{} \right\rangle$$

(5.30b) reads as follows: beside the expected collective discourse referent X, the store contains a state s_X and a location time t_X for it. t_X is a kind of reference time for *NP*s; like any reference time, it is assumed to be included in (the time of) the state s_X.[21] Note that the content-DRS of (5.30b) is empty: this is because the *NP* is not the lexical anchor of the sentence-DRS. Its descriptive content is entered as a constraint in the store (note the similarity to proposals to replace variable–condition pairs with sorted variables — Farkas (1997)).

(5.31) *a.* *there be:*

b.
$$\left\langle \left\{ \begin{array}{l} \langle t, \quad , BC_{t.loc} \rangle, \\ \langle s, \boxed{t \subseteq s}, BC_{e_m} \rangle, \\ \langle \tau, \boxed{\tau = \mathcal{L}(s)}, BC_{pron} \rangle, \\ \langle \beta, \boxed{\beta = AT_f(s)}, BC_Q \rangle \end{array} \right\}, \boxed{\begin{array}{c} s\!: P(AT_f(s)) \\ (\beta = AT_f(s)) \end{array}} \right\rangle$$

When the weak *NP* *two cats* is combined with *there be* (represented as (5.26b), repeated here as (5.31b)), the resulting representation is (5.32b) (except that present tense information is included

[21] The subscripts on the Binding Conditions for t_X and s_X indicate their 'nominal' character, viz the need to be related to the time of the main eventuality described by the sentence.

in (5.32)):

(5.32) *a.* *there are two cats:*

$$b. \quad \left\langle \left\{ \langle \tau, \boxed{\tau = \mathcal{L}(s)}, BC_{pron} \rangle \right\} , \begin{array}{|c|} \hline t\ s\ X \\ \\ t = n \subseteq s \\ |X| = 2 \\ s{:}\, cat(AT_f(s)) \\ (X = (\beta =)AT_f(s)) \\ \hline \end{array} \right\rangle$$

When combining (5.31b) with (5.30b), the following substitutions are to be performed: β/X, P/cat, and s_X/s. The *NP*'s descriptive content is entered now in the main DRS, and the store is emptied of the variables contributed by the constituents that have been combined. These variables are now part of the (local) DRS universe.

We take the Binding Condition for indefinites to be underspecified, and X therefore inherits the binding condition of β: BC_Q subsumes BC_{indef}.

Exercise: check that on this analysis an indefinite combined with *there be* cannot get wide scope (as in *John thinks that there is a cat on the roof*), nor can it be in the restrictor if *there be* isn't (*There is always a cat on this roof*).

Composition for Hungarian *talált két macskát* 's/he found two cats' works in the same manner. With one difference, the same holds for *Mary acquired a husband*: the variable R from (5.29b) is bound to *husband*. In this case, the *NP a husband* is said to come with two variables, a 'proper' discourse referent and a place holder, which gets bound to the discourse referent contributed by the *NP Mary*. **Exercise:** You may want to construct a representation for *a husband* and for *Mary acquired a husband*.

Exercise: how does *talált két macskát* 's/he found two cats' differ from *Mary acquired a husband*, as regards the state of being (two) cats and the state of being Mary's husband? This has to do, among other things, with the difference between 'make available' verbs and verbs of result.

The attentive reader may have noticed that our representation for *acquire* is predicted to take only relational nouns as internal arguments, while it can in fact combine with non-relational nouns. The reason for this is that we assume non-relational noun (phrase)s to be coerced into a relational construal, when they are internal arguments of *have* or *acquire*, or when they have a possessee role in a possessive description (see also Barker (1995), Jensen and Vikner (1994), Partee (2000)). We too will follow this practice when representing possessive descriptions (see (5.50) below). Yet another **exercise*** is to construct a representation for *Mary acquired a house* on the basis of (5.50) and (5.29). (NB some care is needed in order to avoid a reading which says that there is something which is a house, but was not one before Mary acquired it.)

Hungarian bare nominal incorporation:

Hungarian incorporation is handled with the same composition method that is used for existential constructions. From the point of view of variable management the main difference between incorporation and existential sentences is that bare nominals are assumed to come without a 'proper', non-placeholder discourse referent. Here this is rendered by analysing a bare nominal as providing a place holder variable only, one which is underspecified for number,[22] as in (5.33b) below.

(5.33) a. *macskát* ('cat-Acc'):

$$b. \quad \left\langle \left\{ \begin{array}{l} \langle t_\delta, \quad , BC_{n.pr.t.} \rangle, \\ \\ \langle s_\delta, \boxed{\begin{array}{c} t_\delta \subseteq s_\delta \\ s_\delta\colon cat^*(\delta) \end{array}}, BC_{n.t.dep.} \rangle \end{array} \right\}, \boxed{} \right\rangle$$

(5.34) a. *macskát talált*
cat-Acc found 's/he did cat-finding'

$$b. \quad \left\langle \left\{ \ (\langle \gamma, \boxed{\gamma = G(ec)}, BC_{pron} \rangle) \ \right\}, \boxed{\begin{array}{c} t \ ec \ \varepsilon \ s \\ t < n \ \ t \subseteq s \\ ec = \varepsilon \oplus_e s \quad s = RES(\varepsilon) \\ \\ ec\colon \boxed{\begin{array}{c} \varepsilon\colon \alpha \ \textit{cat-find for } \gamma \\ s\colon \ cat(AT_f(\gamma, s)) \\ \delta = AT_f(\gamma, s) \end{array}} \end{array}} \right\rangle$$

Hungarian bare nominals are taken to contribute basically a property only (with the situation/state parameter s_δ). Thus the placeholder discourse referent δ may (optionally) be entered into the store and unified with β, but this will not yield an accessible discourse referent of the kind that is contributed by a weak determiner.

Our approach shares a number of properties with the account developed in Farkas and Swart (2001). This includes the distinction between proper discourse referents and placeholder variables, and the role this distinction plays in excluding pronominal anaphora for incorporated nominals.

The most important difference between Farkas and Swart (2001) and the analysis presented here concerns the role of lexical (subevent) structure. In Farkas and Swart (2001) the lexical semantics of verbs is not relevant; in principle, any Hungarian verb could be incorporating.[23] On our account, incorporation is possible only with the so-called light verbs, which are analysed as expecting a property type internal argument. (Whereas in Farkas and Swart (2001) all Hungarian verbs expect an internal argument of the usual kind.) Confining incorporation in Hungarian to light verbs is supported by the findings É.Kiss (1998a): transitive Hungarian verbs are said to fall into two natural classes, precisely on the basis of their ability (or need) to be preceded by a bare nominal or some other secondary predicate (see also Komlósy (1994)). Statives like *szeret* 'like', *gyűlöl* 'hate' or *tud* 'know' do not accept bare nominal direct objects, and they have a mild inclination for taking specific object *NP*s.

A further difference concerns another aspect of subevent structure: on our analysis the incorporated nominal is in effect made part of the event description. This is useful for blocking unwanted existential entailments with intensional (or merely opaque) cases. *Bélyeget gyűjt* 's/he stamp-collects' *autót lop* 's/he car-steals', or *házat épít* 's/he house-Acc builds' can describe activities (or states) without the corresponding (real-world) objects. (That is to stay, 's/he stamp-collects' can describe the collector's disposition, when in fact no stamps have been collected so far.)

Definites:

[22] As noted earlier, in Hungarian the default number is the singular. Thus a question of the form *Do you have child?* can be answered with *Yes, I have two* (cf. Maleczki (1992)). This is the converse of a the result of a test for English that goes back to Manfred Krifka.

[23] Consequently, Farkas and Swart (2001) is suited for the analysis of incorporation in languages that do not place any particular lexical constraint on incorporating verbs. Hindi is such a language, cf. Dayal (1999).

Preceding discussion has revealed that (at least in English) definites are not always excluded from existential sentences. In this regard two observations are of interest for us here:

The first descriptive generalisation (for English only) is that a definite may occur in a *there*-sentence just in case it is not anaphoric. Thus (5.35b) is acceptable on its own, and is unacceptable when the definite has an antecedent in a(n immediately) preceding sentence:

(5.35) *a.* I saw two cats in the tree
b. ∗There are the two cats on the roof now

The second generalisation is that an anaphoric definite is acceptable with a Definiteness Effect verb just in case the verb itself is anaphoric, in a way which is made clear by (4.56), repeated here as (5.36). In such instances we may speak of the Definiteness Effect being 'lost', or 'cancelled'. This phenomenon is quite robust and systematic in Hungarian (cf. ex. (4.36) from the preceding chapter). In English, too, this is quite robust, just in case the (quasi) Definiteness Effect has a lexical source (see also (4.76) from the preceding chapter).

(5.36) *a.* Mary had a lover and a husband
b. She had the lover before (she had) the husband

(Irene Heim: p.c.)

In these notes we do not have a full account for the anaphoric mechanisms that make (5.36b) acceptable. What we can offer is the intended representation, together with some suggestions.

Returning to the general issue of definites in existential sentences, our framework allows for two options. These can be taken to correspond to the 'non-English' and the English case, respectively.

According to the first option, β cannot be bound to the referent X contributed by the definite, because their Binding Conditions do not match. This is the case, we think, in languages that do not admit definites in existential sentences at all. This relies on the assumption that in these languages the Binding Conditions of definites are incompatible with those of β. That is to say, in these languages semantic composition yields bad output already at the unification stage, viz at a stage that can be modelled as in (5.37b):

(5.37) *a.* (∗)*there are the two cats:*

$$b.\quad \left\langle \left\{ \begin{array}{l} \langle \tau, \boxed{\tau = \mathcal{L}(s)}, BC_{pron}\rangle, \\[1em] \langle \beta, \boxed{\beta = AT_f(s)}, BC_Q\rangle, \end{array} \right\}, \boxed{\begin{array}{c} s\ t\ X \\ \hline t = n \subseteq s \\ |X| = 2 \\ s\colon cat(AT_f(s)) \\ (\beta = AT_f(s)) \end{array}} \right\rangle$$

The second option corresponds to the English case: In English, presumably, the Binding Condition of definites *is* in principle compatible with that of β. That is to say, an English definite comes with an underspecified Binding Condition comparable to that of an indefinite, plus the requisite uniqueness presupposition (see also Kamp (2001b) for a proposal along these lines).

What makes anaphoric definites unacceptable in English existential sentences is, we think, a breach of locality. Suppose that β can be bound to X. Then, after Binding Conditions are converted into the more usual type of DRS-es, the Binding Condition for definite descriptions gets converted into a presupposition, yielding (5.38). This is ill-formed, because the discourse referent X is separated from its descriptive content. This is schematised in (5.38):

$$(5.38)\quad \left\langle \left\{ \boxed{\begin{array}{c} X \\ \hline ???? \end{array}} \right\}, \boxed{\begin{array}{c} s\ t \\ \hline t = n \subseteq s \\ |X| = 2 \\ s\colon cat(AT_f(s)) \end{array}} \right\rangle$$

The assumption behind (5.38) is that the contribution of *there be* has to be assertional. (In simpler terms, the badness of (5.38) may result from the event description's being unable to 'follow' the definite to the presupposition slot, as it were.) Then the prediction is that in existential constructions that allow the verb to be presuppositional, anaphoric definites are allowed just in case they are bound together with the verb.

This is precisely what we find in (5.36). The intended representation of one clause from (5.36b) is the following:

(5.39) *a.* *She had the husband:*

b.
$$\left\langle \left\{ \boxed{\begin{array}{c} \underline{x} \\ female(x) \end{array}}, \boxed{\begin{array}{c} \underline{s}\ \underline{t}\ \underline{y} \\ t<n \quad t\subseteq s \\ s\colon husband\text{-}of(x,y) \end{array}} \right\}, \boxed{} \right\rangle$$

(5.39b) says that it is presupposed that there was a past state of a woman's having a husband. (The pronoun *she* contributes to the presupposition-DRS on the left; the state description and the definite contribute the presupposition-DRS on the right.) Note that in this representation the contribution of the verb and that of the direct object *NP* are in one DRS, i.e., they contribute a well-formed representation.

The exact principles and mechanisms that enable an event and one of its arguments to be familiar or presuppositional are not clear at this time. Presumably they have to do with the information structure of these sentences: according to our judgments, in (5.36b) the two clauses are Background, or Theme, the Focus being on the temporal connective.

Quantificational *NP*s are unacceptable in existential sentences for the same reason as anaphoric definites: their Binding Conditions are incompatible with that of β:

(5.40) *a.* $*$*There is every cat*

b.
$$\left\langle \left\{ \begin{array}{l} \langle t, \quad , BC_{t.loc}\rangle, \\ \langle s, \boxed{t\subseteq s}, BC_{e_m}\rangle, \\ \langle \tau, \boxed{\tau=\mathcal{L}(s)}, BC_{pron}\rangle, \\ \langle \beta, \boxed{x=AT_f(s)}, BC_Q\rangle, \\ \langle x, \quad , BC_{every}\rangle \end{array} \right\}, \boxed{\begin{array}{c} t\ s\ x \\ t=n\subseteq s \\ s\colon cat(AT_f(s)) \\ (x=AT_f(s)) \end{array}} \right\rangle$$

By reductio ad absurdum suppose that β can be bound to x. This yields the ill-formed structure (5.41). Note that the wide scope property of the coda is a crucial element of the analysis: If this were not so, the coda could be entered in the nuclear scope of the quantifier, rescuing (5.41). This is not possible, however, for independent reasons discussed at the beginning of this chapter.

(5.41)
$$\boxed{\boxed{\begin{array}{c} x\ s\ t \\ t=n\subseteq s \\ s\colon cat(AT(s)) \\ x=AT(s) \end{array}} \;\; \Diamond\!\!\begin{array}{c} \forall \\ x \end{array} \;\; \boxed{?????}}$$

Presupposition triggers in existential constructions:

The relevant *NP* may contain presuppositions just in case these do not 'interfere' with the binding properties of the main discourse referent. **Exercise:** construct a representation for at least one sentence in (5.42).

(5.42) *a.* There is another cat on the roof
b. There is an owl on the roof too

In the light of such examples it is reasonable to say that the existential construction is a *hole* (Langendoen and Savin (1971), Heim (1983)) for presuppositions. In other words, it is not presuppositions as such that make strong *NP*s unacceptable in these constructions.

Constituent negation poses its well-known problems with existential sentences as well, since it is to be assigned wide scope at least relative to the verb(al complex). At the present stage of research we can see two options.

One option is to assume a properly constrained decomposition of *no* (or Dutch *geen* and German *kein*) into a negation operator and an indefinite, and allow negation to scope relatively freely, but to remain always on the 'left' of the indefinite (for a detailed discussion on the scopal properties of *kein* and *geen* see Swart (2000)). In this case, e.g. *there be* is composed with the 'remnant' of *no cats* (viz *cats* or *some cats*) in the usual manner, and negation would apply to the output.

The other option is to say that incorporation in existential constructions comes in two steps, anyway: one step is to compose the verb(al complex) with the descriptive content of the *NP*, and the following step is to compose with its determiner, such that the determiner will have (very local) scope relative to the $V + N'$. Schematically:

(5.43) $Det(V + N')$

One can see that constituent negation is but a subcase of (5.43). In this case, an *NP* like *no cats* is said to involve a special, negative Binding Condition, as shown in (5.44b). Merge can then proceed as usual. When Binding Conditions are converted into full representations, negation emerges as scoping over the construction. These steps are shown in (5.45b-c). (5.45b) corresponds to a stage where the requisite operations have been performed in the store component (i.e. the two stores have been unioned, and substitutions have been performed), but the content component is yet unchanged. (5.45c) shows a stage where (i) store variables have been 'discharged' (except for τ, which is still combine with the coda), and (ii) the content DRS now contains the conditions contributed by the *NP*, in accordance with the Binding Condition BC_{neg} (in simpler terms, negation has local scope over *there be* and the 'remnant' of the *NP*).

(5.44) *a.* *no cats:*

b.
$$\left\langle \left\{ \begin{array}{l} \langle \alpha, \boxed{s_\alpha\colon cat^*(\alpha)}, BC_{neg}\rangle, \\ \langle t_\alpha, \quad , BC_{n.pr.t.}\rangle, \\ \langle s_\alpha, \boxed{t_\alpha \subseteq s_\alpha}, BC_{n.t.dep.}\rangle \end{array} \right\}, \boxed{} \right\rangle$$

(5.45) *a.* *There are no cats:*

b.
$$\left\langle \left\{ \begin{array}{l} \langle t, \quad , BC_{t.loc}\rangle, \\ \\ \langle s, \boxed{t \subseteq s}, BC_{e_m}\rangle, \\ \\ \langle \tau, \boxed{\tau = \mathcal{L}(s)}, BC_{pron}\rangle, \langle \beta, \boxed{\beta = AT_f(s)}, BC_Q\rangle, \\ \\ \langle \alpha,\ BC_{neg}\rangle \end{array} \right\}, \boxed{\begin{array}{c} s\ t\ \alpha \\ \\ s\!: P(AT_f(s)) \\ (\alpha = \beta = AT_f(s)) \end{array}} \right\rangle$$

c.
$$\left\langle \left\{ \langle \tau, \boxed{\tau = \mathcal{L}(s)}, BC_{pron}\rangle \right\}, \boxed{\neg \boxed{\begin{array}{c} t\ s\ \tau\ \alpha \\ \\ t \subseteq n \\ s\!: cat^*(\alpha) \\ \alpha = AT_f(s) \\ \tau = \mathcal{L}(s) \end{array}}} \right\rangle$$

These two strategies concerning constituent negation yield different predictions about the availability of so-called split readings (on split readings see Swart (2000) and the references cited there). With these readings, it is possible for negation to have relatively wide scope, and the 'indefinite' part to stay in situ. Indeed, in many cases the split reading seems to be the preferred one:

(5.46) *a.* Dutch: Ze hoeven geen verpleegekundigen te ontslaan
They have no nurses to fire
De re: "For no nurse x is it necessary to fire x"
De dicto: #"It is necessary for them to fire no nurse(s)"
Split: "It is not necessary for them to fire nurses"

(Swart (2000): (4))

Split readings are relevant for existential sentences, because they can decide between the two options considered here. The 'free scope' proposal predicts split readings for existential sentences, whereas the 'local scope' predicts that these readings are unavailable.

The following Dutch example tips the balance in favour of 'free scope' negation (but more input is welcome):

(5.47) Dat rapport is vanwege het handschrift vrijwel onleesbar.
Maar daarom hoeven er nog geen fouten in te zitten
"That report is virtually illegible because of the handwriting.
Lit. But therefore need there still no mistakes in it to sit.
"But that is <u>no</u> reason why there should be <u>any</u> mistakes in it."

(5.47) is relevant, because here constituent negation (*geen*) within the embedded *er*-sentence scopes over the (negative polarity) verb *hoeven* 'need' from the main clause.

Possessive descriptions are acceptable in existential constructions just in case the possessor is a weak *NP* (cf. Woisetschlaeger (1983), Barker (2000)):

(5.48) *a.* There is an old man's bicycle in the garden
b. There is the editor in chief of the Economist in the pub
c. ∗There are all/most linguists' bicycles in the garden

Concerning synthetic Genitives, our (tentative) analysis rests on two assumptions: (*i*) The determiner in the possessor phrase is a determiner for the possessee as well. In this we follow Barker

(1995) and Partee (2000); in terms of the framework employed here this means that in a Genitive *both* the possessor and the possessee variable are subject to the Binding Condition that comes with the determiner of the possessor phrase. (*ii*) We don't take synthetic Genitives with weak possessors to be presuppositional. Here this means simply that the representation of the possessor remains at the same level as that of the possessee. This is motivated by the fact that the possessor cannot scope independently from the possessee (at least not in an existential sentence):

(5.49)
a. Every student thinks that there is a linguist's cat on the roof
NOT: There is a linguist, and every student thinks there is a (narrow scope) cat of his on the roof
b. There is always a linguist's cat on the roof
NOT: A linguist is such that there is always a cat of his on the roof

Given the observation in (5.49), we assume that possessor and possessee representations may not be separated. In the case of an existential construction, the possessor *NP* will remain local to that construction, without being in fact incorporated. The possessee variable in turn will inherit the binding condition of the possessor determiner. The schema in (5.50) can be regarded as a starting point of our analysis: the determiner is taken to act on the $\langle Possessor, Possessee\rangle$ pair. (5.50) represents a Genitive *NP* with an indefinite as Possessor: the store is said to contain the pair $\langle x, y\rangle$, with x as possessor and y as possessee. Both variables are said to come with the Binding Condition for indefinites (and $\mathcal{R}$ stands for an unspecified possessor relation; with relational possessees it is assumed to be substantiated by the content of that noun; in other cases it is left unspecified). (Determiners in possessive constructions were defined as relational in Partee (2000). In Barker (1991) quantificational possessors are said to bind both variables.)

(5.50) $\left\{\langle\langle x,y\rangle, \boxed{x\mathcal{R}y}, BC_{indef}\rangle, \ldots\right\}$

Thus, we do not take synthetic Genitives with a weak possessor *NP* to be presuppositional: *a linguist's cat* means *some cat of some linguist*. The possessor contributes to the same representation level as the possessee, without itself getting bound.

The full representation for *a linguist's bicycle* has the form (5.51b), where s_x and s_y stand for the states of being a linguist and a bicycle, respectively. The possessor relation $\mathcal{R}$ is itself part of a state description: it describes the state of being a linguist's bicycle.[24]

(5.51) *a.* *a linguist's bicycle:*

b.
$$\left\langle \left\{ \begin{array}{l} \langle t_{loc}, \quad , BC_{n.pr.t.}\rangle, \\ \langle s_x, \quad , BC_{n.t.dep.}\rangle, \\ \langle s_y, \quad , BC_{n.t.dep.}\rangle, \\ \langle s_{\mathcal{R}}, \quad , BC_{t.poss.}\rangle, \\ \langle\langle x,y\rangle, \boxed{\begin{array}{c} s_x\!: linguist(x) \\ s_y\!: bicycle(y) \\ s_{\mathcal{R}}\!: \mathcal{R}(x,y) \end{array}}, BC_{indef}\rangle \end{array} \right\}, \boxed{} \right\rangle$$

The existential sentence *There is a linguist's bicycle in the garden* will be represented in very much the same manner as the unproblematic sentence *There is a bicycle in the garden.* This is shown in

[24]In cases of inalianable possession these three states are assumed to be tied together rather intimately.

(5.52b) (again, the presupposition triggered by the definite in the coda has been ignored):

(5.52) *a.* *There is a linguist's bicycle in the garden*

$$b.\quad \left\langle \{\ \}\ ,\ \begin{array}{|c|} \hline t\ s\ x\ s_x\ y\ g\ l \\ t = n \subseteq s \\ garden(g)\ l = IN(g) = \mathcal{L}(s)(=\tau) \\ s_x{:}\, linguist(x) \\ \\ s{:}\begin{array}{|c|}\hline \\ bicycle(y) \\ \mathcal{R}(x,y) \\ y = \beta = AT_f(s,\tau) \\ \hline \end{array} \\ \hline \end{array} \right\rangle$$

(For the sake of clarity, we indicated which individual variables are equated with placeholders from the representation of *there be*: the spatial region l IN the garden is bound to τ, and β binds the possessee variable y.) In composing *there be* with a possessive description we assume that (i) β has access to the appropriate member of the pair $\langle x, y\rangle$, and yet (ii) the contribution of the possessor *NP* remains local.

Exercise: The reader can check that possessive descriptions with strong *NP*s as possessors are unacceptable in this framework for the same reason as 'ordinary' strong *NP*s are unacceptable. (That is, *There is every linguist's bicycle in the garden* is bad for the same reason as *There is every bicycle in the garden.*)

Conjunction:

Conjunction is problematic for unification based approaches (cf. Moore (1989)): the reader can check that the variable to be replaced by a term has not one but two terms to unify with. This problem can be overcome in two ways: either one postulates a version of conjunction reduction, or resorts to non-Boolean summation. Here we elaborate on both options, and discuss a construction that may serve to decide between the two strategies.

Conjunction reduction essentially creates n copies of the 'argument' A that combines with a complex category B_1 & ... & B_n that consists in n conjuncts (see Kamp and Reyle (1993): Ch.2). For *there be* and NP_1 *and* NP_2 this amounts to having *there be* NP_1 *and there be* NP_2.

Non-boolean conjunction in this framework amounts to forming the sum $\oplus$ (Link (1983), Kamp and Reyle (1993)) of the relevant discourse referents, and merging the output of summation with the 'other' discourse referent. In the case of *there be* NP_1 *and* NP_2, this means that β from the entry of *there be* will be unified with a discourse referent X obtained from the summation of the discourse referents contributed by the *NP*s. The *NP*s will also have to contribute a complex property variable for the placeholder property variable P to unify with.

The following sentences may serve as decisive in the choice between conjunction reduction and summation:

(5.53) *a.* ??There are two cats and their kittens on the roof
b. *There are two cats and all their kittens on the roof

The point of (5.53a) is that the presupposition triggered by the pronoun *their* in the first conjunct is resolved locally to the discourse referent provided by the first conjunct. With simple conjunction reduction (5.53a) is predicted to be perfectly ungrammatical, whereas with summation it is predicted to be perfectly grammatical. Our informants' judgments showed considerable variation, however, so, for the time being, this is an open problem. (5.53b) was judged as uniformly unacceptable. (5.53a) on the other hand was judged as halfway acceptable by some native speakers of English (those who do not reside in an English-speaking community). Those native speakers who currently live in an English-speaking community (viz they came from the UK or from the US) judged (5.53a) as perfectly acceptable.[25]

Apparently, those speakers of English for whom (5.53a) is acceptable seem to opt for a non-Boolean version of conjunction. The problem is to capture the representation assigned to (5.53a) by those speakers who did not regard this sentence as fully acceptable.[26]

Exercise: As opposed to (5.53a), *There are two cats with their kittens on the roof* is perfectly grammatical. Why?

At this point we provide representations for both the conjunction reduction approach and for the summation approach, with some partial explanations for the partial acceptability of (5.53a). NB, we intend these representations to be an invitation for further discussion.

Conjunction reduction: On the conjunction reduction strategy, conjuncts (as in (5.54b)) are unified with *there be* independently of each other. In fact there are two options here: (i) disallowing any interaction between the representations of the conjuncts, or (ii) allowing first for the resolution of the presupposition triggered by *their* to the first conjunct.

(5.54) *a.* two cats and their kittens

b.
$$\left\langle \left\{ \begin{array}{l} \langle t_X, \quad , BC_{n.pr.t.}\rangle, \\ \langle s_X, \boxed{t_X \subseteq s_X}, BC_{n.t.dep.}\rangle, \\ \langle X, \boxed{\begin{array}{c} |X| = 2 \\ s_X\!: cat^*(X) \end{array}}, BC_{indef}\rangle \end{array} \right\}, \boxed{} \right\rangle \langle and \rangle$$

$$\left\langle \left\{ \begin{array}{l} \langle t_Y, \quad , BC_{n.pr.t.}\rangle, \\ \langle s_Y, \boxed{t_Y \subseteq s_Y}, BC_{n.t.dep.}\rangle, \\ \langle\langle U, Y\rangle, \boxed{s_Y\!: \textit{kit-of}^{**}(U, Y)}, BC_{\{pr.,d.d.\}}\rangle \end{array} \right\}, \boxed{} \right\rangle$$

(5.54b) reads as follows: the first conjunct is the standard representation for an indefinite; the store for the second conjunct contains the pair of discourse referents $\langle U, Y\rangle$, since we assume that possessive descriptions crucially involve such pairs (see the discussion concerning (5.50)). This pair comes with the Binding Conditions of a pronoun and a definite description, respectively. Consequently, if the second conjunct is to unify with *there be* on its own (i.e. if the pronominal referent U cannot be resolved to X from the first conjunct) this leads to unacceptable results. This option corresponds to the representations of those speakers who found (5.53a) perfectly unacceptable.

If the presupposition of the second conjunct is bound *within* the conjunction, what we get is somewhat more acceptable. This however hinges on the assumption that Binding Conditions may get converted into presuppositions (and presuppositions may get bound) before the representations of constituents are merged. At any rate, what is assumed in this case that the pronominal discourse referent U can be bound to the discourse referent X contributed by the first conjunct. Since the $\pm$new or $\pm$presuppositional features of the entire possessive description hinge upon the $\pm$new properties of the possessor, the justification of the referent U may at least be a necessary condition for the *NP their kittens* to become halfway acceptable in this context.

[25] Apparently, the Dutch, German or Hungarian versions of (5.53a) are quite robustly unacceptable.

[26] The sharp contrast between (5.53a) and (5.53b) militates against a presuppositional analysis of existential sentences. **Exercise:** Why?

This algorithm predicts that (5.53a) is the same as the following:

(5.55) *a.* There are some cats on the roof
b. ???(And) There are their kittens as well

The midway acceptability of such constructions for some speakers may be due to the fact that although the presupposition of the second conjunct *is*, after all, justified in the context of the first conjunct, what this leaves us is still a familiar discourse referent where a new one is expected. That is, to such speakers these cases may very well resemble those where a *there*-sentence contains an *anaphoric* definite description.

An additional factor that may rescue (5.53a) and (5.55) from total unacceptability is the 'naturalness' of the relation between cats and kittens. If *cat* and *kitten* is replaced, say, by *linguist* and *grandmother*, the result is far less acceptable than in the original case.

Summation

According to us, the summation strategy to conjunction (in existential sentences) amounts to taking the non-Boolean sum of individual discourse referents, and unify the sum-discourse referent with the requisite placeholders in the entry of *there be.* The placeholder P will be unified, not with the complex property $N_1' \sqcup N_2'$ (the join of the descriptive contents of the conjunct *NP*s), but with the property of being the sum of two individual discourse referents. Conjoining *two cats and their kittens* will therefore proceed in the following manner:

(5.56) *a.* *Two cats:*

b.
$$\left\langle \left\{ \begin{array}{l} \langle t_X, \quad , BC_{n.pr.t.}\rangle, \\[1em] \langle s_X, \boxed{t_X \subseteq s_X}, BC_{n.t.dep.}\rangle, \\[1em] \langle X, \boxed{\begin{array}{c} |X| = 2 \\ s_X{:}\, cat^*(X) \end{array}}, BC_{indef}\rangle \end{array} \right\}, \boxed{} \right\rangle$$

(5.57) *a.* *their kittens:*

b.
$$\left\langle \left\{ \begin{array}{l} \langle t_Y, \quad , BC_{n.pred.t.}\rangle, \\[1em] \langle s_Y, \boxed{t_Y \subseteq s_Y}, BC_{n.t.dep.}\rangle, \\[1em] \langle \langle U, Y\rangle, \boxed{s_Y{:}\, kittens\text{-}of^{**}(U,Y)}, BC_{\{pron.,def.desc.\}}\rangle \end{array} \right\}, \boxed{} \right\rangle$$

(5.58) *a.* *Two cats and their kittens:*

b.
$$\left\langle \left\{ \left\langle Z, \boxed{\begin{array}{c} X\ s_X\ t_X\ U\ Y\ s_Y\ t_Y \\[0.5em] t_{X,Y} \subseteq s_{X,Y} \\ s_X{:}\, cat^*(X) \quad |X| = 2 \\ U = X \\[1em] Y = \Sigma y. \boxed{\begin{array}{c} y \\ kitten - of^*(U,y) \end{array}} \\[1em] Z = X \oplus Y \end{array}}, BC_{\{indef.,def.d.\}} \right\rangle \right\}, \boxed{} \right\rangle$$

(5.58b) presents the 'summed' version of *two cats and their kittens*. The discourse referent to be unified with *there be* is Y; as said before, we assume that the property contributed by Y (and which is unified with the placeholder variable from the representation of *there be*) is the property of being the sum of X and V.

Note that (5.58b) can combine faultlessly with *there be*. This is because the sum discourse referent Z is new *and* free. This 'faultless' version of conjunction corresponds to the representations of those speakers who found (5.53a) perfectly acceptable.

If one assumes that non-Boolean summation is the underlying operation for those speakers who did not find (5.53a) perfectly acceptable, the reason for this judgment type of grammaticality judgment is presumably, a tendency during processing to re-distribute the sum over its summands.

To sum up the discussion about conjunction and presuppositions, it seems to us that the present framework can adequately represent both the perfectly acceptable and the perfectly unacceptable construals of (5.53a), and it can also go some way towards explaining why this sentence is neither fully acceptable nor fully unacceptable with some speakers.

5.3 Appendix: Incorporation as Function Application

5.3.1 Van Geenhoven's Original Proposal

Veerle van Geenhoven's analysis is seen as a first generalisation of 'existential' constructions in languages as varied as English, German and West Greenlandic (van Geenhoven (1996), McNally and van Geenhoven (1997)). The common trait of these constructions is that they are incorporating *in the semantics*, where incorporation stands for a novel composition method, and a switch, so to speak, in the roles traditionally attributed to verbs and their arguments.

At first blush, Semantic Incorporation means that the verb and the relevant *NP* are to be combined by a rule that is 'stronger' in some sense than the usual rules of semantic composition, which usually preserve the autonomy of constituents. The initial motivation was provided by syntactic or lexical incorporation in languages like West Greenlandic, where the verb and the relevant N' can be seen to form one word:[27]

(5.59) Arnajaraq ipili-tur-p-u-q
A.ABS apple-ate-IND-[-tr]-3Sg
"Arnajaraq ate an apple/apples"

Semantic Incorporation is seen as a semantic correlate to word-formation (without being committed to the 'word' status of the output). It can also be seen as transposing a lexical/syntactic analogy into the realm of semantic composition.

Someone familiar with the literature on Hungarian can remark that this language provides independent crosslinguistic motivation for semantic incorporation. Hungarian lacks syntactic or lexical incorporation of the kind seen in West Greenlandic or Iroquoian languages. Nevertheless, there is an early proposal by Anna Szabolcsi (Szabolcsi (1986)) to the effect that Hungarian Definiteness Effect verbs and their internal arguments are composed via (some version of) incorporation (see also de Hoop (1992) and van Hout (1998)).Szabolcsi's proposal was not cast in a mathematically precise framework, since the right tools were not available in the nineteen-eighties. Yet her programmatic article contains very clear arguments for semantic incorporation.

In 1996, Veerle van Geenhoven proposed a formalisation of Semantic Incorporation, based primarily on West Greenlandic data, and which was extended to English *have* in her thesis, and to *there*-insertion contexts in subsequent work, and also in McNally and van Geenhoven (1997). The core idea behind this proposal is that the discourse referent-introducing capacity of a weak NP is relegated to the verb (to the complex *there be* in this case). As seen in (5.60a), an incorporating (intransitive) verb is a function from properties into sentences; the variable corresponding to the (internal) argument is introduced (and existentially quantified over) by the entry of the verb.

[27]Moreover, it is shown in van Geenhoven (1996), that most incorporated constructions in West Greenlandic show a Definiteness Effect comparable to that in English.

This schema is intended to account for at least part of the dependencies and constraints exhibited by the Definiteness Effect construction, and precisely by postulating an existential quantifier in the entry of the verb, that is, by conforming to Milsark's original conjecture.[28]

Here we would like to point out a number of technical (and partly methodological) shortcomings of Semantic Incorporation as originally proposed by van Geenhoven. We do this in order to show that if one is to preserve the attractive intuitions behind this proposal, then a different formalisation is called for.

The main schema of semantic incorporation is the following (cf. van Geenhoven (1996)):

(5.60) *a.* incorporating IV: $\lambda P.\exists x.[P(x) \wedge V(x)]$
b. incorporated N$'$: $\lambda y.[P(y)]$

(5.60a) is an expression in static logic, without variables over times or eventualities. It can be adopted in DRT in several ways, depending on the introduction of eventuality discourse referents, and one's translation of *be*.

For *there*-insertion, van Geenhoven proposes (5.61a). (5.61b) is our "translation" into λ-DRT. LOC, or $\mathcal{L}$ is a predicate over locations, presumably supplied by the coda. We suppose in case there is no coda an abstract predicate may serve to close off the sentence (e.g. a dummy predicate provided by *there*).

(5.61) *a.* $\lambda P.\lambda LOC.\exists x.[P(x) \wedge LOC(x)] \Rightarrow$

b. $\lambda P.\lambda\mathcal{L}.\boxed{\begin{array}{c} x \\ \\ P(x) \\ \mathcal{L}(x) \end{array}}$

(5.62) *a.* There is a gnome in the garden $\rightsquigarrow$

b. $\boxed{\begin{array}{c} x \\ \\ gnome(x) \\ in\_the\_garden(x) \end{array}}$

A closer scrutiny and some crosslinguistic comparison reveals the following properties of (5.61):

Semantic Incorporation is a sufficient, but not a necessary condition for the Definiteness Effect. This is shown by several types of data. First, incorporated nominals in Mohawk may have a definite construal:

(5.63) **M** : Wa'-ke-nakt-ahninu'
fact-1sS-bed-∅-buy-punc
"I bought the/a bed"

(Baker (1995), (1) on p.5.)

Second, in Hungarian bare nominals incorporate into their host verb, without yielding Definiteness Effect constructions. There is no Definiteness Effect if the verb has a process construal, and verbs (those from the *bring*-class) have precisely this construal with a bare nominal:

(5.64) János (egy órá-ig/∗egy óra alatt) széket hozott
John (one hour-till/one hour under) chair-Acc brought
"John chair-brought" OK: for an hour/Out: in an hour

Third, there is no Definiteness Effect in Hungarian if the internal argument does not denote something newly created or made available by the event (Kálmán (1995), Bende-Farkas (forthcoming)).

[28]This method goes back to Carlson (1977).

This is the case e.g. with the verb *fúr* 'drill', 'bore through', when its direct object denotes the thing subjected to drilling (viz *falat fúr* lit. 'wall-drill'). The point here is that with some verbs one can have incorporated nominals that do not contribute to an existential construction (as opposed to *lyukat fúr* 'hole-drill', for instance).

Four, (5.61a) yields wrong results with Hungarian bare nominals, because it incorrectly allows the nominal to be an antecedent for pronominal anaphora. As seen from the preceding chapter and from (5.65a) below, Hungarian bare nominals cannot antecede pronouns. Both versions of (5.61) predict (wrongly) that bare nominals always license pronominal anaphora. It may be recalled from the preceding chapter that Hungarian is not an isolated case: there are other languages, such as Armenian and Hindi, where bare nominals do not license pronominal anaphora (Dayal (1999), Vaux and Sigler (1997)).[29]

(5.65) *a.* János kismacskát talált. #Fekete volt.
John kitten-Acc found. Black was
"There has been kitten-finding by John. It was black."

b. János talált egy kismacskát. Fekete volt.
John found one kitten-Acc. Black was.
"John found a kitten. It was black."

An additional problem presented by (5.65) is that in Hungarian proper full indefinites are not interchangeable with bare nominals, whereas the Semantic Incorporation schema (5.61a) would reduce such indefinites to properties. This, however, is to be avoided. Thus Hungarian *NP*s are problematic for any method that treats 'full' *NP*s and bare nominals on a par.

Constituent negation is problematic for (5.61a), as it is for most analyses that do not resort to decmposing *no* or German *kein* into a negation operator and an indefinite (or a higher order analysis as in Swart (2000)). On its own, (5.61a) will assign the verb's discourse referent wide scope over constituent negation:

(5.66) There are no students in the pub

(5.67) *a.* There are: $\lambda P.\lambda\mathcal{L}\,.\,\boxed{\begin{array}{c} X \\ P^*(X) \\ \mathcal{L}^*(X) \end{array}}$

b. no students$_{pred}$: $\lambda y.\boxed{\neg\boxed{\begin{array}{c} \eta \\ student^*(\eta) \\ \eta = y \end{array}}}$

c. in the pub : ...

d. (5.66) : $\boxed{\begin{array}{c} X \\ in\_the\_pub^*(X) \\ \neg\boxed{\begin{array}{c} \eta \\ student^*(\eta) \\ \eta = X \end{array}} \end{array}}$

(5.67b) says that there some people in the pub, who are not students. This is not the intended meaning of (5.66). (It can be checked that in general $MON\downarrow$ *NP*s will gain unwanted existential

[29]In Armenian it is in fact 'bare' *NPs* of the form *five woman*[sic!] that do not license pronominal anaphora.

force when combined with (5.61).) In a proper representation negation should have wide scope over the discourse referent. Geenhoven herself invokes a decomposition of *no* in the style of the decomposition usually invoked for German *kein* or Dutch *geen*. In fact, in 5.2 a similar decomposition method has been assumed for the unification method, as well.

An assumption behind (5.61a) is that weak *NP*s are predicative. In fact, this is the main claim of McNally and van Geenhoven (1997). According to this paper, the weak–strong distinction corresponds to the ±predicative distinction.

Defining weak *NP*s as predicative leads to results that are not entirely clear, or require some explanation. This is because the class of weak *NP*s is not identical to the class of *NP*s that appear in predicative position.

An additional problem arises from the particular composition method resorted to. McNally and Geenhoven obtain predicative *NP*s from generalised quantifiers by means of Richard Montague's type-shifting functor **BE**, employed for more general use by Barbara Partee (Partee (1986)).

(5.68) **BE** : $\lambda\mathcal{Q}.\lambda y.[\mathcal{Q}(\lambda x.[x = y])]$
BE(a man) : $\lambda y.[man(y)]$

Indeed, many weak *NP*s can be used predicatively (e.g. *a man, no doctor* a.s.o.). The problem is, there are weak *NP*s that are not predicative, or at least **BE** does not yield a well-formed result for them. This is the case with *many*, for instance. Conversely, there are predicative *NP*s that are strong. In (5.69b-c), one sees strong *NP*s in *there*-sentences. The #-sign indicates that they are appropriate only in certain contexts, under certain conditions.

(5.69) *a.* There are many students in the pub—weak, nonpredicative
b. */# There is the student in the pub—strong, predicative
c. */#There is John (to meet)—strong, predicative

In their joint paper, van Geenhoven and McNally argue that admitting predicative strong *NP*s in *there*-sentences is in fact not a shortcoming of the Semantic Incorporation approach, since definites are acceptable in *there*-sentences only under certain circumstances. Our comment on this is that one needs to distinguish between several sorts of *there*-sentences, which are appropriate in very different contexts. The reader may recall that typical (presentational/existential) *there*-sentences do not allow strong *NP*s of any kind, except for unique, non-anaphoric definites, such as superlatives. So-called list-sentences (*There are the flowers to water, there are the executives to meet*) on the other hand do allow definites, but (as pointed out in Ward and Birner (1995)) these definites must not be anaphoric (or at least their antecedent must not be in a directly preceding sentence).

(5.70) *a.* I wonder if the peonies in my garden need looking after
b. */#There are now the peonies to water

In other terms, from the nonformal literature it has been clear for some time that *there*-sentences that admit certain kinds of strong *NP*s are quite special in the constraints they impose on preceding context, and can be quite different from 'ordinary' *there*-sentences. This in turn means that one unified schema cannot and need not cover all types of *there*-sentences, as intended in (5.61a).

Returning to the issue of the application of **BE**, one has to note that this functor is superfluous in DRT, where most weak *NP*s are predicative in the first place. But even in DRT one has to distinguish between weak and strong predicative *NP*s, and for this (5.61) is still insufficient.

Scope: Several earlier examples have shown that indefinites in existential sentences have obligatory narrow scope. Now strange as it may seem, the Semantic Incorporation framework *does* permit indefinites to have wide scope, or to be bound non-locally.

Such readings can be obtained if (i) the relevant *NP* introduces a discourse referent (say, x) in a superordinate DRS, and (ii) the property argument of the incorporating verb is saturated with the placeholder property $\lambda y.[y = x]$, as shown in (5.71):

(5.71)
$$\boxed{\begin{array}{c} \ldots x \ldots \\ N'(x) \\ \ldots \\ \lambda P. \boxed{\begin{array}{c} z \\ \hline P(z) \\ \mathcal{L}(z) \end{array}} \quad (\lambda y.[y = x]) \end{array}} \rightarrow_{\beta-conv} \boxed{\begin{array}{c} \ldots x \ldots \\ N'(x) \\ \ldots \\ \boxed{\begin{array}{c} z \\ \hline z = x \\ \mathcal{L}(z) \end{array}} \end{array}}$$

(5.71) closely mirrors the existential disclosure of Dekker (1993), with the difference that the 'disclosed', or excorporated discourse referent z is re-captured by the referent x from the superordinate DRS. (5.71) for instance can yield (5.72b), a reading which the sentence (5.72a) does not have:

(5.72) *a.* There is always a cat that lands on its feet

b.
$$\boxed{\boxed{\begin{array}{c} \varepsilon\ x \\ \hline \varepsilon\colon \varphi \\ cat(x) \end{array}} \left\langle \begin{array}{c} \forall \\ \varepsilon \end{array} \right\rangle \boxed{\begin{array}{c} s\ e\ \tau\ y \\ \hline s\mathcal{R}\varepsilon \\ s\colon AT^{*}(\tau, y) \\ s\mathcal{R}e \\ e\colon y\ lands\ on\ y\text{'s}\ feet \\ y = x \end{array}}}$$

In fact, (5.71) is used by Ede Zimmermann (Zimmermann (1992/93)), precisely to obtain wide scope, de dicto readings for indefinites in opaque contexts. According to Zimmermann, intensional verbs like *seek* or *owe* subcateogrise for proprerty type internal arguments. De re readings are obtained by saturating the internal argument slot of these verbs with the property $\lambda y.[x = y]$, where x is the variable bound by the wide scope quantifier:

(5.73) *a.* Ede seeks a unicorn
b. $seek(e, \lambda x.unicorn(x))$ de dicto
c. $\exists x.[unicorn(x) \wedge seek(e, \lambda y.[y = x])]$ de re

One might try to argue here that the initial, static formulation (5.61a) does not work like (5.71) and (5.73), because (5.61a) contains a quantifier, whereas (5.71) and (5.73) do not involve quantification (because of DRT and because of the semantic type of the verb, respectively). But it can be seen that the same problem arises with (5.61a), too:

(5.74) *a.* $\exists x.[N'(x) \wedge \ldots \lambda P.\exists y.[P(y) \wedge L(y)](\lambda z.[z = x])]$
b. $\exists x.[N'(x) \wedge \ldots \exists y.[(\lambda z.[z = x])(y) \wedge L(y)]]$
c. $\exists x.[N'(x) \wedge \ldots \exists y.[y = x \wedge L(y)]] \Leftrightarrow$
d. $\exists x.[N'(x) \wedge \ldots L(x)]$

The (im)possibility of excorporating the indefinite and generating the unwanted reading (5.72b) hinges on a corollary of the Definiteness Effect formulated in Heim (1987):

(5.75) $*$There be x , where x is an individual variable

(5.75) serves to exclude pronouns and traces from *there*-insertion contexts. This constraint is by no means straightforward to adopt, however. In our opinion, it has to be stipulated separately, which in turn requires very sound motivation.

The existential disclosure shown in (5.71) in fact hinges on another assumption, namely, that weak *NP*s can and do introduce discourse referents, whereas the Semantic Incorporation schema denies them this possibility. This does not undermine (5.71), however. This is because Semantic

Incorporation does in fact allow weak *NP*s to be ambiguous between a property and a non-property construal. The reason is that a good many verbs themselves are non-incorporating (i.e. do not introduce a discourse referent for one of their arguments), and many other verbs are said to have both (incorporating and 'ordinary') construals.[30] But then it is obvious that a weak *NP* can combine with an ordinary verb (or, say, an ordinary preposition) only if it introduces a discourse referent.[31]

Conjunction is also problematic for (5.61); in fact, the source of the problem is the Semantic Incorporation schema itself. Here we would like to show that the problem persists, both with Boolean and non-Boolean conjunction.

On the Boolean approach, predicative *NP*s need to be lifted to a type that expects an incorporating verb as argument: *A cat*, for instance, will be translated as $\lambda\mathcal{P}.\mathcal{P}(\lambda x.[cat(x)])$.

Then *two cats and five owls* will be translated as follows (assuming the generalised conjunction of Partee and Rooth (1983)). $\mathcal{P}$ is a variable of the type $(((et)(et))(et))$, that is, a placeholder for *there are*. (Greek letters stand for collective discourse referents. $5, 10$, etc. are assumed to be cardinality predicates.)

(5.76) $\lambda\mathcal{P}.[\mathcal{P}(\lambda\alpha.[cat(\alpha) \wedge 10(\alpha)]) \wedge \mathcal{P}(\lambda\beta.[owl(\beta) \wedge 5(\beta)])]$

If $\mathcal{P}$ is substituted for $\lambda P.\lambda\mathcal{L}.\exists\gamma.[P(\gamma) \wedge \mathcal{L}(\gamma)]$ from (5.61a), one gets the following:

(5.77) a. $\lambda\mathcal{P}.[\mathcal{P}(\lambda\alpha.[cat(\alpha) \wedge 10(\alpha)]) \wedge \mathcal{P}(\lambda\beta.[owl(\beta) \wedge 5(\beta)])](\lambda P.\lambda\mathcal{L}.\exists\gamma.[P(\gamma) \wedge \mathcal{L}(\gamma)]) =_{\beta-conv}$
b. $\lambda\mathcal{L}.[\exists\alpha.[cat(\alpha) \wedge 10(\alpha) \wedge \mathcal{L}(\alpha)] \ \wedge \lambda\mathcal{L}.[\exists\beta.[owl(\beta) \wedge 5(\beta) \wedge \mathcal{L}(\beta)] =_{conj.rule}$
c. $\lambda\mathcal{L}.[\exists\alpha.[cat(\alpha) \wedge 10(\alpha) \wedge \mathcal{L}(\alpha)] \wedge \exists\beta.[owl(\beta) \wedge 5(\beta) \wedge \mathcal{L}(\gamma)] =_{conj.rule}$

(5.77b) yields the intended translation, but only if the *NP*s are shifted to a higher type. (The type $(((et)(et))(et))$ is in fact a generalisation of Montague's raising operator: from et to $(((et)(et))(et))$.) This takes away much of the elegance and simplicity of the central concept behind Semantic Incorporation.

An added complication comes from the application of **BE**. A rather rigid order of operations has to be assumed, otherwise one gets absurdities (the reader can check that Boolean conjunction of properties is not allowed). In order to avoid these asburdities, it has to be stipulated that in the first step, **BE** applies separately to the conjuncts. In the second step the conjuncts are lifted separately, and the conjunction rule can apply only after *that*, as a third step. (The point is, one cannot conjoin the generalised quantifiers first and apply **BE** after that.)

With the non-Boolean approach, the problem is that the conjuncts fail to provide the discourse referents that are to serve as summands. (The assumption being that *there are* introduces a collective discourse referent, understood as the sum of the conjunct referents.)

(5.78) below presents the non-Boolean solution to the conjunction problem, which is seen to create its own problems in turn. For the sake of convenience we use static logic, but the problem is the same in λ-DRT:

(5.78a) is the (non-DRT) translation of *there are*: it expects a property type argument that holds of a collection X. (5.78b) is the 'simpleminded' translation of *ten cats and five dogs*: it is to be noted that the conjuncts do not share any variables. If they did, one would get something that is both ten cats and five owls. One way to make (5.78b) compatible with *there are* is to abstract a variable U, which is the non-Boolean sum of the two other variables Y and Z. This yields (5.78c). This however is of the wrong type, viz. a function from individuals into properties, while (5.78a) expects a property type argument. Moreover, note that (5.78c) is ill-formed, since it is the conjunction of two properties with a formula $(U = Y \oplus X)$.

[30] See also van der Does and de Hoop (1998).

[31] Of course a wide scope, excorporated *NP* is not introduced in a higher DRS for the sake of combining with a verb. Our point is, either weak *NP*s can have non-predicative construals, and then the referent x introduced in (5.71) is the *NP*s own referent, so to speak. Or, one can still take weak *NP*s as predicative, and simply assume a mechanism of existential closure for top-level discourse referents.

To make (5.78c) compatible with *there are*, and to remedy the type mismatch, existential closure needs to be performed on the conjuncts—this yields (5.78d).

(5.78) *a.* $\lambda P.\lambda\mathcal{L}\exists X.[P^*(X) \wedge \mathcal{L}^*(X)]$
b. $\lambda Y.[cat^*(Y) \wedge |Y| = 10] \wedge \lambda Z.[owl^*(Z) \wedge |Z| = 5] = ???$
c. $\lambda U.[\lambda Y.[\ldots Y \ldots] \wedge \lambda Z.[\ldots Z \ldots] \wedge U = Y \oplus Z]$
d. $\lambda U.\exists Y.\exists Z.[\ldots \wedge U = Y \oplus Z]$

Now the methodological problem created by this solution stems from existential closure over the conjuncts. Our point is, if one allows existential closure as a repair operation, then the fundamental idea of Semantic Incorporation is weakened considerably. Or, existential closure may be disallowed, for the sake of uniformity, but then conjunction can only be handled by means of type-lifting, another unattractive option, which undermines the simplicity of the initial hypothesis.

The discussion of Semantic Incorporation as defined in (5.61) concludes with the following.

(i) The ±predicative distinction is neither necessary nor sufficient to characterise the weak–strong distinction.

(ii) The present formulation of Semantic Incorporation in (5.61) is not sufficient to ensure that weak *NP*s in *there*-insertion contexts get only narrow scope readings. This in turn suggests that *there be* contains an implicit quantifier or operator that binds the discourse referent of the NP, and that this binding is achieved by means other than simple existential quantification (which in DRT is not even quantification).

(iii) The problem posed by conjunction suggests that weak *NP*s <u>are</u> to be allowed to introduce their own discourse referents, contrary to (5.61). Then *there be* should contain a binding mechanism that can 'capture' these referents.

5.3.2 The Expletive as Placeholder

In 1993 Reihnard Blutner proposed a Dynamic Montgue Grammar analysis of *there*-insertion (Blutner (1993)). As in Milsark's original proposal, and like McNally and van Geenhoven after him, he identifies the weak–strong distinction with ±predicativity. The relevant predicative readings are obtained by applying the (dynamic version of the) **BE** operator to generalised quantifiers. This is shown in (5.79–5.80) below. An additional constraint in the meaning of *there* (cf. (5.81) below) serves to distinguish weak predicative *NP*s from strong ones, such as definites, pronouns or proper names.

(5.79) $\mathbf{BE}(\mathcal{P}) =_{df} \lambda u.\mathcal{P}(\,^\wedge\lambda v.\uparrow[\,^\vee v = \,^\vee u])$

(Blutner (1993) (53):54)

(5.80) $\mathbf{BE}(\lambda\mathbf{P}.Ed_i[\uparrow STUD(d_i);\ ^\wedge\mathbf{P}(\,^\vee d_i)]) = \lambda u.Ed_i[\uparrow STUD(d_i); \uparrow d_i = \,^\vee u]$

(Blutner (1993) (54):54)

It can be seen from (5.80) that dynamic **BE** preserves the dynamic existential quantifier E—this is as should be, because of the special properties of discourse markers in dynamic theories.

Blutner argues for a dynamic logic analysis of *there*-sentences, because of the novelty constraint imposed on *NP*s, and also because the nature of the binding relation he posits between the indefinite and the expletive. He proposes to assign *there* the type of a dynamic generalised quantifier. As reproduced in (5.81), *there* is translated as a type-lifted pronoun, with the additional constraint that its discourse marker is new relative to preceding context.

(5.81) $[_{NP} there_i] \quad \hookrightarrow \quad \lambda\mathbf{P}.\ ^\wedge\mathbf{P}(d_i)$

$\langle$ d_i *new w.r.t. previous context* $\rangle$

(Blutner (1993) (45g):55)

The informed reader may note a similarity between Blutner's analysis of *there*-insertion and Barbara Partee's analysis of *have* (Partee (2000)). In both analyses, the element responsible for the Definiteness Effect is a placeholder for an *NP*, and this is rendered by translating it as a λ-term that denotes (almost) an identity function. With Partee, *have* is translated as $\lambda R.[R(\lambda x.[x = x])]$, where R is of type $((et)(et))$, so *have* is of type $(((et)(et))(et))$. R is bound by the object *NP*, which is assumed to be relational.

These translations can be taken to correspond to the intuition that *there (be)* and *have* are incorporating elements, even though this is not made explicit by the authors. Accordingly, these analyses can also be seen as versions of the incorporation strategy, even if they do not attribute existential force to *there* or to *have*. Rather, the incorporating function will inherit the properties of the *NP*'s determiner, as seen from the sample derivation reproduced in (5.82). (Recall that dynamic **BE** preserves the quantifier of its argument.) This is seen as a technical advantage over van Geenhoven's original formulation of Semantic Incorporation, since it avoids the problems caused by negation and by $MON\downarrow$ *NP*s.

(5.82) $[_S[_{NP} there_i]$ is $[_{NP} a_i\ [_{N'} student\ hungry]]]$

$\lambda\mathbf{P}.\,{}^\wedge\mathbf{P}({}^\vee d_i)$ $\quad$ $\lambda\mathbf{P}.Ed_i[\uparrow STUD(d_i); \uparrow HUNGRY(d_i);\ {}^\vee\mathbf{P}({}^\wedge d_i)]$

BE

$\lambda u.Ed_i[\uparrow STUD(d_i); \uparrow HUNGRY(d_i); \uparrow d_i = {}^\vee u]$

FA

$Ed_i[\uparrow STUD(d_i); \uparrow HUNGRY(d_i); \uparrow d_i = d_i]$

(Blutner (1993) p.57)

Blutner's analysis can be seen to avoid another problem, which van Geenhoven's original proposal suffers from, viz the possibility to assign wide scope to the indefinite. In principle, here, too, the indefinite might be assigned wide scope, and *there* might be saturated with the dummy property $\lambda u.\,{}^\vee u = {}^\vee d_i$ (where d_i is the discourse marker of the indefinite). Thus, one might in principle get a structure like (5.83):

(5.83) $Ed_i[\uparrow STUD(d_i); \ldots \lambda\mathbf{P}.[\mathbf{P}\,{}^\wedge(d_i)](\lambda u.\,{}^\vee u = {}^\vee d_i); \ldots] =_\beta$
$Ed_i[\uparrow STUD(d_i); \ldots {}^\vee u = {}^\vee d_i \ldots]$

This possibility is not discussed in (Blutner (1993)). As far as we can see, it can be blocked, if the notion of 'preceding context' is made more precise. The novelty condition on *there* can be understood with respect to local context: then in (5.83) the discourse marker d_i will not count as new in the *local context* of *there*.[32]

Blutner's analysis (like most analyses of *there*-insertion) is problematic with respect to conjunction. The source of the problem is the presence of the discourse marker in the translation of *there*, and the fact that Boolean conjunction of properties yields wrong results. (The same problem could be seen with van Geenhoven's approach.)[33]

(5.84) *a.* $\mathbf{BE}(\lambda\mathbf{P}.[Ed_i.[\uparrow STUD(d_i); \mathbf{P}({}^\wedge(d_i))]; Ed_j[\uparrow PROF(d_j); \mathbf{P}({}^\wedge d_j)]] =_{df}$
b. $\lambda u.[Ed_i.[\uparrow STUD(d_i);\ {}^\vee u = {}^\vee d_i]\ ;\ Ed_j.[\uparrow PROF(d_j);\ {}^\vee u = {}^\vee d_j]]$

(5.84b) is the result of applying **BE** to *a student and a professor*, and it corresponds to the set of individuals who are both students and professors.

[32] This can be seen as the converse of the prohibition against variables in *there*-insertion contexts, formulated in Heim (1987).

[33] Syncategorematic Boolean conjunction will work, though, provided the *NP* is lifted to a function that expects a generalised quantifier (pronominal *there*) and returns a formula: $\lambda\mathcal{Q}.\mathcal{Q}(\lambda u.Ed_i.[\uparrow STUD; u = d_i]$. That is, $\mathcal{Q}$ is of type $((sedd)(d))$, where d is the type of dynamic formulas and s is the type of states. This type-lifting operation, however, is even more complicated than the lift required for Semantic Incorporation.

This problem can be overcome if one operates with non-Boolean conjunction $\oplus$. Then the translation of, for instance, **BE** *two professors and three students* is the following (γ_i stands for a collective discourse marker; the extension sign $^\vee$ has been omitted):

(5.85) $\lambda u.E\gamma_3.[E\gamma_1.[\uparrow PROF(\gamma_1); \uparrow 2(\gamma_1)]\ ; E\gamma_2.[\uparrow STUD(\gamma_2); 3(\gamma_2)]\ ; \gamma_3 = \gamma_1 \oplus \gamma_2; \gamma_3 = u]$

The pronominal discourse marker d_i (or γ_i, in the case of *there are*) in the translation of *there* will then be equated with the γ_3, the sum of the markers $\gamma_{1,2}$. This solution is not entirely satisfactory in the case of $MON \downarrow$ *NP*s. In these cases one presumably has to operate with null discourse markers.[34]

[34] $MON \downarrow NP$ will be problematic in the analysis developed in 5.2, as well.

Bibliography

Abraham, W. and de Meÿ, S. (eds): 1986, *Topic, Focus and Configurationality*, John Benjamins, Amsterdam.

Abusch, D.: 1994, The Scope of Indefinites, *Natural Language Semantics* **3**, 88–135.

Abusch, D. and Rooth, M.: t.a., Empty Domain Effects for Presuppositional and Non-Presuppositional Determiners, *in* H. Kamp and B. H. Partee (eds), *Context-dependence in the Analysis of Linguistic Meaning*, Elsevier Publishers.

Ackerman, F. and Webelhuth, G.: 1997, The Construct Predicate, *in* M. Butt and T. King (eds), *Proceedings of the '97 LFG Conference*, CSLI-online: `http://csli-publications.stanford.edu`.

Alsina, A.: 1992, On the Argument Structure of Causatives, *Linguistic Inquiry* **23**, 517–556.

Alsina, A.: 1997, Resultatives: A Joint Operation of Semantic and Syntactic Structures, *in* M. Butt and T. King (eds), *Proceedings of the '97 LFG Conference*, CSLI Publications Online.

Bach, E., Jelinek, E., Kratzer, A. and Partee, B. H. (eds): 1995, *Quantification in Natural Languages*, Studies in Linguistics and Philosophy, Kluwer Academic Publishers, Dordrecht.

Baker, M. C.: 1995, Lexical and Nonlexical Noun Incorporation, *in* Egli, Pause, Schwarze, von Stechow and Wienold (1995), pp. 3–34.

Bánréti, Z. (ed.): 1994, *Papers in the Theory of Grammar*, Research Institute for Linguistics, Hungarian Academy of Sciences, Budapest.

Barker, C.: 1991, *Possessive Descriptions*, PhD thesis, UCSC.

Barker, C.: 1995, *Possessive Descriptions*, Dissertations in Linguistics, CSLI Publications, Stanford.

Barker, C.: 2000, Definite Possessives and Discourse Novelty, *Theoretical Linguistics* .

Barwise, J. and Cooper, R.: 1981, Generalized Quantifiers and Natural Language, *Linguistics and Philosophy* **4**, 159–219.

Bäuerle, R., Schwarze, C. and von Stechow, A. (eds): 1983, *Meaning, Use and Interpretation of Language*, De Gruyter, Berlin/New York.

Bende-Farkas, Á.: 1999, Quantification in Existential Sentences. *Proceedings of the 1999 Formal Grammar Conference*; Utrecht.

Bende-Farkas, Á.: forthcoming, *Verb–Object Dependencies in Hungarian and English. A DRT-based Account (working title)*, PhD thesis, Stuttgart University.

Bittner, M.: 1994, *Case, Scope and Binding*, Vol. 30 of *Natural Language and Linguistic Theory*, Kluwer, Dordrecht/Boston/London.

Bittner, M.: 1995, Quantification in Eskimo: A Challenge for Compositional Semantics, *in* Bach, Jelinek, Kratzer and Partee (1995), pp. 21–58.

Bittner, M.: 1999, Concealed Causatives, *Natural Language Semantics* **7**, 1–79.

Blutner, R.: 1993, Dynamic Generalized Quantifiers and Existential Sentences in Natural Languages, *Journal of Semantics* **10**(1), 33–64.

Burton, S. C.: 1995, *Six Issues to Consider in* Choosing a Husband*: Possessive Relations in the Lexical Semantic Structures of Verbs*, PhD thesis, Rutgers University, New Brunswick, N.J.

Butt, M.: 1995, Clause Union —Then and Now, *in* Morrill and Oehrle (1995), pp. 17–32.

Carlson, G.: 1977, *Reference to Kinds in English*, PhD thesis, University of Massachusetts at Amherst.

Chierchia, G.: t.a., A Puzzle about Indefinites, *in* C. Cecchetto, G. Chierchia and M. T. Guasti (eds), *Semantic Interfaces: Reference, Anaphora and Aspect*, CSLI, Stanford.

Comorovski, I.: 1995, On Quantifier Strength and Partitive Noun Phrases, *in* Bach et al. (1995), pp. 107–144.

Culicover, P. and McNally, L. (eds): 1998, *The Limits of Syntax*, Academic Press, New York.

Dayal, V.: 1999, Bare NP's, Reference to Kinds, and Incorporation, *Proceedings of SALT IX*, UCSC, Santa Cruz.

de Hoop, H.: 1992, *Case Configuration and Noun Phrase Interpretation*, PhD thesis, Groningen University.

de Jong, F. and Verkuyl, H. J.: 1985, Generalized Quantifiers: the Properness of Their Strength, *in* J. van Benthem and A. ter Meulen (eds), *Generalized Quantifiers in Natural Language*, Foris, Dordrecht.

de Swart, H.: 1992, Intervention Effects, Monotonicity, and Scope, *in* C. Barker and D. Dowty (eds), *Proceedings of SALT II*, Ohio State University, Colombus, pp. 387–406.

Dekker, P.: 1993, *Transsentential Meditations*, PhD thesis, University of Amsterdam, Amsterdam.

Dekker, P.: 1996, On Context and Identity, *in* H. Kamp and B. Partee (eds), *Context Dependence in the Analysis of Linguistic Meaning; Proceedings of the Prague/Bad Teinach Workshops.*

Donnellan, K.: 1966, Reference and Definite Descriptions, *Philosophical Review* **75**, 281–304.

Dowty, D.: 1979/1991, *Word Meaning in Montague Grammar*, Vol. 7 of *Studies in Linguistics and Philosophy*, 2nd edn, Reidel/Kluwer, Dordrecht.

Egli, U.: 1991, (In)definite Nominalphrase und Typentheorie, *Zwei Aufsätze zur definiten Kennzeichnung*, number 27 in *Arbeitspapier*, Fachgruppe Sprachwissenschaft, Universität Konstanz, Konstanz.

Egli, U., Pause, P. E., Schwarze, C., von Stechow, A. and Wienold, G. (eds): 1995, *Lexical Knowledge in the Organization of Language*, Vol. 114 of *CILT*, John Benjamins, Amsterdam and Philadelphia.

Egli, U. and von Heusinger, K.: 1995, The Epsilon Operator and E-type Pronouns, *in* Egli et al. (1995), pp. 121–124.

Egli, U. and von Heusinger, K.: 2000, Reference and the Semantics of Anaphora, *in* von Heusinger and Egli (2000), pp. 17–29.

É.Kiss, K.: 1998a, Genericity, Predication and Focus, *in* Rothstein (1998).

É.Kiss, K.: 1998b, The Hungarian Verbal Complex Revisited, *Proceedings of CLITE1*, JATE, Szeged.

Farkas, D.: 1981, Quantifier Scope and Syntactic Islands, *Proceedings of CLS 17*, Chicago University Press, Chicago, pp. 59–66.

Farkas, D.: 1996, Specificity and Scope, *in* L. Nash and G. Tsoulas (eds), *Langues et Grammaire 1*, n.a., Paris.

Farkas, D. F.: 1997, Evaluation Indices and Scope, *in* Szabolcsi (1997b), chapter 6, pp. 183–215.

Farkas, D. F.: 2001, Varieties of Indefinites. Paper presented at the Workshop *Choice Functions and Natural Language Semantics* at ESSLLI'01, Helsinki.

Farkas, D. F. and Swart, H. D.: 2001, Bare Nominals in the Typology of Indefinites. Ms, UCSC/Utrecht.

Filip, H.: 1996, Quantification, Aspect and Lexicon, *in* Kruijff, Morrill and Oehrle (1996).

Fodor, J. D. and Sag, I.: 1982, Referential and quantificational indefinites, *Linguistics and Philosophy* **5**, 355–398.

Freeze, R.: 1992, Existentials and Other Locatives, *Language* **68**, 553–595.

Galton, A.: 1984, *The Logic of Aspect: an Axiomatic Approach*, Clarendon Press, Oxford.

Geach, P.: 1962, *Reference and Generality*, Cornell University Press, Ithaca.

Heim, I.: 1982, *The Semantics of Definite and Indefinite Noun Phrases*, PhD thesis, University of Massachusetts at Amherst, Amherst.

Heim, I.: 1983, On the Projection Problem for Presuppositions, *in* M. Barlow and D. Flickinger (eds), *Proceedings of the West Coast Conference on Formal Linguistics*, Stanford University, Palo Alto, pp. 114–123.

Heim, I.: 1987, Where Does the Definiteness Restriction Apply?, *in* Reuland and ter Meulen (1987), pp. 21–42.

Herburger, E.: 1997, Focus and Weak Noun Phrases, *Natural Language Semantics* **5**, 53–78.

Hilbert, D. and Bernays, P.: 1970, *Grundlage der Mathematik*, 2 edn, Springer-Verlag, Berlin.

Horn, L. R.: 1989, *A Natural History of Negation*, University of Chicago Press, Chicago.

Ioup, G.: 1977, Specificity and the Interpretation of Indefinites, *Linguistics and Philosophy* **1**, 233–245.

Jackendoff, R.: 1990/91, *Semantic Structures*, MIT Press, Cambridge, Mass.

Jensen, P. A. and Vikner, C.: 1994, Lexical Knowledge and the Semantic Analysis of Danish Genitive Constructions, *in* S. Hansen and H. Wegener (eds), *Topics in Knowledge-based NLP Systems*, Samfundslitteratur, Copenhagen, pp. 37–55.

Kálmán, L.: 1995, Definiteness Effect Verbs in Hungarian, *in* Kenesei (1995).

Kálmán, L. and Pólos, L. (eds): 1990, *Papers from the Second Symposium on Logic and Language*, Akadémiai, Budapest.

Kamp, H.: 1981, A Theory of Truth and Semantic Representation, *in* J. Groenendijk (ed.), *Formal Methods in the Study of Language*, Mathematisch Centrum, Amsterdam.

Kamp, H.: 1990, Prolegomena to a Structural Theory of Belief and Other Attitudes, *in* C. A. Anderson and J. Owens (eds), *Propositional Attitudes*, number 20 in *CSLI Lecture Notes*, CSLI, Stanford, pp. 27–90.

Kamp, H.: 1999, *A DRT-based Formalism for the Representation of Attitudinal States and Indirect Discourse.*

Kamp, H.: 2001a, Computation and Justification of Presuppositions, *in* M. Bras and L. Vieu (eds), *Semantics and Pragmatics of Discourse and Dialogue: Experimenting with Current Theories*, CRISPI, Elsevier.

Kamp, H.: 2001b, Copula Constructions, Presentational *There*-Sentences and Non-nominal Quantification. Ms, IMS, Stuttgart University.

Kamp, H.: 2001c, The Importance of Presupposition, *in* C. Rohrer, A. Roßdeutscher and H. Kamp (eds), *Linguistic Form and Its Computation*, CSLI, Stanford.

Kamp, H. and Reyle, U.: 1993, *From Discourse to Logic*, Kluwer, Dordrecht.

Kamp, H. and Roßdeutscher, A.: 1994a, DRS-Construction and Lexically Driven Inference, *Theoretical Linguistics* **20**.

Kamp, H. and Roßdeutscher, A.: 1994b, Remarks on Lexical Structure and DRS-Construction, *Theoretical Linguistics* **20**.

Keenan, E. L.: 1987, A Semantic Definition of "Indefinite NP", *in* Reuland and ter Meulen (1987), pp. 286–317.

Keenan, E. L. and Faltz, L.: 1985, *Boolean Semantics for Natural Language*, Reidel, Dordrecht.

Kenesei, I. and Csaba Pléh (eds): 1992, *Approaches to Hungarian*, Vol. 4, JATE, Szeged.

Kenesei, I. (ed.): 1987, *Approaches to Hungarian*, Vol. 2, JATE, Szeged.

Kenesei, I. (ed.): 1995, *Approaches to Hungarian*, Vol. 5, Attila József University, Szeged.

Kiefer, F. and É.Kiss, K. (eds): 1994, *The Syntactic Structure of Hungarian*, Vol. 27 of *Syntax and Semantics*, Academic Press, New York.

Kim, Y.: 1996, *A Situation Semantic Account of Existential Sentences*, PhD thesis, Stanford University.

Komlósy, A.: 1994, Complements and Adjuncts, *in* Kiefer and É.Kiss (1994).

Kornfilt, J.: 1990, Naked Partitive Phrases in Turkish. Ms, Syracuse University.

Krahmer, E.: 1995, *Discourse and Presupposition*, PhD thesis, Catholic University of Brabant, Tilburg.

Kratzer, A.: 1998, Scope or Pseudoscope? Are there Wide-Scope Indefinites?, *in* Rothstein (1998), pp. 163–196.

Krifka, M.: 1992, Thematic Relations as Links between Nominal Reference and Temporal Constitution, *in* Sag and Szabolcsi (1992), pp. 29–54.

Kruijff, G.-J., Morrill, G. V. and Oehrle, R. T. (eds): 1996, *Formal Grammar; Proceedings of the Conference of ESSLLI, Prague 1996*, Prague.

Ladusaw, W. A.: 1994, Thetic and Categorical, Stage and Individual, Weak and Strong, *in* M. Harvey and L. Santelmann (eds), *Proceedings of SALT IV*, Cornell University DMLL, pp. 220–229.

Ladusaw, W. A.: 1999, Predicate Restriction and Saturation (jointly with Sandra Chung). Paper presented at the 12th Amsterdam Colloquium.

Langendoen, D. and Savin, H.: 1971, The Projection Problem for Presuppositions, *in* C. Fillmore and D. Langendoen (eds), *Studies in Linguistic Semantics*, Reinhart and Winston, New York.

Lappin, S. and Reinhart, T.: 1987, Presuppositional Effects of Strong Determiners: A Processing Account, *Linguistics* **26**, 1021–1037.

Levin, B. and Rappaport-Hovav, M.: 1995, *Unaccusativity: At the Syntax–Lexical Semantics Interface*, MIT Press, Cambridge, MA.

Lewis, D.: 1975, Adverbs of Quantification, *in* E. L. Keenan (ed.), *Formal Semantics of Natural Languages*, Cambridge University Press.

Link, G.: 1983, The Logical Analysis of Plurals and Mass Terms: A Lattice-Theoretical Approach, *in* Bäuerle, Schwarze and von Stechow (1983), pp. 303–323.

Liu, F.: 1990, *Scope Dependency in English and Chinese*, PhD thesis, UCLA.

Lloyd, J. W.: 1987, *Foundations of Logic Programming*, Symbolic Computation—Artificial Intelligence, 2 edn, Springer-Verlag, Berlin etc.

Lodrup, H.: 1994, "Surface Proforms" in Norwegian and the Definiteness Effect, *in* M. Gonzalez (ed.), *NELS 24 Proceedings*, GLSA, Amherst.

Lumsden, M.: 1998, *Existential Sentences: Their Structure and Meaning*, Croom Helm, London.

Maleczki, M.: 1992, Bare Common Nouns and Their Relation to the Temporal Constitution of Events in Hungarian, *in* P. Dekker and M. Stokhof (eds), *Proceedings of the Eighth Amsterdam Colloquium*, ILLC, University of Amsterdam, Amsterdam.

Maling, J.: 1987, Existential Sentences in Swedish: Reference to Thematic Roles, *in* M. Browning, E. Czaykowski-Higgins and E. Ritter (eds), *The 20th Anniversary of MIT Linguistics; MIT Working Papers in Linguistics*, Vol. 9, MIT Press, Cambridge, Mass.

Matthewson, L.: 1999, On the Interpretation of Wide Scope Indefinites, *Natural Language Semantics* **7**(1), 79–134.

McNally, L.: 1998, Existential Sentences without Existential Quantification, *Linguistics and Philosophy* **21**, 353–392.

McNally, L. and van Geenhoven, V.: 1997, *Redefining the Weak–Strong Distinction*. Paper presented at the Paris Syntax and Semantics Conference.

Milsark, G.: 1977, Towards an Explanation of Certain Peculiarities of the Existential Construction in English, *Linguistic Analysis* **5**(3), 1–29.

Mitchell, J. E.: 1986, *The Formal Semantics of Point of View*, PhD thesis, University of Massachusetts, Amherst, MAS.

Mithun, M.: 1984, The Evolution of Noun Incorporation, *Language* **60**, 847–895.

Moens, M. and Steedman, M.: 1988, Temporal Ontology and Temporal Reference, *Computational Linguistics* .

Mohanan, T.: 1995, Wordhood and Lexicality, *Natural Language and Linguistic Theory* **13**, 75–134.

Moltmann, F.: 1996, Domain-related Dynamic Semantics and the Weak–Strong Distinction among Quantifiers. MS, CUNY, Philosophy Department.

Moltmann, F.: 1997, Intensional Verbs and Quantifiers, *Natural Language Semantics* **5**, 1–52.

Moore, R. C.: 1989, Unification-Based Semantic Interpretation, *in* (ed.), *Proceedings of EACL 27*, ACL.

Morrill, G. V. and Oehrle, R. T. (eds): 1995, *Formal Grammar; Proceedings of the Conference of ESSLLI, Barcelona 1995*, Barcelona.

Musan, R.: 1995, *On the Temporal Interpretation of NPs*, PhD thesis, MIT.

Musan, R.: 1996, *There*-Constructions Revisited, *Proceedings of SALT VI*, Cornell University, Ithaca, pp. 167–184.

Paducheva, E.: 2000, Definiteness Effect: The Case of Russian, *in* von Heusinger and Egli (2000).

Partee, B. H.: 1986, Noun-phrase Interpretation and Type-shifting Principles, *in* J. Groenendijk (ed.), *Studies in Discourse Representation Theory and the Theory of Generalized Quantifiers*, Foris, Dordrecht.

Partee, B. H.: 1989, Binding Implicit Variables in Quantified Contexts, *in* C. Wiltshire (ed.), *Proceedings of CLS 25*, Chicago Linguistic Society, Chicago, pp. 342–365.

Partee, B. H.: 1995, Quantificational Structures and Compositionality, *in* Bach et al. (1995), pp. 541–602.

Partee, B. H.: 2000, Weak NPs in HAVE-Sentences, *in* J. Gerbrandy, M. Marx, M. de Rijke and Y. Venema (eds), *Liber Amicorum for Johan van Benthem*, Amsterdam.

Partee, B. H. and Rooth, M.: 1983, Generalized Conjunction and Type-Shifting Principles, *in* Bäuerle et al. (1983), pp. 361–383.

Platzak, C.: 1983, Existential Sentences in English, German, Icelandic and Swedish, *in* F. Karlsson (ed.), *Papers from the 7th Scandinavian Conference on Linguistics*, Deptartment of General Linguistics, University of Helsinki.

Poesio, M.: 1994, Weak Definites, *Proceedings of SALT IV*, Cornell University, Ithaca, pp. 282–299.

Prince, E. F.: 1978, On the Given/New Distinction, *in* P. R. Clyne, W. F. Hanks and C. L. Hofbauer (eds), *CLS 15 Proceedings*, University of Chicago, pp. 267–278.

Prince, E. F.: 1981, Toward a Taxonomy of Given-New Information, *in* P. Cole (ed.), *Radical Pragmatics*, Academic Press, New York.

Pustejovsky, J.: 1991, The Syntax of Event Structure, *Cognition* **41**, 47–81.

Reinhart, T.: 1997, Quantifier Scope: How Labor is Divided between QR and Choice Functions, *Linguistics and Philosophy* **20**, 335–397.

Reinhart, T.: t.a., *Interface Strategies*, MIT Press, chapter Topic and the Conceptual Interface.

Reuland, E. J. and ter Meulen, A. (eds): 1987, *The Representation of (In)definiteness*, MIT Press, Cambridge, Mass.

Reyle, U., Rossdeutscher, A. and Kamp, H.: 2000, Ups and Downs in the Theory of Temporal Reference, *in* U. Reyle (ed.), *Presuppositions and Underspecification in the Computation of Temporal and other Relations in Discourse*, Arbeitsberichte des Sonderfoschungsbereichs 340, Stuttgart/Tübingen, Nr.164.

Rooth, M.: 1999, Association with Focus or Association with Presupposition?, *in* P. Bosch and R. van der Sandt (eds), *Focus: Linguistic, Cognitive and Computational Perspectives*, Studies in Natural Language Processing, Cambridge University Press, Cambridge, pp. 232–246.

Rothstein, S. (ed.): 1998, *Events and Grammar*, Kluwer, Dordrecht.

Rullmann, H.: 1989, Indefinite Subjects in Dutch. NSF Grant Report/Quantification, UMass Amherst.

Ruys, E. G.: 1992, *The Scope of Indefinites*, PhD thesis, Utrecht University.

Sæbø, K. J.: 1996, Anaphoric Presuppositions and Zero Anaphora, *Linguistics and Philosophy* **19**.

Sag, I. and Szabolcsi, A. (eds): 1992, *Lexical Matters*, Vol. 24 of *CSLI Lecture Notes*, CSLI, Stanford.

Sandt, R. V. D.: 1992, Presupposition Projection as Anaphora Resolution, *Journal of Semantics* **9**, 333–377.

Schubert, L. K. and Pelletier, F. J.: 1989, Generically Speaking; or, Using Discourse Representation Theory to Interpret Generics, *in* G. Chierchia, B. H. Partee and R. Turner (eds), *Properties, Types and Meaning*, Vol. 2, Kluwer, Dordrecht, pp. 193–168.

Schwarz, B.: 2001, Two Kinds of Long-Distance Indefinites.

Swart, H. D.: 2000, Scope Ambiguities with Negative Quantifiers, *in* von Heusinger and Egli (2000).

Szabolcsi, A.: 1986, From the Definiteness Effect to Lexical Integrity, *in* Abraham and de Meÿ (1986), pp. 321–348.

Szabolcsi, A.: 1997a, Strategies for Scope Taking, , pp. 109–154.

Szabolcsi, A. (ed.): 1997b, *Ways of Scope Taking*, Vol. 65 of *Studies in Linguistics and Philosophy*, Kluwer, Dordrecht.

Szabolcsi, A. and Zwarts, F.: 1993, Weak Islands and an Algebraic Semantics of Scope Taking, *Natural Language Semantics* **1**(3), 235–284.

van der Does, J. and de Hoop, H.: 1998, Type-Shifting and Scrambled Indefinites, *Journal of Semantics* .

van Geenhoven, V.: 1996, *Semantic Incorporation and Indefinite Descriptions*, PhD thesis, Tübingen University, Tübingen.

van Geenhoven, V.: 1998, *Semantic Incorporation and Indefinite Descriptions. Semantic and Syntactic Aspects of Noun Incorporation in West Greenlandic*, Dissertations in Linguistics, CSLI Publications, Stanford.

van Hout, A.: 1998, *Event Semantics of Verb Frame Alternations*, to be looked up.

Vangsnes, Ø. A.: 1994, *The syntactic source and semantic reflexes of the definiteness effect*, Master's thesis, University of Bergen.

Vaux and Sigler, M.: 1997, Agreement in the Verbal and Nominal Domains in Armenian. Paper presented at the Stuttgart Symposium on Historical Linguistics.

von Heusinger, K.: 2000, The Reference of Indefinites, *in* von Heusinger and Egli (2000).

von Heusinger, K. and Egli, U. (eds): 1996, *Proceedings of the Konstanz Workshop "Reference and Anaphoric Relations"*, number 79 and 84 in *Working Papers in Linguistics*, Konstanz.

von Heusinger, K. and Egli, U. (eds): 2000, *Reference and Anpahoric Relations*, Studies in Linguistics and Philosophy, Kluwer, Dordrecht.

von Stechow, A.: 1996, The Different Readings of Wieder 'Again': A Structural Account, *Journal of Semantics* **13**, 87–138.

von Stechow, A.: 2000, Temporally Opaque Arguments in Verbs of Creation, *in* A. Bonomi (ed.), *Proceedings of Bergamo Conference on Tense and Modality*, n.d.

Wacha, B.: 1974, Az ige és a tárgy kapcsolata a magyarban. [The Relationship betwen Verb and Object in Hungarian. In Hungarian.], *Nyelvtudományi Közlemények. (Communications in Linguistics).* **83**, 157–183.

Ward, G. and Birner, B.: 1995, Definiteness and the English Existential, *Language* **71**, 722–742.

Williams, E.: 1984, *There*-insertion, *Linguistic Inquiry* **15**, 131–153.

Winter, Y.: 1996, What Makes Choice Natural?, *in* von Heusinger and Egli (1996).

Winter, Y.: 1997, Choice Functions and the Scopal Semantics of Indefinites, *Linguistics and Philosophy* **20**, 399–467.

Winter, Y.: 1998, *Flexible Boolean Semantics*, PhD thesis, UIL-OTS Utrecht.

Woisetschlaeger, E.: 1983, On the Question of Definiteness in 'an Old Man's Book', *Linguistic Inquiry* **14**, 137–154.

Zeevat, H.: 1992, Presuppostion and Accommodation in Update Semantics, *Journal of Semantics* **9**(4), 379–410.

Zimmermann, T. E.: 1992/93, On the Proper Treatment of Opacity in Certain Verbs, *Natural Language Semantics* **1**, 149–181.

Zucchi, A.: 1995, The Ingredients of Definiteness and the Definiteness Effect, *Natural Language Semantics* **3**, 33–78.