GRAMMAR AND INFORMATION:
A STUDY OF TURKISH INDEFINITES

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF INFORMATICS
OF
THE MIDDLE EAST TECHNICAL UNIVERSITY

BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE
OF DOCTOR OF PHILOSOPHY
IN
THE DEPARTMENT OF COGNITIVE SCIENCE

SEPTEMBER 2010

Approval of the Graduate School of Informatics

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ABSTRACT

GRAMMAR AND INFORMATION:
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September 2010, 173 pages

Turkish, along with many other languages, marks its direct objects in two distinct ways: overt accusative marking (Acc) versus no marking (∅). The research on the grammar and interpretation of Turkish indefinite descriptions has focused on the effects of this distinction in case-marking on the interpretation of indefinite noun phrases. The overt accusative marker has been associated with discourse-linking (Nilsson 1985; Enç 1991; Zidani-Eroğlu 1997), specificity (von Heusinger 2002; von Heusinger and Kornfilt 2005), presuppositionality (Kennelly 1997; Kelepir 2001), individuation/particularization (Nilsson 1985; Taylan and Zimmer 1994; Bolgün 2005; Kılıçaslan 2006), and totality/delimitedness (Nilsson 1985; Nakipoğlu 2009). The common denominator of these proposals is that each draws a direct correlation between the accusative marker and a semantic or pragmatic category. The thesis argues that such direct associations are either too specific to receive full empirical support, or are too general to possess significant explanatory force. Instead, the thesis tries to come up with an account where the contribution of the accusative marker is minimized to create room for extra-grammatical resources to play explanatory roles.

On the empirical side, we review and provide Turkish data that do not conform to the analyses of the accusative case as a specificity marker or as an existential presupposition trigger.

The cases problematic for these proposals come from the interaction of accusative marked indefinites with various intensional operators. In an excursion to a closely related domain, we provide data and argumentation that challenge the tenability of a purely grammatically determined pattern of "neutral" intonation. Our discussion reveals that some information-theoretic concerns are effective in determining the "neutral" intonation of an utterance. We use these observations in clarifying the discourse-linking function attributed to the accusative marker.

On the theoretical side, we search for a grammatical basis which not only gives rise to the interpretive effects attributed to the accusative marker, but also explains why certain types of noun phrases obligatorily receive the accusative marker in Turkish. On the basis of data from coordinating conjunctions, we argue that a "semantic incorporation" account that construes the difference between overt Acc versus $\emptyset$-marking as a type difference is not adequate in explaining the relevant Turkish facts. Instead, we propose to base the difference between Acc-marking versus $\emptyset$-marking on the distinction between properties and kinds. We take $\emptyset$-marked indefinites as existential quantifiers over instances of kinds that are licensed under string adjacency. We treat Acc-marked indefinites as referential objects based on contextually restricted properties, which are modeled as generalized Skolem terms (Steedman 2010). We show how the proposed distinction captures the empirical facts reviewed in the thesis.

Keywords: Indefinite Noun Phrases, Turkish, Specificity, Discourse-linking, Focus, Combinatory Categorial Grammar

ÖZ

DİLBİLGİSİ VE BİLGİ: TÜRKÇE BELİRSİZ AD ÖBEKLERİ ÜZERİNE BIR ÇALIŞMA

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Tez Yöneticisi: Doç. Dr. Cem Bozşahin

Eylül 2010, 173 sayfa

Türkçe, diğer birçok dil gibi, dolaysız tümleçleri iki farklı biçimde belirtmektedir: açık belirtme durumu (Acc) ve sıfır sesbirim (∅). Türkçe belirsiz ad öbeklerinin dilbilgisel ve anlambilimsel özellikleri üzerine yapılan araştırmalar, durum eklerindeki bu farklılığın anlamlandırma üzerindeki etkilerine yoğunlaşmışlardır. Açık belirtme durumu bağlam-bağlılık (Nilsson 1985; Enç 1991; Zidani-Eroğlu 1997), özgüllük (von Heusinger 2002; von Heusinger and Kornfilt 2005), varsayımlılık (Kennelly 1997; Kelepir 2001), tekilleştirme (Nilsson 1985; Taylan and Zimmer 1994; Bolgün 2005; Kılıçaslan 2006), sonluluk (Nilsson 1985; Nakipoğlu 2009) gibi kavramlarla ilişkilendirilmiştir. Bu çalışmaların ortak paydası açık durum ekiyle anlamsal ya da edimsel bir ulam arasında dolaysız bir ilişki kuruyor olmalarıdır. Tez bu ilişkilendirmelerin, ya ampirik veriler karşısında olumlanamayacak kadar özgül, ya da açıklayıcılık açısından yetersiz kalacak kadar genel olduklarını ileri sürmektedir. Tez bunun yerine dilbilgisi dışı ögelerin de rol oynayabileceği bir alan yaratacak şekilde, belirtme durumunun katkısını asgariye indirmeye çalışmaktadır.

Ampirik tarafta, Türkçe durum ekinin özgüllük ve varlık varsayımı tetikleyicisi olarak açiklanamayacağına dair veriler ortaya konacaktır. Bu açıklamalar için problemli olan veriler belirtme durum ekiyle çesitli içlemsel operatörlerin etkileşimlerinde ortaya çıkmaktadır.

Yakından ilintili bir alana geçilerek, tamamen dilbigisel kaynaklara dayanarak “yansız ezgi” kavramının açıklanamayacağına dair veri ve tartışmalar ortaya konacaktır. Bu tartışmaların sonunda birtakım bilgi kuramsal etmenlerin bir tümcenin “yansız ezgi”sinin oluşmasında rol oynadığı ortaya çıkacaktır. Buradan çıkan sonuç ve gözlemler, durum ekinin bağlam-bağlılık ile ilkişini açıklamakta kullanılacaktır.

Kuramsal tarafta, sadece gözlemlenen anlamlandırma etkilerini değil, neden Türkçe’de birtakım yapıların zorunlu olarak durum eki gerektirdiğinin dilbilgisel temelleri aranacaktır. Eşbağımlılık yapılarındaki verilerden yola çıkılarak, “anlambilimsel gövdeleyicilik” kuramının Türkçe’deki verileri açıklamakta yetersiz kaldığı gösterilecektir. Bunun yerine, açık durum ekli belirsiz ad öbekleri ile sıfır sesdurumlu belirsiz ad öbekleri arasındaki farkın “özellik” ve “tür” kavramları arasındaki farka dayandırılması gerektiği savunulacaktır. Bu bağlamda, sıfır ses durumlu belirsiz ad öbekleri tür örnekleri üzerinde işleyen varlıksal niceleyiciler olarak çözümleneceklerdir. Açık belirtme durumlu belirsiz ad öbekleri ise bağlamsal kısıtlara tabi olan özellikler üzerinde, genel Skolem terimleri olarak tanımlı, göndergesel aygıtlar olarak çözümleneceklerdir. Önerilen çözümlemenin tezde ele alınan ampirik verileri nasıl sağladığı gösterilecektir.

Anahtar Kelimeler: Belirsiz Ad Öbekleri, Türkçe, Özgüllük, Bağlam-bağlılık, Odak, Birleşimsel Ulamsal Dilbilgisi

ACKNOWLEDGMENTS

I am grateful to my supervisor Cem Bozşahin for his guidance, friendship, and collaboration throughout the years. I would like to thank the other members of my examining committee Aslı Göksel and Deniz Zeyrek for their support and guidance through the thesis period. I would like to thank Ümit Deniz Turan and Varol Akman for being in my defense jury, and for their feedback and warmth. This thesis has benefited much from discussions with Cem Bozşahin, Aslı Göksel, Cem Keskin, Duygu Özge, Sumru Özsoy, Mark Steedman, Ceyhan Temürcü, and Deniz Zeyrek. I am so grateful to them for this.

I would like to thank the participants of the Specificity Workshop held in Stuttgart in August 2010, especially Donka Farkas, Dolgor Guntsetseg, Klaus von Heusinger, Edgar Onea, and Carla Umbach for illuminating discussions.

I am grateful to Mark Steedman and TÜBİTAK for a year long visit to the ICCS of University Edinburgh. I would like to thank the participants of the "Syntax Semantics Research Group" and "The Phonology Workshop" held in Edinburgh during Fall 2007 for valuable discussions.

Many people supported me in various ways throughout the thesis period. I would like to thank Nurcan Atakay, Berhayat Bahşiş, Ahmet Beyaz, Kaan Bıyıkoğlu, Vicky Chondrogianni, Duygu Çınga, Sibel Gülnar, Necla Işıklar, Canan İpek, Ali Kantar, Duygu and Yiğit Karahanoğulları, Asuman and Ozan Keysan, Zerin, Muvaffak and Onur Kükürt, Belkıs, Hamit and Nazlı Oğuz, Cihan Özkan, Ayfer and Vedat Samra, Kemal and Emine Sofu, Bilge Say, Tim Smith, Ferhat Soylu, Ergün Tepebağlı, Selim Tezcan, Başar Tuna, Murat Ulubay, and Çağlar Yalı.

I am infinitely grateful to my parents Cahide and Sadi Özge who were, as always, willing to sacrifice *anything* they have for me during the thesis period.

Partners are usually thanked for reminding the thesis writer that s/he must not loose the

track of life, which is still outside, which worths living, and so on. In our case with Duygu, we lost the track of life *together*; for many times, and sometimes completely. I am grateful to this thesis for laying the grounds for such a tight form of togetherness with someone like her.

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LIST OF ABBREVIATIONS

Abl	Ablative case
Acc	Accusative case
CCG	Combinatory Categorial Grammar
Cmpl	Complementizer
Cond	Conditional
Cord	Coordinator
Dat	Dative case
FPrt	Focus particle
GQ	Generalized quantifier
Gen	Genitive case
GST	Generalized Skolem term
Imp	Imperative
Inf	Infinitival
Ins	Instrumental case
Loc	Locative case
Nmnl	Nominalizer
Opt	Optative
Prg	Progressive
QPrt	Question particle
QR	Quantifier raising
Rcp	Reciprocal
Rel	Relativizer
RprPst	Reportive past

CHAPTER 1

INTRODUCTION

The thesis is concerned with the division of labor between "grammar" and "information" as manifested in a specific domain of linguistic inquiry: the grammar and interpretation of indefinite noun phrases in Turkish. Our understanding of the terms "grammar" and "information" needs clarification. We take "grammar" to be a computational system whose function is to mediate between the observable (sound and movement) and the unobservable (meaning) ends of linguistic expressions. We take "information" to cover whatever knowledge there is that gets involved in linguistic communication and that lies outside of "grammar".

Our use of the term "computational system" deserves some clarification as well. We use the term in a fairly standard sense. Any computational system can be thought of as comprising of some stored data and algorithmic procedures that operate on these data.[1] To be more concrete, the particular computational system that will be employed in the thesis is a [C]ombinatory [C]ategorial [G]rammar (see Chapter 4). A typical CCG comprises of a lexicon (data) and a small set of combinatory operations (procedures) that generate more complex expressions out of what there are in the lexicon. This makes explicit what is meant by "grammar". What is left out by this delimitation, namely world-knowledge, the utterance context—which includes lots of things from "where" and "now" to the record of what was said, attentional and epistemic states of the conversational parties and so on, belongs to the realm of "information". Of course these definitions in themselves do not say much about where the line between "grammar" and "information" is actually drawn. This is so because they leave unspecified what can go into the lexicon. The present thesis will try to provide this missing part.

[1] The distinction may be somewhat blurred in some models of computation though.

Apart from the usual benefits of explicitness, the present emphasis on being concerned with the issue of where to draw the boundary between "grammar" and "information", and paying attention to both, which are among the typical tenets of "dynamic" theories like Discourse Representation Theory (Kartunnen 1976; Kamp 1984; Heim 1982 and others), has a methodological rationale. It provides a constraint on theorizing that may be easily missed if one concentrates on either side of the divide in exclusion of the other. This degree of freedom can be put in a slogan: "Do not replicate in "grammar" what you already have in "information". Grosz *et al.* (1983:44) seem to be complaining about the neglect of a similar constraint when they say:

> Linguistic theories typically assign various linguistic phenomena to one of the categories, *syntactic*, *semantic*, or *pragmatic*, as if the phenomena in each category were relatively independent of those in the others. However, various phenomena in discourse do not seem to yield comfortably to any account that is strictly a syntactic or semantic or pragmatic one.

The thesis is motivated by our conviction that the reductionist strategy Grosz *et al.* (1983) are complaining about in the above quote is widely employed in the investigation of Turkish indefinite descriptions.

Turkish is one of those languages with two objective cases, namely the overt accusative marker *(y)I* and ∅-marking, where the particular choice of one or the other is usually connected with certain interpretive effects. In this thesis we will concentrate on indefinite descriptions headed by the Turkish expression *bir*.

Turkish accusative marker (henceforth Acc) has received the following analyses.

(1) a. Discourse-linking (Nilsson 1985; Enç 1991; Zidani-Eroğlu 1997).

b. Specificity (von Heusinger 2002; von Heusinger and Kornfilt 2005).

c. Presuppositionality (Diesing 1992; Kennelly 1997; Kelepir 2001)

d. Individuation/Particularization (Nilsson 1985; Taylan and Zimmer 1994; Bolgün 2005; Kılıçaslan 2006)

e. Totality/Delimitedness (Nilsson 1985; Nakipoğlu 2009)

In the due course we will argue that some of these proposals (a–c) are too specific to receive full support from the empirical facts that will be reviewed and introduced in the thesis. We will argue on the other hand that some others (d–e) are too general, and in this regard better be made to follow from more basic principles.

The thesis opens with Chapter 2 which is the only chapter of the thesis that does not contain any original material. It gives a brief background on linguistic issues surrounding indefinite descriptions such as scope and specificity.

Chapter 3 has three main parts. In §3.1 we provide a general overview of noun phrase interpretations in Turkish. §3.2 is devoted to the clarification of the data concerning the interaction of Turkish indefinite descriptions under various case-markings with semantic and pragmatic phenomena like nominal quantification, specificity, discourse-linking, modal operators, referentially opaque verbs, propositional attitude verbs, negation and information structure. In this section evaluation of the existing proposals and introduction of new data go hand in hand. In the final section of Chapter 3 we provide some challenge to the purely syntax-based proposals for focus projection phenomena in Turkish. This provides a case study in itself showing how "grammar" and "information" interact in assigning the appropriate intonational focus of an utterance. Some results of this final section of Chapter 3 are also made use of in Chapter 5 in explaining certain aspects of Enç's (1991) discourse-linking proposal.

Chapter 4 introduces the framework that will be employed in the analysis of the data reviewed in the previous chapter. The first section of this chapter is an introduction to Combinatory Categorial Grammar (CCG). In §4.2 we couple CCG with an intensional semantic representation language, which draws on the two-sorted type theory of Gallin (1975) and the Situation Calculus of McCarthy and Hayes (1969). In the final section of this chapter we discuss generalized Skolem term account of Steedman (2010) and propose certain modifications that we will make use of in capturing the interpretation of Acc-marked indefinites in Turkish.

Chapter 5 opens with a discussion of a widely employed proposal concerning the interpretation of indefinites and their interaction with case-marking, namely "semantic incorporation" of van Geenhoven (1998); van Geenhoven and McNally (2005). We provide some empirical evidence from Turkish that renders a "semantic incorporation" account untenable for Turkish. In the second part of this chapter we present our proposal regarding the gram-

mar and interpretation of indefinites in Turkish, and try to justify our claims by applying the proposal to various phenomena discussed in Chapter 3.

Chapter 6 summarizes the contributions of the thesis and outlines some open problems.

CHAPTER 2

BACKGROUND ON INDEFINITES

2.1 Indefinites and Scope

The interest in the scope of indefinites is due to some well known problems indefinites pose for a standard treatment of quantifier scope that integrates a Russellian existential Generalized Quantifier[1] (Barwise and Cooper 1981) interpretation of indefinites with the syntactic operation of Quantifier Raising or its Montagovian equivalent "quantifying in". Let us briefly review these problems.

It is descriptively well established that complex NPs and conditional clauses, among other constructions, act as *scope islands*, meaning that a quantifier embedded in such an environment cannot take scope beyond that environment (Farkas 1981). The following examples from Fodor and Sag 1982:369–70 illustrate the point.

(2) a. John overheard the rumor that each of my students had been called before the dean.

b. If each friend of mine from Texas had died in the fire, I would have inherited a fortune.

(2a) does not say that for each of my students John overheard the rumor that (s)he had been called before the dean; and similarly, (2b) does not say that each friend of mine is such that if (s)he dies in the fire I inherit a fortune. The absence of such readings attests that universals cannot take scope out of complex NPs and conditional clauses. This is expected under the usual transformational assumptions, given that QR, which is needed for wide scope

[1] A generalized quantifier is a function from properties to sets of properties. For instance the generalized quantifier *every* maps the property *man* to the set of properties that every man has.

interpretation, is a syntactic movement operation, and the above constructions are islands also for similar operations like overt *wh*-movement and covert LF movement of *wh*-in situ.

However, the minimal variants of (2a/b) given below in (3, Fodor and Sag 1982:exx. 58 and 60) are ambiguous between a wide scope and narrow scope interpretation of the indefinites *a student of mine* and *a friend of mine from Texas*, respectively.

(3) a. John overheard the rumor that a student of mine had been called before the dean.

b. If a friend of mine from Texas had died in the fire, I would have inherited a fortune.

For instance (3b) can either mean that the death of *any* of my friends in Texas is enough for me to inherit a fortune—indefinite is confined to the conditional—, or that a particular friend of mine from Texas is such that if (s)he dies in the fire, I inherit a fortune. In the latter reading the indefinite *a friend of mine* takes scope out of the conditional clause and therefore is immune to the scope island restriction that applied to *each* NP in (2) above. The same points apply to (3a). This manifestation of what Reinhart (1997) calls "the syntactic freedom of existential wide scopes" marks a basic contrast between indefinites and "standard" quantifiers like *each*, *every*, *no* and so on.

Fodor and Sag (1982) go further to show that the scope escaping indefinite cannot be a special type of Generalized Quantifier (GQ) distinguished from universals in its exceptional scope restrictions. Their argument basically is that if this were the case, the sentence in (4, their ex. 73, p. 375) would have an interpretation according to which the indefinite *a student in the syntax class* have escaped the conditional clause but got trapped under the scope of the universal *every professor*, resulting in an "intermediate scope" interpretation.[2] In other words, if indefinites are GQs immune to scope islands, what can prevent them from raising past the conditional and stopping short of outscoping the universal?

(4) If a student in the syntax class cheats on the exam, every professor will be fired.

Fodor and Sag (1982) claim that such an intermediate reading is nonexistent; the only wide scope reading for the indefinite is the one where it takes maximal scope: A particular student in the syntax class is such that if (s)he cheats, every professor will be fired.

[2]This interpretation would read: For every professor there exists a certain student in the syntax class, such that if that student cheats, then the professor will be fired.

These observations regarding the scoping behavior of indefinites, among other things, led Fodor and Sag (1982) to propose that indefinites, besides their existential quantifier interpretation, also have an interpretation very close to that of referential expressions like definite descriptions and demonstratives. On this account, the ambiguity in (3) between a narrow and a wide scope indefinite reading boils down to the lexical ambiguity of the indefinite determiner *a*. In the quantificational interpretation, the NP *a friend of mine from Texas*, being an existential GQ, is subject to the usual island constraints for QR, and therefore stays within the scope of the conditional operator *if*. In the referential reading on the other hand, the indefinite takes the widest possible scope, or it is "scopeless", as typical of referring expressions.

The nonexistence of intermediate scope in sentences like (4), which is a crucial step in Fodor and Sag's (1982) argument, is contested by Ruys (1992:101) on the grounds that the unavailability of intermediate scope in (4) may be due to phrase structural constraints on QR rather than anything related to the interpretation of the indefinite. Specifically, even if the indefinite raised out of the conditional adjunct it could not fall within the scope of the universal, given the impossibility of raising the universal past a pre-posed CP (the conditional clause). Ruys argues that the correct case for testing the availability of intermediate scope is the following (his 17):

(5) Every professor will rejoice if a student in the syntax class cheats on the exam.

where Ruys argues that there *is* an intermediate scope reading.[3] He also argues that the intermediate scope reading can be further facilitated by "turning off" the maximal wide scope reading by introducing a bound variable pronoun as in (6, his 18).

(6) Every professor$_i$ will rejoice if a student of his$_i$ cheats on the exam.

Kratzer (1998) argues that intermediate scope readings are facilitated by the presence of implicit bound pronouns, and provides an account that aims to capture this sensitivity of intermediate scope readings to bound variable anaphora. Let us take a look at the idea of implicit bound variable anaphora.

It is standard to assume that third person English pronouns, besides their deictic and discourse anaphoric uses, are used as variables bound by a quantifier, as in (7).

[3] See Winter 1997:403 for other authors that challenge the nonexistence of intermediate scope readings.

(7) a. Every man$_i$ believes he$_i$ is a genius.

b. $\forall x.man'x \rightarrow believe'(genius'(pro'x))x$

Partee (1989) attributes to Mitchell (1986) the observation that some open-class words behave like bound variable pronouns, as illustrated in (8) (Partee's 9).

(8) a. John visited a *local* bar.

b. Every sports fan in the country was at a *local* bar watching the playoffs.

The point here is that the adjective *local* has an implicit argument standing for a location; a local bar is always local to some reference point. In (8a) the implicit argument can be bound by the utterance context (deictic), or some reference point established in the previous discourse (discourse anaphoric). In (8b) besides the deictic and discourse anaphoric bindings, there is also a more readily available reading in which the implicit argument of *local* is bound by a universal quantifier that quantifies over individuals or locations of individuals. Such bound variable readings are also available in one-place versions of relational nouns, as Partee (1989:ex. 11) illustrates with the following example.

(9) Every participant had to confront and defeat an *enemy*.

In the bound variable reading, each participant confronts and defeats an enemy of his or her.

Partee (1989) makes three points relevant to our present concerns. One is: she suggests "that the general case of lexical meaning is a combination of inherent meaning and dependence on context." (p. 276) This means that taking lexical items to be incorporating implicit contextually bound arguments is the rule rather than the exception. We will see below a way of formalizing this insight. The second point of interest in Partee 1989 is that there are three sources of contextual dependence: (i) extra linguistic deictic context; (ii) discourse context; and (iii) sentence internal context provided by quantifiers and other operators (p. 272). A third point concerns what exactly is meant by a 'sentence internal context". Here Partee entertains the possibility that what is quantified over and bound sentence internally may be a context parameter rather than a variable over times, places, and so on (see pp. 265/273).[4] To give an example for the last point, consider the following sentence (Partee's 13a).

[4] Lewis (1975) makes a similar point on adverbs of quantification.

(10) Every man who stole a car abandoned it 2 hours *later*.

Here Partee takes (10) to be quantifying over cases of car thefts, rather than over a time variable. This makes *later* parametrized for cases rather than time points. She suggests a DRT like representation for modelling the contexts and the accessibility relation between them. In this setting, it becomes a lexical semantic requirement for *later* that the cases it is anchored to must incorporate a reference time.

Against Kratzer's (1998) claim that intermediate readings are available for cases involving implicit binding, various authors argued that bound anaphora is not a necessary condition for intermediate scope.[5] However, admitting intermediate scope readings does not refute a semantic ambiguity account like that of Fodor and Sag (1982). The source of intermediate scope is still debatable.

In Chapter 4 we will return to the issue of intermediate scope, when discuss Steedman (2010) generalized Skolem term account, which we will make use of in our analysis of Turkish Acc-marked indefinites.

2.2 Indefinites and Specificity

The investigation of specificity involves the following basic types of questions:

(11) a. *Analysis of Specificity:*

What does it mean for an NP to be specific? What is specificity? Under what circumstances does a linguist tend to mark a reading as specific?

b. *Grammar of Specificity:*

How is specificity realized? Or: How is specificity computed?

Enç 1991 (that we will discuss in more detail below) instantiates the simplest type of response to these questions. *Analysis*: Being specific is being in a certain kind of relation to existing discourse referents; *Grammar*: Specificity is realized in Turkish by the presence of the accusative marker, or in English, by *a certain*. For convenience, let us name this kind of approach a "direct account".

[5] See Abusch 1994, Ruys 1992:§§3.4.1 and 4.2.4, Winter 1997:430/431 on the availability of intermediate scope readings.

A direct account handles specificity strictly within the bounds of the grammar. It is some aspect of the representation assigned by the grammar to the expression that directly conditions the availability of a specific reading. There is no room in such a picture for mechanisms that refer to certain aspects of the context of use and/or the users of expressions.

There are certain kinds of objections to a direct account of specificity. One kind of objection argues, while holding that specificity belongs to the domain of grammar, that it is not marked as direct as by a feature reserved for specificity. The grammar delivers specific readings rather through the interaction of various grammatical components. For instance, Ruys (1992) proposes to reduce the specific/non-specific distinction to differences in the configurational relations between scope taking operators, In such an account, specific/non-specific only remains as a descriptive term.

However there is an argument against reducing specificity to a scope phenomenon (Fodor and Sag; Enç 1982; 1991:see). Consider the following example from Fodor and Sag (1982:355), where a specific/nonspecific ambiguity is claimed in the absence of any scope ambiguity inducing operators.[6]

(12) A student in the syntax class cheated on the final exam. (ambiguous)

Take another example, this time from Enç 1991:3, where a specificity difference is claimed in the absence of interacting operators.

(13) a. John talked to a logician about this problem.

b. John talked to a certain logician about this problem.

Not every author takes the claimed meaning differences in (12) and (13) to be stemming from genuine semantic (hence grammatical) ambiguity. This brings us to another type of objection to a direct account of specificity. Some authors suggested that specificity belongs to the theory of pragmatics. For instance Kripke (1977:276, note 41) suspects that the specific/non-specific distinction can be subsumed under his distinction between "speaker's reference" and "semantic reference".[7] In a similar vein, Higginbotham (1987:64–6) argues

[6]Incidentally, note that there is no room in Enç's (1991) account for the ambiguity of (12), since the fact that the student is picked from a contextually given set makes it specific.

[7]Kripke's dichotomy argues against a semantic ambiguity treatment of Donnellan's (1966) referential/attributive distinction. Therefore his objections seem to apply to Fodor and Sag's (1982) referential/quantificational distinction as well.

that the proper place for treating specificity is within the theory of "force" (roughly, pragmatics), rather than the theory of "sense" (semantics).

In the present thesis we will take side with those who take specificity to be an essentially pragmatic phenomena. The two types of specificity, namely that of Enç's (1991), and that of von Heusinger's (2002) will be discussed in detail in Chapter 3. Issues concerning some other types of specificity (Farkas 2002) will be raised along the way.

CHAPTER 3

THE DATA

This chapter is devoted to a critical evaluation and clarification of the data regarding Turkish indefinites. We will provide original data that undermine some generalizations proposed in the literature concerning the grammar and interpretation of case-marking and indefinites in Turkish. We defer the analysis of the data presented here in the terms of the present account to Chapter 5.

3.1 Turkish Noun Phrases

3.1.1 Preliminary Remarks

In this thesis, we will mainly be concerned with noun phrases of the following general structure:[1]

(14) NP → (Modifier)* Determiner Noun

One crucial aspect of Turkish NPs that the above schematization does not reflect is that the modifier determiner order can vary for some modifiers and determiners, and this variation may have subtle interpretive effects. We will not be concerned with such effects in the thesis.[2]

What we schematize as Modifier in (14) may contain adjectivals, relative clauses, ordinals, and so on. What we schematize as Noun can be a simple or a compound noun. The Determiners that we will be mainly concerned are *bir* ('a/one') and quantificational determiners like *her* ('every') and *çoğu* ('.') Although on occasion we will look at some examples

[1] In this context '*' means "zero or more". In the rest of the thesis it will indicate ungrammaticality of linguistic expressions.

[2] See Göksel and Kerslake 2005 for the relevant facts.

involving cardinals, we will concentrate on indefinites involving *bir* ('a/one'), leaving cardinals and other pluralities out of the scope of the thesis.

Some notes on *bir* are in order. Turkish expression *bir* is usually considered to be ambiguous between an indefinite article and a numeral. Aygen-Tosun (1999) claims that *bir* has only the numeral reading, on the grounds that there are languages with a definite article and no indefinite article, but no language has the latter without having the former.

We think there exists enough evidence that *bir* has both a numeral and a determiner reading. First there is the observation (Kornfilt 1997; Kennelly 2004) that the determiner *bir* is distinguished from numerals by tending to occur close to the nominal head in modified noun phrases. Another frequently cited fact is that the numeral, but not the determiner *bir* can receive stress. Below we provide further discussion and evidence for the ambiguity of *bir*.

A relevant distinction between numerals and the indefinite article is that numerals usually give rise to exhaustivity implicatures. This is not so for the indefinite article. For instance, Steedman (2009:49) reports that "*A boy ate a pizza* is true in models where more than one boy did so." Now consider the following exchanges:[3]

(15) Pizza nasıl-dı?
pizza how-Pst
'How was the pizza?'

(16) a. Bir çocuk pizza ye-di. O-na sor-abil-ir-sin.
a kid pizza eat-Pst s/he-Dat ask-Psbl-Aor-Cop.2sg
'A kid ate pizza. You can ask her/him.'

b. *Bir* çocuk pizza ye-di. O-na sor-abil-ir-sin.
a kid pizza eat-Pst s/he-Dat ask-Psbl-Aor-Cop.2sg
'One kid ate pizza. You can ask her/him.'

c. İki çocuk pizza ye-di. Onlar-a sor-abil-ir-sin.
two kid pizza eat-Pst they-Dat ask-Psbl-Aor-Cop.2sg
'Two kids ate pizza. You can ask them.'

[3]Italics indicate the location of sentential stress.

(16b), which has the sentential stress on *bir* gives rise to an exhaustivity implicature; it is unacceptable in a context where there are more than one kid who ate pizza, which is expected given the focus on the numeral. The difference between (16a) and (16c) is the crucial one. We think the difference is basically this. A speaker who knows that 4 kids ate a pizza may utter (16a), if s/he has a specific kid in mind. On the other hand a speaker with the knowledge of the 4 kids is quite unlikely to utter (16c).

Another evidence for the asymmetry between the determiner *bir* and numerals is the following. Only *bir* is compatible with a preceding ordinal, as (17) shows. Presumably, this is so because this is the determiner *bir* rather than the numeral.

(17) San-a ikinci bir/*iki sans ver-iyor-um
you-Dat second a/*two chance give-Prg-1sg
'I am giving you a second chance'

Another place where the difference between the numeral and the determiner *bir* is highlighted is covert partitives. Any indefinite NP can be understood as belonging to a previously established set. A crucial distinction is between cases where the restrictor of the NP coincides with the established set, and those that the restrictor is understood as a proper subset of the established set. Consider (18) where (b) and (c) are meant to be alternative continuations to (a).

(18) a. Kapı-da birkaç asker bekl-iyor-du,
door-Dat a few soldier wait-Prg-Pst
'A few soldiers were waiting at the door.'

b. Bir çavuş ban-a dön-dü.
a sergeant me-Dat turn-Pst
'A sergeant turned to me.'

c. Bir asker ban-a dön-dü.
a soldier me-Dat turn-Pst
'A soldier turned to me.'

We suggest that the expression *bir* is a determiner in (18b) and a numeral in (c).

3.1.2 Kind Reference, Genericity and "Free Choice"

We take the central characteristic of **kind** denotations as not involving instances, generic or otherwise. A typical verb that subcategorizes for kind denoting NPs in its direct object is *icad et* ('invent').[4] Various forms of NPs can appear as the direct object of this verb. (19) gives examples for a bare Acc-marked NP (a), an indefinite NP (b), and a modified ∅-marked NP (c).

(19) a. O dönem Fransızlar **zımba-yı** icat et-ti.
that period French stapler-Acc invent-Pst
'In that period, French invented the stapler.'

b. Ruslar yeni **bir denizaltı** icad et-ti.
Russians new a submarine invent-Pst
'Russians have invented a new submarine.'

c. Ruslar **radar-a yakalan-ma-yan denizaltı** icad et-ti.
Russians radar-Dat get caught-Neg-Rel submarine invent-Pst
'Russians have invented a submarine capable of escaping radar control.'

Another verb that may occur with kind denoting NPs is *sev* ('like'). The direct object of this verb may denote a kind both in generic and episodic contexts, as testified by (20a).

(20) Ruslar alışveriş merkezi-ni sev-di/sev-er.
Russians shopping mall-Acc like-Pst/like-Aor
'Russians liked/likes the shopping mall.'

A point of divergence between *sev* ('like') and *icad et* ('invent') is that the former is acceptable only with determinerless case-marked direct objects, especially in episodic contexts. Consider the following examples:

(21) a. *Ruslar alışveriş merkezi sev-di.
Russians shopping mall like-Pst/like-Aor
'Int: Russians liked the shopping mall.'

[4] Being selected by certain verbs is a test for kind denotation suggested in Krifka *et al.* 1995:10.

b. ?*Ruslar alışveriş merkezi sev-er.
Russians shopping mall like-Pst/like-Aor
'Russians liked/likes the shopping mall.'

The significance of these examples is that they show that what sort of NP can denote a kind is not a question that can be settled without paying attention to the lexical semantics of the verb that goes together with the NP under consideration.

We distinguish **generic** NPs from kind denoting NPs, **dependent generics**, and "free choice" (see below). We take a generic NP to be one that denotes the typical instance of a kind. Here are some typical structures that involve generic NPs in the present sense:

(22) a. Adam bir alba-yı andır-ıyor.
man a colonel-Acc resemble/remind-Prg
'The man reminds one of/resembles a colonel' (specific/non-specific colonel)

b. Bu bölüm-de bir işçi ailesi-ni anlat.
this section a worker family-Acc tell
'In this section, picture a (typical) working class family.'
'In this section, picture a working class family; Any family you can think of.'

The relevant readings of (22a) and (22b) are the "non-specific colonel" reading, and the "typical working class family" reading, respectively. Both readings involve a reference to the typical instance of a kind.

What distinguishes generic reference in the above sense from dependent generics and "free choice" is that, while generic readings are licensed by certain verbs, the latter two are licensed by the presence of an operator mosly regarless of the particular verb they go with. Take an example of a dependent generic where a generic reading is conditional on the presence of the aorist suffix.

(23) a. Ahmet bir oturuşta iri bir kuzu-yu yi-yebil-ir.
A. one sitting-Loc large a lamb-Acc eat-Psbl-Aor
'Ahmet can eat a large lamb in one sitting.'

b. Ahmet bir oturuşta iri bir kuzu-yu yi-yebil-di.
A. one sitting-Loc large a lamb-Acc eat-Psbl-Pst
'Ahmet ate a large lamb in one sitting.' (non-generic)

In (23b), where the main verb bears past tense morphology, the NP *iri bir kuzu* ('a large lamb') cannot have a generic interpretation. The NP denotes a particular lamb.

According to Krifka *et al.* (1995:14), "indefinite singular NPs cannot be simply considered as kind-referring or 'generic' in and of themselves". The genericity of singular indefinites is induced via other elements of the clause they come in, which Krifka *et al.* (1995) name as "characterizing sentences" (in opposition to "particular sentences"). While Turkish data seems to replicate this pattern, there is a useful distinction to be made in the way a singular indefinite gets a generic reading. One type of genericity is induced by modal operators, we call such generics as dependent generics. Another type of genericity is induced via certain lexical items. This latter type was the "typical instance" denoting expressions (see 22 above). Some other verbs that select such NPs are *hayal et* ('imagine'), *düşün* ('picture (in the mind)'), *kast et* ('mean').[5]

A close kin of dependent generics is "free choice" NPs.[6] Take the following sentence uttered in a context where a group of students are waiting to be taken to some place.

(24) Ben bir öğrenci-yi al-abil-ir-im.
I a/one student-Acc take-Psbl-Aor-1sg
'I can take one of the students. Any of them is OK.'

We call the reading the NP *bir ogrenci* ('a/one student') gets "free choice" because the speaker is not concerned with the identity of the student, as long as s/he is a student. (Also note that under the given context the NP is not interpreted as generic or dependent generic.) As was the case with operator induced generics, "free choice" readings vanish when the licensing operator (the aorist in (24)) is removed, as illustrated by (25), which again should be considered in the context given above.

(25) Ben bir öğrenci-yi al-dım.
I a/one student-Acc take-Pst.1sg
'I took one of the students.'

[5]The type of NPs we call generic in the sense of "a typical instance" are called "nonspecific" by Krifka *et al.* 1995:15. Although they note that they use the term in a pre-theoretic sense, distinguishing it from the usages of Fodor and Sag 1982 and Enç 1991, we think it nevertheless adds confusion to an already elusive term.

[6]Turkish has a determiner *herhangi bir* ('any') reserved for free choice items. The cases we collate under "free choice" exclude such explicitly marked items. See Zidani-Eroğlu 1997:Ch. 3 for a discussion of free choice items in Turkish.

Let us call this latter type of reading "specific" for the moment.

The major difference between dependent generics and "free choice" NPs is that the former has a restrictor encompassing the whole class the nominal denotes, while the latter can be contextually restricted. Dependent generics come in "generic sentences", whereas "free choice" NPs come in "particular sentences" (see Krifka *et al.* 1995:3). The semantic content of the verb is effective in making a dependent generic reading available. For instance, changing the verb in (24) from *al* ('take') to *kandır* ('cheat') makes available, and forefronts, an operator induced generic reading:

(26) Ben bir öğrenci-yi kandır-abili-r-im.
I a/one student-Acc cheat-Psbl-Aor-1sg
'I can cheat a student.'

Another distinction between dependent generic and "free choice" readings is that the former has a lawlike or "dispositional" character. For instance (26), in its generic reading, has roughly the following reading:[7]

(27) For all x, if x is a student, then I am capable of cheating x.

It is crucial to observe that the lawlike behavior manifested in the dependent generic reading of (26) is contingent on the content of the particular modality involved in the sentence, rather than being contributed by the NP. Although (26) has its generic reading forefronted, it is actually multiply ambiguous. One source of this multiplicity of readings is the ambiguity in the modal suffix *abil*, which we simply gloss as Psbl (for possibility). In this particular case possible interpretations of the modal suffix include, but may not be restricted to, physical possibility, circumstantial possibility, or permission. Physical possibility and permission give a lawlike character to the reading. Circumstantial possibility on the other hand gives rise to a different type of reading, which can informally be described as follows:

(28) I may possibly cheat a student. But I haven't decided who or if.

In such a case the speaker may have in mind a contextually available set of students or the whole class of students. This is something that needs to be fixed in the particular context

[7] It is another widely recognized aspect of dependent generics that they are *usually* prone to exceptions (Kadmon and Landman 1993; Krifka *et al.* 1995).

the sentence is uttered in, and therefore cannot be a part of the interpretation of the NP or the verbal complex. Let us call this type of reading "modal-existential" for convenience.[8]

As far as Acc marked indefinites are concerned, we have thus far encountered the following types of readings:

(29) a. Generic;

b. Dependent generic;

c. "Free choice";

d. Specific;

e. Modal-existential.

We will argue in Chapter 5 that the NPs involved in (29b–e) all have the same grammatical basis. The differences in the readings of the sentences they participate in arise from elsewhere. (29a) on the other hand categorically differs from the others.

Now let us see whether Acc vs. ∅ direct object marking has any effect on the availability of the type of readings we have been discussing in this section. Consider the following minimal pair.

(30) a. Bir avukat-ı dolandır-abil-ir-im.
a lawyer-Acc swindle-Psbl-Aor-1sg
'I can swindle a lawyer.'

b. Bir avukat dolandır-abil-ir-im.
a lawyer swindle-Psbl-Aor-1sg
'I can swindle a lawyer'

What exactly is the difference between (30a) and (30b)? Again both sentences are multiply ambiguous. One reading of (30a) that is of present interest is the operator induced generic reading, where the modality is physical possiblity. The reading can be informally put as follows:

[8]What we mean by "modal-existential" is very close to a *de dicto* reading familiar from propositional attitude literature.

(31) I am capable of swindling any lawyer whatsoever.

It is crucial that this reading is available under both intonational variants of the sentence, namely with sentential stress on the object and on the verb. Of course the interpretations under different intonations may differ as far as their presuppositions are concerned, but they are at least truth conditionally equivalent to (31).[9] We claim that the reading informally given in (31) is not available for (30b), the variant where the direct object does not bear Acc.[10] If we fix the modality to physical possibility, what (30b) says can be put as follows:

(32) All I am capable of doing is to swindle a lawyer.

3.1.3 Universal Quantification and Distributivity

Cross linguistic studies on quantification have shown that not every language realizes quantificational structures in the familiar ways employed in languages like English (see Partee 1995 for a review). For instance the universal quantifier realized in English as *every* and *each* seems to be lacking in many languages (Steedman 2010:145). The aim of this section is to establish that the Turkish *her* is a universal quantifier determiner similar to *every/each* as far as its distributive force is concerned.

In deciding on the availability of a true universal quantifier reading, we will employ the well known incompatibility of universally quantified NPs with collective predicates. Take the following pair of examples.[11]

[9]The two intonational realization are as follows:

i Bir avukat-ı *dolandır-abil-ir-im*.

ii *Bir avukat-ı* dolandır-abil-ir-im.

The dependent generic reading of (i) should be straightforward for native Turkish speakers. The dependent generic reading of (ii) might be in need of a supporting context like the following:

iii Bir doktor-u dolandır-abil-ir misin?
'Can you swindle a doctor?'

[10]Göksel and Kerslake 2005:384 claim that generic indefinite direct objects obligatorily receive Acc. They make this claim for NPs that has genuine generic reference (as opposed to operator induced genericity) in the present sense. Their term "generic" has a broader coverage than ours. It includes the entire class (which we call "kind") as well as its typical instance (our generic reference).

[11]See Aygen-Tosun 1999 for similar examples and argumentation.

(33) a. Her bakan uzlaş-tı.
every minister settle up-Pst
'Every minister settled up. (non-collective)'

b. Bakan-lar uzlaştı.
minister-Plu settle up-Pst
'The ministers settled up.'

(33a) has a single reading where each of the ministers settled up with a third party disjoint from the set of ministers. (33b) on the other hand *has* a collective reading where the settlement was *among* the ministers.

The resistance of *her* to collectivity is more striking with predicates like *be a good team/couple* and *weigh two pounds* which contrast with *meet/gather/surround* type collectives in being not downward entailing: If a group of people surround a building, the predicate holds for any subgroup, whereas if a group of people weigh so many pounds, the predicate does not hold for any subgroup (see Reinhart 1997:384 for a discussion and the original source of this observation). Yoad Winter, as reported in Reinhart 1997:384, suggests that non-downward entailing predicates like *be a good team/couple* and *weigh two pounds* are more reliable as a test for collectivity. Consider the following examples.

(34) a. #Italya-dan gel-en her öğrenci iyi bir ekip ol-du.
Italy-Abl come-Rel every student good a team become-Pst
'#Every student from Italy has become a good team.'

b. Italya-dan gelen öğrenci-ler iyi bir ekip ol-du.
Italy-Abl come-Rel student-Plu good a team become-Pst
'The students from Italy has become a good team.'

(34a) is pragmatically anomalous because it entails that each Italian student has formed a team whose single member is her/himself. The same is not observed for the plural in (34b). Consider also:

(35) a. Her kutu 50 kilo gel-di.
every box 50 kilogram come-Pst
'Each box weighed 50 kg.'

b. Kutu-lar 50 kilo gel-di.
box-Plu 50 kilogram come-Pst
'The boxes weighed 50 kg.'

In a situation where (35a) is true the total weight of the boxes must exceed 50 kg. This is not so for (35b).

The universal quantifier *her* obligatorily induces distributive dependencies. For instance, only in (36b) there is a reading where only one song is written in a situation where there are more than one students.[12] (36b), which involves the plural NP *öğrenciler* ('students'), can receive either a distributive or a collective interpretation.[13]

(36) a. Her öğrenci bir şarkı yaz-dı.
every student a song write-Pst
'Every student wrote a song. (distributive)'

b. Öğrenci-ler bir şarkı yaz-dı.
student-Plu a song write-Pst
'Students wrote a song.'(distributive/collective)

Another relevant evidence comes from number agreement. NPs determined by *her* require singular agreement, which again testifies to its obligatorily distributive character.

(37) a. Her öğrenci bir makale yaz-abil-ir-(*ler).
every student a article write-Psbl-Aor-Plu
'Every student can write an article.'

b. Öğrenciler bir makale yaz-abil-ir-(ler).
student-Plu a article write-Psbl-Aor-Plu
'Students can write an article.'

[12] More on nominal quantification involving quantificational dependencies in §3.2.1.

[13] Scope independence or wide scope of an independent should be distinguished from "accidental co-reference". For instance the following sentence seems as if it has a wide scope indefinite:

i. O gece her davetli harika bir film izledi.

This is due to common world-knowledge, which tells that more than one person can watch a movie at the same time, and it is not usually the case that guests in a movie gala watch different movies.

The distributive character of *her* is not confined to subjects. Consider the following pair.[14]

(38) a. Öğretmen her öğrenci-ye not-lar-ı-nı söyle-di.
teacher every student-Dat grade-Plu-Poss.1sg-Acc tell-Pst
'The teacher told every student her/his grades.'

b. Öğremtmen öğrenci-ler-e not-lar-ı-nı söyle-di.
teacher student-Plu-Dat grade-Plu-Poss.1sg-Acc tell-Pst
'The teacher told the students their grade(s).'

In (38b) the plural marking attached to the noun *not* ('grade') can either be a number marking applying to the noun itself, or be part of the agreement marker induced by the plural possessor *öğrenci-ler* ('student-Plu'). (38a) on the other hand involves no such ambiguity. The only available reading is that each student is told more than one grades. This shows that *her* is obligatorily distributive, it cannot have a collective reading.

Another indication of distributivity is the ability to bind bound-variable pronouns (Steedman 2010). *Her* passes this test as well, as shown by the following.

(39) Her öğrenci$_i$ anne-si$_{i/j}$-ni gör-dü.
every student mother-Poss.3sg-Acc see-Pst
'Every student$_i$ saw his$_{i/j}$ mother.'

Before we close this section, we want to briefly discuss a proposal on quantificational dependencies (distributivity in present tense) in Turkish. Kennelly (2003) claims that quantificational dependencies in Turkish are not induced certain lexical items, but rather effectuated by discourse structure, particularly information focus and contrast. Accordingly Kennelly (2003) treats *her* ('every') phrases as plurals. The data in this section provides counterevidence to this proposal, since none of the examples we have considered in this section presupposes a contrastive context.[15]

[14]The correct analysis of Turkish third person singular possessive suffix is -(s)I(n), where (s) is realized when it is preceded by a vowel, and (n) is realized if the possessive marker is followed by further suffixation (Göksel and Kerslake 2005:69). In our glosses, when a third person possessive suffix is followed by a case marker, we group the buffer (n) with the case marker. This simplifies the indication of the optionality of the accusative marker in cases like *not-lar-ı(-nı)* ('notes-Poss.3sg(-Acc)').

[15]See Arslan-Kechioritis 2009 and references cited there for other works that oppose Kennelly's (2003) proposal on similar grounds.

3.2 Turkish Indefinite Descriptions

3.2.1 Nominal Quantifier Scope

In this section we look at the interaction between indefinites and nominal universal quantification (as opposed to quantification over situations or temporal indices). It has been frequently noted in the literature that Turkish quantificational dependencies in the preverbal domain are subject to precedence effects (Kural 1992; Göksel 1998; Aygen-Tosun 1999; Temürcü 2005; İşsever 2007 among others). A number of authors claim that intonational and information structural effects are partly (Kural 1992; Göksel 2007; Özge 2009), or sometimes solely (Kennelly 2003, 2004) determinant in quantificational dependencies. If we leave aside for the moment the latter type of effects, and restrict our attention to case-marked[16] indefinites, the following generalization emerges:

(40) a. In $\forall \prec \exists$ surface order, both $\forall\exists$ and $\exists\forall$.

b. In $\exists \prec \forall$ surface order, only $\exists\forall$(though see below).

We will shortly see some examples (some of them adapted from Göksel 1998) that illustrate the generalization in (40). We provide examples for dative and accusative marked objects, and note that the pattern applies to other case markers as well. For a two argument sentence, for any argument there are two options for the determiner (universal quantifier or indefinite article) and two options for whether it precedes or succeeds the other argument. This means four different structures for any selection of the object case. (41) and (42) illustrate the possibilities for a dative and an accusative object, respectively.

(41) a. Her doktor bir hasta-ya bak-ıyor. ($\forall\exists/\exists\forall$)
every doctor a patient-Dat examine-Prg
'Every doctor is examining a patient.'

b. Bir hasta-ya her doktor bakıyor. ($?\forall\exists/\exists\forall$)
a patient-Dat every doctor examine-Prg
'Every doctor is examining a patient.'

[16]Subject arguments are counted as marked with $\emptyset$ morphology nominative case.

c. Her hasta-ya bir doktor bak-ıyor. (∀∃/∃∀)
every patient-Dat a doctor examine-Prg
'A/Some doctor is examining every patient.'

d. Bir doktor her hasta-ya bak-ıyor. (?∀∃/∃∀)
a doctor every patient-Dat examine-Prg
'A doctor is examining every patient.'

(42) a. Her doktor bir hasta-yı tedavi ed-iyor. (∀∃/∃∀)
every doktor a patient-Acc treat-Prg
'Every doctor is treating a patient.'

b. Bir hasta-yı her doktor tedavi ed-iyor. (?∀∃/∃∀)
a patient-Acc every doctor treat-Prg
'Every doctor is treating a patient.'

c. Her hasta-yı bir doktor tedavi ed-iyor. (?∀∃/∃∀)
every patient-Acc a doctor treat-Prg
'a doctor is treating every patient.'

d. Bir doktor her hasta-yı tedavi ed-iyor. (∀∃/∃∀)
a doctor every patient-Acc treat-Prg
'a doctor is treating every patient.'

The most relevant aspect of the above data is the fact that indefinite descriptions preceded by a universally quantified NP can *stay independent of the influence of* this quantifier. We say "stay independent of the influence of" rather than "takes scope over", because we do not know whether the indefinites in above examples do take scope over the preceding universals.[17] Universal quantifier and indefinite article *bir* somehow mask the crucial distinction between "staying independent of the scope of" and "taking scope over". Let us try some other determiners. Take the following example.

[17]It seems that we diverge here from other appraisals of the interaction between quantifier scope and linear order in Turkish, including those cited above.

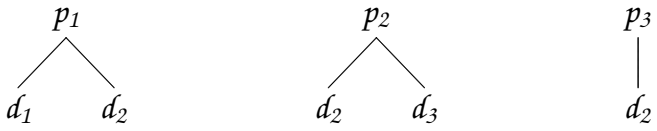
(43) İki hasta-yı çoğu doktor muayene et-ti.
two patient-Acc most doctor examine-Pst
'Most doctors examined two (particular) patients.'

This sentence has a reading where the Acc marked NP *iki hasta-yı* ('two patient-Acc') has a distributive interpretation. This reading can informally be put as follows:

(44) There are two patients such that each of them is examined by the majority of the doctors.

To further clarify the reading in (44), assume that there are three patients p_1 p_2 and p_3, and three doctors d_1 d_2 and d_3. Also assume that patients and doctors are related through "is examined by" as depicted in (45).

(45)



The relevant point to observe is that (43), under the reading (44), is true in such a model, although the patients p_1 and p_2 are examined by different sets of doctors. This shows that the NP *iki hasta-yı* ('two patient-Acc') can receive a distributive interpretation. Now consider a minimal variant where the linear order of the arguments is altered.

(46) Çoğu doktor iki hasta-yı muayene et-ti
most doctor two patient-Acc see-Pst
'Most doctors examined two patients.'

In one of its readings (46) says that the majority of the doctors examined two patients, where patients may vary with respect to doctors. In another reading, the majority of the doctors has examined a particular set of two patients. However (46) does not have a reading parallel to (44), and hence is false in the model depicted in (45). It is in this incapability of an indefinite to distribute over a preceding quantified NP that we say indefinites do not take scope over, but only stay independent of the influence of preceding universals in examples (41) and (42).[18]

[18]Incidentally, examples like (41b) have operator induced generic or "free choice" readings as well. Consider:

In sharp contrast to the above pattern observed for case-marked NPs, ∅-marked indefinite objects cannot be exempt from the scope of a preceding universal. For instance, the following sentence does not have a reading where there is a patient treated by every doctor.

(47) Her doktor bir hasta muayene et-ti. (∀∃/*∃∀)
every doctor a patient examine-Pst
'Every doctor examined a patient.'

It is under debate whether non-preverbal ∅-marked objects are grammatical or not (see Göksel 2007 for discussion and references). We need not go into this debate for the moment. What is important for us here is that the scope possibilities are independent of the position of the ∅-marked object. Compare (47) with (48) below.

(48) ?Bir hasta her doktor muayene et-ti. (∀∃/#∃∀)
a patient every doctor examine-Pst
'Every doctor examined a patient.'

Even if (48) is taken to be grammatical, it cannot mean that the same patient is treated by each doctor. It is also crucial that although intonational and information structural effects can override the precedence effects noted in (40) (Kural 1992; Kennelly 2003; Göksel 2007; Özge 2009), no matter what the intonation or the context is, neither (47) nor (48) can have a reading where the indefinite is not in the scope of the universal.

3.2.1.1 Intermediate Scope

Before closing this section we look at "intermediate scope" phenomena and its interaction with case-marking in Turkish. Consider the following minimal pair, where the only difference between the examples is the presence vs. absence of the accusative marker on the NP *önemli bir problem* ('an important problem').

(49) a. Çoğu dilbilimci önemli bir problem-i çöz-en her makaleyi oku-muş-tur.
most linguist important a problem-Acc solve-Rel every article-Acc read-Ev.Cop-Aor
'Most linguists have read every article that solves an important problem'

---

i Öyle harika bir hastane-ki, bir hasta-ya her doktor bakıyor.
such wonderful a hospital-Rel a patient-Dat every doctor examine-Prg
'It is such a wonderful hospital that a patient is examined by every doctor.'

b. Çoğu dilbilimci önemli bir problem çöz-en her makaleyi oku-muş-tur.
most linguist important a problem solve-Rel every article-Acc read-Ev.Cop-Aor
'Most linguists have read every article that solves an important problem'

(49a), the case marked version, is ambiguous between the readings in (50).

(50) a. The majority of linguists is such that it is enough for an article that it solves some important problem for him/her to have read it.

b. It is more probable than not that for a linguist l there exists an important problem p, such that l have read every article that solves p.

(49b) on the other hand has only the reading in (50b).

The data of this section show that ∅-marked indefinite objects obligatorily have the narrowest possible scope with respect to nominal quantifiers. Whereas Acc-marked indefinites are flexible in their scope possibilities with respect to nominal quantifiers. One significance of this state of affairs is that ∅-marked indefinites cannot be considered as "referential" in the sense of Fodor and Sag 1982, contrary to what is claimed by Arslan-Kechioritis 2009. The reason is that being "referential" in Fodor and Sag's (1982) sense is to be like a demonstrative pronoun, which is a type of expression that is immune to all scoping effects. The case for ∅-marked indefinites in Turkish appears to be quite to opposite: they cannot escape the influence of any commanding operators.

3.2.2 Discourse-Linking

The notion of "discourse-linking" (= D-linking) is due to Pesetsky 1987:107–8, where it is argued that *which* is distinguished from *who* and *what* in necessarily being D-linked. D-linking is explained as follows:

> When a speaker asks a question like *Which book did you read?*, the range of felicitous answers is limited by a set of books both speaker and hearer have in mind. If the hearer is ignorant of the context assumed by the speaker, a *which*-question sounds odd... Similarly, in a multiple *which*-question like *Which man read which book?* the speaker assumes that both speaker and hearer have a set of men and a set of books in mind, and that the members of ordered man-book pairs

> in a felicitous answer will be drawn from the sets established in the discourse. No such requirement is imposed on *wh*-phrases like *who*, *what*, or *how many books*. These phrases may be *non-D-linked*. If a speaker asks *How many angels fit on the head of a pin?*, there is no presumption that either speaker or hearer has a particular set or quantity of angels in mind. (*ibid.* 107–8)

Another illustration of D-linking involves a difference between *every* and *each*, noted in Kadmon and Landman 1993:378: "the use of *each* requires that the set that it's a distributor for be given in the context of utterance; it should be a set that has been mentioned or made salient earlier in the conversation." The authors claim that "you can naturally start a conversation with [(51a)], but not with [(51b)]".

(51) a. Every child should have a daily glass of milk. (*ibid.* ex. 68)

b. Each child should have a daily glass of milk. (*ibid.* ex. 69)

Enç (1991) claims that -Acc is the necessary and sufficient morphological reflex of specificity, which she equates to Pesetsky's (1987) D-linking.[19] Enç's notion of specificity is closely related to the notion of *definiteness* as defined in Discourse Representation Theory (Kamp 1984; Heim 1982; van Eijck and Kamp 1997). Both notions speak of the discourse status of being linked to a previously established referent in the discourse model. The link is "identity" in definiteness. Specificity on the other hand stands for a weaker type of dependency: It is either established through a subset relation ("partitive specificity", §2), or any other relation other than identity ("relational specificity", §6).

Enç (1991) holds that Turkish accusative objects are interpreted as partitive specifics. The following examples (her 16 and 17) are provided as support to her claim, where (52) serves as a discourse setter for the continuations in (53).

(52) Odama birkaç çocuk girdi.
my-room-dat several child entered
'Several children entered my room.'

[19] Enç (1991:4): "[I]ndefinites in the object position are always unambiguously specific or nonspecific. If the NP bears the accusative case morpheme *-(y)i*, it is obligatorily interpreted as specific… If the NP does not carry case morphology, it is obligatorily interpreted as nonspecific".

(53) a. İki kız-ı tanıyordum.
two girl-acc knew-1sg
'I knew two girls.'

b. İki kız tanıyordum.
two girl knew-1sg
'I knew two girls.'

The only difference between (53a) and (53b) is that in the former the direct object bears the accusative marking. The crucial observation here is that only in (53a) the girls are understood as belonging to the set of children mentioned in (52). Enç holds that the difference between the Acc-marked indefinite in (53a) and its ∅-marked correlate in (53b) is that of specificity. The NP in (53a) "has a covert partitive reading, and it introduces into the domain of discourse individuals from a previously given set."(p. 6)

Enç (1991) also presents the following exchanges in favor of her claim that the accusative marker both gives rise to, and is required for, a specific (her 20 and 21):

(54) İki çocuğ-u yedinci sınıf-a, bir çocuğ-u da sekizinci sınıf-a gönderdim.
two child-Acc seventh grade-Dat one child-Acc and eight grade-Dat I-sent
'I sent two children to the seventh grade, and one child to the eight grade'

(55) Yedinci sınıf-a iki cocuk, sekizinci sınıf-a da bir çocuk gönderdim.
seventh grade-Dat two child eight grade-Dat and one child I-sent
'I sent two children to the seventh grade, and one child to the eight grade'

Enç (1991) (p. 6) argues that (54), where direct objects are Acc-marked, "can only be interpreted as saying something about some children previously introduced into the domain of discourse." On the other hand, the ∅-marked objects in (55) are both indefinite and nonspecific in Enç (1991)'s account, and "the discourse referent of a nonspecific indefinite is... required to be *unrelated* to previously established referents."(p. 8) On this basis, Enç (1991:7) argues that (55) "can be used felicitously in describing what I did at the time, or what happened to the two classes, but cannot be construed as stating something about children who had been previously discussed."

Now let us observe some counterexamples to the double sided correlation Enç (1991) proposes to exist between Acc-marking and her notion of specificity. We will return to the discussion of why Enç's (1991) correlation holds in some cases but not in others in §5.2.4.

First let us observe that -Acc does not imply specificity. Consider the possible answers in (57) to the question in (56).

(56) Ahmeti neden tutukla-mış-lar?
A.-Acc why arrest-RprPst-Plu
'Why was Ahmet arrested?'

(57) a. Bir polis-i döv-müş.
a police-Acc beat-RprPst
'He has beaten a policeman.'

b. Bir işadamı-nı kaçır-mış.
a businessman-Acc kidnap-RprPst
'He has kidnapped a businessman.'

c. Geçen haftaki yazı-sı-nda bir milletvekili-ni aşağıla-mış.
last week article-Poss.3sg-Loc a deputy insult-RprPst
'He insulted a deputy in his column last week.'

d. Bir emekli-yi dolandır-mış.
a pensioner swindle-RprPst
'He has swindled a pensioner.'

In neither of the answers in (57) accusative marked NPs have to get a partitive reading, or any other discourse anchoring, in order for the exchange to be coherent. The NPs are completely new to the discourse, but nevertheless are quite natural with -Acc marking.

Before going on, let us stop to respond to some potential objections to the above counterexamples. It might be argued that all the answers in (57) are in fact partitives, on the grounds that the arresting scenario provided by the question in (56) establishes a set of possible victims of criminal acts, from which the answers in (57) pick their referents. We think such an objection robs the category "partitive" of any content it has. This is so because there is no such thing as "null context", and, therefore, *every* utterance draws its referents from previously established or accommodated contextual sets. However, it is also true that the level of contextual specification prior to an utterance is a matter of degree. Therefore we provide

some examples that can be felicitously uttered as discourse initiators, and presumably assume very little on the part of the hearer.[20]

(58) a. Dün sabah arabam-a emekli bir boksörü al-dı-m.
yesterday morning car-Poss.1sg-Dat retired a boxer-Acc take-Pst-Poss.1sg
'Yesterday morning I took a retired boxer to my car.'

b. Günlerdir bir romanı bitirme-ye çalıs-ıyorum.
for days a novel finish-Nmnl-Dat try-Prg.1sg
'For days I've been trying to finish a novel.'

c. Dün ana haberler-e ilk defa bir travesti-yi çıkar-dı-lar.
Yesterday main news-Dat first time a transvestite-Acc cause-to-appear-Pst.3pl
'Yesterday they hosted a transvestite on the main news for the first time.'

Again the accusative marker does not induce any D-linking (partitive specificity) effect.

Another potential objection goes like this: Enç's correlation does not hold in (57) because, under normal discourse conditions, NPs in those examples bear a focal accent, which was presumably not the case in Enç's examples (53a) and (54). This objection cannot be held: The response in (59), where the NP we are concerned with does not bear the focal accent, is as coherent as (57a) when considered as an answer to (56). The same point applies to other counterexamples.

(59) Bir polis-i fena halde *dövmüş*.
a police-Acc terribly beat-RprPst
'He has terribly beaten a policeman.'

Now let us observe that specificity does not imply Acc-marking either. We have two set of counterexamples here. In the first set (60), there are examples where the contextual set is given in the same sentence with the bare direct object NP. The examples in the second set (61) are like Enç's (1991) example (16), given as (52) above.

(60) a. Babam-ın getirdiği giysi-ler arası-ndan iki kravat seç-tim.
father-Poss.1sg bring-Rel cloth-Plu among-Abl two tie choose-Pst.1sg
'I picked two ties from among the clothes that my father left.'

[20] See Zidani-Eroğlu 1997 for other examples of out-of-the-blue accusative marked indefinites. Her interpretation of the possibility of such indefinites differs from the present one, as will be discussed in §5.2.4.

b. Yaz kampı-nda bizim lise-den iki kişi gördüm.
summer camp-Loc our high school two person see-Pst.1sg
'I saw two guys from the high school in the summer camp.'

c. Hakem bizim takım-dan iki, karşı takım-dan üç kişi at-tı.
referee our team-Abl two opponent team-Abl three person dismiss-Pst.3sg
'The referee dismissed two players from our team, and three from the opponent.'

d. Alet kutusundan bir tornavida al-dım.
toolbox-Abl a screwdriver take-Pst.1sg
'I've picked a screwdriver from the toolbox.'

(61) a. İşe gireli üç gün olmuştu.
'It had been three days I started the job.'

İki memur bir de odacı tanıyordum.
two officer a FPrt office-boy knew-Prg-Pst.1sg
'I knew two officers and an office-boy.'

b. Bir süre raftaki kitapları inceledi.
'She searched through the books on the shelf for some time.'

Ardından bir roman seçip, kasaya yönel-di.
then a novel like-Cord chose-Dat head-Pst
'Then she chose/picked a novel and headed to the counter.'

c. Odaya girdiğimde mücevher kutusu açıktı.
'When I entered the room the jewelery box was open.'

Aceleyle cebi-m-e iki bilezik at-tım.
in a hurry pocket-Poss.1sg-Dat two bracelet throw-Pst.1sg
'I quickly put two bracelets into my pocket.'

d. Kütüphanemdeki kitapları dağıtmaya karar vermiştim.
'I had decided to give away the books in my library.'

Ali-ye bir roman verdim; Canan'a da uc deneme.
A.-Dat a novel give-Pst.1sg C.-Dat Fprt three essays.
'I gave a novel to Ali, and three essays to Canan.'

Enç (1991) predicts that the direct object indefinite NPs in these examples cannot be linked to any previously established (set of) discourse referent(s). However her prediction is not borne out. In all of the examples above, the primary reading is the one where the object described by the bare NP belongs to a previously established set.

The above data suggest that accusative marking is neither a sufficient nor a necessary condition for Enç's (1991) category of specificity. As said above, we will return to Enç's (1991) proposal in §5.2.4 below.

3.2.3 Specificity

von Heusinger (2002), like Enç (1991), takes the accusative case in Turkish to be an indicator of specificity.[21] However von Heusinger's (2002) definition of specificity differs from that of Enç (1991). von Heusinger (2002:272) gives the following "characterization of specificity":[22]

(62) a. The interpretation of a specific NP does not depend on the interpretation of the matrix predicate or semantic operators such as modal verbs.

b. the referent of a specific NP is functionally linked to the speaker of the sentence or to another referential expression in the sentence such as the subject or object.

c. The lexical item *a certain* prominently marks a specific reading of an indefinite NP.

d. The accusative-case suffix marks an [*sic*] specific indefinite direct object (in the preverbal base position) in Turkish.

It will be useful to observe that (62) provides a stronger characterization of specificity than Enç (1991). Particularly, the above characterization allows non-specific partitives (von Heusinger 2002:26 2). The point can be illustrated over a minimal pair from Enç 1991:exx. 12 and 13.

[21] von Heusinger (2002:p. 246) confines the accusative case-specificity correlation to immediately preverbal objects, and adds the genitive case of the embedded subjects to morphosyntactic reflexes of specificity in Turkish. See his note 3 on p. 254 for earlier sources of these claims.

[22] The genitive case-specificity correlation for Turkish should be added to the last item of this characterization. See von Heusinger 2002:§3 and p. 272.

(63) a. Ali bir piyano-yu kiralamak istiyor.
A. one/a piano-Acc to-rent wants
'Ali wants to rent a certain piano.'

b. Ali bir piyano kiralamak istiyor.
A. one/a piano to-rent wants
'Ali wants to rent a (non-specific) piano.'

Under Enç's (1991) conception (63a) has a specific interpretation regardless of whether Ali's intention is about a certain piano or not. It is enough that we are talking about a piano to be picked from a certain contextually available set (see her discussion on p. 5). For von Heusinger (2002) on the other hand, (63a) is ambiguous between a specific and a non-specific reading. If Ali somehow knows which piano to rent, we have a specific interpretation, if he does not, we have a non-specific interpretation.

We will not discuss von Heusinger's (2002) claims concerning Turkish since these claims are further elaborated in von Heusinger and Kornfilt (2005) (henceforth vH&K), which we discuss next.

vH&K, in their investigation of "the semantic and morphological parameters that determine the presence or absence of the accusative case marker", depart from Enç (1991) in two respects. First, they employ von Heusinger's (2002) notion of specificity in place of Enç's (1991). Second, they retreat to the position that accusative case implies specificity but not the other way around.[23] This retreat is forced, among other things (see below), by examples due to Dede (1986), which show that caseless indefinite NPs may be ambiguous between a specific and a non-specific reading in modal contexts (see also §3.2.4.1). For instance in (71) from Dede 1986:p. 159, both a specific and a non-specific reading for *bir kitap* ('a book') is possible, as the translations make clear.[24]

(64) Bir kitap arıyor-um. Bulamıyor-um.
a book looking for-1sg can't find-1sg
'I am looking for a book. I can't find it.'
'I am looking for a book. I can't find one.'

[23] Remember that in Enç 1991 accusative case-specificity correlation was argued to hold in both directions.

[24] We provide an explanation of this ambiguity in terms of the present account in §5.2.5

However, accusative-specificity correlation does not work smoothly even in a single direction. vH&K claim that the accusative case marker is a reliable indicator of specificity, only if there aren't any "other reasons for its occurrence that makes its usage obligatory on independent grounds." (p. 10) Eventually, they come up with a number of necessary conditions, neither of them sufficient on its own, for their claim to hold.[25] Their claim is summarized in (65).

(65) The accusative case on a direct object is a reliable indicator of specificity in von Heusinger's (2002) sense (i.e. -Acc implies specificity),

   a. only if -Acc maker is not required for morphosyntactic reasons independent of specificity (see their §4.2 for the analysis of these reasons).

   b. only if -Acc maker is not required for marking definiteness. reasons independent of specificity (see their §4.2 for the analysis of these reasons).

   c. only if the direct object is indefinite (i.e. of the form *bir* N).

   d. only if the direct object is immediately preverbal.

   e. only if the direct object is not a "definite generic" (see below).

Before granting von Heusinger and Kornfilt the provisos in (65), a few comments are in order.

If not for independent reasons (65a–b). This is a very "powerful" proviso; both in its capacity to avoid refutation—thereby weakening the claim—, and with regards to the grammatical machinery it presupposes.[26] Therefore, a proposal that accounts for the facts without such a proviso would be preferable.

If not for definiteness (65b) and *Only indefinites* (65d). These two provisos are intimately related. vH&K (note 6) admit that non-referential (hence non-specific in their terms) definite NPs are accusative marked, violating the specificity marking function they attribute to the

[25] The claim is first made in von Heusinger (2002), without the provisos.

[26] For instance, in a lexicalist categorial setting like that of CCG, where all the grammatical information is encoded in the lexicon and projected from there via a derivation involving rules that are sensitive only to the types of their inputs but not to their derivational histories, it is simply impossible to device such constraints as 'interpret Y as X, if (not) immediately preverbal' (see Özge and Bozsahin 2010 for a similar point on focus). We conjecture that incorporation of such constraints to the grammar would be complicated for less tightly constrained grammatical theories as well.

accusative. They give the following example where *dekan* ('the dean') can either be specific or not.

(66) Hasan dekan-ı ar-ıyor.
Hasan dean-acc seek-Prg
'Hasan is looking for the dean.'

They respond to this counterexample by claiming that a non-specific reading is available despite the accusative because "there is no other way to mark definiteness of such non-referential terms." (note 6). This forces them to employ (65c) as a further qualification of their claim. However if there is no way other than the accusative marker "to mark defintieness of such non-referential terms", then the accusative marker *marks* definiteness. This is in contradiction with what they claim elsewhere in the paper, namely that the accusative cannot be the definiteness marker in Turkish, because it can combine with indefinites (4–5). This contradiction could be avoided by claiming that the accusative marker in Turkish is a reliable indicator of definiteness if it is not a reliable indicator of specificity, further complicating an account which is already not so simple.

Generic Definites (65). Dede (1986:ex. 46, p. 157) observes that the N-Acc form *çikolata-yı* ('chocolate-Acc') in (67) is interpreted as referring to "the whole class of the entity", rather than "to a specific instance or amount of chocolate.", in the generic context induced (5.2.5) by the aorist inflection of the verb and the plural marking of the subject.

(67) Çocuk-lar çikolata-yı sev-er.
child-Plu chocolate-Acc like-Aor
'Children like chocolate.'

vH&K, after citing this example (their 9b), comment thus: "[t]his usage is quite limited, and having mentioned its existence, we shall not discuss it further." We do not agree with the claim that generics of type (67) are limited in Turkish. This completes our discussion of the provisos in (65).

Let us now consider an example over which one can compare the predictions of the two notions of specificity proposed by Enç (1991) and von Heusinger and Kornfilt (2005), and can assess whether they hold or not. Take the following minimal pair:

(68) a. Her öğrenci bir metod-u izle-yecek.
every student a method-Acc follow-Fut.1sg
'Every student will follow a method.'

b. Her öğrenci bir metod izle-yecek.
every student a method follow-Fut.1sg
'Every student will follow a method.'

Recall from §3.2.1 that (68a) but not (68b) has a reading where the indefinite object does not distribute over the universal. Here we are interested only in the narrow scope indefinite readings of the sentences in (68).

Enç (1991) predicts that (68a) needs to invoke a familiar set of methods (or items compatible with the verb *izle* ('follow')), from which particular methods are picked from. Although the case is arguable, let us assume that this prediction is borne out.

On the other hand, von Heusinger and Kornfilt (2005) predict for (68a) that there exists a functional dependence between students and the methods they will follow.[27] The reference of the NP *bir metodu* needs to depend on a sentential element (i.e. students for the narrow scope case we are considering) without getting bound by any modal operator. However, (68a) can describe a situation where which student will take which method has not been decided yet. There may be no functional dependence that maps each student to the method s/he will follow. This clearly shows that the NP *bir metodu* besides the nominal universal quantifier *her öğrenci*, may also depend on the operator expressed by the suffix *-ecek*. It is not important for our purposes which particular operator is expressed by *-ecek*. It can be a simple future reference, to say a planned project, or it may be expressing obligation or any modal future. The crucial point is that the Acc-marked NP *can* be interpreted as depending on this operator, in contradiction to von Heusinger and Kornfilt's (2005) predictions.

[27] It should be noted that what is meant by "functional dependence" here is not meant as a functional dependence in the set theoretic sense. In this latter sense any mapping from a set to another that assigns each member of the first set to at most one element of the second counts as a function. On the other hand what is meant by "functional dependence" in von Heusinger and Kornfilt 2005 concerns a *systematic* mapping, where in a sense we have the rule of how the mapping will be performed. In the present context a "functional dependence" between students and methods might be "his/her favorite method", "the method his/her teacher assigned to him/her", "the method s/he last followed", and so on.

In the next section, which is about the interaction of Acc vs. ∅-marking with various intensional phenomena, we will see more examples where the Acc-marked indefinite objects behave in ways that are predicted to be ruled out by von Heusinger and Kornfilt (2005).

3.2.4 Intensionality

In this section we will examine how indefinites behave in various intensional contexts. Such an examination is needed for the following reason. The claims concerning the interaction of indefinites with intensionality (Dede 1986; Kelepir 2001; von Heusinger and Kornfilt 2005; Hedberg *et al.* 2009 among others) are usually based on a single type of intensional context: referentially opaque verbs like *seek*. It is fairly established that Acc-indefinites always take wide scope (*de re* interpretation) with respect to opaque verbs. This observation has provided part of the empirical basis for claims associating Acc with interpretive notions like specificity, existential presupposition and so on (detailed discussion below). As we will see in this section, a closer look at the interaction of indefinites with intensionality reveals that Acc-marked indefinites are not always guaranteed to take wider scope than intensional operators, disputing the "always *de re*" proposals for the Acc-marker.

3.2.4.1 Referentially Opaque Verbs

Referentially opaque verbs typically give rise to specificity distinctions like the following:

(69) John is seeking a unicorn.

where John may be seeking a particular unicorn, or he may be after an arbitrary unicorn. The first is the "transparent", and the second is the "opaque" reading of the indefinite *a unicorn*.
[28]

Dede (1986) seems to be the first to claim that Acc-indefinites obligatorily receive a transparent interpretation with respect to *ara* ('seek'). Consider the following pair.

(70) a. Bir sekreter ar-ıyor-um.
a secretary seek-Prg-1sg
'I am looking for a secretary.'

[28]The terminology is due to Quine (e.g. 1966). See Zimmermann 1993 and van Geenhoven and McNally 2005 for relevant discussion. Alternative terms used in place of transparent/opaque are *de re*/*de dicto* and specific/nonspecific.

b. Bir sekreter-i ar-ıyor-um.
a secretary-Acc seek-Prg-1sg
'I am looking for a secretary.'

Dede (1986) also claims that inanimate ∅-marked direct objects are ambiguous between a "transparent" and an "opaque" reading. For instance in (71) from Dede 1986:159, both readings for *bir kitap* ('a book') are possible, as the translations make clear.

(71) Bir kitap arıyor-um. Bulamıyor-um.
a book looking for-1sg can't find-1sg
'I am looking for a book. I can't find it.'
'I am looking for a book. I can't find one.'

Dede's (1986) observations concerning the behaviour of Acc-marked indefinites with respect to the referentially opaque *ara* ('seek') have led many researchers (see below) to the conclusion that Acc-marking directly indicates an interpretive effect (e.g. specificity, existential presupposition etc.) that explains the obligatorily "transparent" readings of such marked direct objects.

On the other hand, it has been recognized at least since Nilsson 1985 that there can be Acc-marked "opaque" objects. For instance, take the following example (Nilsson 1985:35 ex. 37).

(72) Nicoli-nin bir kusur-u-nu ar-ıyor-du.
N.-Gen a fault-Poss.3sg-Acc seek-Prg-Pst
'He was trying to find a fault with Nicoli.'

The example does not presuppose that there is some fault with Nicoli. However the noun *kusur*hata somewhat blurs the "transparent"/"opaque" ambiguity of the Acc-marked direct object. Consider the following example.

(73) Ali-nin bir resmi-ni arı-yor-um.
A.-Gen a picture seek-Prg-1sg
'I am seeking a picture of Ali.'

(73) can mean either that I am seeking a particular picture of Ali, or I am in need of any picture of Ali.

Nilsson (1985) has also recognized that the verb *andır* ('resemble/remind of'), which is usually cited among referentially opaque verbs, requires an Acc-marked object, where both "transparent" and "opaque" readings are possible.

(74) John bir albay-ı andırıyor.
J. a colonel-Acc resemble-Prg
'John resembles a colonel.("transparent"/"opaque")'

Even in the face of these examples, there is still room for arguing that Acc-marker *does* indicate an interpretive category that somehow gives rise to a "transparent" reading. The common denominator of the two counterexamples to the Acc-"transparency" association is that in both of the cases Acc-marking is obligatory. Genitive-possessive constructions obligatorily receive Acc-marker in Turkish, and the verb *andır* ('resemble/remind of') is ungrammatical with a ∅-marked object. There are some proposals in the literature on the grammar of accusative marking arguing that accusative marker has its interpretive effects only in cases where it is not obligatory for some other reason (e.g. von Heusinger and Kornfilt 2005 for Turkish, Lidz 2006 for Kannada). Such 'defeasable" characterizations of the accusative marker are conjectured to complicate the grammar. Therefore it is desirable to avoid them if possible. Chapter 5 will argue that they can be avoided in the case of Turkish.

Now we will show that an association between Acc-marker and "transparency" is not tenable, even if we grant that Acc-marker has its interpretive effect only in cases where it is not obligatory for some independent reason. Consider the following discourse:

(75) a. Yakında bir şirket kur-acağ-ım.
soon a firm establish-Fut-1sg
'I will establish a firm soon.'

b. Üç muhasebeci çalıştır-ma-yı düşün-üyor-um.
three accountant employ-Nom-Acc think-Prg-1sg
'I am planning to recruit three accountants.'

c. Şu an bir muhasebeci-yi arıyorum.
this moment one accountant-Acc seek-Prg-1sg
'I am seeking one accountant.'

d. Diğer-leri-ni şirket kur-ul-duk-tan sonra ara-yacağ-ım.
other-Poss.3pl-Acc firm-Acc establish-Pass-Sub-Abl after seek-Fut-1sg
'I will seek the others after the firm is established.'

The interesting part is (75c). Crucially the Acc-marked NP *bir muhasebeci-yi* ('one accountant-Acc') does not have any of the interpretive properties attributed to Acc-marking that makes such NPs "transparent". For instance no specific accountant is involved (contra von Heusinger and Kornfilt 2005). Likewise, no existential presupposition is triggered (contra Diesing 1992; Kennelly 1997; Kelepir 2001 among others); The speaker may well not be able to find any accountants for the firm, this has no bearing on the truth of her utterance (75c). An important point here is that the expression *bir* is in its numeral sense (see §3.1.1 above). To highlight this let us slightly change the context as follows.

(76) a. Yakında bir şirket kur-acağ-ım.
soon a firm establish-Fut-1sg
'I will establish a firm soon.'

b. Üç eleman çalıştır-ma-yı düşün-üyor-um.
three accountant employ-Nom-Acc think-Prg-1sg
'I am planning to recruit three personnel.'

c. #Şu an bir muhasebeci-yi arıyorum.
this moment one accountant-Acc seek-Prg-1sg
'I am seeking an accountant.'

In (76) the restrictor of the covert partitive is not identical with the contextually established set, so we no longer have the numeral *bir*, but the determiner *bir* (again see §3.1.1 above). Here we have a "transparent" interpretation of the NP. Namely, the speaker asserts that there is an accountant that s/he is after. This eventually renders her/his utterance infelicitous due to lack of a connection to the preceding discourse.

The data reviewed and presented in this section show that the interpretive behavior of an NP with respect to referentially opaque verbs cannot be a function only of the Acc-marker.

3.2.4.2 Attitude Verbs

In this section we consider the behaviour of Acc-marked vs. ∅-marked indefinite objects with respect to propositional attitude verbs like *düşün* ('think') and *suphelen* ('doubt'). Here are some relevant examples:

(77) a. Dekan bu pozisyon-a bir profesör-ü ata-ma-yı düşün-üyor.$(think\exists/\exists think)$
dean this post-Dat a professor-Acc to appoint-Acc consider-Prg.3sg
'The dean is considering to appoint a professor for this post.'

b. Dekan bu pozisyon-a bir profesör ata-ma-yı düşün-üyor. $(think\exists/\exists think)$
dean this post-Dat a professor to appoint-Acc consider-Prg.3sg
'The dean is considering to appoint a professor for this post.'

(78) a. Ahmet-in bir işadamı-nı kaçır-acağı-ndan şüphelen-iyorum. $(spct\exists/\exists spct)$
A.-Gen a businessman-Acc kidnap-Nmnl-Abl suspect-Prg.1sg
'I suspect that Ahmet will kidnap a businessman.'

b. Ahmet-in bir işadamı- kaçır-acağı-ndan şüphelen-iyorum. $(spct\exists/*\exists spct)$
A.-Gen a businessman kidnap-Nmnl-Abl suspect-Prg.1sg
'I suspect that Ahmet will kidnap a businessman.'

(77a) can be used to describe two sorts of situations, which can be given by the paraphrases below:

(79) a. There is a professor p about whom the dean entertains the thought of assigning her to this post (*de re* reading).

b. The dean entertains the thought "Whoever I assign to this post, it should be a professor"(*de dicto* reading).

The ∅-marked variant (77b) on the other hand has only the *de dicto* reading in (79b). Similar observations apply for the minimal pair in (78). We conclude under the light of these examples that while Acc-marked objects can receive *de dicto* or *de re* reading with respect to propositional attitude verbs, ∅-marked indefinites are confined to *de dicto* readings.

3.2.4.3 Modality

Let us first restrict our attention to indefinites that are neither Acc nor ∅-marked, and observe that such indefinites are *de dicto/de re* ambiguous with respect to a variety of possibility and necessity operators. The sentences in (80) illustrate the point respectively for nominative, instrumental, dative and ablative cases.

(80) a. Bir avukat Mary-yi ikna ed-ebil-ir. (∃◇/◇∃)
a lawyer M.-Acc convince-can-Aor
'A lawyer can convince Mary.'

b. Mary bir avukat-la gör-üş-ebil-ir. (∃◇/◇∃)
M. a lawyer-Ins see-Rcp-can-Aor
'Mary might see a lawyer.'

c. Mary bir avukat-a danış-abil-ir. (∃◇/◇∃)
M. a lawyer-Dat consult-can-Aor
'Mary can consult a lawyer'

d. Mary bir avukat-tan hoşlan-abil-ir. (∃◇/◇∃)
M. a lawyer-Abl like-can-Aor
'Mary might get fond of a lawyer.'

As there are other factors that constrain the Acc-marking, examples involving *de dicto* Acc-indefinites are not as readily available as for other case-markers. The following sentence directly quoted from a recent TV commercial, though apparently intended to be *de dicto*, is *de dicto/de re* ambiguous.

(81) Bu kredi kartı reklamı-nda ünlü bir yıldız-ı oynat-abilirdik... Ama yapmadık.
this credit card commercial-Loc famous a star-Acc recruit-Hyp.Pst but we didn't.
'In this credit card commercial, we could have recruited a famous star; but we didn't.'

(81) may (*de re*) or may not (*de dicto*) be about a particular famous star. This example clearly shows that Acc-marked indefinites can co-vary with indices introduced by modal operators.

3.2.5 Existential Presupposition

Another author who associates the Turkish Acc-marker with specificity is Diesing (1992). Diesing (1992:80) diverges from Enç (1991) in her construal of the term 'specificity', however. Kennelly (1997) collates two definitions under one, which treats an NP specific if "the set denoted by NP... is not empty." Diesing (1992); Kennelly (1997); Kelepir (2001) claim that Acc indicates specificity in this sense. In other words the Acc-marker is an existential presupposition trigger.

A relevant point about the *de dicto* reading of (81) of the previous section is that although the famous stars may vary with the possible cases, they seem nevertheless to be picked from famous stars existing in the actual world. However, it to crucial to observe that this is only a side effect of the past reference involved in the hypothetical past modality of (81).[29] By changing the modality we can bring in the possibility of reference to famous starts not existing only in the actual world, but also in non-actual hypothetical or future worlds. For instance the following sentence does not necessarily mean that the director may consider to recruit in one of his upcoming films one of the stars existing in the speech situation. If the case turns out to be that the director recruits an actress which was only a mediocre artist when the sentence it uttered but became famous in the mean time, we would not want to consider the director to have changed his mind on whom to recruit.

(82) Bir film-im-de ünlü bir yıldız-ı oynat-abil-irim.
a film-Poss.1sg-Loc famous a star-Acc recruit-can-Aor.1sg
'I can recruit a famous star in one of my films.'

To get clearer about whether Acc-marking is an existential presupposition trigger or not, let us change our example in another respect as well. After all, the NP *a famous star* is not a very good choice for testing whether there is any existential presupposition triggering going on or not, since world-knowledge makes it hard to entertain the possibility that there are no famous stars. Consider two conference organizers who are discussing whom to invite to their conference. One of them utters the following sentence:

[29] It also needs to be noted that the NP is not interpreted as "free choice". The commercial makers do not mean that they could have starred any famous star whatsoever.

(83) Konferans-a Türkçe bil-en bir İzlandalı-yı çağır-alım.
conference-Dat Turkish know-Rel a Icelander-Acc invite-Opt.2pl
'Let us invite a Turkish speaking Icelander to the conference.'

This sentence in the optative mood does not commit its speaker to the existence of any Turkish speaking Icelanders, as witnessed by the following continuation which is completely natural:

(84) ... tabi böyle biri var-sa, ve biz o-na ulaş-abil-ir-sek.
of course such someone exist-Cond and we it-Dat reach-can-Aor-Cond
'... of course there is such a person and we can reach him/her.'

It should be noted that the circumstantial possibility mood of (82) and the optative mood of (83) respectively rule out "free choice" and generic readings of the Acc-marked NPs. Furthermore, both sentences have acceptable variants with ∅-marking on the indefinite objects. All these observations compel us to draw the conclusion that the Acc-marker in Turkish is not an existential presupposition trigger.

The data of this section also appears to be problematic for Ketrez's (2005) generalization concerning the cases where Acc can be deleted. Ketrez (2005:93) claims that Acc can be deleted under the following conditions:

(85) a. Accusative case gets deleted if the object is non-presuppositional and appears adjacent to the verb.

b. Accusative case cannot delete when the object carries a possessive morpheme.

What is problematic for this generalization is that we *can* have non-presuppositional preverbal objects that do bear the Acc-marker, violating the case (a).

3.2.6 Negation

It is well-established that ∅-marked indefinite objects take scope below negation (e.g. Turan 1998), as can be observed in the following example.

(86) Ahmet bir kitap getir-me-di.

A. a book bring-Neg-Pst

'Ahmet didn't bring a book.'

'*There is a book b such that Ahmet didn't bring b.'

In this section we will be concerned with what effects an Acc-marking on the indefinite has on the scope of the indefinite with respect to negation.

Kelepir (2001, 2004) claims that in structures like the one below the Acc-marked NP obligatorily takes scope below negation.

(87) ?(Hiç)kimse bir arkadaş-ım-ı davet etmemiş.

anybody a friend-1poss-acc invite-neg-evid

'Nobody invited (even) one friend of mine.'

*'A friend of mine is s.t. nobody invited her/him'

We have three reasons to keep the type of data exemplified in (87) out of the scope of the present thesis. First reason is that, as already observed by Kelepir (2001), the example has a "modal flavor" to it, witnessed by the optional *even* in its translation. One of the central claims of the present thesis will be that Acc-marked NPs are sensitive to modal operators.

Second reason why we will not consider (87) is that it involves a Negative Polarity Item, namely *(Hiç)kimse*, in the absence of which the Acc-marked NP *bir arkadaşım-ı* takes scope above negation, as observed by Kelepir (2004:34, ex. 20).

Third, we think that genitive possessive constructions that involve the expression *bir* right before the possessed noun (e.g. *Ahmet-in bir arkadaşı* ('A friend of Ahmet's')) better not be treated under the same term with "ordinary" indefinites like *(güzel) bir kadın* ('a (beautiful) woman'). Our argument for this claim comes from the observation that the *bir* involved in genitive possessives has a crucial difference from the *bir* that is usually considered as an indefinite determiner. The difference is that an indefinite determiner never implies that the restrictor of the indefinite has more than one element. For instance take the following sentence:

(88) Dün Türkçe konuş-an İzlandalı bir aktör-ü ziyaret et-tim.

yesterday Turkish speak-Rel Icelandic a actor-Acc visit-Pst.1sg

'Yesterday I visited a Turkish speaking Icelandic actor.'

The crucial observation here is that the hearer of (88) is not compelled to the conclusion that there are more than one Turkish speaking Icelandic actors. However, when it comes to a genitive-possessive involving *bir*, commitment to the existence of more than one individuals satisfying the restrictor of the NP is compulsory. For instance the speaker of the following sentence commits herself to the proposition that Ahmet has more than one car.

(89) Dün Ahmet-in bir araba-sı-nı kullan-dım.
yesterday A.-Gen bir car-Poss.3sg-Acc drive-Pst.1sg
'Yesterday I drove one of Ahmet's cars.'

From now on we will be concerned with the "ordinary" indefinites of the form '(modifier) *bir* noun', leaving the investigation of the relation between genitive-possessives and negation to future work.

Kelepir (2004) claims that Acc-marked indefinites are ambiguous in their scope relation to negation, they can either be below or above negation.

(90) a. Hasan bir odev-i yap-ma-dı. (Kelepir 2004:33, ex. 16a)
H. a homework-Acc do-Neg-Pst
'Hasan didn't do a homework.' ('Hasan didn't do one of the homeworks.')

b. Hasan iki kapıyı cilalamadı. (Kelepir 2004:33, ex. 16b)
H. two door-Acc polish-Neg-Pst
'Hasan didn't polish two doors.' ('Hasan didn't polish two of the doors.')

Kelepir (2001) observes that the prominent readings of the sentences in (90) are those where the indefinite takes scope above negation. Namely the readings where the sentences are about a particular homework and about two particular doors. Kelepir (2001:33) claims that the sentences also have another reading where no particular homeworks or doors are involved. She gives the following context as a facilitation of the claimed readings.

(91) a. Hasan iki kapıyı cilalamış, sen hala oturuyorsun.

b. Hasan iki kapıyı cilalamadı, sadece bir kapıyı cilaladı.

However, as the contextualization Kelepir (2004) offers for the claimed readings makes clear, (91b) is an "emphatic denial". Such kinds of readings are usually assumed to involve

meta-linguistic devices that go beyond the linguistic contribution of the negation morpheme (see Szabolcsi (2004:413) for discussion). Szabolcsi (2004:413) offers the method of *why*-question contextualization to avoid "emphatic denial" interference. When considered as an answer to a question like (92), the sentences in (90) no longer have the wide-scope negation readings.

(92) Hasan-a neden kız-dın?
H.-Dat why get angry-Pst.2sg
'Why did you get angry at Hasan.'

Another phenomenon that complicates the data concerning the scope of negation with respect to indefinites is "contrast" (see again Szabolcsi (2004:413) for discussion.) To illustrate take the following minimal pair.

(93) a. Hasan yeni bir kitabı *getìr-me-miş*.
H. new a book-Acc bring-Neg-HypPst
'Hasan hasn't brought an important book.'

b. Hasan *yení* bir kitabı *getìr-me-miş*.
H. new a book-Acc bring-Neg-HypPst
'Hasan hasn't brought an *important* book.'

The prominent reading (93a) is that there is a new book that Hasan didin't bring (∃¬). However, when we put a secondary pre-nuclear accent on the modifier *yeni* ('new') as in (93b), we can get a reading which is paraphrased as: "Hasan brought a book, but it wasn't a new one'. This is a typical instance of an interaction between intonational/informational focus and an operator. What falls under the scope of negation is influenced by a contrastive accent. We will also leave this important interaction between negation and focus out of the scope of the thesis, concentrating on negated structures that do not involve no "contrast" or "emphatic denial".

We close this section by providing some examples where the effects of Acc-marking vs. ∅-marking can be clearly observed.

(94) a. Parti-de güzel bir kadın gör-me-dim. (¬∃/*∃¬)
party-Loc beautiful a woman see-Neg-Pst.1sg
'I didn't see a beautiful woman at the party.'

b. Parti-de güzel bir kadın-ı gör-me-dim. (*¬∃/∃¬)
party-Loc beautiful a woman-Acc see-Neg-Pst.1sg
'I didn't see a beautiful woman at the party.'

(95) a. John-a gizli bir mesaj yolla-ma-dım. (¬∃/*∃¬)
J.-Dat secret a message send-Neg-Pst.1sg
'I didn't send a secret message to John.'

b. John-a gizli bir mesaj-ı yolla-ma-dım. (*¬∃/∃¬)
J.-Dat secret a message-Acc send-Neg-Pst.1sg
'I didn't send a secret message to John.'

(96) a. Ben bir şey anla-ma-dım. (¬∃/*∃¬)
I a thing understand-Neg-Pst.1sg
'I didn't understand anything.'

b. Ben bir şey-i anla-ma-dım. (*¬∃/∃¬)
I a thing-Acc understand-Neg-Pst.1sg
'I didn't understand something.'

3.2.7 Lexical Restrictions on Case-marking of Indefinites

3.2.7.1 Verbs that Favor ∅-marked Indefinites

It has been noted in the literature that certain verbs are odd with Acc-marked indefinites (e.g. Kelepir 2001; Kılıçaslan 2006; Hedberg *et al.* 2009). Such claims are based on asymmetries like the following, where a "verb of creation" *yap* ('make') is odd with an Acc-marked indefinite:

(97) a. Ali bir kek yap-tı.
A. a cake make-Pst.3sg
'Ali made a cake.'

b. *#Ali bir kek-i yaptı.
A. a cake-Acc make-Pst.3sg
'Int: Ali made a cake.'

First it needs to be observed that the problem is not with the Acc-marker but with the co-occurrence of *bir* and the Acc-marker.[30] A bare Acc-marked object is impeccable with a verb of creation.

(98) Ali kek-i yap-tı.
A. cake-Acc make-Pst.3sg
'Ali made the cake.'

Second it needs to be observed that the admissibility of the Acc-marker in (98) is independent of any existence presuppositions and the realistic past tense carried by the verb. A non-existing, hypothetical (or planned) object can carry Acc-marking and appear as an argument of a creation verb. Suppose a context where preparations for a party is under discussion. Someone utters the following:

(99) Ali kek-i yap-acak.
A. cake-Acc make-Fut.3sg
'Ali will make the cake.'

In (99), no reference to an existing object is made. The cake under discussion is an intensional object that exists only in the plans about the party.

In the same "party planning" context, it is not hard to see that (97b) and its future tense variant in (100) are acceptable, if one accommodates her/his discourse model so that more than one cake is (planned to be) made. Under such circumstances (97b) would have a reading which can be paraphrased as *Ali will make/made one of the cakes*. Again no reference is made to an existing cake. This once again shows that Acc-marker cannot be carrying a presupposition that the extension of the nominal is not empty. We will return to the issue in Chapter 5.

(100) Ali bir kek-i yapacak.
A. a cake-Acc make-Fut.1sg
'Ali will make a cake.'

[30] I am grateful to Cem Bozşahin for pointing this out.

3.2.7.2 Verbs that Favor Acc-marked Indefinites

Certain verbs favor Acc-marked indefinites to ∅-marked ones.[31] Here is a representative list:

(101)

açıkla ('explicate')	*affet* ('forgive')
alkışla ('applaud')	*anla* ('understand')
aş ('exceed/surpass')	*aşağıla* ('humiliate')
ayart ('seduce')	*baştan çıkar* ('seduce')
dürt ('poke')	*eleştir* ('criticize')
izle ('track')	*kastet* ('mean')
kıskandır ('make jealous')	*merak et* ('be concerned about')
onar ('repair')	*suçla* ('blame')
sürdür ('sustain')	*okşa* ('caress')
önemse ('give importance')	*önle* ('prevent')
şaşırt ('surprise')	*temsil et* ('represent')
utandır ('ashame')	*yer* ('satirize')
yokla ('inspect')	

We defer the discussion on the common denominator of these verbs to Chapter 5.

3.2.8 Information Structure

In this section we consider the relation between Acc vs. ∅-marking of indefinite objects with information structural notions like "given" and "new" information.

Kennelly (2003) draws some explicit parallels between the Acc vs. zero forms of indefinites with information structural notions. We will first take her claim on ∅-indefinites. Kennelly (2003) claims that ∅ indefinites are always "New Information". A closer inspection of the relevant Turkish data suggests that this generalization may not always be warranted. Consider the discourse in (102) and the exchange in (103).

(102) a. Tüm kaçakların bulun-ma-sı-nı istiyorum.
whole deserter-Plu-Gen be found-Nmnl-Poss.3sg-Acc want-Prg.1sg
'I urge all the deserters be found.'

[31] Bolgün 2005 provides a frequency analysis of co-occurrence of verbs with Acc- and ∅-marking, based on METU Turkish Corpus (Say *et al.* 2004). Some of the verbs listed in (101) are from his study.

b. Ayrıca, bir kaçak bul-duğunuz-da, o-nu hemen etkisiz hale getir-in.
furthermore a deserter find-Cmpl.2pl-Loc it-Acc quickly neutralize-Imp
'Furthermore, when you find a deserter, neutralize him immediately.'

(103) a. Pazardan çok güzel elma ve armut al-dım.
market-Abl very nice apple and pear buy-Pst.1sg
'I've bought very nice apples and pears from the market.'

b. Ben bir elma yer-im.
I a apple eat-Aor.1sg
'I can eat an apple.'

The above examples show that the referential domain of a ∅-indefinite does not have to be completely unbound from the previous discourse. These examples also pose difficulties for Enç's (1991) ∅-marking non-partitivity correlation (§3.2.2).

Another claim Kennelly (2003:1074–5) makes concerning the relation between information structure and indefinites is that Acc-marked indefinites, which she calls specific, are infelicitous in the immediately preverbal position (the so called focus position, see §3.3), unless they are in a local D-linking relation with a sentential element. The data Kennelly (2003) backs her claim with is as follows:

(104) a. *Her tamirci nefis bir elma-yı yedi.
every mechanic-Nom delicious an apple-Acc has.eaten
'Every mechanic has eaten a delicious (specific) apple.'

b. Her tamirci eski bir arabayı tamir etti.
every mechanic-Nom has.repaired
'Every mechanic has repaired an old (specific) car.'

(105) a. *Her doktor eski bir arabayı aldı.
every doctor-Nom old a car-Acc has.bought
'Every doctor has bought an old (specific) car.'

b. Her doktor ihtiyar bir hastayı tedavi etti.
every doctor-Nom elderely a patient-Acc has.treated
'Every doctor has treated an elderly (specific) patient'

Kennelly's (2003) claim here is that (104a) and (105a) are unacceptable with a wide scope specific reading for the direct objects. She further claims that this unacceptability can be remedied by changing the verb-phrases such that some implicit D-linking relations are invoked, which eventually make the utterances acceptable. For instance in (104b) and (105b), world-knowledge about what mechanics and doctors are generally involved in provides the D-linking between the direct objects and the subject needed to render the utterances acceptable.

However there is an alternative explanation for why Kennelly's informants may be judging (104a) and (105a) as unacceptable. First observe that the wide scope readings of these utterances, which are claimed to be unavailable, require all the mechanics eating the same apple, and all the doctors buying the same car. Both cases are rendered far fetched according to standard assumptions concerning the size of an apple and the general structure of shopping for cars. In our judgement the readings that are claimed to be unavailable become available once this inferential obstacle is eased. Specifically, only changing the verbs in (104a) and (105a) as in (106) brings back the missing readings.[32]

(106) a. Her tamirci nefis bir elma-yı kokladı.
every mechanic-Nom delicious an apple-Acc smell-Pst.3sg
'Every mechanic has smelled a delicious (specific) apple.'

[32]Some clumsiness still remaining in (106) can be removed by playing with aspect and adding some introduction, where neither of these modifications establish a D-linking effect between mechanics/doctors and apples/cars. Consider the following examples which are more natural than the examples in the text:

i. İçeri girdiğimde, her tamirci kırmızı bir elmayı kokl-uyor-du.
when I entered every mechanic-Nom red an apple-Acc smell-Prg-Pst.3sg
'When I entered, every mechanic was (engaged in) smelling a red apple.'

ii. İçeri girdiğimde, her doktor eski bir arabayı inceliyordu.
when I entered every doctor-Nom old a car-Acc examine-Prg-Pst.3sg
'When I entered, every doctor was examining an old (specific) car.'

b. Her doktor eski bir araba-yı incele-di.
every doctor-Nom old a car-Acc examine-Pst.3sg
'Every doctor has examined an old (specific) car.'

We still do not have a natural relation that would imply a D-linking between the objects and the subjects. None of the verb phrases in (106) denotes an action that is typical of being a mechanic or a doctor, but we do have the specific object readings. Once again we witness how inferential (informational) aspects of interpretation are at work in a domain which at first sight gives the impression of a linguistically encoded constraint.

3.3 Notes on Focus Projection

This section aims to draw attention to the fact that, besides certain syntactic constraints, some pragmatic factors are also effective in deciding the intonational structure of an utterance in a particular context. Besides its interest on its own right, it lays the ground for the explanation we provide in §5.2.4 on why Enç (1991) discourse-linking (partitive specificity) is entirely missing in certain occasions, even though the indefinite object bears an Acc-marker.

The immediately preverbal position has a distinguished status in Turkish. Among the alternative accentuations of a basic subject-object-verb sentence, the one with the most prominent accent on the direct object is argued to be maximally general in contextual felicity. For instance while (107a) can answer any of the questions "What happened?", "What did Aynur do?" and "What did Aynur eat?", shifting the prominence away from the immediately preverbal *pastayı* ('the cake') as in (107b–c) requires a somewhat more specific context.[33]

(107) a. Aynur *kek-ì* yedi.
A. cake-Acc eat-Pst
'Aynur ate the cake.'

b. *Aynùr* kek-i yedi.
A. cake-Acc eat-Pst
'Aynur ate the cake.'

[33] In the examples, italic face designates the item that bears the final prominent accent (aka. nuclear accent) of the sentence. Though we do not designate the pre-nuclear accents and post-nuclear deaccenting, the nuclear accent, by definition, should be understood as the location of the final fall in the utterance.

c. Aynur kek-i *yedì*.
A. cake-Acc eat-Pst
'Aynur ate the cake.'

A similar interplay between accentuation and contextual specificity, usually discussed under the name of "focus projection", has been observed in many other languages, since the phenomenon was first introduced to generative linguistics by Chomsky (1972).[34] Chomsky's analysis, aimed as a "first approximation", have set the theoretical frame for most of the subsequent work.

Chomsky (1972) assumes that the "semantic representation" of a linguistic expression, besides other information, incorporates a partitioning of the meaning into *focus* and *presupposition*,[35] and that the contribution of accentuation is to this dimension of meaning. He argues for instance that "[t]he semantic representation of [(108)] must indicate, in some manner, that *John* is the FOCUS of the sentence and that the sentence expresses the PRESUPPOSITION that someone writes poetry." (89)

(108) It isn't JOHN who writes poetry.

On the basis of some previous discussion in the same paper (p. 67) suggesting that "semantic representation" is that part of the grammar which represents the " 'purely grammatical' component of meaning", the following hypothesis can be attributed to Chomsky.

(109) *Grammaticality of Information Structure:*
The information structure (see note 35) of a linguistic expression is part of its grammatically specified meaning.

It is this insight that has led to numerous studies which take information structural notions like topic and focus as grammatical primitives. For instance, the standard "Y-model" theorizing, following Jackendoff (1972), takes focus as a syntactic feature which percolates

[34] See von Stechow and Uhmann 1986; Winkler 1996; Gussenhoven 1999 for reviews on "focus projection". See Keijsper 1985 for a review of Russian and Praguean approaches to the phenomenon.

[35] Various semantic/pragmatic notions that belong to the sentential level such as *focus*, *presupposition*, *topic*, *comment*, *given/new information* and so on are usually collected under the term "information structure". There are numerous accounts of information structure and related concepts. Steedman and Kruijff-Korbayová (2003) provide a bird's eye view of the field.

through a syntactic level of representation, culminating in interpretive and phonetic effects at the interfaces (Selkirk 1984; Rochemont and Culicover 1990). Or in more recent proposals, information structural notions are taken to head phrasal projections (Rizzi 1997).

Another influential idea of Chomsky 1972 is the notion of "normal intonation". The idea is that there are certain grammatical processes, like the Nuclear Stress Rule, that operate on surface structures (or some other syntactic representation) and assign a center of intonation (i.e. nuclear accent) to the given expression. This context-independent, structure-driven assignment operation, which results in "normal" or "neutral" intonation, is distinguished from other processes that are responsible for the assignment of "expressive or contrastive" intonation.[36]

This of course cannot be all there is to the notion of "neutral intonation". One also needs to address the empirical issue of deciding on what counts as "neutral intonation"; otherwise, saying that the "neutral intonation" is the one assigned by the grammatical rules of accent assignment would lead to circularity. There are basically two types of criteria employed in deciding on the "neutral intonation" for a particular expression in a given language. The first one is contextual in character:

(110) *The Contextual Criterion of "Neutral Intonation"*:

> An utterance with a "neutral intonation" is the one which can be uttered in an out-of-the-blue (or "null") context as a discourse initiator, or as an answer to the question "What happened?"

The criterion stated as such is highly vague. Whether there can be a more precise definition of it, or whether there *is* a truly out-of-the-blue or "null" context has been a matter of some debate (Ladd 1996). We will not be concerned with this important issue,[37] for the present account will not make any essential use of this criterion. It is worth noting however that any account making an essential use of the criterion *should* be concerned with the debate.

The second type of criterion for "neutral intonation" is structural in character:

[36] This notion of "normal/neutral intonation" as opposed to "contrastive intonation" has been criticized on various grounds, most notably by Bolinger 1972; Schmerling 1976; Ladd 1980; Gussenhoven 1983.

[37] Although we cannot think of any argument apart from mere reflection to support it, our contention is that the level of contextual specificity prior to an utterance—or more precisely, the amount of information that is held by the conversational parties to be shared among them at a given time—is a matter of degree, and can *never* be "null". See Johnson-Laird 1982 for some relevant discussion, especially the parts on later Wittgenstein.

(111) *The Structural/Scopal Criterion of "Neutral Intonation"*:

The "neutral intonation" of an utterance is the one which allows a "wide-focus" reading; or, equivalently, it is the one which renders focus projection possible.

The special status of the immediately preverbal position mentioned in the opening paragraph of this section comes into play in this connection. It is taken to be the unmarked position of the sentential stress, where the unmarkedness in question is construed either along (110) (see e.g. İşsever 2003), or (111) (see e.g. Göksel and Özsoy 2003).

Now imagine a couple at their breakfast table, and consider the following sentences as uttered by one of the parties as a dialog initiator.

(112) a. Ali Aynur-u *aldat-ìyor-muş.*
A. A.-Acc cheat-Prg-Ev.Cop
'Ali has been cheating on Aynur.'

b. Ali karı-sı-nı *aldat-ìyor-muş.*
A. wife-Poss.3sg-Acc cheat-Prg-Ev.Cop
'Ali has been cheating on his wife.'

c. Hükümet alkollü içecek-ler-den al-ın-an vergi-yi *düşür-ecèk-miş.*
government alcoholic beverage-Plu-Abl take-Pass-Rel tax-Acc lower-Fut-Ev.Cop
'The government will lower the taxes on alcoholic beverages.'

The interest of these utterances is that they should be deemed "neutral" under both criteria of "neutrality", and yet they do not have their intonational center on the immediately preverbal item.[38] Furthermore, their immediately preverbal stressed versions require somewhat more specific contexts. For instance,

(113) Ali *Aynu-rù* aldat-ıyor-muş.
A. A.-acc cheat-Prg-Ev.Cop
'Ali has been cheating on Aynur.'

induces a contextual background like *Contrary to our guess, it turned out that it was Aynur that Ali was cheating on, not Ayşe.*

[38] For instance, (112a) does not have to be construed as being in contrast with *Ali Aynuru aldatmıyormuş.* or as an answer to *Ali Aynuru ne yapıyormuş?*

What is the trick here? It should be noted that the omission of the evidential *mış* somehow degrades the naturalness of the utterances as dialog initiators, but not to the level of infelicity. The point we will make is independent of the effect of the evidential marker anyway. The contribution of the evidential marker can be eliminated as follows. Consider the following minimal variant of (112a),

(114) Ali Aynuru *gör-ùyor-muş.*

A. A.-Acc cheat-Prg-Ev.Cop

'Ali has been seeing Aynur.'

This utterance forces us to accommodate a contextual background where whether Ali was seeing Aynur or not was an issue at some time prior to the conversation. Recall that we were not forced to accommodate a similar background in (112a). That utterance is quite felicitous even if we hold the assumption that whether Ali was cheating on Aynur has never been a topic of discussion or interest in the entire history of the couple. This simply shows that one part of the trick is about the difference between *aldatmak* ('to cheat on') and *görmek* ('to see'). In our opinion, this demonstrates that there cannot be a purely syntactic account of neutral accentuation and/or information structure in Turkish, unless one is willing to claim that there exists a relevant syntactic difference between these two verbs that will explain the difference in their information structural behavior.

Let us go on with a difference between *aldatmak* and *görmek* that seems to be relevant in the present context. First some general remarks are in order. The notion of focus (or more generally "informativity") is related to the notion of "contrast", which is, by definition, related to the presence of alternatives; there is no meaning to the term "contrast" without the integral notion of "alternative". Finally, we think, all this can and should be grounded on the information theoretic notion of "entropy" (Shannon 1948; Dretske 1981): the informativity of an event is a function of its capacity to reduce uncertainty in the system within which it is interpreted. Accents are signals of informativity. They instruct the hearer to adjust her mental model of the discourse to reduce the present uncertainty by making use of whatever is in the scope of the accent. We will return below to what we mean by "scope of an accent".

The difference between (112a) and (114) thus boils down to this: the verb *aldatmak*, in comparison to *görmek*, is richer with respect to the alternatives it affords in this particular context. At the point it is encountered, namely after two human referents were established

in the discourse model, it is picked up from the list of possible relations between human beings, which contains many items that are in contrast with *aldat* ('cheat'). On the other hand, at the same slot, *gör* ('see') does not restrict such a set. Given that it is accented, we are nevertheless forced to accommodate an alternative. Therefore we interpret the contrast to be on the polarity of the expression—that is, as a *he does/doesn't* type of contrast. This in turn leads us to accommodating the background assumption that whether Ali sees Aynur was an issue under discussion or of interest.

The significance of having the evidential suffix *mIş* comes into light in this connection. Besides facilitating a "news" context, under a Kornfiltian post copular clitic analysis, it provides "space" for the accent to fall on the lexical content, rather than on the inflection, where an accent on the latter signals a polarity contrast.[39]

Let us turn to the notion of "scope of an accent", the grammatical aspect of information structure. Consider the minimal pair (115).

(115) a. Ali *Aynu-rù* aldat-ıyor-muş.
A. A.-Acc cheat-Prg-Ev.Cop
'Ali has been cheating on Aynur.'

b. Ali *karı-sı-nì* aldat-ıyor-muş.
A. wife-Poss.3sg-Acc cheat-Prg-Ev.Cop
'Ali has been cheating on his wife.'

The interest of this pair is that (115b) is still felicitous as a dialog initiator, in contrast to (115a), which, we argued above, requires some amount of contextual support. Why is then shifting the accent the same way in very similar sentences alters their contextual presuppositions in such a different way?

We claim that the answer lies in a difference between the chunks *Aynur-u aldatıyor* vs. *karısını aldatıyor*. Among these two chunks, only the latter expresses a general quality or property of individuals. The predicate *karısını aldatıyor* can potentially apply to any married man, but this is not so for *Aynur-u aldatıyor*. We are unable for the moment to give any more substance then this to our use of the term "general", and have to assume that what

[39]The progressive also seems to have a role here. Observe the difference between *(i) Aynur'u seviyor musun? Evet, seviyórum/?sevíyorum* vs. *Bunu yapamam; çünkü ben Aynuru sevìyorum/seviyòrum.*

we mean by it is sufficiently clear, at least intuitively. Being a generally applicable quality *karısını aldatıyor* restricts a set of likewise qualities, and gives rise accordingly to a "stative" predication (see below). The rather parochial predicate *Aynur-u aldatıyor* on the other hand diverts the hearer's attention to the activity or the event described by the verb phrase, resulting in an "eventive" predication.

Let us further clarify what we mean by the "stative" vs. "eventive" predication. We argued above that (115a) induces a contextual background like *Contrary to our guess, it turned out that it was Aynur that Ali was cheating on, not Ayşe.* Call this Case 1. However, there is also another type of background, which pops up in one's mind when *Aynur'u aldatmak* ('cheating on Aynur') is taken as a single information unit. Call this Case 2. (In Case 2 the focus of the utterance encompasses the entire verb phrase; whereas in Case 1 the focus of the utterance was narrowly encompassing only the direct object *Aynur-u*.) This latter type of interpretation can be characterized by the context: *What was that noise next room last night? Any idea?* In such a context, we can "take up" the message as introducing an individual (namely Ali) to our mental model of the situation, and then attributing to it a certain type of activity, which, by world knowledge, explains the source of the noise in question.

We think another relevant difference between the utterances in (112) and (115) is in the way they are organized into informational units. Comparing (112b) and (115b), we can argue that the former conveys its message in three steps, whereas the latter does this in two steps. (112b) successively introduces two discourse referents and then at the third step specifies the relation between them. (115b) on the other hand first introduces a discourse referent, and then specifies a property of that referent. The same thing applies to (112a) and (115a). The only difference is that In (115a), in contrast to (112a), *Aynur* is informationally subordinated to a action attributed to *Ali*; its denotation no longer functions as an individual but rather as part of the description of an action.

The only thing that concerns the grammar proper in this picture, we claim, is that the accent on the immediately pre-verbal item can take under its scope either the object or the OV constituent *Aynur-u aldat* and *karısı-nı aldat*. Now we turn to some evidence from Turkish that the limits on what can go under the scope of a single accent is a grammatical phenomenon. Consider (116).

(116) a. Ali nerede?
A. where
'Where is Ali?'

b. *Bahçe-de* çalış-ıyor.
garden-Loc work-Prg.3sg
'He is gardening.'

In the absence of more specific contextual background, we are forced to interpret (116b) as *He is doing some gardening.* Ali may not be doing some other thing, say practicing violin, in the garden. In other words, it is only when *bahçe-de* is taken as an integral part of a complex predicate that we have a unit that can go under the scope of a single accent. If *bahçe-de* were intended as a locative adjunct, the appropriate form would be:

(117) Bahçe-de *çalış-ıyor*.
garden-Loc work-Prg.3sg
'He is working in the garden.'

where each unit has its own accent.[40] The same thing applies for the other types of adjuncts as well.[41]

Let us go on with some other constructions that impose grammatical limits on scopes of accents. Subjects of transitive verbs are a case in point. Göksel and Özsoy (2003) claim that focus cannot project from subjects. This view is contested in Özge and Bozsahin 2010 on the basis of data similar to (118) and (119) below.

(118) a. Bisiklet nere-de?
bike where-Loc
'Where is the bike?'

b. *Ahmèt* biniyor.
A. ride-Prg
'Ahmet is riding it.'

[40]We again do not designate pre-nuclear accents.

[41]That focus cannot project from locative adjuncts is first observed in İşsever 2006.

(119) a. Kitab-ım-ı gör-dün mü?
book-Poss.1sg-Acc see-Pst.2sg Qpart
'Have you seen my book?'

b. *Aynùr* okuyor.
A. read-Prg
'Aynur is reading it.'

Both (118b) and (119b) are quite natural responses to their corresponding questions, suggesting that the accent on a subject can take in its scope the subject-verb constituent. The picture is sharply altered when the verbs are replaced with some others as follows.

(120) a. Bisiklet nere-de?
bike where-Loc
'Where is the bike?'

b. #*Ahmèt* boyu-yor.
A. paint-Prg
'Ahmet is painting it.'

(121) a. Kitab-ım-ı gör-dün mü?
book-Poss.1sg-Acc see-Pst.2sg Qpart
'Have you seen my book?'

b. #*Aynùr* yak-ıyor.
A. burn-Prg
'Aynur is burning it.'

Once again we think that the source of this asymmetry should be sought in the informational properties of the particular verbs involved. Here we use "informational" in the information-theoretic sense that we briefly discussed above, namely their potential to reduce uncertainty. The verbs in examples (118b) and (119b) are highly predictable given the questions mentioning objects that these verbs go together quite frequently; bikes are for riding, as books are for reading. These verbs simply do not reduce much uncertainty. The verbs in (120) and (121) are quite unpredictable, and therefore has high information content.

It is crucial to note that the information-theoretic significance of the verbs in these latter examples is somewhat different from those we have seen earlier, namely *aldat* ('cheat') vs. *gör* ('see'). There, the issue with *gör* was not that it was highly predictable, in the sense that *ride* is in (118). Rather *gör* ('h')as a relatively small alternatives in that particular context, namely possible relations among human individuals. It appears apt to call such words "narrow cohort" items, to borrow some terminology from lexical access literature.[42]

The cases (118b) and (119b), where focus projection from an S to SV was possible, can be considered under what Lambrecht and Michaelis (1998:499) and Jacobs (1999) call "integration into an informational unit". The notion of "integration" describes any situation where an unaccented item is informationally highlighted by virtue of being adjacent to an accented item. By this token "integration" is a term applicable to projection from S to SV and O to OV alike. However there is an asymmetry between these two types of projection. The asymmetry is that whether focus projects from O to OV is never contingent on informational notions, whereas whether it does from S to SV is, as we observed in examples (120) and (121). All this suggest that we are faced with a grammatical constraint blocking projection from S to SV, as Göksel and Özsoy (2003) is right in observing. This constraint is overridden when the V is informationally too weak to get accented. For an item to be informationally weak, it must either be highly predictable, or it must be a "narrow cohort" item. In either case the amount of uncertainty it eliminates is low.

Yet another place where there seems to be a grammatical constraint on focus projection is genitive possessive constructions. Consider the following example.

(122) a. Salon-un orta-sı-nda-ki şey ne?
living room-Gen middle-Poss.3sg-Loc-Rel thing what
'What's that thing in the living room?'

[42] A simple test for whether two verbs belong to the same cohort in the context of a particular object may look like this.

(i.) Q: Have you X'ed Z?

A: No, I Y'ed it.

For an NP Z, and verbs X and Y, if the above exchange is sound, then X and Y belong to the same cohort in the context of Z.

b. Baba-m-ın *bavul-ù*.
father-Poss.1sg-Gen.3sg suitcase-Poss.3sg
'My father's suitcase.'

c. *Baba-m-ìn* bavul-u.
father-Poss.1sg-Gen.3sg suitcase-Poss.3sg
'My father's suitcase.'

(122c) but not (122b) presupposes a context where other suitcases are involved. One thing that distinguishes the behavior of genitive-possessive constructions from the cases above is that no matter what the informational status of the possessee, a possessor accented genitive-possessive construction (like 122c) has always a narrow focus on the possessor. We do not know whether this generalization holds for a large number of lexical items, and we do not have any explanation as to why this type of blocking of focus projection differs from S to SV type in admitting no exceptions.

It is relevant in the present context to discuss a recent proposal on the semantics of the accusative-marker. Nakipoğlu (2009) argues that the accusative case marking, in interaction with sentential accentuation, has some well-defined information structural properties in Turkish. In particular, she claims, when accented, an accusative marked DP signals "discourse-new" but "hearer-inferable" information; and when unaccented, "discourse-old" and "hearer-old" information. To begin with the first half of the claim, her account inherits an error from Prince 1981, namely that accented items are necessarily "discourse-new". The notions like "discourse-new" and "previous mention" have no place in characterization of focus, since the notion of "newness" associated with focus does not concern the elements themselves but their relational status in a proposition (Lambrecht 1994; Lambrecht and Michaelis 1998). The following discourse illustrates the point:

(123) a. Aynur benim en iyi arkadaşımdı.
A. my most good friend-Pst.1sg
'Aynur was my best friend.'

b. Ne zaman içim-e bir hüzün çökse,
what time my inside-Dat a sorrow settle-Cond
'Whenever I felt blue…'

c. hemen *Aynur'u/onu* çağır-ır-dım.
immediately A.-Acc/she-Acc call-Aor-Pst.1sg
'I used to call Aynur/her immediately.'

As for the second half of Nakipoğlu's (2009) claim, namely that unaccented[43] accusatives are "discourse-old" and "hearer-old", (112) shows that this claim is not tenable either. The accusative marked DPs, which are "unaccented" in Nakipoğlu's (2009) sense, need not be discourse or hearer-old. The upshot of the present argument is that the explanatory strategy of treating information structural notions as primitives, and associating them with particular morphemes and patterns of accentuation runs into trouble, even in an account like Nakipoğlu's (2009), which, we think rightfully, admits the role of inference in information update.

[43] By "unaccented" Nakipoğlu (2009) means that the main sentential stress is shifted to the verb.

CHAPTER 4

THE THEORETICAL FRAMEWORK

This chapter is devoted to the introduction, modification, and justification of the theoretical framework within which the proposal of the thesis will be developed. We employ Combinatory Categorial Grammar (Steedman 2000b) as the grammatical framework on which we base the proposal of the thesis. The reasons behind this choice are as follows. One attractive feature of CCG is that it provides a computationally and theoretically restricted formalism, where non-monotonic structure inspecting and structure changing operations like wh-movement, Quantifier Raising and so on are completely done away with. Given that the scope phenomena concerning indefinite NPs call for very flexible representations, trying to capture the phenomena in a highly restricted formalism like CCG is significant as a way of putting the theory's foundational principles to test. Another significance of our choice of CCG is due to its highly flexible notion of syntactic constituency. Almost any left-to-right string is assigned a semantic logical form by the competence grammar—hence treated as a syntactic constituent, thanks to the combinatory operations like type-raising and functional composition (see below). This flexibility in turn provides a transparent way of picturing how grammar interacts with various extra-grammatical sources of information relevant for linguistic understanding.

The chapter opens with §4.1, where we provide a brief introduction to CCG. §**??**

4.1 Background on Combinatory Categorial Grammar

The most basic idea behind a categorial grammar[1] is its analysis of linguistic expressions into functions and arguments. Take two English expressions *John* and *walks*; and for the sake of simplicity assume that *John* stands for a certain individual, namely John. It is immediate that the expression *walks* is somewhat incomplete in a sense in which *John* is not. We took *John* to stand for John, but what does *walks* stand for? It is commonplace to think that *walks* should somehow be related to (the description of) a state of affairs that involves someone or something walking. However *walks*, as it stands, is short of such a description as it lacks the specification of who or what is walking. Then we can think of *walks* as something that gives us descriptions of states of affairs when provided with specifications of individuals; or something that relates specifications of individuals to descriptions of states of affairs. As it is always the same state of affairs that *walks* gives when given the same individual, we can treat *walks* as a *function* mapping individuals to states of affairs. Therefore, in forming a sentence from *John* and *walks*, we say that the function *walks* applies to its argument *John* to give the sentence *John walks*.[2,3]

Thus far we have been talking in terms of semantic objects like individuals and properties. The obvious question that arises in the context of a grammatical theory is the following: How are these semantic characterizations of linguistic expressions related to their syntactic characterizations? This question brings us to another crucial aspect of categorial grammars. Categorial grammars thrive to maintain a fairly tight correspondence between the syntax and the semantics of linguistic expressions. What is meant by the syntax-semantics link's being tight has both a static and a dynamic aspect. In its static aspect, a tight syntax-semantics

[1] Categorial grammars are usually taken to originate with Ajdukiewicz 1935 and Bar-Hillel 1953. Steedman 1993 and Wood 1993 provide more detailed introductions to categorial grammar.

[2] See Lewis 1970 for the intuitive basis of thinking of meanings in terms of functions.

[3] It is important to observe that the function-argument distinction is not an absolute one. The above characterization of *walks* as the function and *John* as the argument follows from our initial assumption that *John* stands simply for John. There are alternatives, however. The above characterization of *walks* is equivalent to saying that *walks* stands for a property possessed by certain individuals, or that it characterizes the set of individuals that have the property, whatever that property exactly is. Then it is possible to take *John* as not standing for an individual but for a function that maps properties into states of affairs in which the individual John has those properties. In this latter setting, the function *John* applies to the argument *walks* to give the sentence *John walks.* All this shows that what is the function and what is the argument in a certain linguistic construction is a matter of analysis.

correspondence requires that every syntactic characterization has a corresponding semantic characterization. In other words every item that the theory recognizes as a (morpho)syntactic unit is also a meaning bearing unit. (As we will see below there are variations on the nature of this mapping.) In its dynamic aspect, a tight syntax-semantics correspondence requires that every syntactic operation is systematically paired with a semantic operation. This is what Bach (1989:66) calls the *rule-by-rule hypothesis*.

The both aspects of a tight syntax-semantics correspondence can be captured in a very transparent and economical fashion. Before coming to how this is done, it will be convenient to introduce the notion of **type**.

In a referential, model-theoretic approach to natural language semantics the task of the semanticist is to define a systematic correspondence between the expressions of the language under consideration and objects in a certain model. A typical model is an abstract representation of the world in terms of individuals, properties of and relations between these individuals and so on. Usually the correspondence is defined by first translating the expressions of the natural language under discussion to an intermediary level of logical form, and then evaluating this logical form with respect to a certain model.[4] As we saw in the opening paragraph of this section, an intuitive way of construing logical forms and the model-theoretic objects that they correspond to as functions. In this perspective to linguistic meaning, the space of meanings is a collection of various kinds of functions, where a special case is that of functions which take zero arguments. Such functions are called constants or atoms. **Types**, particularly semantic types, can be thought of as an abstract and recursive classification that divides this meaning space into subclasses.

Let us return to our example *John walks* for illustration. The entire sentence *John walks* is taken to denote either truth or falsity, therefore the type of its denotation is a truth value, which is designated as t. The expression *John* is taken to stand for an individual; individuals are decreed to be of type e (for entity). As we saw above *walks* can be construed as denoting a function that maps an individual like John to the propositions that he walks. This makes *walks* denote a function of type (et), which reads "maps e type things to t type things". The same type for *walks* can be arrived at by decomposing *John walks* by "abstracting" the entity typed *John* from the truth-value typed *John walks*. In a sentence like *John loves Mary*, the

[4] It is possible to treat the linguistic expression itself as the logical form by adjusting the interpretation procedure accordingly. See Thomason 1974; Dowty *et al.* 1981 for accessible discussions.

expression *loves Mary* is the same type as of *walks*, since functionally speaking both *walks* and *loves Mary* does the same thing, they map an e type denotation to a t type denotation. This reasoning automatically makes the transitive verb *loves* have a denotation of type $(e(et))$, a function that maps e type things to a function that maps e type things to t type things.[5]

The infinite set of possible semantic types can be defined by inducing over two basic types as follows:

(124) Semantic Types:

i e, t are semantic types;

ii. if ϵ and τ are semantic types, then so is $(\epsilon\tau)$;

iii. nothing else is a semantic type.

where only a small part of this set is used by actual natural languages.

The syntactic analysis of natural languages can be approached from the same angle. Let us take the same example *John walks*. Let us define our syntactic types as NP corresponding to e and as S corresponding to t. This makes *John* syntactically of type NP and *John walks* syntactically of type S. It is not hard to see that this analysis makes *walks* syntactically a function from NP type expressions to S type expressions. A similar argument can be made for *loves*, where it is syntactically analyzed as a function from NP type expressions (i.e. direct objects) to functions from NP type expressions (i.e. subjects) to S type expressions. This way of theorizing about the syntax-semantics relation establishes both a correspondence between syntactic and semantic descriptions, and a systematic correlation between syntactic and semantic operations. To see what is meant by the latter type of correlation, consider what happens when the expression *John* is combined with the expression *walks*. What happens on the semantic side is that a function from entities to truth-values applies to an entity type argument. What happens in parallel on the syntactic side is the application of a function from NP type expressions to S type expressions to an NP type argument.

At this point, a relevant question is this. If we have such a transparent correspondence between syntactic and semantic analysis, then why do we have syntactic types in addition to

[5]We use a left associative convention in eliminating the parentheses in types. According to this, $(e(et))$ is written as $e(et)$, and $((et)t)$ is written as ett.

semantic types? We will briefly look at two motivations for having syntactic types in addition to semantic types.

Motivation 1: Consider the combination of the items *John* and *loves* into a sentence. As we saw above, on both the syntactic and the semantic side, what happens when *John* and *loves* combine is the application of a function to its argument giving a result. However, there is at least one reason that the correspondence between the syntactic and the semantic characterizations of the same combination cannot be that of identity. When looking at the combination of *John* and *walks* on the syntactic side we need to take care of something that is missing on the semantic side; and this is directionality. In order for *walks* to apply to *John*, the latter must be to the left of the former, otherwise we would have to admit *walks John* to be synonymous to *John walks.* On the other hand, there is no left or right when we are dealing with semantic objects. Furthermore syntactic analyses pay attention to in what order the arguments are taken by a functor as well. For instance the first argument that *loves* combines is the one that is to its left, not the one that is to its right. Therefore, syntactic types have to contain information concerning the directionality and order of the arguments that a function takes.

Motivation 2: The second motivation for having syntactic types besides semantic types is that although we have a functional mapping from syntactic types to semantic types, the reverse is not the case. For instance, from the semantic point of view it seems profitable to take nominal/adjectival predicates like *is sick* and verbal predicates like *walks* to be of the same semantic type, namely et. On the other hand if we take both expression to be of the same syntactic type, then we won't be able to capture in our syntax certain differences in their distributions. A case in point is the asymmetry between *he walks slowly* and **he is sick slowly*. *Slowly* has to somehow know that it is combining with a legitimate unit in the former and with an illegitimate unit in the latter.

As we saw above syntactic types need to incorporate information concerning the directionality and order of the arguments the function being designated. Therefore a syntactic type should carry the following types of information: (i) the type of things it takes as argument(s) (i.e. its domain), (ii) the type of things it results in after taking its argument(s) (i.e. its range), and (iii) the direction and the order in which it expects its argument(s). There is a simple notation for achieving this. Directionality is designated with a slash: '$/$' for right and '$\backslash$'

for left. A syntactic type of a one place function is formed by concatenating the range, the directionality and the domain in that order. The following exemplifies the case for *walks*,

(125) *walks* := $S\backslash NP_{sg}$

where the operator ':=' pairs the phonetic representation on its left (which we represent via orthography to aid readability) with the syntactic type on its right. The syntactic type to the right of ':=' says that the expression *walks* is a function that maps expressions of type NP_{sg} to its left, to expressions of type S. The types NP_{sg}, S and so on stand for complex feature bundles as standard in syntactic theory since Chomsky 1970.

Functions with more than one arguments are "Curried". "Currying" transforms a function $f : A \times B \mapsto C$ into a function $g : A \mapsto (B \mapsto C)$, or more generally:

(126) $f : A_1 \times A_2 \times \ldots \times A_n \mapsto C \Rightarrow g : A_1 \mapsto (A_2 \mapsto (\ldots \mapsto (A_n \mapsto C)\ldots))$

"Currying" affords a straightforward way of encoding argument order under the general syntactic type scheme of range-slash-domain. The two argument transitive *love* is encoded as follows:

(127) *loves* := $(S\backslash NP_{sg})/NP$

which says that *loves* is a two argument function that takes its first argument (direct object) to its right, and its second argument (subject) to its left.

In cases where an expression does not take any arguments, it is said to be *atomic*, and the syntactic type consists in the type of the expression itself, as in:

(128) *John* := NP_{sg}

One way to maintain the tight correspondence between syntax and semantics discussed above is to make use of λ-calculus in encoding logical forms. Now we can give a complete grammatical analysis of a transitive verb like *love* in standard CCG notation:[6]

[6]One unorthodoxy in this representation is in the way a two place relation like loving is designated in the logical form. In semantic interpretations juxtaposition of two terms as in ab means that a applies to b. Juxtaposition is left associative: abc and $(ab)c$ are the same interpretation. In the sentence *John loves Mary*, interpreted as like $love'mary'john'$, the meaning of the predicate *loves Mary*, symbolized as $love'mary'$, applies to the meaning of *John*, symbolized as $john'$, making *John* the logical object and *Mary* the subject. In a more standard notation the logical form of the same sentence would be represented as $loves'(john', mary')$. We will come to the significance of this distinction below.

(129) $\underbrace{\text{love}}_{\text{phon. form}} := \underbrace{(S\backslash NP)/NP}_{\text{syn. type}} : \underbrace{\lambda x_e \lambda y_e . love'_{e(et)} xy}_{\text{sem. interpretation}}$

The syntactic type $(S\backslash NP)/NP$ designates that *love* is a functor which takes its argument to its right giving another functor $S\backslash NP$, which is of the same syntactic type as for instance the intransitive *sleep*. Lambda bindings in the semantic interpretation ensure that the rightward NP is interpreted as the logical object of the loving relation, and the leftward NP as the logical subject, giving a transparent syntax/semantics correspondence.

What we have seen thus far is by and large shared by most brands of categorial grammar, also inherited by CCG. Now we will move to more distinctive aspects of CCG.

CCG is a generative theory of natural grammar in the sense of Chomsky 1957. It provides a computationally constrained grammar formalism, which consists of a finite categorial lexicon and a small number of combinatory operations that project this lexicon to an infinite set of grammatical expressions. Every grammatical expression, lexical or compound, is of a *category*, which pairs a phonological form with a semantic interpretation through a *syntactic type*, as in (129) above.

The most primitive operation in CCG for forming complex expressions out of lexical items is functional application which is schematized as follows:

(130) a. Forward Application:

$$X/Y\text{: } f \quad Y\text{: } a \quad \rightarrow \quad X\text{: } fa \qquad (>)$$

b. Backward Application:

$$Y\text{: } a \quad X\backslash Y\text{: } f \quad \rightarrow \quad X\text{: } fa \qquad (<)$$

Derivation of a simple transitive sentence, which is equivalent to a classical context-free derivation with the phrase structure rules $S \rightarrow NP\ VP$ and $VP \rightarrow V\ NP$ is as follows:

(131)

John	loves	Mary
$NP : john'$	$(S\backslash NP)/NP : \lambda x \lambda y . love' xy$	$NP : mary'$
	$S\backslash NP : \lambda y . love' mary' y$ (>)	
$S : loves' mary' john'$ (<)		

Now we come to what makes CCG a *combinatory* grammar. The central idea of a grammar's being combinatory is that the only method it admits for forming complex expressions

from the lexical definitions is concatenation. CCG diverges from varieties of categorial grammar that employ non-concatenative modes of syntactic combination such as Bach's (1979) RIGHT-WRAP (namely combination by infixation) in being strictly concatenative.[7] This is worded as *The Principle of Adjacency* (Steedman 2000b:54):

(132) *The Principle of Adjacency:*

Combinatory rules may only apply to finitely many phonologically realized and string adjacent entities.

Besides expressing the strictly concatenative nature of syntactic combination, The Principle of Adjacency also rules out any use of empty categories in theorizing.

On a more technical level, what makes a CCG a combinatory grammar is its appeal to Curry and Feys's (1958) combinatory logic, as its model of "the computation". CCG hypothesizes that natural grammar makes use of a small number of primitive operations on functions (i.e. combinators). These are *functional composition* (combinator **B**), *type raising* (**T**), and *substitution* (**S**). Only the first two concerns us here. Here are the definitions:

(133) a. Forward Composition:

$$X/Y : f \quad Y/Z : g \quad \Rightarrow \quad X/Z : \lambda x.f(gx) \qquad (>\mathbf{B})$$

b. Backward Composition:

$$Y\backslash Z : g \quad X\backslash Y : f \quad \Rightarrow \quad X\backslash Z : \lambda x.f(gx) \qquad (<\mathbf{B})$$

(134) Forward Type Raising:[8]

$$X : a \quad \Rightarrow \quad T/(T\backslash X) : \lambda f.fa \qquad (>\mathbf{T})$$

Inclusion of the combinatory operations of function composition and type raising makes it possible to deliver *John loves* as a constituent of the sentence *John loves Mary* as shown in (135), which is impossible with the context-free rules.

[7] See Dowty 2007 for a recent discussion on non-concatenative categorial formalisms.

[8] Informally put, what type raising does is to turn an argument category X into a functor looking for a functor that is looking for X as an argument. In a sense it "activates" an argument "passively waiting" for a functor to apply to it. See note 3 for the semantic motivation behind type-raising.

(135)

John	loves	Mary
$NP : john'$	$(S\backslash NP)/NP : \lambda x\lambda y.love'xy$	$NP : mary'$
$S/(S\backslash NP) : \lambda f.f\ john'$ (>T)		
$S/NP : \lambda x.love'xjohn'$ (>B)		
$S : loves'mary'john'$ (>)		

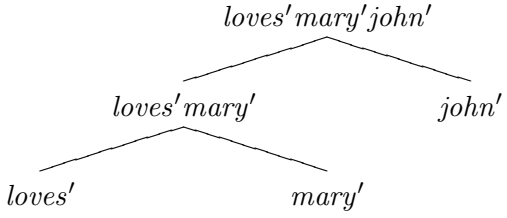
The flexibility in the notion of "constituency" afforded by **B** and **T** renders almost any contiguous leftmost prefix of a sentence a constituent. Steedman (2000b,a) exploits this flexibility in holding that every *intonational phrase* (Selkirk 1984) is a combinatory constituent, thereby simplifying the syntax-phonology interface to the point of transparency. Intonational phrases, which are combinatory constituents with compositional semantics, are further associated with information structural units of *theme* and *rheme*.[9]

It is crucial to observe that the result of a combinatory operation is entirely determined by the syntactic types of the input categories and the operation itself; combinatory operations are totally "blind" to the derivational histories of the input categories. This makes CCG a "direct compositional" account in the sense of Barker and Jacobson (2007). For this reason, the "combinatory derivation" which looks like an upside-down phrase structure tree is not a representational level of the theory. This leaves the semantic interpretation as the only place for stating "static" constraints similar to Binding Conditions of Chomsky 1981.

Following the research line initiated by Bach and Partee (1980), CCG defines Binding Theory over semantic interpretation (Steedman 1996). First observe that semantic interpretations are binary branching trees (with the exception of pro-terms discussed below), where each non-terminal node designates the result of a functional application, as can be observed by comparing (136) and (137), which are different forms of the same hierarchical representation.

(136) $((loves'mary')john')$

(137)



[9] See Özge and Bozsahin 2010 for an application of this theory to Turkish intonation.

Now a command relation can be defined over logical forms as follows (adapting from-Steedman and Baldridge 2007):

(138) LF-command:

A node α LF-commands a node β iff the first branching node that dominates α dominates β and α does not dominate β.

According to this definition the subject $john'$ LF-commands the object $mary'$ in (136), and generally arguments command their more oblique co-arguments. This allows one to capture in the logical form certain symmetries traditionally attributed to accesibility or thematic hierarchies or command relations realized at certain syntactic level of representations.

The notion of LF-command will be important in the scope account of CCG, which we turn to in the next section.

4.2 The Semantic Representation Language

We use Gallin's (1975) two-sorted type theory, augmented with constructs from the Situation Calculus of McCarthy and Hayes (1969) as the semantic representation language that will be used in the thesis. We will designate this language as L for convenience. This section starts with some introductory remarks on the theoretical components of language understanding (§4.2.1) that will be useful to distinguish. Then, §4.2.2 will present how intensionality will be captured in L. §4.3.3 will give the model theory for L, which will follow the model theory given in Steedman 2010:Ch. 5, apart from some minor modifications and the addition of intensionality to the system. §4.2.3 will address the issue of how surface forms of linguistic expressions are mapped to expressions of L.

4.2.1 Remarks: Delimiting the Grammar

We will assume, following many others,[10] that understanding natural language involves the construction and constant modification of a mental model that includes some discourse referents (objects, events, situations etc.), together with some properties of, and relations among

[10]There are two parallel streams for representationalism: Linguistic/logical (Kartunnen 1976; Kamp 1984; Heim 1982) and computational (Grosz and Sidner 1986).

them. We will assume that this discourse model takes the form of a "conversational scoreboard" (Lewis 1979), which, in addition to those above, includes various information like the most salient discourse referents, current time, location, active alternatives[11] and so on.

When theorizing about the natural grammar, it is desirable to be explicit about one's assumptions about where the grammar lies in the process of natural language understanding described above. We will assume that natural language understanding can be structured into various subproblems. One issue concerns what is represented in a discourse model. Call this **the representation problem**. Discourse models are dynamic, they constantly change. This change is effectuated through various means like direct perception, accommodation, inference, integration of new linguistic material and so on. Call the characterization of these processes **the manipulation problem**. Surface forms of linguistic expressions are mapped to certain representations to be integrated into the discourse model. Call the problem of characterizing these representations **the interpretation problem**. We also have the problem of how to map the surface form of an utterance to its interpretation, **the mapping problem**. Interpretations assigned to surface forms need to be integrated to the evolving discourse model. Therefore, perhaps as a subcase of the manipulation problem, we have **the integration problem**. Finally we have the problem of deciding on the truth of a discourse model, **the evaluation problem**.[12]

We will take the grammar to be concerned only with the mapping problem. The mapping mechanism, and therefore the boundaries of the grammar, is fairly explicit in CCG. A CCG grammar consists of a finite lexicon (possibly augmented with a number of lexical rules) and a finite set of universal combinatory rules. Anything that lies outside of this system is extra-grammatical.

We will also assume that the semantic interpretation delivered by the grammar is in the same terms with the discourse model. In this respect what we call LF is not a syntactic, but a semantic representation. The distinction concerns the fact that the latter but not the former can be assigned a model-theoretic interpretation.

As for the integration problem, we assume that there is a bidirectional information flow between the discourse model and the grammar driven semantic composition. In the semantics to discourse direction, interpretations delivered through the grammatical process are incre-

[11] That active alternatives should be a part of the discourse model is suggested in Thomason 1990.

[12] Some parts of the present characterization is inspired by Moore 1995:Ch. 1.

mentally added to the discourse model, changing the discourse model accordingly.[13] In the other direction, discourse affects semantic interpretation through at least the following ways:

(139) a. Resolution of indexical (deictic) expressions.

b. Resolution of pronominal expressions.

c. Evaluation of discourse functions (see page 79 below).

In this section we outlined our basic assumptions concerning the theoretical components of natural language understanding. The rest of this chapter will address various components that are relevant for the topic of the thesis.

4.2.2 Intensionality and The Situation Calculus

Among various formalisms devised to capture intensional phenomena in natural language semantics, most familiar are modal logic based ones like Montague's (1973) Intensional Logic and its descendants. In this thesis, sacrificing mathematical elegance, we will use a more natural language like representation that borrows most of its constructs from event/situation calculi of AI knowledge representation and planning literature (McCarthy and Hayes 1969; Kowalski and Sergot 1986; Shanahan 1999; Reiter 2001). Our semantic representations will be "ontologically promiscuous" in the sense of Hobbs 1985. Being "ontologically promiscuous" means to feel free to quantify over various sorts of semantic objects like states, events, actions, instants and so on.[14]

Before going on, it is important to make clear what is *not* aimed at in this thesis. There are two main concerns in developing knowledge representations in AI. These are what McCarthy and Hayes (1969) name *epistemological* and *heuristic* adequacy. The former concerns the adequacy in representing the relevant aspects of the studied domain. The latter is concerned with notions like computational feasibility and efficiency that arise in the context of inferring further information from constructed representations. When dealing with natural language semantics, the task we are faced with on the epistemological side is the formulation of what

[13] See Haddock 1989 for a tutorial review on incremental semantic interpretation, and other papers in the same issue for discussion and empirical motivation.

[14] A parallel line of research initiated by Davidson's (1967) reification of events appears to be more widely known in linguistics.

Bach (1986:p. 573) calls "natural language metaphysics". Natural language metaphysics, or "semantic ontology", is basically concerned with the question "What do people talk as if there is?"(*ibid.*). In other words, our semantic ontology is the totality of the types of semantic objects that our semantic representations quantify over. In this thesis there will be almost no original discussion on natural language metaphysics. We will eclectically adopt certain categories from the literature, without trying to motivate them through grammatical analyses of any natural language. Likewise, we will not attend to issues concerning the heuristic adequacy of the assumed semantic representations.

Let us start by an informal discussion of Situation Calculus (McCarthy and Hayes 1969). In our ontology, there are things called **situations**. A situation is a snapshot of what is the case. The total state of affairs concerning what there is. This means that when we are modelling the world—the subject matter of natural languages—every situation contains a huge amount of information. Such information is too huge to represent by any means. However we can query the information content of a situation in certain ways. For instance we can ask what the time is in a particular situation. For this, assume a function $\mathbf{time}$, defined from the set of situations to positive integers, that gives the time in the particular situation that it is applied to (say in terms of number of seconds elapsed since the Big Bang). This is what we mean by 'discourse function' in (139c) above.

It is important to note that for any two situations, having the same value for $\mathbf{time}$ does not mean that they are identical. This allows us to make use of situations in talking and reasoning about not just what is or was the case in the actual course of history, but also what might be or can be the case.[15]

Another important concept of Situation Calculus is that of a **fluent**. Anything that may change from situation to situation is a fluent. In other words a fluent is something that has a situation argument. Consider the state of affair of John's sleeping. Whether such a state holds or not depends on which situation we are meaning it to hold in. The following function aims to capture this dependence on situations:

(140) $\lambda s.sleep'(john', s)$

(140) is meant to be a function that answers 'true' for situations where John sleeps, and

[15]Likewise, any two situations that are identical with respect to what is the case in them can nevertheless differ in the value that $\mathbf{time}$ maps them to.

'false' for situations where he does not. Notice that this is just another way to query a situation, slightly different from $\mathbf{time}$. As the terminology goes, the function $\mathbf{time}$ is a **functional fluent**; its *value* changes from situation to situation. (140) on the other hand is a **relational fluent**; whether it holds or not changes from situation to situation.[16]

A simple finite clause with present tense can be represented as in (141).

(141) a. John sleeps.

b. $sleep'(john', s'_0)$

c. $sleep'_{s'_0} john'$

We will henceforth write situation arguments as subscripts as in (141c). Notice that s'_0 in (141b/c) is a situation constant, not a variable. This semantic representation says that the state of affair 'John's sleeping' holds at the particular situation s'_0.

In capturing the semantics of modality and certain intensional verbs we will make use of a construct based on the Situation Calculus. Moore (1985) provides a formal account that integrates the possible world semantics of knowledge (Hintikka 1971) with the Situation Calculus, where reasoning about knowledge and action is captured in a unified formalism. In capturing the semantics of expressions related to knowledge and belief we will resort to a relation K akin to Moore's (1985) accessibility relation for his modal logic of knowledge. Adapting to situations the following expression states that situation σ_1 is compatible with what α knows in situation σ_2.

(142) $K(\alpha, \sigma_1, \sigma_2)$

An intuitive characterization of K is to take it as stating that α might well be in σ_1 for what he knows in σ_2 (see Moore 1985 for further details).

This regime provides a straightforward means to capture the semantics of attitude verbs like *know*, as illustrated in (143).

(143) a. Harry knows that John sleeps.

b. $\forall s.K(h', s, s'_0) \rightarrow sleeps'_s j'$

[16] Of course a relational fluent is just a special type of functional fluent. It is a functional fluent whose range is the set of truth values.

What (143b) says is that in every situation s that is compatible with what Harry takes to be true in situation s'_0, it is the case that John sleeps.

We will freely adapt the relation K to other sorts of propositional attitudes (e.g. believing, suspecting, hoping) and modalities (e.g. circumstantial, deontic), where the exact content of the modal relation involved may be inferred from the context, along the lines of Kratzer 1981.

4.2.3 Associating Surface Forms with Semantic Representations

This section demonstrates how the surface form of an expression is mapped to its semantic interpretation (or logical form) in a CCG framework. As our central concerns are semantic our syntactic representations will not be more than sketchy.

Let us continue by decomposing the simple expression (141a). We take proper names like *John* to be **rigid designators** (Kripke 1980). A rigid designator denotes the same object in every situation that the object exists. Therefore proper names are not fluents under the present assumptions. (144) gives the lexical definition of proper names.

(144) *John* $:= \quad S/(S\backslash NP_{[3sg]}) \quad : \quad \lambda f.f\,john'$

The categories of intransitive and transitive English verbs are as in (145).[17],[18]

(145) a. IV $:= \quad S_{[-\mathrm{fin}]}\backslash NP \quad : \quad \lambda x\lambda s.iv'_s x$

b. TV $:= \quad S_{[-\mathrm{fin}]}\backslash NP/NP \quad : \quad \lambda x\lambda y\lambda s.tv'_s x\,y$

Pronouns. Our treatment of pronouns follows Steedman 2000b, 2010 in many respects, with slight notational and content-wise differences. We treat non-deictic pronouns like *he*,

[17] Parentheses in syntactic categories may be omitted under a left associative convention. According to this $(S\backslash NP)/NP$ is written as $S\backslash NP/NP$.

[18] A side remark on the categories in (145) is that they appear to violate the *Principle of Categorial Type Transparency* (Steedman 2000b), which basically says that syntactic types must directly reflect the underlying semantic types. The reason for the violation might be taken to be the fact that in (145a), what is a two place function in semantic interpretation has a one place function as its syntactic type. However, what we designate as $S_{[-\mathrm{fin}]}$ is not an atomic category, it is a function from situations to truth values. In this respect the category is totally in line with the logic of the *Principle of Categorial Type Transparency*. Observe that there is no linguistic expression with a type of a situation. For this reason, it is entirely reasonable that there is no syntactic type with an argument of such type. Also note that the syntactic type $S_{[-\mathrm{fin}]}$ deterministically has the interpretation of type st.

she, *it* and so on as argument type (e or type raised eTT) expressions of the form $\mathbf{pro}_i$, where i is an index unique to the instance of a pronoun. At those instances where only one pronoun is involved we suppress the index. Indexing is a device to keep track of the originating sources of pronominal items, and we will not make any crucial use of this device in the thesis. We also do not indicate the gender feature of pronominal items for the sake of simplicity.

As for the pronoun resolution, we assume that during derivations expressions like $\mathbf{pro}_i$ are specified by a pronoun resolution mechanism as terms of the form $(pro'_i \alpha)$ (without any type change), where α is either a salient discourse referent or the variable of an LF-commanding operator. This non-determinism captures the distinction between discourse bound vs. bound-variable pronouns.

Crucially, we also assume that the mechanism described in the last two paragraphs is in use for other other free-variables and related phenomena that can be modeled by pronoun-like mechanisms (e.g. temporal reference). We leave the type constraint that prevents an ordinary pronoun to get bound to a situation variable and vice versa implicit in the expression $\mathbf{pro}_i$.

Demonstrative pronouns and other indexicals are interpreted in a similar fashion with the exception that they can only be specified as indexical pointers to discourse referents; operator binding is not available to demonstratives. We distinguish indexicals from pronouns by designating them as $\mathbf{idx}_i$ and $(\mathbf{idx}_i \alpha)$.

The syntactic type of ordinary pronominal and demonstrative expressions is $NP^{\uparrow}_{agr}$ in both their specified and unspecified form.

Tense and Finiteness. Now we have the category for proper nouns and verbs. All we need to be able to derive simple finite clauses is to decide on the contribution of the finite inflection. We will adopt here a largely simplified view of tense, and will completely ignore aspect.[19]

Reichenbach (1947) observes that the semantics of tense makes reference to the following temporal categories: **point of speech** (S), **point of the event** (E), and **point of reference** (R). Thomason (1974:67) independently characterizes R and S, respectively as "the time *about which* one is talking [and] the time *at which* one is talking". The importance of this trichotomy is that the semantics of a particular tense can be construed as stating certain relations among

[19] See Moens and Steedman (1988) and Steedman (1997) for treatments of tense and aspect that are potentially implementable under present assumptions.

these primitives:[20] Simple present: S=R=E; Simple past: R=E<S; Past perfect: E<R<S and so on.

Let us immediately turn to how the above relations are associated with surface forms. The particular relations stated to be holding among E, R and S is encoded in the semantic interpretation of the corresponding tense marker. The event point E is the unbound situation variable of a non-finite verbal category. E corresponds to the situation in which the event/action/state depicted by the verb holds or occurs. The category of the tense marker relates this situation argument to R and S, as will be illustrated shortly. The speech point S gets instantiated to the particular situation in which the utterance is made. There remains how the reference point R is specified. R has usually been taken to be discourse anaphoric.[21] Moens and Steedman (1988) observe that this anaphoric process needs to be different from pronoun resolution, however. In distinction to pronoun resolution, when a contextually provided temporal antecedent binds an anaphoric R variable, it may no longer be available for binding further variables. We will not be concerned with modelling this dynamic nature of temporal antecedents, which Moens and Steedman (1988) call **temporal focus**. We will simply assume a function designated as '$\mathbf{tf}$' that retrieves the temporal focus of the discourse model at the time of evaluation. On the basis of these assumptions, we model tense related inflection morphemes in the form of the function categories in (146) and (147).[22]

(146) Inf (Sg., Pres.) $:=$ $S_{[+\mathrm{f}]}\$\backslash S_{[-\mathrm{f}]}\$$: $\lambda p \lambda \ldots \lambda s.p \ldots (\mathbf{tf}\, s) \wedge \mathbf{tf}\, s = s$

(147) Inf (Sg., Past.) $:=$ $S_{[+\mathrm{f}]}\$\backslash S_{[-\mathrm{f}]}\$$: $\lambda p \lambda \ldots \lambda s.p \ldots (\mathbf{tf}\, s) \wedge \mathbf{tf}\, s < s$

The relation symbol '$<$' designates a precedence relation between situations on the same time line, akin to McCarthy and Hayes's (1969) 'cohistorical' relation.

Here is how a simple past sentence like *John arrived* is derived:

[20] See Moens and Steedman (1988) for a very lucid discussion.

[21] See Partee 1973; Webber 1988 for the "tense as pronoun" view. See Moens and Steedman 1988:22 for additional references.

[22] The dollar sign is a convention for representing sets of lexical categories that share a common range. For instance $S\backslash\$$ stands for the set $\{S, S\backslash NP, S\backslash NP/NP\}$, namely the set of categories in the English lexicon that ultimately result in S.

(148)

John	arrive	-ed (Sg., Past.)
$S_{[+\mathrm{f}]}\backslash NP_{[3\mathrm{sg}]}$: $\lambda p.pj'$	$S_{[-\mathrm{f}]}\backslash NP$: $\lambda x\lambda s.arrive'_s\, x$	$S_{[+\mathrm{f}]}\backslash NP_{[3\mathrm{sg}]}\backslash(S_{[-\mathrm{f}]}\backslash NP)$ $\lambda p\lambda x\lambda s.px(\mathbf{tf}\, s) \wedge \mathbf{tf}\, s < s$
	$S_{[+\mathrm{f}]}\backslash NP_{[3\mathrm{sg}]}$: $\lambda x\lambda s.arrive'_{(\mathbf{tf}\, s)}\, x \wedge \mathbf{tf}\, s < s$	$<$
$S : \lambda s.arrive'_{(\mathbf{tf}\, s)} j' \wedge \mathbf{tf}\, s < s$		$>$

The outcome of (148) is not yet in the form of a truth-conditionally evaluable representation. This is so because the situation variable s (standing for the speech situation, or S) is not saturated yet; and, relatedly, the value of the functional term $\mathbf{tf}\, s$ is not specified. Actual utterances of (148) must involve some mechanism that binds the situation λ-term to the speech situation. For this purpose we will assign "the falling statement contour", which we will designate with '.', to the following category:

(149) . := $S_{[+\mathrm{f}]}\backslash S_{[+\mathrm{f}]}$: $\lambda f.f\,\mathbf{now}$

where the logical constant '**now**' stands for an indexical like the first person pronoun; it evaluates to the situation the declarative contour is used in. Therefore, what (149) does in effect is to type raise the speech situation over functions from situations to truth values.[23]

Applying the assertion function (149) to the result of (148) gives:

(150) *John arrived.* := S : $arrive'_{(\mathbf{tf}(\mathbf{now}))} j' \wedge \mathbf{tf}(\mathbf{now}) < \mathbf{now}$

(150) gives the sense-semantic interpretation of *John arrived.* To illustrate how this interpretation is *integrated* to a discourse model in an actual use of *John arrived*, consider the following exchange:

(151) a. What did happen after I left?

[23]The idea of silent assertion operators are not uncommon in the literature. Kripke (1977:p. 276,p. 276 note 35) attributes to John Robert Ross the suggestion that every sentence starts with a silent "I say that…" operator. Hintikka (1986:p. 333) suggests a "I know that…" operator in assertive sentences. A similar proposal for an assertion operator is made in Krifka 1992. However it is more in line with the present assumptions to associate such an operator with a linguistically realized category, like a certain type of intonational contour. It should also be noted that the syntax and semantics of such contours are not as simple as (149) may suggest. See Steedman 2000a and Özge and Bozsahin 2010 for combinatory theoretic treatments of intonation, respectively in English and Turkish.

b. John arrived.

Assume that (151b) is uttered in a particular situation 's_0''. This will specify the indexical '$\mathbf{now}$' in the interpretation of (151b) as '$\mathbf{idx}_{s_0'}$'. The temporal focus in the situation 's_0'' is set by the preceding question (151a) to that state of the world that resulted upon the departure of the speaker of (151a). Our semantics designates this temporal focus by '$\mathbf{tf}\, s_0'$'. This gives us (152), which is a truth-conditionally satisfactory interpretation of a token of the expression *John arrived* uttered in a particular situation 's_0''.[24]

(152) $arrive'_{(\mathbf{tf}\, s_0')} j' \wedge \mathbf{tf}\, s_0' < s_0'$

The aim of the above discussion on tense and finiteness was to illustrate how grammatical composition gets in contact with the components of the utterance context. We will omit in most of our examples tense information. It will be assumed that certain situation constants that we will use in the examples are obtained through a mechanism like the one sketched above.

Common Nouns. We will treat common nouns as functions from individuals to propositional fluents. A typical common noun category looks like this ('n' for nominal):

(153) CN $:=$ $S_{[\mathrm{n},-\mathrm{f}]} \backslash NP$: $\lambda x \lambda s.cn'_s x$

Predicate Nominals. In our analysis of predicate nominals like *a table*, we take the indefinite article *a* to be semantically an identity function that marks its result with a feature, say [i], that is required by the finite inflection. This marking is required to capture **John is man*. Specifically:

(154) *a* $:=$ $S_{[\mathrm{n},-\mathrm{f},\mathrm{i}]} \backslash NP / (S_{[\mathrm{n},-\mathrm{f}]} \backslash NP)$: $\lambda p.p$

Now assume that the predicative *was* gets the category in (155).

[24] Some notes on '$\mathbf{tf}$' are in order. The above analysis has it that '$\mathbf{tf}$' applies to a situation and returns the temporal focus—which itself is a situation—in that situation. However a situation is a particular state of the world, which may contain numerous discourses and thereby numerous temporal foci. We leave it implicit in the definition of '$\mathbf{tf}$' that it is relativized to the particular conversational parties under discussion. Similar functions will all be assumed to be relativized in similar ways. This will obviate the need to represent the utterance context separately from the representation of how the world is.

(155) *was* := $(S_{[\mathrm{n},+\mathrm{f},\mathrm{i}]}\backslash NP)/(S_{[\mathrm{n},-\mathrm{f},\mathrm{i}]}\backslash NP)$: $\lambda p\lambda x\lambda s.p\,x\,(\mathbf{tf}\,s)\wedge \mathbf{tf}\,s < s$

Our lexical assumptions afford the following derivation of a nominal predication.

(156)

John	was	a	spy
$S/(S\backslash NP)$: $\lambda f.f\,j'$	$(S_{[\mathrm{n},+\mathrm{f}]}\backslash NP)/(S_{[\mathrm{n},-\mathrm{f},\mathrm{i}]}\backslash NP)$: $\lambda p\lambda x\lambda s.p\,x\,(\mathbf{tf}\,s)\wedge \mathbf{tf}\,s < s$	$(S_{[\mathrm{n},-\mathrm{f},\mathrm{i}]}\backslash NP)/N$: $\lambda p.p$	$S_{[\mathrm{n},-\mathrm{f}]}\backslash NP$: $\lambda x\lambda s.spy'_s\,x$
		$S_{[\mathrm{n},-\mathrm{f},\mathrm{i}]}\backslash NP : \lambda x\lambda s.spy'_s\,x$ (>)	
	$S_{[\mathrm{n},+\mathrm{f}]}\backslash NP : \lambda x\lambda s.spy'_{(\mathbf{tf}\,s)}\,x\wedge \mathbf{tf}\,s < s$ (>)		
$S_{[\mathrm{n},+\mathrm{f}]}$: $\lambda s.spy'_{(\mathbf{tf}\,s)}\,j'\wedge \mathbf{tf}\,s < s$ (>)			

Universal Quantification. We assume a generalized quantifier interpretation for the universal quantifier, which surfaces as the words *every*, and *each* in English.[25] The standard interpretation of a universal generalized quantifier is the following.

(157) $\lambda p\lambda q.\forall x.p\,x \rightarrow q\,x$

However (157) is not usable under present assumptions. Both the restrictor and the nuclear scope arguments of (157) are functions from individuals to truth values (so that we get truth values as the arguments of the truth functional implication '$\rightarrow$'). Therefore our category for nouns given in (153) and the category our grammar assigns to verb phrases are not the correct type to be arguments of *every*.

We revise the category of *every* as follows:

(158) *every* := $(S/(S\backslash NP))/N$: $\lambda p\lambda q\lambda s.\forall x.p\,x\,s \rightarrow q\,x\,s$

This category identifies the situation variables of the restrictor predicate and the nuclear (main) predicate. This is too strong a formulation in the face of empirical facts, however. To see why, take the following example from Cooper 1996:ex. 22:[26]

(159) Everything is on the table.

[25] We ignore any fine grained distinctions between *every* and *each*, noted for instance in Fodor and Sag 1982:365, Cooper 1996:§5.1.

[26] Cooper (1996) discusses this example in the situation theory of Barwise and Perry 1981, which is a different enterprise than the Situation Calculus adopted here.

Cooper observes that the quantification domain of *everything* cannot be the same with that of the domain of the described situation. Otherwise (159) should mean that the referent of *the table*—which is a thing—is on itself.

A similar argument can be made over tense (see e.g. Bach 1968; Enç 1986). Consider the following sentence.

(160) Every representative is a director (now).

This sentence has a reading where those persons who are asserted to be directors in the speech situation are no longer representatives. This means that representativehood has to be evaluated in a situation that is different from that in which directorhood is evaluated. Therefore the situation argument of the restrictor of the universal quantifier must be allowed to get bound by a situation different from that of the main predication. To do justice to this requirement we will assume that the situation argument of the restrictor of a universal may on occasion be left as a free variable (of the form $\mathbf{pro}$) to get bound by a contextual situation index. We give an example derivation for the category in (158):

Under these assumptions, the main predicate bound and discourse bound derivation of (160) are as follows, respectively :

(161)

$$\dfrac{\dfrac{\dfrac{\text{Every}}{\underset{:\lambda p\lambda q\lambda s\forall x.p\,x\,s\rightarrow q\,x\,s}{(S/(NP\backslash S))/N}}\quad\dfrac{\text{representative}}{\underset{:\lambda x\lambda s.repres'_s\,x}{N}}}{\underset{:\lambda q\lambda s\forall x.repres'_s\,x\rightarrow q\,x\,s}{S/(S\backslash NP)}>}\quad\dfrac{\text{is a director}}{\underset{:\lambda z\lambda s.direc'_{(\mathbf{tf}\,s)}\,z\wedge\,\mathbf{tf}\,s=s}{S\backslash NP}}}{S:\lambda s\forall x.repres'_s\,x\rightarrow direc'_{(\mathbf{tf}\,s)}\,x\wedge\mathbf{tf}\,s=s}>$$

(162)

$$\dfrac{\dfrac{\dfrac{\dfrac{\text{Every}}{\underset{:\lambda p\lambda q\lambda s\forall x.p\,x\,\mathbf{pro}\rightarrow q\,x\,s}{(S/(NP\backslash S))/N}}\quad\dfrac{\text{representative}}{\underset{:\lambda x\lambda s.repres'_s\,x}{N}}}{\underset{:\lambda q\lambda s\forall x.repres'_{\mathbf{pro}}\,x\rightarrow q\,x\,s}{S/(S\backslash NP)}>}\quad\dfrac{\text{is a director}}{\underset{:\lambda z\lambda s.direc'_{(\mathbf{tf}\,s)}\,z\wedge\,\mathbf{tf}\,s=s}{S\backslash NP}}}{S:\lambda s\forall x.repres'_{\mathbf{pro}}\,x\rightarrow direc'_{(\mathbf{tf}\,s)}\,x\wedge\mathbf{tf}\,s=s}>}{S:\lambda s\forall x.repres'_{(pro'\,s'_{63})}\,x\rightarrow direc'_{(\mathbf{tf}\,s)}\,x\wedge\mathbf{tf}\,s=s}\,pro$$

In (162), the last step indexed as *pro* indicates the pronoun resolution step where the free situation variable of the restrictor $repres'$ is specified to refer to the contextually available situation constant s'_{63}.

Intensional Operators. As a representative of an intensional operator introducing expression, we give the lexical category of the propositional attitude verb *know* as follows, where K is the Moore's (1985) knowledge relation discussed above in §4.2.2:

(163) *know* := $(S\backslash NP)/S'$: $\lambda p\lambda x\lambda s_1\forall s_2.K(x, s_2, s_1) \rightarrow p\, s_2$

We give the following category to the factive complementizer *that*.

(164) *that* := $S'_{[+\mathrm{f}]}/S_{[+\mathrm{f}]}$: $\lambda t.t$

These assumptions afford the following derivation of *Harry knows that John was a spy*.

(165)

Harry	know	-s	that	John was a spy
$S/(S\backslash NP)$: $\lambda f.f\, h'$	IV/S' : $\lambda p\lambda x\lambda s_1\forall s_2.$ $K(x, s_2, s_1)$ $\rightarrow p\, s_2$	$(IV/S')\backslash(IV/S')$: $\lambda p\lambda q\lambda x\lambda s_3.$ $p\, q\, x(\mathbf{tf}\, s_3) \wedge$ $\mathbf{tf}\, s_3 = s_3$	S'/S : $\lambda p.p$	$S_{[\mathrm{n},+\mathrm{f}]}$: $\lambda s_4.spy'_{(\mathbf{tf}\, s_4)}j' \wedge$ $\mathbf{tf}\, s_4 < s_4$
		IV/S' : $\lambda q\lambda x\lambda s_3.(\forall s_2.K(x, s_2, (\mathbf{tf}\, s_3)) \rightarrow q\, s_2) \wedge$ $\mathbf{tf}(s_3) = s_3$ (<)		$S'_{[\mathrm{n},+\mathrm{f}]}$: $\lambda s_4.spy'_{(\mathbf{tf}\, s_4)}j' \wedge \mathbf{tf}\, s_4 < s_4$ (>)
		$S\backslash NP$: $\lambda x\lambda s_3.(\forall s_2.K(x, s_2, (\mathbf{tf}\, s_3)) \rightarrow spy'_{(\mathbf{tf}\, s_2)}j' \wedge \mathbf{tf}\, s_2 < s_2)\ \wedge\ \mathbf{tf}(s_3) = s_3$ (>)		
S: $\lambda s_3.(\forall s_2.K(h', s_2, (\mathbf{tf}\, s_3)) \rightarrow spy'_{(\mathbf{tf}\, s_2)}j' \wedge \mathbf{tf}\, s_2 < s_2)\ \wedge\ \mathbf{tf}(s_3) = s_3$ (>)				

When this sentence is uttered in a situation 's'_0', it will assert that in all situations compatible with what Harry knows in 's'_0', it holds that John was a spy.

In this section we have seen how surface forms are associated with logical forms in CCG for some basic constructions. In the next section we will discuss the treatment of indefinites in a CCG setting.

4.3 Indefinites as Generalized Skolem Terms

This section introduces a semantic device named **generalized Skolem term** that is proposed by Steedman (2010)[27] as a means to capture the semantics of expressions like *a man*, *some saxophonist*, *three apples*, and the like, which are traditionally analyzed as existential generalized quantifiers. The reason why we are interested in generalized Skolem terms is that

[27] Steedman's (2010) work is centrally concerned with the natural semantics of scope. The issue was first dealt with in CCG terms in Park 1996.

the thesis proposes to treat Acc-marked indefinites as generalized Skolem terms, as will be detailed in Chapter 5.

This section deals with the semantic aspects of Steedman's (2010) proposal, the syntactic issues concerning generalized Skolem terms, namely how they are realized in the surface forms of utterances, was treated in §4.2.3.

The present use of generalized Skolem terms involves certain modifications to Steedman's (2010) system both in the semantic and syntactic aspects. These modifications will be introduced along the way.

Steedman's (2010) proposal is based on the idea of Skolem functions, hence we start this section with a brief note on Skolem functions. Skolemization is the process by which the existential quantifiers in a logical formula are eliminated. A formula of first order predicate logic is in *prenex normal form* if it is composed of a sequence of quantifiers and a quantifier-free part, as schematized in (166).

(166) $Q_1 x_1 \ldots Q_n x_n . \phi$

An existential quantifier in a formula in prenex normal form can be eliminated by deleting it and replacing every occurrence of its variable by a function parametrized to all the universally quantified variables that the deleted existential falls within the scope of. More formally, if the quantifier sequence in (166) contains an existential quantifier Q_i, it can be eliminated by deleting it and replacing every occurrence of x_i in ϕ by $f(\tilde{x})$, where f is a function symbol not occurring in the original formula, and $(\tilde{x})$ is a tuple of variables x_k distinct from one another, such that $k < i$ and Q_k is a universal quantifier. The case where there is no universal quantifier Q_k with $k < i$ results in a Skolem function f with no variables, which is a constant.[28]

In a framework that treats indefinites as GQs and employs a QR like mechanism that allows relative scoping of GQs, the so called quantifier scope ambiguity in (167a) can be

[28] The formula obtained by Skolemization is contradictory (unsatisfiable) if and only if the original formula is contradictory. This is a useful property utilized in refutation based theorem proving systems.

represented as (167b) and (167c).[29]

(167) a. Every man loves some woman.

b. $\forall x.man'x \rightarrow \exists y.woman'y \wedge loves'yx$

c. $\exists y.woman'y \wedge \forall x.person'x \rightarrow loves'yx$

In (167b/c) the indefinite *some woman* gets the generalized quantifier interpretation in (168).

(168) $\lambda q \exists x.woman'x \wedge qx$

Applying Skolemization to formulas (167b/c) gives the following.

(169) a. $\forall x.man'x \rightarrow woman'(sk_{41}x) \wedge loves'(sk_{41}x)x$

b. $\forall x.man'x \rightarrow woman'sk_{17} \wedge loves'sk_{17}x$

where names of Skolem functions are drawn from $\{sk_1, sk_2, \ldots\}$. (169a), which is the correlate of the narrow scope indefinite reading, says that every man loves the woman individual that the Skolem function sk_{41} maps him to. On the other hand (169b), the wide scope indefinite reading, says that every man loves the woman individual denoted by the Skolem constant

[29] In logical forms, '$\wedge$' and '$\vee$' binds more tightly than '$\rightarrow$'. We indicate the scope of '$\neg$' explicitly by parentheses. We use the dot '.' convention in eliminating parentheses in logical forms. The dot '.' takes scope to its right, delimited by the matching parenthesis of the last unmatched parenthesis opened before it, if there is any. The dots between leftmost operators are suppressed. For stacked implications, we eliminate parenthesis under a left-associative convention. The following equivalences illustrate the notational conventions.

(i) a. $(P \wedge Q) \rightarrow R \equiv_\alpha P \wedge Q \rightarrow R$

b. $(P \rightarrow (Q \rightarrow R)) \rightarrow ((P \rightarrow Q) \rightarrow (P \rightarrow R)) \equiv_\alpha$
$(P \rightarrow .Q \rightarrow R) \rightarrow .P \rightarrow Q \rightarrow .P \rightarrow R$

c. $P \wedge \forall x((R \rightarrow Q) \rightarrow S) \equiv_\alpha P \wedge \forall x.R \rightarrow Q \rightarrow S$

d. $(P \wedge \forall x(R \rightarrow Q)) \rightarrow S \equiv_\alpha (P \wedge \forall x.R \rightarrow Q) \rightarrow S$

e. $P \rightarrow Q \rightarrow R \equiv_\alpha (P \rightarrow Q) \rightarrow R$

sk_{17}.[30]

Steedman's (2010) generalized Skolem terms diverge from standard Skolemization in certain respects. For one, generalized Skolem terms (GSTs) are structured representations that augment ordinary Skolem functions with restrictor predicates (and in Steedman's (2010) system, also with cardinality restrictions, which we gloss over at the moment). A GST is a structured object of the form $sk^{\mathcal{A}}_{i:p}$, where p is the (possibly complex) restrictor predicate, i is the index that is unique to the NP that is interpreted as a generalized Skolem term, and $\mathcal{A}$ is the possibly empty set of arguments of the Skolem function that the GST designates. In this notation logical forms in (169) become:

(170) a. $\forall x.man'x \rightarrow loves'sk^{(x)}_{41:woman'}x$

b. $\forall x.man'x \rightarrow loves'sk_{17:woman'}x$

A more important divergence between generalized Skolem terms and standard Skolemization is that in the former indefinite NPs are directly interpreted as generalized Skolem terms, rather than having a Skolemization process running over classical existentially quantified formulas. This brings us to the issue of how to capture the difference between a bound Skolem term (170a) and an independent Skolem term (170b) reading, in the absence of a mechanism that gives relative scopings to quantifiers. To illustrate how the arguments of generalized Skolem terms are specified, it will be convenient to look at how surface forms are mapped to logical forms involving GSTs.

We start by category assignments. Steedman (2010) assumes the entry in (171a) for the indefinite article, which yields (171b) when supplied with an N.[31]

[30]From an intuitive standpoint, capturing the wide scope existential reading in (167c) by (169c) may appear to be in error. We are often inclined to interpret conditional statements as encoding—usually through implicit "inductive relations and causal connections"—a relation between the antecedent and the consequent (Stalnaker 1968). In (169c), in opposition to this intuitive expectation, whether the individual $sk_{17}$is a woman or not is independent of someone's being a man or not. Therefore, having the predication $woman'sk_{17}$ within the consequent of the conditional may appear somewhat bizarre. From a logical point of view on the other hand, there is nothing to get perplexed once it is taken for granted that '$\rightarrow$' stands for the "material implication"—the truth function which gives 0 when its antecedent is 1 and consequent is 0, and gives 1 otherwise. The variant of Skolemization due to Steedman (2010) that will be given shortly below is more congenial to our intuitions.

[31]The notation $NP^{\uparrow}$ is a schematization for type raising. $NP^{\uparrow}$ can stand for $S/(S\backslash NP)$, $S\backslash(S/NP)$, $(S\backslash NP)/(S\backslash NP/NP)$, and so on.

(171) a. *a(n)* := $NP^{\uparrow}_{[3sg]}/N_{[3sg]}$: $\lambda p \lambda q.q(skolem'_i p)$

b. *a donkey* := $NP^{\uparrow}_{[3sg]}$: $\lambda q.q(skolem'_i donkey')$

The lexical assignment (171a) only indicates that the expression formed by applying it to an N is to be interpreted as a Skolem term, but it does not yet actuate the Skolemization itself. Expressions like $skolem' donkey'$ are named as *unspecified Skolem terms*. The process of Skolemization specification requires the information of which universally quantified variables and/or intensional operators the to be Skolemized term falls within the scope of. This is called the *environment* of an unspecified Skolem term and defined as follows (Steedman 2010:103):

(172) *The environment* $\mathcal{E}$ of an unspecified skolem term $\mathcal{T}$ is a tuple comprising all variables bound by a universal quantifier or other operator in whose structural scope $\mathcal{T}$ has been brought *at the time of specification, by the derivation so far*.

We assume that *environment* information is carried with every unspecified Skolem term in a bottom up fashion through the derivation and refer the reader to Steedman 2010 for the exact details.

Now we come to another important point of divergence from ordinary Skolemization. The specification of a generalized Skolem term is assume in Steedman 2010 to be an operation that can take place anytime during a derivation, and turns an unspecified Skolem term of the form $skolem'_i p$ to a generalized Skolem term $sk^{\mathcal{A}}_{i:p}$, where the arguments $\mathcal{A}$ is a tuple comprising of *all* the variables that are in the *environment* of the Skolem term at the point when the specification occurs.

To illustrate, consider how the logical forms in (173) are derived in (174).

(173) a. Every man loves a woman.

b. $\forall x.man'x \rightarrow loves' sk^{(x)}_{41:woman'} x$

c. $\forall x.man'x \rightarrow loves' sk_{17:woman'} x$

(174) a.

$$\dfrac{\dfrac{\text{Every man}}{\underset{:\lambda p.\forall x.man'x \rightarrow px}{S/(S\backslash NP)}} \quad \dfrac{\text{loves}}{\underset{:\lambda z\lambda y.loves'zy}{(S\backslash NP)/NP}} \quad \dfrac{\text{a woman}}{\underset{:\lambda q.q(skolem'_{41}\,woman')}{S\backslash(S/NP)}}}{\dfrac{\underset{:\lambda z.\forall x.man'x \rightarrow loves'zx}{S/NP}}{\underset{:\forall x.man'x \rightarrow loves'(skolem'_{41}\,woman')x}{S}}}$$

$$\vdots$$

$$S : \forall x.man'x \rightarrow loves'sk^{(x)}_{41:woman'}x$$

b.

$$\dfrac{\dfrac{\text{Every man}}{\underset{:\lambda p.\forall x.man'x \rightarrow px}{S/(S\backslash NP)}} \quad \dfrac{\text{loves}}{\underset{:\lambda z\lambda y.loves'zy}{(S\backslash NP)/NP}} \quad \dfrac{\text{a woman}}{\underset{:\lambda q.q(skolem'_{17}woman')}{S\backslash(S/NP)}}}{\dfrac{\underset{:\lambda z.\forall x.man'x \rightarrow loves'zx}{S/NP} \quad \underset{\lambda q.q(sk_{17:woman'})}{\vdots}}{S : \forall x.man'x \rightarrow loves'sk_{17:woman'}x}}$$

This is basically how the system works. In the succeeding sections we will look at what generalized Skolem terms have to offer concerning some issues related to indefinites which are central to the thesis.

4.3.1 GSTs and "Functional Readings"

Steedman (2010:Ch. 5) gives a model theory for the semantic representation language augmented with GSTs—the language in which logical forms like those derived above in (174) are expressed. We will give the model theory with some modifications in §4.3.3. In this section we will have an informal look at the semantic aspects of generalized Skolem terms in order to be able to compare them with some similar accounts based on the general idea of Skolemization and functional dependence. In particular, we will illustrate over a simple example familiar from above, repeated here as (175), how logical forms involving generalized Skolem terms are model-theoretically evaluated.[32]

(175) a. Every man loves some woman.

b. $\forall x.man'x \rightarrow loves'sk^{(x)}_{41:woman'}x$

c. $\forall x.man'x \rightarrow loves'sk_{17:woman'}x$

[32]We slightly diverge from Steedman's (2010) formulation at some points. See §4.3.3 for details.

First take (175c), the so called wide scope indefinite reading. The evaluation procedure starts with an arbitrary initial assignment function that maps each variable to an individual in the domain. Skolem terms are not covered by this assignment function. In its first step the procedure checks the logical form under evaluation for any Skolem terms *which do not have any bound variables among its arguments*. The evaluation procedure is interested in such Skolem terms, because if there are any, the evaluation procedure will extend the variable assignment function to cover those Skolem terms—i.e. it will add to the assignment function mappings from those Skolem terms to individuals. In (175c) there is $sk_{17:woman'}$ fulfilling the condition of having no bound variables among its arguments—the Skolem term has no arguments anyway. Let us assume that the evaluation procedure, having found a Skolem term that matches its criterion, extends its assignment function by assigning the individual ***mary*** to the Skolem term $sk_{17:woman'}$.[33] Crucially, when extending the current assignment function to cover a Skolem term, the evaluation procedure also makes sure that the individual assigned to the Skolem term satisfies the restrictor predicate of the Skolem term. In the present case this amounts to making sure that ***mary*** is in the extension of the predicate $woman'$. From here on the evaluation procedure proceeds with the standard course of evaluation of universally quantified formulas, which consists in trying one-by-one the individuals in the domain as values for x and checking whether the conditional holds for each and every such individual. If the procedure fails to satisfy the universally quantified conditional with the initial choice of ***mary*** as the value of the Skolem term $sk_{95:person'}$—i.e. it finds an individual for x such that the conditional is not satisfied, then it backtracks and tries another woman individual as the value of the Skolem term. The procedure is repeated either until an individual is assigned to the Skolem term such that the universally quantified conditional is satisfied, or the procedure runs out of person individuals in the domain, thereby failing to satisfy the formula. In other words, the logical form (175c) comes out true if and only if *there is a woman individual* i in the domain such that when assigned to $sk_{17:woman'}$ the universally quantified conditional is satisfied.

Let us now observe the model-theoretic evaluation of (175b), repeated as (176) for ease of reference.

[33] Some notational conventions: We use *Mary* for the linguistic expression, $mary'$, m' etc. for non-logical constants of logical forms, and ***mary***, $\mathbf{m}$ etc. for model-theoretic objects.

(176) $\forall x.man'x \rightarrow loves'sk^{(x)}_{41:woman'}x$

Again the evaluation procedure starts with an initial variable assignment. Then it inspects the formula for Skolem terms which do not have any bound variables among its arguments. There is no such Skolem term in the present case. The only Skolem term we have, namely $sk^{(x)}_{41:woman'}$, has x as its only argument, and x is bound by a universal quantifier in (176). Therefore the assignment function is left untouched. In the next step, the evaluation procedure starts evaluating the universally quantified formula by assigning one-by-one individuals to x. Let us trace the first pass assuming that the first individual assigned to x is *harry*. Now the task of the procedure is to evaluate the following formula with an assignment function that maps x to *harry*:

(177) $man'x \rightarrow loves'sk^{(x)}_{41:woman'}x$

Now the evaluation procedure inspects this formula for any Skolem terms that do not contain any bound variables among their arguments. Now there is such a Skolem term, namely $sk^{(x)}_{41:woman'}$, whose only argument x is free in (177). Then the evaluation procedure extends the variable assignment by assigning a woman individual to the Skolem term $sk^{(x)}_{41:woman'}$, say *lucie*. Now the evaluation procedure tries to satisfy (177), where x has the value *harry* and $sk^{(x)}_{41:woman'}$ has the value *lucie*. Now assume that the formula fails with these variable assignments—*harry* is a man who does not love *lucie*. In that case, the procedure backtracks to its choice for *lucie* as the extension of $sk^{(x)}_{41:woman'}$, and assigns the Skolem term another person individual, and *keeping its choice of harry as the value of* x, tries again with the new value for the Skolem term. The procedure revises its choice of *harry* as the value of x, only if it finds a person individual that satisfies the formula when assigned to the Skolem term, in order to try other individuals in the domain as values for x. The choice for what value to assign to x is in an "outer" loop than the choice for what value to assign to the Skolem term, and in this respect the universal is said to take scope over the Skolem term. It is clear that the evaluation we have just sketched is just a detailed way of saying that (176) is satisfied in a model if and only if for every man individual *there exists* a woman individual that he loves.

As the above discussion shows, what generalized Skolem term mechanism does is to relegate existential quantification to model-theoretic evaluation, rather than having it explicitly in the logical form Reinhart 1997; Winter 1997 or making use of discourse bound free vari-

ables Kratzer 1998; Matthewson 1999.[34] In this respect we assume that generalized Skolem terms are not in themselves responsible for "functional readings" of indefinites, exemplified in cases like:[35]

(178) Every man loves some woman—namely his wife.

We follow Mitchell 1986; Partee 1989; Bende-Farkas and Kamp 2001; Schwarzschild 2002 and others in capturing such specific dependent readings by "implicit domain restriction". Specifically, we will assume that the restrictors of generalized Skolem terms can host implicit further restrictions in the form of conjunctions, and we will also assume that this conjoined implicit restrictors can host free variables that can get bound to any of the arguments of the GST. In this setting the indefinite in (178) is assumed to receive an interpretation like that in:

(179) $\forall x.man'x \rightarrow loves'sk^{(x)}_{41:\lambda z.woman'z \wedge C'z}x$

The actual content of the predicate C' is determined by the context. The most basic case is the one where C' realizes the standard implicit domain restriction present in almost every use of predicative expressions (see Enç 1986; Cooper 1996 among others). For instance the speaker of (179) may be holding it to be the common ground that the expression *woman* ranges over the female participants of the last night's party, rather than the entire set of women. (Of course similar arguments apply for the restrictor of the universal.) In this case C' becomes the predicate "λx[x is one of the people from the last night's party]".

A more complicated case is the one where C' involves a free variable. For instance assume that C' is $\lambda z.wife\text{-}of'\mathbf{pro}\,z$.[36] Now under the previous assumption (page 81) that free-variables can get bound either to the variables of LF-commanding operators, or contextually salient referents, we can arrive at a reading where the free variable **pro** in the restrictor is bound to the sole argument of the GST, namely x. Here is the logical form:

[34] In the present thesis we do not discuss but leave for future work the issue of how generalized Skolem term mechanism fairs with Chierchia's (2001) criticisms concerning choice function (Reinhart 1997; Winter 1997 and Skolemized choice function accounts (Kratzer 1998; Matthewson 1999). Chierchia's (2001) points concern the behaviour of indefinites in downward entailing contexts, which we do not cover in detail in the present thesis.

[35] We diverge here from Steedman (2010:37) who says "Skolem functors... can be thought of as free variables over contextually available functions and individuals, implicitly globally existentially closed-over, whose value the hearer does not necessarily know, as in the related account of Kratzer 1998."

[36] For the way we treat free variables and other pronominal expressions see the discussion on page 81.

(180) $\forall x.man'x \rightarrow loves'sk^{(x)}_{41:\lambda z.woman'z \wedge wife\text{-}of'(pro'\,x)\,z}x$

According to (181) the sentence *Every man loves some woman* is to be considered true in case for each man in the model one can find *at least* one individual who is a woman, who is in the wife-of relation to the man, and whom the man loves. It is crucial to note that even this does not entail that we have a "functional reading" of the indefinite. What is needed is the background assumption of a culture where men are married to at most one woman at any given time. After accommodating that assumption, we end up with a "functional reading" of the indefinite *some woman*.

The present treatment admits a variant of (181), where the free variable in the restrictor is bound to a salient contextual man, while the Skolem term is still bound by the universal. The logical form is this:

(181) $\forall x.man'x \rightarrow loves'sk^{(x)}_{41:\lambda z.woman'z \wedge wife\text{-}of'(pro'\,fred')\,z}x$

This interpretation of *Every man loves some woman*, which says that each man is in a loving relation with at least one of Fred's wifes, may appear to be far fetched in a monogamous cultural background, but we think it must not be ruled out semantically.

The same mechanism can be assumed to be responsible for global specific readings of the "the individual that the speaker has in mind" type. In such a case we have an interpretation like the following, where the generalized Skolem term is specified to be independent of any LF-commanding operators.

(182) $\forall x.man'x \rightarrow loves'sk_{41:\lambda z.woman'z \wedge C'z}x$

In this case C' can be contextually specified to be something like "λx[x is the individual that a friend of mine told me about]", which involves and indexical term pointing to the speaker.

To recapitulate, The moral of the above discussion is this. The present use of generalized Skolem terms as an account of the semantics of indefinite descriptions treats them as purely formal devices that control the assignment function extension throughout the model-theoretic evaluation. They are not directly responsible for semantic phenomena that involve functional dependencies between discourse referents. In this respect our use of the GST mechanism is most closely related to Farkas 1997; Brasoveanu and Farkas 2009, and although GSTs are

ultimately based on Skolemization, we take them not to be functional in the sense Skolemization is utilized in works like Kratzer 1998; Matthewson 1999.

This may of course be an inaccurate characterization of generalized Skolem term mechanism as it is constructed in Steedman 2010, given that these devices are utilized by Steedman (2010) for many other phenomena that we do not cover in the present thesis. Therefore the above characterization should be read as about a subpart of Steedman's (2010) system that we draw from for the purposes of the present thesis.

4.3.2 GSTs and "Intermediate Scope"

One important aspect of Steedman's (2010) generalized Skolem term account is the requirement that when an unspecified Skolem term is specified at a point in a derivation, it takes *all* the arguments LF-commanding it at that point as arguments. This requirement has sound predictions concerning the availability of scope alternatives for certain constructions.

One such case involves coordinate structures. Take the following example from Steedman 2010:

(183) Every boy admires and every girl detests, some saxophonist.

Geach (1970) observed over a slight variant of this example that it is impossible to receive a reading where the indefinite takes wide scope with respect to one universal while it takes narrow scope with respect to the other. The readings are limited to the following:

(184) a. There is one saxophonist who is admired by every boy and detested by every girl.

b. For each boy there is a saxophonist that he admires, and for each girl there is a saxophonist that she detests, where there may be as many saxophonists as the total number of boys and girls.

Let us now see how the example is treated in CCG. A crucial step in the derivation is deriving *Every boy admires and every girl detests* as a constituent expecting an NP to its right to become a sentence. We saw above how to derive constituents like *Every boy admires*, with the aid of type-raising and function composition. All we need is the following category for *and*.[37]

[37] For the semantics of **and** see Partee and Rooth 1983 and the derivation below.

(185) *and* $:= \quad X\backslash X/X \quad : \quad \lambda p\lambda q.\mathbf{and}qp$

Now the string *Every boy admires and every girl detests* can be derived as follows:

(186)

Every boy admires	and	every girl detests
S/NP	$(S/NP)\backslash(S/NP)/(S/NP)$	S/NP
$:\lambda x\forall y.boy'y \rightarrow admires'xy$	$:\lambda p\lambda q\lambda z.qz \wedge pz$	$:\lambda y\forall x.girl'x \rightarrow detests'yx$
	$(S/NP)\backslash(S/NP)$ (>)	
	$:\lambda q\lambda z.qz \wedge \forall x.girl'x \rightarrow detests'zx$	

$S/NP:\lambda z[\forall y.boy'y \rightarrow admires'zy] \wedge [\forall x.girl'x \rightarrow detests'zx]$ (<)

From here on there are basically two possibilities. Either we can specify the Skolem term associated with *some saxophonist* before it gets combined with the result of (186)—realizing the reading in (184a), or we can specify the Skolem term after it gets combined with the result of (186)—realizing the reading in (184b). These continuations are respectively depicted below.

(187)

Every boy admires and every girl detests	some saxophonist
S/NP	$S\backslash(S/NP)$
$:\lambda z[\forall y.boy'y \rightarrow adm'zy] \wedge [\forall x.girl'x \rightarrow det'zx]$	$:\lambda q.q(skolem'_{32}sax')$
	$\lambda q.qsk_{32:sax'}$

$S:[\forall y.boy'y \rightarrow adm'sk_{32:sax'}y] \wedge [\forall x.girl'x \rightarrow det'sk_{32:sax'}x]$ (<)

(188)

Every boy admires and every girl detests	some saxophonist
S/NP	$S\backslash(S/NP)$
$:\lambda z[\forall y.boy'y \rightarrow adm'zy] \wedge [\forall x.girl'x \rightarrow det'zx]$	$:\lambda q.q(skolem'_{32}sax')$

$S:[\forall y.boy'y \rightarrow adm'(skolem'_{32}sax')y] \wedge [\forall x.girl'x \rightarrow det'(skolem'_{32}sax')x]$ (<)

$S:[\forall y.boy'y \rightarrow adm'sk^{(y)}_{32:sax'}y] \wedge [\forall x.girl'x \rightarrow det'sk^{(x)}_{32:sax'}x]$

According to Steedman (2010), the reason why we do not get "mixed scope" readings in (189) below, is that the Skolem term specification mechanism requires that at the final step of derivation (188), the unspecified Skolem terms in both conjuncts must be specified as bound to all the operators LF-commanding them just before the specification step—$\forall y$ for the first and $\forall x$ for the second conjunct.

(189) a. $[\forall y.boy'y \rightarrow adm'sk^{(y)}_{32:sax'}y] \wedge [\forall x.girl'x \rightarrow det'sk_{32:sax'}x]$

b. $[\forall y.boy'y \rightarrow adm'sk_{\exists 2:sax'}y] \wedge [\forall x.girl'x \rightarrow det'sk^{(x)}_{\exists 2:sax'}x]$

Likewise this constraint on Skolem term specification predicts the unavailability of an intermediate reading, where books vary with women rather than men, for the following sentence:[38]

(190) Every man who read some book loved every woman. (Steedman 2010:ex. 20, Ch. 8)

The crucial observation is that CCG's syntactic combinatorics do not allow to combine the indefinite (or its host relative clause) with the universal object *every woman* before combining with the universal subject *every man*. What this brings is that there is no point in a derivation of this sentence in which the indefinite is under the LF-command of *only every woman*. Therefore it is not possible to obtain an intermediate reading where each woman is has a particular book such that every man who read that book loves her.

On the other hand the same mechanism that makes the above predictions also predicts the unavailability of "intermediate" readings where people seem to get such readings. Consider for instance a typical example of intermediate scope (adapted from Kratzer 1998):

(191) Every professor$_i$ rewarded every student who read some paper (he$_i$ had recommended).

Once again, the crucial observation is that there is no way for *some paper* entering within the scope of *every professor* without entering within the scope of *every student*, making it impossible to get an intermediate reading, according to which for each professor there is a certain problem such that s/he rewarded every student who read that paper.

Steedman (2010:§8.4) explains this discrepancy between the predictions of his account and speaker judgments as follows. According to Steedman (2010) the occasions where speakers get intermediate readings from examples like (191) are those in which they interpret *every student* not as a universal quantifier but as a collective individual (like *all students*). Under the assumption that a collective individual does not incorporate a universal operator, the only

[38] Chierchia (2001) discusses a similar example, namely,

i Every professor competent on some problem examined every student. (Chierchia 2001:ex. 49)

where the unavailability of an intermediate reading is explained as a "weak cross-over" violation.

universal operator left to bind the indefinite is *every professor*, resulting in an intermediate reading.

We have two points concerning Steedman's (2010) account of intermediate readings. First, we would like to suggest a way to test it. If it is the interference of a collective interpretation for the medial universal which makes an intermediate reading available, then speakers who get intermediate readings should stop getting that readings when the collective reading is ruled out. If our reasoning is correct, Steedman's (2010) account predicts that it should be harder to get an intermediate reading from the sentence below, as compared to (191) above, given that the bound variable pronoun in *his/her term project* requires an operator reading for *every student*.

(192) Every professor$_i$ rewarded every student$_j$ who did his/her$_j$ term project on some paper (he$_i$ had recommended).

It needs to be seen how native speakers would judge sentences like (192). For the moment we suggest it as a possible test for Steedman's (2010) account of intermediate readings.

Our second point concerning Steedman's (2010) account of intermediate readings is based on the observation that intermediate readings are not observed only with respect to nominal quantification, but also arise in the context of intensional operators. Bach (1968:107) observes that (193) has four readings, serving grounds for the continuations in (194, *ibid.* exx. 111-4).

(193) The Smiths claim Walter said Mary wanted to marry a Swede. (Bach 1968 ex. 110)

(194) a. ... although they think he's Norwegian.

b. ... although he thinks he's Norwegian.

c. ... although she thinks he's Norwegian.

d. ... because they are so dependable.

Before going on, let us see how intensional operators can be put in interaction with indefinites like *a Swede*. As Steedman (2010) suggests, the obvious way to do this is to allow generalized Skolem terms to get bound by intensional operators as well as nominal ones.

One additional issue that needs to be clarified in an intensional setting is how to specify the situation indices of the restrictors of generalized Skolem terms. We will assume that the situation index of a GST restrictor is a free-variable that either gets bound to a contextually available situation constant, or to one of the arguments of the Skolem term, during Skolem term specification. This brings situation indices of the restrictors of GSTs, along with other possible free variables in the restrictors, under the general regime of pronominal expressions (see the discussions on page 81 and 96 above).

Let us see how an example involving an intensional verb, namely *John wants to marry a Norwegian*, can be captured in the present system. We assign *want* the following category:

(195) *want* $:= \quad (S\backslash NP)/(S_{[\mathrm{to}]}\backslash NP) \quad : \quad \lambda p\lambda x\lambda s_1\forall s_2.\, W(x, s_2, s_1) \rightarrow p\, x\, s_2$

where W stands for an irreflexive modal relation. $W(\alpha, \sigma_1, \sigma_2)$ holds if and only if situation σ_1 is in accordance with the unfulfilled desires agent α has in situation σ_2. The derivation is as follows:[39]

(196)

John	wants	to marry	a Norwegian
$NP^{\uparrow}$: $\lambda f.f\,j'$	$(S\backslash NP)/(S_{[\mathrm{to}]}\backslash NP)$: $\lambda p\lambda x\forall s_2.$ $W(x, s_2, s'_0)\rightarrow p\, x\, s_2$	$(S_{[\mathrm{to}]}\backslash NP)/NP$: $\lambda x\lambda y\lambda s_3.$ $marry'_{s_3}\, x\, y$	$NP^{\uparrow}$: $\lambda q.q(skolem'\, norw'_{\mathbf{pro}})$
		$S_{[\mathrm{to}]}\backslash NP$: $\lambda y\lambda s_3.marry'_{s_3}(skolem'\, norw'_{\mathbf{pro}})\, y$	<
	$S\backslash NP$: $\lambda x\forall s_2.\, W(x, s_2, s'_0) \rightarrow marry'_{s_2}(skolem'\, norw_{\mathbf{pro}})\, x$		>
S: $\forall s_2.\, W(j', s_2, s'_0) \rightarrow marry'_{s_2}(skolem'\, norw'_{\mathbf{pro}})\, j'$			<
S: $\forall s_2.\, W(j', s_2, s'_0) \rightarrow marry'_{s_2}\, sk^{(s_2)}_{norw'_{s_2}}\, j'$			*skl*

Derivation (196) realizes the reading where the indefinite takes narrow scope with respect to the intensional operator. Leaving the index of the restrictor of the generalized Skolem term (interpreting *a Norwegian*) as a free variable affords a very close alternative reading, whose derivation departs from (196) only in specifying the pronominal situation argument to a contextually available situation constant, rather than to the variable of the intensional operator. Here is the logical form:

[39] We omit the analysis of tense in the rest of the examples, substituting a situation constant like s'_0 for the reference time.

(197) $\forall s_2 . W(j', s_2, s'_0) \rightarrow marry'_{s_2}\, sk^{(s_2)}_{norw'_{s_2}}\, j'$

The difference between (196) and (197) is that in the latter John's intentions concern a set of Norwegian available in the current situation s'_0, which can be paraphrased as *John wants to marry one of the Norwegians*.

The so called wide scope reading for the indefinite *a Norwegian* can be derived by specifying the Skolem Norwegian "before" it is brought in the scope of the universal quantifier over situations as in (198).

(198)

John	wants	to marry	a Norwegian
$NP^{\uparrow}$: $\lambda f.f\,j'$	$(S\backslash NP)/(S_{[\text{to}]}\backslash NP)$: $\lambda p\lambda x\forall s_2.$ $W(x, s_2, s'_0) \rightarrow p\,x\,s_2$	$(S_{[\text{to}]}\backslash NP)/NP$: $\lambda x\lambda y\lambda s_3.$ $marry'_{s_3}\,x\,y$	$NP^{\uparrow}$: $\lambda q.q(skolem'\,norw'_{\mathbf{pro}})$
			$\lambda q.q(sk_{norw'_{s'_0}})$ skl
		$S_{[\text{to}]}\backslash NP$: $\lambda y\lambda s_3.marry'_{s_3}\,sk_{norw'_{s'_0}}\,y$	<
	$S\backslash NP$: $\lambda x\forall s_2.W(x, s_2, s'_0) \rightarrow marry'_{s_2}\,sk_{norw'_{s'_0}}\,x$		>
S: $\forall s_2.W(j', s_2, s'_0) \rightarrow marry'_{s_2}\,sk_{norw'_{s'_0}}\,j'$			<

It is crucial to observe that a Skolem specification of the form $sk^{(s_2)}_{norw'_{s'_0}}$ is not available for (198) due to the mechanics of Skolem term specificiation—the operator of s_2 does not LF-command the Skolem term at the point of specification.

Having seen how intensional operators go together with generalized Skolem terms, we can now look at examples involving more than one operators, intercalating intensional and nominal ones. Consider the following sentence.

(199) John doubts that every girl wants to marry a Norwegian.

With the current form of Skolem term specification mechanism, CCG can deliver only the following readings for (199) (we ignore the alternatives that arise due to different specifications of the situation index of the restrictor *norweg'*, leaving it as $\mathbf{pro}$, and the restrictor *girl'*, assuming it to be s'_0 throughout).

(200) a. $\forall s_1 . D(j', s_1, s'_0) \rightarrow \forall x.girl'_{s'_0}\,x \rightarrow \forall s_2 . W(x, s_2, s_1) \rightarrow marry'_{s_2}\, sk^{(s_1, x, s_2)}_{norweg'_{\mathbf{pro}}}\, x$

b. $\forall s_1 . D(j', s_1, s_0') \rightarrow \forall x . girl'_{s_0'} x \rightarrow \forall s_2 . W(x, s_2, s_1) \rightarrow marry'_{s_2} sk^{(x,s_2)}_{norweg'_{\mathbf{pro}}} x$

c. $\forall s_1 . D(j', s_1, s_0') \rightarrow \forall x . girl'_{s_0'} x \rightarrow \forall s_2 . W(x, s_2, s_1) \rightarrow marry'_{s_2} sk^{(s_2)}_{norweg'_{\mathbf{pro}}} x$

d. $\forall s_1 . D(j', s_1, s_0') \rightarrow \forall x . girl'_{s_0'} x \rightarrow \forall s_2 . W(x, s_2, s_1) \rightarrow marry'_{s_2} sk_{norweg'_{\mathbf{pro}}} x$

In neither of the cases an intermediate reading is actualized, and even if we interpret *every girl* as a collective individual, the indefinite is either trapped within the scope of the second intensional operator (*want*) or has a global wide scope reading (200d).

One option here might be to argue that intermediate readings are not derived by the GST mechanism, but through the narrowing of restrictors to a singleton ala Schwarzschild (2002). Take the reading where in every situation that conforms to John's doubts there is a Norwegian that every girl wants to marry. This is the reading where *a Norwegian* takes intermediate scope below D and above the remaining operators. To obtain such an intermediate reading, we need to be able to device such a restrictor in place of *norweg'* that it gives a singleton for each iteration of the variable s_1. It is not clear to us how such a restriction can be obtained.

To conclude, pending further clarification of the empirical status of Steedman's (2010) account of intermediate readings, we assume that intermediate readings are derived by the generalized Skolem term mechanism, by stipulating that unspecified Skolem terms has to get bound to *at least one*, rather than all (cf. page 92), the arguments belonging to the operators LF-commanding them at the point of specification. In this setting, we loose the sound predictions reviewed above concerning coordinate structures and *Every man who read a book loves every woman* kind of sentences. We have to leave a deeper investigation of whether/how these predictions can be captured without sacrificing intermediate readings to future work.

4.3.3 Model Theory for the Semantic Representation Language

4.3.3.1 Motivation

This section gives a model theory for the semantic representation language used in expressing logical forms. Besides certain omissions concerning plurality, pronouns, polarity and others, the present model theory diverges from Steedman 2010:Ch. 5 in two respects.

One is rather pedagogical in nature and concerns the mechanism with which we decide when an assignment function needs to be extended to cover a Skolem term. This divergence can be found under the heading of "readiness of a Skolem term for extension". The interest

in this divergence lies in that it appears to simplify the definition of variable (and Skolem term) assignment, given that it does not require the use of inverse correspondences (cf. Steedman 2010:Ch. 5).[40]

The other departure concerns the point where the restrictor of a generalized Skolem term is checked for whether it is satisfied by the referent of the term. In Steedman 2010, this check is done during the evaluation of the expression that takes the Skolem term as argument. We propose to do this check at the moment the assignment function is extended to cover the Skolem term under consideration. The reason is as follows.

Take the following example from Farkas 1981:ex. 14b.

(201) John gave an A to every student who recited a difficult poem by Pindar.

We are interested in the reading where *a difficult poem by Pindar* has wider scope than *every student*. That is, a poem is such that John gave an A to every student who recited it. This reading is represented as follows:

(202) $\forall x.student'x \wedge recite'sk_{pindar\text{-}poem'}x \rightarrow gave\text{-}an\text{-}A'x\ j'$

In evaluating (205) we start with an initial assignment, say g, that assigns variables in the language certain objects in the model. At the start, g, by assumption, is not yet defined for the Skolem term $sk_{pindar\text{-}poem'}$. (205) comes out true if there is an extension of g, say g', which is exactly like g except that it assigns the Skolem term $sk_{pindar\text{-}poem'}$ to an object (of the appropriate sort) in the model such that the conditional holds for every assignment that is exactly like g' except for the value it assigns to x.

Now let us have a more detailed look at how we carry out the evaluation of (205). The first thing we need to do is to extend the assignment function such that it covers $sk_{pindar\text{-}poem'}$. Assume that, as a first guess, we assign an object, say *harry*, to the Skolem term as its value. Given the assumption that *harry* is not in the extension of *poem'*, we will never be able to satisfy an expression that has the $sk_{pindar\text{-}poem'}$ as its argument under the current assignment function, but we do not know it yet for we didn't check whether *harry* satisfies the restrictor of the Skolem term or not.

[40]The present divergence may appear as a matter of personal taste for the mathematically initiated. Our motivation for having it is our conjecture that linguists are generally more familiar with the format presented here.

The next step is to check whether the universally quantified conditional is satisfied with the current assignment (which now includes the '$sk_{pindar\text{-}poem'} \mapsto$ *harry*' mapping). What is needed is to see whether the conditional is satisfied with every possible assignment of an object to x. Assume that we start with *john*$'$. Then what we need to consider is the following formula, where x is assigned *john*$'$ and $sk_{pindar\text{-}poem'}$ is assigned *harry*$'$.

(203) $student'x \wedge recite' sk_{pindar\text{-}poem'} x \rightarrow gave\text{-}an\text{-}A' x\ j'$

At this point the relevant clause of the model theory (Sv below, 2d in Steedman 2010:§5.3) requires that all the extensions of the assignment function to ready Skolem terms common to the antecedent and consequent that satisfy the antecedent, to satisfy the consequent. As there are no common ready Skolem terms among the antecedent and the consequent, and that "being an extension" is a reflexive relation, the only assignment function to consider is the current one. Now we know that the antecedent will not be satisfied because it is impossible to satisfy the left conjunct, namely $recite' sk_{pindar\text{-}poem'} x$, with the mapping '$sk_{pindar\text{-}poem'} \mapsto$ *harry*'. At this point there is no chance to revise this mapping without going out of the loop that tries values for x. This in turn means that no matter what value we assign to x, the antecedent of the conditional will not be satisfied, which means that the conditional will be satisfied for every value we assign to x. This means that we have found an assignment extension that satisfies the universally quantified conditional. This is an unwelcome result, because whenever we come across with a formula like (205) we can satisfy it by an extension to the assignment function that assigns the Skolem term an individual that does not fulfill its restrictor condition.

On the basis of this result we propose that restrictor satisfaction is checked at the point where the assignment function is extended to cover the Skolem term at issue (see clause (Eii) below).

However this move is not sufficient on its own to obtain the correct semantics of (205). To see why, let us first observe that the model theoretic evaluation of (205) renders it equivalent to the following formula to be evaluated in a standard model theory for predicate logic:

(204) $\exists y.pindar\text{-}poem' y \wedge \forall x.student' x \wedge recite' y\ x \rightarrow gave\text{-}an\text{-}A' x\ j'$

The problem here, as observed by Schwarzschild (2002), is that the existence of any difficult poem by Pindar that is not recited by any of the students makes (205) (and (204))

true. (This is so because any such poem will make the antecedent false for any choice of x.) This is something we would not want the interpretation of (201) to allow. Schwarzschild (2002) remedies this inadequacy by assuming a mechanism that restricts the domain of the existential to a singleton set, containing the particular Pindar poem the speaker of (201) refers to. This solution can be readily imported to the present system by implicit domain restriction discussed above (page 96). The relevant logical form would be:

(205) $\forall x.student'x \wedge recite'sk_{pindar\text{-}poem' \wedge C'}x \rightarrow gave\text{-}an\text{-}A'x\ j'$

where C' is a contextually inferred predicate like "λx.[x is the Pindar poem the speaker has in mind]".

4.3.3.2 Types

The types T_L of L is the smallest set such that:

i. $e, t \in \mathrm{T}_L$

ii. if τ and $\tau' \in \mathrm{T}_L$, then $\tau\tau' \in \mathrm{T}_L$

4.3.3.3 Syntax

Symbols: The symbols of L consists of the following sets of symbols:

i. A set C_τ of non logical constants of type τ for each $\tau \in \mathrm{T}_L$.[41]

ii. A set V_τ of variables of type τ for each $\tau \in \mathrm{T}_L$.[42]

iii. The set $\mathrm{C_{Sk}} = \{sk'_0, sk'_1, sk'_2, \ldots\}$ of Skolem term names.

iv. The set $\mathrm{C_L} = \{K_{e(s(st))}, W_{e(s(st))}, \mathbf{pro_{ee}}, \mathbf{idx_{ee}}, \mathbf{now}, \mathbf{tf}, \mathbf{spkr}\}$ of logical constants, with the indicated types.

[41] Following standard practice we will use primes ('') in designating non logical constants. We will draw s type constants from $\{s'_0, s'_1, s'_2, \ldots\}$. Constants of other types will usually be the primed and italicized abbreviations of corresponding English words.

[42] We draw s type variables from $\{s_1, s_2, s_3 \ldots\}$, and e type variables from $\{x, y, z\}$, subscripting when necessary. We also assume that definitions ensure that we never run out of constants or variables for any type.

v. The set $\{\wedge, \rightarrow, \neg\}$ of connectives, the set $\{\forall, \exists, \lambda\}$ of operators, and the set $\{(,), ., [,]\}$ of punctuation symbols.

Expressions: For each $\tau \in \mathrm{T}_L$, the set E_τ of expressions of L of type τ is defined as follows:

i. For each $\tau \in \mathrm{T}_L$, $\mathrm{C}_\tau \cup \mathrm{V}_\tau \subset \mathrm{E}_\tau$.

ii. E_{Sk} is the smallest set such that $\sigma^{\epsilon}_{\pi} \in \mathrm{E}_{\mathrm{Sk}},$ where $\sigma \in \mathrm{C}_{\mathrm{Sk}}, \pi \in \mathrm{E}_{et}$, and ϵ is an n-tuple of elements drawn from $\mathrm{E}_s \cup \mathrm{E}_e$ for $n \geq 0$.

iii. $\mathrm{E}_{\mathrm{Sk}} \subset \mathrm{E}_e$

iv. If $\alpha \in \mathrm{E}_{\tau\tau'}$ and $\beta \in \mathrm{E}_\tau$, then $\alpha\beta \in \mathrm{E}_{\tau'}$.

v. If $\alpha \in \mathrm{E}_{\tau'}$, and $\upsilon \in \mathrm{V}_\tau$, then $\lambda\upsilon.\alpha \in \mathrm{E}_{\tau\tau'}$.

vi. if $\phi, \psi \in \mathrm{E}_t$, then so are $\phi \wedge \psi$, $\phi \rightarrow \psi$, $\neg\phi$, $\neg\psi$.

vii. if $\phi \in \mathrm{E}_t$, and $\upsilon \in \mathrm{E}_\tau$ for some $\tau \in \mathrm{T}_L$, then $\forall\upsilon.\phi$, $\exists\upsilon.\phi \in \mathrm{E}_t$.

viii. For any $\tau \in \mathrm{T}_L$, nothing else is in E_τ.

4.3.3.4 Semantics

M. *Model and evaluation domains*: A model $\mathcal{M}$ for L is a tuple $\langle \mathrm{A}, \mathrm{W}, I \rangle$, where A is a set of individuals, W is a set of situations, and I is an interpretation function defined over $\bigcup_{\tau \in \mathrm{T}_L} \mathrm{C}_\tau$, namely the set of all the non-logical constants of L. Let D_τ stand for the evaluation domain for type $\tau \in \mathrm{T}_L$, which is defined as follows:[43]

i. $\mathrm{D}_e = \mathrm{A}$;

ii. $\mathrm{D}_s = \mathrm{W}$;

iii. $\mathrm{D}_t = \{1, 0\}$;

iv. $\mathrm{D}_{\tau\tau'} = \mathrm{D}_{\tau'}^{\mathrm{D}_\tau}$

[43]The notation B^{A} stands for the set of all functions from set A to set B.

The interpretation function I maps each C_τ to D_τ.

A. *Variable assignment*:

An **assignment function** g is a function that maps V_τ to D_τ, for $\tau \in \mathrm{T}_L$. A **revision** of an assignment function g regarding a variable υ, designated as $g[\upsilon]$, is the function which may differ from g only in the value it assigns to υ.

V. *Valuation*: The **valuation** function for a model $\mathcal{M}$ and an assignment function g, designated as $V_{\mathcal{M},g}$ is defined as follows:

i. if $\alpha \in \mathrm{E}_e$, $V_{\mathcal{M},g}(\alpha) = I(\alpha)$;

ii. if $\alpha \in \mathrm{V}_\tau$, $V_{\mathcal{M},g}(\alpha) = g(\alpha)$;

iii. if $\alpha \in \mathrm{E}_{\mathrm{Sk}}$, $V_{\mathcal{M},g}(\alpha) = g(\alpha)$, if g is defined for α;[44]

iv. if $\alpha \in \mathrm{E}_{\tau\tau'}$ and $\beta \in \mathrm{E}_\tau$, $V_{\mathcal{M},g}(\alpha\beta) = V_{\mathcal{M},g}(\alpha)\, V_{\mathcal{M},g}(\beta)$;

v. if α is of the form $\lambda\nu.\pi$, of type $\tau\tau'$, $V_{\mathcal{M},g}(\alpha)$ is the function f such that for all $a \in \mathrm{D}_\tau, h(a) = V_{\mathcal{M},g[\nu\mapsto a]}(\pi)$.

E. *Assignment function extension*: An **extension** g' of an assignment function g to a set $\{\Sigma_1, \Sigma_2, \ldots, \Sigma_n\}$ of Skolem terms is defined as follows:

i. For $n = 0$, $g' = g$;

ii. For $n > 0$: Let Σ_1 be of the form σ^ϵ_π.

If there exists a function g'' exactly like g, except that it has the additional mapping $\sigma^\epsilon_\pi \mapsto a$, for some $a \in \mathrm{D}_e$, where g satisfies $V_{\mathcal{M},g}(\pi)(a)$,

then g' is the result of extending g'' to $\{\Sigma_2, \Sigma_3, \ldots, \Sigma_n\}$,

else g' is undefined.

Whenever we speak of an extension g' of g to some Skolem terms, we always mean those Skolem terms that are not already covered by g.

[44] Our definition of satisfaction below ensures that this clause is never invoked for an assignment function g that is undefined for the Skolem term α.

R. *Readiness of a Skolem term for extension*: A Skolem term σ^{ϵ}_{π} in a formula ϕ is **ready for extension** (or simply **ready**) iff no argument in ϵ is a variable bound in ϕ, and σ^{ϵ}_{π} does not occur in the restriction of another Skolem term in ϕ.

S. *Satisfaction*: The definition of **satisfaction** in a model $\mathcal{M}$ with respect to an assignment function g:

Literals:[45]

i. g satisfies $\delta\alpha_1\alpha_2 \ldots \alpha_n$ iff there exists an extension g' of g to all and only the Skolem terms in $\{\alpha_1, \alpha_2, \ldots, \alpha_n\}$ such that,
$V_{\mathcal{M},g'}(\delta)\, V_{\mathcal{M},g'}(\alpha_1)\, V_{\mathcal{M},g'}(\alpha_2) \ldots V_{\mathcal{M},g'}(\alpha_n) = 1$.

Compound Formulas: Let $\phi, \psi \in \mathrm{E}_t$:

ii. g satisfies $\neg\phi$ iff there exists an extension g' of g to all and only the ready Skolem terms in ϕ such that g' does not satisfy ϕ.

iii. g satisfies $\phi \wedge \psi$ iff there exists an extension g' of g to all and only the ready Skolem terms common to ϕ and ψ, such that g' satisfies both ϕ and ψ.

iv. g satisfies $\phi \vee \psi$ iff there exists an extension g' of g to all and only the ready Skolem terms common to ϕ and ψ, such that g' satisfies at least one of ϕ and ψ.

v. g satisfies $\phi \rightarrow \psi$ iff *every* extension g' of g to all the ready Skolem terms common to ϕ and ψ that satisfies ϕ, also satisfies ψ.

Quantification:

vi. g satisfies a formula of the form $\forall\nu.\phi$ iff there exists an extension g' of g to all ready Skolem terms in ϕ, such that every revision $g'[\nu]$ of g' satisfies ϕ.

T. *Truth*:

i. A formula ϕ is true in a model $\mathcal{M}$ iff there exists an assignment function g that satisfies ϕ in $\mathcal{M}$.

[45] By 'literal' we mean a formula (an expression in E_t) headed by a predicate or function symbol.

4.3.3.5 Examples

Let us start with an extensional example. Take (206a) and its narrow (b) and wide (c) scope indefinite readings.

(206) a. John rewarded every student who read an article on indefinites.

b. $\forall z.student'z \wedge read'sk^{(x)}_{\lambda z.art'z \wedge oi'z}x \rightarrow reward'xj'$

c. $\forall x.student'x \wedge read'sk_{aoi'}x \rightarrow reward'xj'$

Assume the following model given in set notation.

(207) $\mathrm{D}_e = \{\textit{john}, \textit{mary}, \textit{alice}, \textit{tom}, \textit{art1}, \textit{art2}, \textit{art3}\}$

$I(john') = \textit{john}$

$I(student') = \{\textit{alice}, \textit{tom}\}$

$I(art') = \{\textit{art1}, \textit{art2}, \textit{art3}\}$

$I(oi') = \{\textit{art1}, \textit{art2}\}$

$I(read') = \{\{\textit{mary}, \textit{art1}\}, \{\textit{alice}, \textit{art1}\}, \{\textit{alice}, \textit{art2}\}, \{\textit{tom}, \textit{art1}\}, \{\textit{tom}, \textit{art2}\}, \{\textit{tom}, \textit{art3}\}\}$

$I(reward') = \{\{\textit{john}, \textit{alice}\}, \{\textit{john}, \textit{tom}\}, \{\textit{john}, \textit{mary}\}\}$

Assume the following assignment function:

(208) $\left\{ \begin{array}{c} x \mapsto \textit{art3} \\ y \mapsto \textit{alice} \\ \vdots \end{array} \right\}$

(209) $\forall x.student'x \wedge read'sk^{(x)}_{\lambda z.art'z \wedge oi'z}x \rightarrow reward'xj'$

Evaluation procedure starts with clause **S**vi, which is responsible for handling quantified formulas. First **S**vi checks for any ready Skolem terms in (209). The Skolem term $sk^{(x)}_{\lambda z.art'z \wedge oi'z}$ is not ready according to **R**, since the argument x of $sk^{(x)}_{\lambda z.art'z \wedge oi'z}$ is bound by the universal $\forall x$. After this check, evaluation procedure continues with g, since, according to **E**, the extension of an assignment function to an empty set of Skolem terms is the assignment function itself. The next thing to check, according to **S**vi, is if every revision of g (see **A**) with respect to x, namely $g[x]$, satisfies the following expression:

(210) $student'x \wedge read'sk^{(x)}_{\lambda z.art'z \wedge oi'z}x \rightarrow reward'xj'$

This means invoking clause **S**v for g and every assignment function that differs from g only in the value it assigns to x. The task can be simplified by observing that any variable assignment that maps x to some individual in D_e which is not a student, trivially satisfies (209) by making the antecedent of the material implication false. Therefore the assignment functions we need to consider are those that map x to one of $\{\textit{alice}, \textit{tom}\}$. Let us take $g[x \mapsto \textit{alice}]$, and test whether this assignment function satisfies (209) by using **S**v. **S**v requires us to determine extensions of $g[x \mapsto \textit{alice}]$ to all the ready Skolem terms that occur both in the antecedent and the consequent of (210). As no such Skolem term exists, the only extension that needs to be considered is $g[x \mapsto \textit{alice}]$ itself. Now if $g[x \mapsto \textit{alice}]$ satisfies the antecedent of (210) it should also satisfy its consequent. Otherwise we will have found a revision of our original g that fails to satisfy (210), and therefore (209) will have come out false with the given assignment, in the given model. Let us see whether $g[x \mapsto \textit{alice}]$ satisfies the antecedent of (210), namely:

(211) $student'x \wedge read'sk^{(x)}_{\lambda z.art'z \wedge oi'z}x$

This invokes **S**iii. Once again we do not have any ready Skolem terms common to both conjuncts. We continue with the current assignment function checking each conjunct separately. First we need to see whether $g[x \mapsto \textit{alice}]$ satisfies $student'x$. This invokes **S**i. We need to determine the value of $V_{\mathcal{M},g[x \mapsto \textit{alice}]}(student')(V_{\mathcal{M},g[x \mapsto \textit{alice}]}(x))$, which, by **V**i and **V**ii, reduces to $I(student')(g[x \mapsto \textit{alice}](x))$. Given the interpretation of $student'$ in our model in (207), this functional application evaluates to 1, showing that $g[x \mapsto \textit{alice}]$ satisfies (210). Next we consider the second conjunct, namely $read'sk^{(x)}_{\lambda z.art'z \wedge oi'z}x$. The relevant clause is again **S**i, which requires to attend to any ready Skolem terms in the literal under consideration. **R** says that $sk^{(x)}_{\lambda z.art'z \wedge oi'z}$ is ready for extension, since its only argument x is free in $read'sk^{(x)}_{\lambda z.art'z \wedge oi'z}x$. Then $g[x \mapsto \textit{alice}]$ needs to be extended to $sk^{(x)}_{\lambda z.art'z \wedge oi'z}$. This extension is handled by **E**. Therefore we try to find a function g'' as described in **E**ii. Let us try *art3* for a, to see how an extension fails. Such an extension requires $V_{\mathcal{M},g[x \mapsto \textit{alice}]}(\lambda z.art'z \wedge oi'z)(\textit{art3})$ to evaluate to 1. By clause **V**v the functional application we are interested in becomes $V_{\mathcal{M},g[x \mapsto \textit{alice}][z \mapsto \textit{art3}]}(art'z \wedge oi'z)$. Now the conjunction fails with the given variable assignment given that *art3* is not in the extension of oi'.

Therefore it is not possible to extend $g[x \mapsto \textit{alice}]$ by assigning $sk^{(x)}_{\lambda z.art'\,z \wedge oi'\,z}$ to *art3*. An extension to *art1* is possible however. Such an extension will satisfy $read'\,sk^{(x)}_{\lambda z.art'\,z \wedge oi'\,z}\,x$, showing that $g[x \mapsto \textit{alice}]$ satisfies the antecedent (211). Now we need to see whether g satisfies the consequent, namely $reward'\,x\,j'$, as well. An invocation of **S**i shows that it does so, given that *john* and *alice* stand in a 'rewarding' relation in our model. This completes the demonstration that $g[x \mapsto \textit{alice}]$ satisfies (210).

We were trying to see whether all the revisions of our original assignment function g given in (208), that maps x to one of $\{alice, tom\}$ satisfies (210). We saw that this is the case for $g[x \mapsto \textit{alice}]$, we need to see the case for $g[x \mapsto \textit{tom}]$. A similar procedure as above will show that $g[x \mapsto \textit{tom}]$ satisfies (210) as well. Therefore there exists an assignment g which satisfies (209) in the model (207). We conclude that (209) is true in (207).

CHAPTER 5

THE ANALYSIS

This chapter is devoted to the analysis of the data reviewed in Chapter 3. The analysis will be in the terms of the framework introduced in Chapter 4.

It appears convenient to put the interpretive effects of the Acc-marker to the center of discussion, given that most of the interesting phenomena concerning indefinite descriptions arise in their interaction with the Acc-marker. It again seems convenient to break down the analysis of Acc marking into two generalizations. On one hand, we are trying to arrive at a generalization of the form 'Acc → X'. The usual distinction between descriptive vs. explanatory generalizations applies here as well. Descriptively read, the implication 'Acc → X' means "What (interpretive) effects are observed when an NP carries the Acc-marker?". Chapter 3, where we compared Acc-marker with its ∅ alternate and other case-markers along their semantic effects in various environments, aimed to establish a descriptive generalization of this kind. On an explanatory reading, the implication 'Acc → X' asks "What is it about the Acc marker that gives way to the observed interpretive effects?". Again the review in Chapter 3 tried to demonstrate that no simple answer is available to such a question. It is observed that Acc interacts both with components of sentential semantics and with usage-related factors. The second type of generalization that we are after is 'X → Acc'. This generalization seeks an explanation of why certain NPs obligatorily carry Acc-marking. We start our analysis with the former generalization.

In a type-theoretic setting, the first thing to do is to seek the difference between Acc- vs. ∅-marking in the types of the constituents thus marked.[1] Before considering some proposals

[1] See de Hoop and Zwarts 2009 for a review of formal semantic approaches that aim to "account for morphological case alternations in terms of variation in the possible semantic types of NPs and verbs"(175).

on the type-theoretic significance of case-marking, let us first briefly look at noun phrase interpretation in formal semantics.

Montague (1973) provides a unified analysis of noun phrases as sets of properties (i.e. ett).[2] The type ett is obvious for quantificational NPs like *every man*, which denotes a function from the set of properties to the set of truth values. It maps properties that contain the set of man to 1, and properties that exclude at least one member of the set of man to 0. The type ett may not be equally obvious for expressions like *John*. It is one of the important contributions of Montague (1973) that he takes the denotation of a proper name to be a function that maps those properties satisfied by the bearer of the proper name to 1, and other properties to 0. This move makes the denotation of proper names—and by extension other individual denoting expressions—functions from the set of properties to the set of truth values, thereby type-identifying them with quantificational expressions.

Partee and Rooth (1983) argue on the basis of conjunction structures that this unified treatment can be violated for the sake of explanatory adequacy. Their argument concerns the semantics of conjunction, which need not concern us at the moment. Partee (1987) further extends the number of available types for noun phrases to the following three: e for "individual", ett for "quantificational", and et for "predicative". Ever since these works, the so called "type shifting" operations that allow transitions between various NP types have been utilized in formal semantics.

A correlation between type-shifting and case-marking is drawn in the works of de Hoop (1996) and van Geenhoven (1998). These accounts are based on data from languages that have two objective cases, where the difference between these cases is captured as a type difference between the NPs carrying them. Here we will be concerned with the details of van Geenhoven (1998) only, and the analysis often called "semantic incorporation". Our points about "semantic incorporation" will apply to de Hoop (1996) as well.

5.1 Are Turkish ∅-indefinites Semantically Incorporated?

Carlson (2006) gives "stable properties" of semantically incorporated NPs as follows:

[2] We use an extensional setting for expository purposes. We have a domain of individuals of type e. A property is a set of individuals, or equivalently a function from the domain of individuals to truth values. This identifies a property p with the set of individuals that possess p.

(212) Incorporated NPs

i. always take the narrowest scope;

ii. do not contribute discourse referents to be targeted by anaphoric processes;[3]

iii. are number neutral.

Turkish bare (i.e. determinerless) noun direct objects arguably pass all these tests (see Erguvanlı 1979; Turan 1998; Öztürk 2009 for discussion on bare noun incorporation in Turkish).[4] ∅-indefinites on the other hand only have the property (212i). Another doubt on whether ∅-indefinites are incorporated raised on the basis of scope of bare adverbs. Aydemir (2004:467) observes the following asymmetry between bare noun objects and ∅ indefinites. While a [bare noun-verb] complex can appear under the scope of a bare adverb (213a), the same is not possible for a [∅-indefinite-verb] complex (213b). This adds another argument against an incorporation analysis of ∅-indefinites.

(213) a. Mehmet kötü [[araba] kullan-ıyor].
M. bad car drive-Prg
'Mehmet drives badly.'
'Mehmet drives bad cars/a bad car.'

b. Mehmet kötü [bir araba] kullan-ıyor.
M. bad a car drive-Prg
'Mehmet drives a bad car.'
'*Mehmet drives a car badly.'

[3]Whether an NP can be targeted by an overt or dropped pronoun has been one of the widely employed diagnostic tests for referentiality in Turkish (Erguvanlı 1979; Ketrez 2005; Arslan-Kechioritis 2009). This property is usually cited as a difference between bare indefinites and bare nouns, where the former but not the latter has the property. We think the generalization is not empirically well-supported. Consider the following example:

Eger birgun cocuk yaparsam, onu kesinlikle koleje yollamayacagim.

[4]There are stronger senses of "incorporation". For instance, Farkas and de Swart 2003 consider as incorporated only forms that have a morphological sign of the incorporation process. No such sign is observed for bare nouns or ∅-indefinites in Turkish. Furthermore, Orgun and Inkelas 2004 claim that, as far as their phonological properties are concerned, bare noun direct objects are phrasal, which morphosyntactically aligns them with non-incorporated NPs.

However there are more liberal notions of "incorporation", sometimes called "pseudo-" or "semantic incorporation" (van Geenhoven 1998; Dayal 2007), which argue for non-standard semantic composition with or *without* overt morphosyntactic reflexes.

In one such account, van Geenhoven (1998) sets out to explain the phenomenon of noun incorporation in West Greenlandic, and to arrive at a general account of "semantic incorporation" of indefinite descriptions. Consider the following pair from van Geenhoven 1998:[5]

(214) a. Angunguu-p aalisagaq neri-v-a-a. (van Geenhoven 1998:13 ex. 2b)
A.-Erg fish.Abs eat-Ind-[+tr]-3sg.3sg
'Angunguaq ate the/a particular fish.'

b. Angunguaq aalisakka-mik neri-v-u-q. (van Geenhoven 1998:14 ex. 4b)
A.Abs fish-Inst.sg eat-Ind-[-tr]-3sg
'Angunguaq ate fish.'

In van Geenhoven 1998, the so called "semantically incorporated" indefinites like the direct object in (214b) are treated as predicates (et), rather than quantificational (ett) or entity denoting (e) expressions. "This predicate is absorbed or *semantically incorporated* by a verb as the restrictor of the verb's internal argument." (131) Another important aspect of van Geenhoven's (1998) proposal is the relation between case and NP interpretation. Some languages, including Turkish, have two objective forms classified as "weak" and "strong" (*ibid*. 113). Weak NPs are uniformly predicative. Strong NPs are either free variable indefinites, definites, or quantifiers (*ibid*. 117).[6]

West Greenlandic data bear close resemblance to Turkish Acc vs. $\emptyset$ alternation. The semantically incorporated, predicative NPs always receive the narrowest scope with respect to quantifiers and negation, and get "opaque" readings with respect to referentially opaque verbs, just like Turkish $\emptyset$-indefinites. In this respect van Geenhoven's (1998) account deserves a closer scrutiny.

Traditionally, verbs are taken to be denoting relations holding among individuals. When a quantificational NP appears as an argument of a verb, the individual or individuals that enter

[5]The examples in (214) involve what corresponds to bare noun objects in Turkish. The semantic incorporation account of van Geenhoven 1998 covers modified objects modified by determiners, numerals, relative clauses and so on as well.

[6]de Hoop 1996 has a similar proposal, where weak-cased objects are interpreted as predicate modifiers of type $et(et)$.

into the relation denoted by the verb are contributed by the quantifier in question. Namely, the argument that the verb applies to is the variable quantified over. However, when it comes to having a verb apply to an argument that does not denote an individual or a quantifier, some "adjustment" is called for to get things right. One such adjustment dates back to Carlson (1977). Carlson (1977) proposed to interpret English bare plurals as kinds. Instead of applying verbs to kind individuals, he proposed that lexical semantics of verbs is such that they create instances out of kinds to take as arguments. A sentence like (215a) which involves a bare plural gets the interpretation in (215b).

(215) a. John saw spots on the floor.

b. $\exists x.\mathbf{R}(x, spot') \wedge see' x j'$

(215b) basically says that John saw something, and that something was a realization of the kind 'spot' (tense and the locative are ignored in the interpretation as a simplification). Carlson (1977) reaches the interpretation in (215b) by interpreting verbs that can take kind denoting NPs as follows:

(216) $\lambda k \lambda y \exists x.\mathbf{R}(x, k) \wedge verb' x\, y$

van Geenhoven's (1998) semantic incorporation idea is quite similar to Carlson's (1977) treatment of bare plurals. She takes incorporated indefinites not as kinds but properties. She argues that certain verbs are ambiguous between a incorporating and a non-incorporating reading. Her proposal can be straightforwardly adapted to the present system. For instance, in a "semantic incorporation" account, the Turkish verb *gör* ('see'), which can take both an Acc and $\emptyset$-marked object, would be listed in the lexicon as follows:[7]

(217) a. gör *('see')* := $S\backslash NP_{nom}\backslash NP_{acc}$: $\lambda x \lambda y.see' x\, y$

b. gör *('see')* := $S\backslash NP_{nom}\backslash (S_{[n]}\backslash NP)$: $\lambda p \lambda y.\exists x.px \wedge see' x\, y$

On the assumption that Acc-marking applies only to strong NPs (entity or quantificational), the entries in (217) ensures that weak (or predicative) NPs are incorporated, in the

[7]The two categories in (217) can also be related through a lexical redundancy rule ala Dowty 1979. The feature [n] that occurs in the incorporating category (217b) indicates that the subcategorized predicate is a nominal rather than a verbal predicate.

sense that they are absorbed by the verb and existentially quantified over. The incorporation proposal can be further specified by assuming that strong NPs can either be quantificational or interepreted as generalized Skolem terms. Now we shall observe that Turkish data provide considerable amount of support to such an account.

First, as van Geenhoven (1998) observes, capturing the incorporating vs. non-incorporating distinction in the lexical category of the verb has the advantage of explaining why not every verb is equally susceptible to Acc vs. ∅-alternation (see §3.2.7 above). The ambiguity that applies to *gör* ('see') may simply not be available for some verbs.

Second, taking ∅-indefinites to be semantically incorporated predicts their narrow scope behaviour with respect to quantificational operators and negation. Likewise, taking Acc-indefinites as generalized Skolem terms explain their scope flexibility. Let us first illustrate the case for quantification.

(218) a. Her erkek bir kadın gör-dü. (∀∃/*∃∀)
every man a woman see-Pst.3sg
'Every man saw a woman.'

b. Her erkek bir kadın-ı gör-dü. (∀∃/∃∀)
every man a woman see-Pst.3sg
'Every man saw a woman.'

As we know from § 3.2.1, the crucial observation here is that only the Acc-marked (218b), has a wide scope indefinite reading. The caseless (218a) does not have a reading where the same woman is kissed by every man, apart from an accidental co-reference reading. This is as expected with the present assumptions. For (218a) the only interpretation is the following:

(219) $\forall x.man'x \rightarrow \exists y.woman'y \wedge see'yx$

On the other hand (218b) is ambiguous between the readings in (220).

(220) a. $\forall x.man'x \rightarrow see'sk^{(x)}_{woman'}x$

b. $\forall x.man'x \rightarrow see'sk_{woman'}x$

where either (a) each man saw a possibly different woman, or (b) there is a woman that every man saw.

Let us briefly digress to note a challenge that the scope taking asymmetry between Acc vs. ∅-marking observed in example (218) poses for the D-linking account of the Acc-marker (Enç 1991, see §3.2.2 above). For Enç (1991) D-linking (or her particular version of "specificity") is a phenomenon independent of scope interaction. A direct object NP is specific if it bears Acc and non-specific otherwise. The challenge (218) poses for such a proposal is this: If Acc vs. ∅-marking is to mark specificity vs. non-specificity, then what is it that prevents (218a) from receiving a reading where a non-D-linked (non-specific) woman is seen by every man? If all that Acc contributes was D-linking then it should have been possible to introduce a non-specific (out-of-the-blue) woman with such a property.

Returning to our topic, let us now observe how the semantic incorporation proposal (coupled with generalized Skolem terms) captures the obligatory narrow scope of indefinites with respect to negation (see §3.2.6 above).

(221) a. Dün partide güzel bir kadın görmedim.
yesterday party-Loc beautiful a woman see-Neg-Pst.1sg
'I didn't see a beautiful woman at the party yesterday.'

b. Dün partide güzel bir kadın-ı görmedim.
yesterday party-Loc beautiful a woman-Acc see-Neg-Pst.1sg
'I didn't see a beautiful woman at the party yesterday.'

In (221b) but not (221a) it is presupposed that there is a beautiful woman at the party whom the speaker did not see. This is because in (221a) what is negated is a complex predicate "seeing a beautiful woman". The classical way of expressing such a predicate is by using existential quantification. Semantic incorporation analysis affords the interpretation we need for (221a). The interpretations assigned to (221a) and (221b) are as follows:

(222) a. $\neg\exists x.woman'x \wedge see'x\,me'$

b. $\neg see'sk_{woman'}\,me'$

According to the model theory given in Chapter 4 (222b) comes out true if the generalized Skolem term $sk_{woman'}$ can be extended to a woman individual that the referent of me' did not see.

It is important to observe that a formula like:

(223) $\exists x.woman'x \wedge \neg see'x\,me'$

is not available for (221a) because it is not possible for the existential quantifier to take scope over negation. It should be noted that having the existential quantifier in (222a) within the scope of negation is independent of whether we take Turkish negation to be clausal or verb phrasal. In either analysis negation will take the verb into its scope. Given that the existential quantifier is contributed by the verb, it will automatically be in the scope of negation.

van Geenhoven's (1998) proposal also possesses explanatory significance regarding the interaction of referentially opaque verbs with Acc vs. ∅-alternation discussed in §3.2.4.1. Zimmermann (1993) argued on various grounds that referentially opaque verbs like *seek* apply to properties rather than intensional quantifiers.[8] To illustrate, compare the two kinds of "opaque" readings of a classical example given in (224).

(224) a. John is seeking a unicorn.

b. $try'_{s_0'}(\lambda s \exists x.unicorn'_s x \wedge find'_s x\,j')j'$

c. $seek'(\lambda s.unicorn'_s)j'$

(224b) is the Montagovian treatment of (224a). It says that John is trying to bring about a situation such that there is a unicorn which John finds. (224c) on the other hand construes *seek* as a relation between individuals and properties, considerably simplifying the semantics of referentially opaque verbs (see Zimmermann 1993 for justification).

The above treatment of *seek*-type verbs nicely fits with van Geenhoven's (1998) semantic incorporation analysis, and is generalized to other types of verbs in subsequent work (van Geenhoven and McNally 2005).[9] An important support for the compatibility of these two theses is the fact that in West Greenlandic, the forms that receive "opaque" readings are those that are semantically incorporated by non-opaque verbs. We saw in §3.2.4.1 above that Turkish data follow a similar pattern. If we disregard for the moment certain complications noted there, the general pattern is that direct objects with Acc-marking receive "transparent" reading, while those with ∅-marking receive "opaque" reading.

[8]The analysis of referentially opaque verbs as applying to intensional quantifiers is due to Montague 1973.

[9]The basic difference between Zimmermann 1993 on one hand and van Geenhoven 1998; van Geenhoven and McNally 2005 on the other is that the latter authors treat *seek*-type verbs as ambiguous as any other incorporating verb. Zimmermann 1993 handles the "transparent" reading of *seek* by an existential quantifier reading of the object.

To sum up, we have introduced the "semantic incorporation" analysis of weak indefinites, and showed some appealing aspects of such an analysis for Turkish. Now we turn to some problematic aspects of "semantic incorporation", which will eventually lead us to abandon it for another analysis.

Can "semantic incorporation" provide a generalization of the form 'X → Acc'? Let us first observe the forms that obligatorily require Acc-marking:[10]

(225) a. Dekan John*(-u) çağır-dı. (Proper names)
dean J.(-Acc) summon-Pst
'The dean has summoned John.'

b. Dekan şu öğrenci*(-yi) çağır-dı. (Demonstratives)
dean that student(-Acc) summon-Pst
'The dean has summoned that student.'

c. Dekan o*(-nu) çağır-dı. (Pronouns)
dean it.3sg(-Acc) summon-Pst
'The dean has summoned her/him.'

d. Dekan her öğrenci*(-yi) çağır-dı. (Quantified phrases)
dean every student(-Acc) summon-Pst
'The dean has summoned every student.'

e. Dekan John'un babası*(-nı) çağır-dı. (Relational Possessives).

f. Dekan John'un arabası*(-nı) aldı. (Non-Relational Possessives).
dean J.'Gen car(-Acc) take-Pst
'The dean has took John's car'

g. Dekan biri*(-ni) çağır-dı.
dean someone(-Acc) summon-Pst
'The dean has summoned someone'
Expressions carrying the possessive suffix *(s)I*; *bir-i* ('someone'), *biri-si* ('someone'), *bazı-sı* ('some'), *kimi-si* ('some'), *hep-si* ('all'), *(bir) başka-sı* ('some other'), *diğer-i* ('the other') and so on.)

[10]Nilsson, 1985:Ch. 4, appears to be the first to provide a listing of the environments for obligatory Acc.

h. *kim* (‘who’), but not *ne* (‘what’), requires Acc.

i. NPs modified with *-ki* phrases.

With the exception of possessives, the common denominator of the items in (225) is that they are either individual denoting or quantificational, which fits well with a “semantic incorporation” analysis: Strong NPs (individual and quantificational) require the strong case. The most problematic case for a “semantic incorporation” analysis is possessives. The problem is that possessives can easily have predicative interpretations. Let us observe how.

From a semantic perspective, what makes an expression a predicate is its ability to be true of some objects and false of some others. This is equivalent to saying that the expression denotes a set, the set of objects that the expression is true of. If we consider a possessive like *Ali’nin bir arkadaşı* (‘a friend of Ali’s’) or *Ali’nin varisi* (‘Ali’s heir’) from this perspective, we see that they fit into the above characterization of predicativity. We can conceive worlds that these predicates hold of groups of individuals, namely Ali’s friends and Ali’s heirs. Now the challenge for “semantic incorporation” can be stated as follows. If a possessive construction can be predicative, and ∅-marking is indicative of predicative NPs that get incorporated by the verb, then why it is impossible to have a ∅-marked possessive?

It should be noted that the challenge posed by possessives concerns only the relation between Acc-marking and non-availability of incorporation. Otherwise Zimmermann’s (1993) and van Geenhoven’s (1998) correlation between predicative NPs (or properties) and “opaque” readings still holds. A possessive direct object is ambiguous between a “transparent” and an “opaque” reading, as can be observed in the following example.

(226) Polis Ahmet-in (bir) arkadaş-ı-nı arıyor.
P. A.-Gen a friend-Poss.3sg-Acc seek-Prg
‘The police is seeking for a friend of Ahmet’ (“transparent”/“opaque”)

It has been claimed (Nilsson 1985; von Heusinger and Kornfilt 2005) that Acc-marker can be a purely formal requirement for NPs that carry the possessive suffix *(s)I* (see 225g). For instance, Nilsson (1985:36) comments thus: “It seems as if the very presence of *-(s)I* makes the Accusative marking obligatory regardless of how these words refer.” Her support for this claim is based on the observation that *başkası* (‘some other’) is synonymous with *bir*

başka kişi ('some other person'), but the former but not the latter require Acc-marking. Here are the relevant examples from Nilsson 1985:36, slightly adapted:

(227) a. Başkası*(-nı) gör-eceğ-im-i bekle-m-iyor-dum. (*ibid.* ex. 42)
someone else(-Acc) see-Cmpl-Poss.1sg-Acc expect-Neg-Prg-Pst.1sg
'I wasn't expecting to see someone else.'

b. Başka bir kişi(-yi) göreceğimi bekle-m-iyor-dum. (*ibid.* ex. 43)
else a person(-Acc) see-Cmpl-Poss.1sg-Acc expect-Neg-Prg-Pst.1sg
'I wasn't expecting to see someone else.'

There are two problems with such an approach. One is that in order to maintain this claim, one needs to assume with von Heusinger and Kornfilt (2005) that Acc-marker inflicts its interpretive effects on the object it attaches to only in those cases where it is not obligatory for any other reason. We expressed doubt about such constraints on the grounds of their potential to complicate the theory of grammar. The second problem with "*(s)I* requires Acc" claim is that the generalization does not hold for noun compounds, which also carry the *-(s)I* suffix, as observed by Kelepir (2001). (228) (slightly adapted from Kelepir 2001) is grammatical without Acc-marking on the direct object.

(228) Bugün bir balık çorbası içtim.
today a fish soup-Poss.3sg drink-Pst.1sg
'Today I drank fish soup.'

This suggests that the obligatoriness of Acc-marking is not due to *-(s)I*, but is somehow related with the genitive marked possessor. The cases collated under (225g) can be subsumed under possessives, on the assumption that they have a silent possessor. This is not an unwarranted assumption, given the fact that the forms listed in (225g) can have overt possessors, with the exception of *kimisi* and *(bir) başkası*. Göksel and Kerslake (2005:188) take *bazısı* and *birisi* kind of expressions as partitives, which is in line with the assumption that they involve genitive possessors. We will return below to the issue of why genitive possessors make Acc-marking obligatory. Now we continue with another problem with "semantic incorporation".

We will now propose a test for the tenability of a "semantic incorporation" analysis of Turkish ∅-indefinites. Our test is based on data from coordinating conjunction structures. It

is fairly established in formal semantics and constraint-based grammar formalisms (CCG, H/GPSG, TAG among others) that operations like coordinating and collective conjunction apply to like types (Chomsky 1957; Gazdar 1981). The following type of ungrammaticalities are straightforwardly captured by a constraint as simple as "only coordinate like types".[11]

(229) *Mary [likes Harry]$_{S\backslash NP}$ and [saw]$_{S\backslash NP/NP}$.

Now consider the following sentences:

(230) a. Ahmet-e bir gömlek al-acağım.
A.-Dat a shirt buy-Fut.1sg
'I will buy Ahmet a shirt.'

b. Ahmet-e vitrin-de-ki saat-i al-acağım.
A.-Dat window-Loc-Rel watch-Acc buy-Fut.1sg
'I will buy Ahmet that watch on the window.'

The ∅-marked direct object *bir gömlek* ('a shirt') in (230a) has a non-specific reading, in the most readily available interpretation of this sentence. This means that under a "semantic incorporation" analysis it should be denoting a property, which is of type et. In (230b) on the other hand we have a definite NP at direct object position, which can be analyzed either as an individual (e) or a quantifier (ett). Now we will introduce some structures that conjoin these NPs.

(231) a. Ahmet-e bir gömlek ve vitrin-de-ki saat-i al-acağım.
A.-Dat a shirt and window-Loc-Rel watch-Acc buy-Fut.1sg
'I will buy Ahmet a shirt and that watch on the window.'

b. Ahmete vitrindeki saat-i ve bir gömlek al-acağım.
A.-Dat window-Loc-Rel watch-Acc and a shirt buy-Fut.1sg
'I will buy Ahmet that watch on the window and a shirt.'

The readings we are interested in, if available, are those where the indefinite has a non-specific reading. If we stick to the "semantic incorporation" analysis, then we have to expect such readings not to be available. Otherwise they would violate the well-established constraint of "like category conjunction", as observed below.

[11] See Steedman 2000b and Steedman 2007 for an extensive discussion.

(232) Ahmet-e [vitrin-de-ki saat-i]$_e$ ve [bir gömlek]$_{et}$ al-acağım.
A.-Dat window-Loc-Rel watch-Acc and a shirt buy-Fut.1sg

We repeat the test for referentially "opaque" *ara* ('seek') and another intensional verb *iste* ('want'). Here are the examples:

(233) a. İyi gün-ler, bir görevli ve Ali Bey'i ar-ıyorum.
good morning-Plu a officer and A. mister-Acc seek-Prg
'Good morning I am looking for an officer and Ali.'

b. İyi gün-ler, Ali Bey'i ve bir görevli ar-ıyorum.
good morning-Plu a officer and A. mister-Acc seek-Prg
'Good morning I am looking for an officer and Ali.'

(234) a. Sen-den bir araba ve Gümüldür-de-ki yazlığ-ı istiyorum.
you-Abl a car and G.-Loc-Rel summer house-Acc want-Prg.1sg
'I want from you a car and the summer house in Gümüldür.'

b. Sen-den Gümüldür-de-ki yazlığ-ı ve bir araba ist-iyorum.
you-Abl G.-Loc-Rel summer house-Acc and a car want-Prg.1sg
'I want from you the summer house in Gümüldür and a car.'

We tried these utterances with 6 native Turkish speakers, who are also linguists.[12] We asked them whether they get a specific, non-specific or ambiguous reading for the indefinite NPs, in case they find the sentence grammatical. The results are summarized in 234.

It turns out that our informants judge the coordinating conjunction of a non-specific NP and a definite (therefore specific) NP grammatical for the verbs *al* ('buy') and *iste* ('want'), whereas they find similar conjunctions unacceptable when they appear as the argument of *ara* ('seek'). It is also observed that the indefinite-definite order is slightly favored. The acceptability of (231a) and (234a) cannot be due to the possibility of sharing the accusative marker, since otherwise the (b) variants would be expected to be unacceptable, and they are not.

[12]The author is grateful to Cem Bozşahin, Aslı Göksel, Cem Keskin, Duygu Özge, Ceyhan Temürcü and Deniz Zeyrek for their judgments and comments.

Table 5.1: Native speaker judgments for examples 231, 233 and 234.

Example	*	Nsp.	Sp.	Both	Total
231a: [Indef. & Def.] buy	-	6	-	-	6
231b: [Def. & Indef.] buy	2	4	-	-	6
233a: [Indef. & Def.] seek	5	-	-	-	5
233b: [Def. & Indef.] seek	4	-	-	1	5
234a: [Indef. & Def.] want	-	6	-	-	6
234b: [Def. & Indef.] want	1	5	-	-	6

It is perhaps needless to note that the acceptability judgement tests like the above should be performed with more participants and with a richer variety of verbs to get a more reliable representation of the data. However, we think that the data summarized in 234 is already suggestive. Take (231a) for instance. The only way to bring this example under the rule of "like category conjunction" is to claim that the Acc-marker is shared by the conjuncts. That is, the syntactic structure is [bir NP & NP]-Acc rather than [bir NP & NP-Acc]. One problem with this analysis is that we can no longer defend a correlation between ∅-marking and specificity, since we will have an Acc-marked indefinite interpreted non-specifically. Furthermore, this loss of correlation would be due to coordination only, since we have a specificity effect in a non-coordinated structure. Observe that the following utterance forces the hearer to accommodate a contextual set of clothes or shirts, as would be predicted by Enç (1991).

(235) Ahmete bir gömleğ-i al-acağım.
A.-Dat a shirt-Acc buy-Fut.1sg
'I will buy Ahmet a shirt.'

Another problem with the claim '(231a) does not violate "like category conjunction" because the Acc-marker is shared' is that it leaves unexplained why a majority of the judges find (231b) acceptable with a non-specific *shirt* reading, for which Acc-sharing is not an available option under standard assumptions.

Example (233), which involves a referentially "opaque" verb, exhibits a pattern reverse of the other verbs we have tested. One significance of the data concerning this example is

that it shows that we *are* testing something. The present pattern of judgements give support to van Geenhoven and McNally's (2005) claim that the "opaque"/"transparent" distinction is due to a type difference between the objects, rather than being due to what *seek* does to its property denoting arguments (Zimmermann 1993).

It is interesting to observe that *iste* ('want'), another intensional verb, shows a different pattern than *seek*. We will have to leave the investigation of the relevant difference between *seek* and *want* to future work.

To sum up, Turkish coordinating conjunction data suggest that the difference between a Acc- vs. ∅-marked indefinite object may not be a type difference, at least for "transparent" verbs like *al* ('buy').[13] In the next section we will discuss an alternative analysis that treats Acc and ∅-marked objects of "transparent" verbs typewise identical, and seeks the difference somewhere else.

In this section we have discussed the phenomenon of "semantic incorporation" as proposed in van Geenhoven 1998, and observed that it has some appealing aspects vis-a-vis Turkish data discussed in Chapter 3. Then we argued on the grounds of genitive-possessive constructions that "semantic incoporation" cannot provide an answer as to why Acc-marking is obligatory for certain constructions (see 225 above). Then we raised a somewhat more serious objection to the "semantic incoporation" analysis. Namely, we showed that the Acc- vs. ∅-marking of the objects of "transparent" verbs and some intensional verbs like *iste* ('want') cannot be due to a type difference between such marked objects. This latter result applies to other proposals that would construe Acc- vs. ∅-distinction as a type difference. Among such proposals are de Hoop 1996 and Chung and Ladusaw 2004.

5.2 The Proposal

We propose that at the center of the difference between Acc- and ∅-marking of indefinites lies the distinction between properties and kinds. The basic distinction between a property and a kind is that the latter is a general category. Every description that can collate some individuals

[13] We should note that *al* ('buy') is *arguably* "transparent". However, our own native judgement is that the pattern observed for *al* ('buy') holds as well for more clearly "transparent" verbs like *getir* ('bring'), *ver* ('give'), *oku* ('read') and so on. We have not tested these with other native speakers, and have to rely on our own judgement for the moment.

under itself can be thought of as a property, whereas the same cannot be said of kinds. As what can be deemed general enough to qualify for a kind is a highly usage and cultural-background based notion, we have to lean on the reader's intuitive grasp of the notion, as is usually done. Take for instance some comments from the literature on the vagueness of what counts as a kind.[14]

(236) a. Chierchia 1998:348: "What counts as kind is not set by grammar, but by the shared knowledge of a community of speakers. It thus varies, to a certain degree, with the context, and remains somewhat vague."

b. Krifka *et al.* 1995:11, nt. 9: "We will not attempt to offer any sort of analysis of the notion 'well-established kind'. The distinction is real enough and is quite striking in its effect on example sentences, but we have no well-formed thoughts as to what the contrast owes its origins."

Let us first summarize the present analysis:

(237) a. Turkish bare nouns can denote kinds, for which we use the notation $N_{[\mathrm{k}]}$.

b. The expression *bir*, under one of its readings, has the following category:

$$\textit{bir}_k \quad := \quad S_{[\mathrm{n}]} \backslash NP / N_{[\mathrm{k}]} \quad : \quad \lambda k \lambda x . \mathbf{Ins}(x, k) \wedge |x| = 1$$

which when applied to a kind denoting N expresses the predicate "λx[is a group of individuals that instantiates the kind denoted by N and that has the cardinality 1". The syntactic feature [n] indicates that what results from the application of *bir* to a kind denoting noun is a nominal predicate, rather than a verbal one.

c. A '$\textit{bir}_k$ N' predicate like:[15]

$$\textit{bir}_k \textit{ kitap} \quad := \quad S_{[\mathrm{n}]} \backslash NP \quad : \quad \lambda x . \mathbf{Ins}(x, \mathbf{book}') \wedge |x| = 1$$

[14] See also Carlson 1977:26ff.

[15] This is nothing but $\textit{bir}_k$ applied to a kind denoting N.

can appear in an argument slot by type-shifting to an object position[16] existential quantifier, which takes the form:[17]

$$\textit{bir kitap-}\emptyset \quad := \quad S\backslash NP/(S\backslash NP\backslash NP) \quad : \quad \lambda q\lambda y\exists x.\mathbf{Ins}(x,\mathbf{book}')\wedge |x|=1\wedge q\,x\,y$$

where we stipulate that the resulting existential quantifier seeks the predicate immediately to its right, under a string adjacency requirement.

d. We distinguish $\textit{bir}_k$ from another interpretation of *bir*, which applies to properties and yields referential terms by picking an item from the extension of the property (at a given index). The form that the referential term takes is again of a generalized Skolem term. The category for this reading of *bir* is as follows:

$$\textit{bir}_d \quad := \quad NP/N \quad : \quad \lambda p.sk^{\mathcal{E}}_{\lambda x.p\,x\wedge|x|=1}$$

e. Referentially opaque verbs like *ara* ('seek') subcategorize both for a referential argument and a property (see Zimmermann 1993 and the discussion on "like category conjunction" above). Their property licensing category requires the property to be strictly left-adjacent.

f. Every direct object argument that is not licensed under cases (b) or (c) is marked with Acc. In effect, this means that only existential quantifications over instances of kinds headed by $\textit{bir}_k$ and property denoting arguments (like those of *seek*) can appear with $\emptyset$-object marking.

The rest of this chapter is devoted to the justification of the claims given in (237).

5.2.1 Motivating $\textit{bir}_k$

Let us start with (237a), repeated here.

(238) Turkish bare nouns can denote kinds, for which we use the notation $N_{[\mathrm{k}]}$.

[16] Note that the syntactic type is adapted to project the subject argument of the predicate that the existential quantifier applies to, as in standard generalized Quantifier syntax/semantics.

[17] Here we follow Chierchia 1998 with a minor modification. Chierchia 1998 takes the determiner itself to be a type-shifter. We follow Partee 1987 in assuming that such kind of type-shifting can be effectuated by a lexical rule or $\emptyset$-morphology.

This observation is based on the existence of sentences like the following where a reference to a kind is manifested with different case-makers:

(239) a. Çocuk-lar çikolata-ya bayıl-ır.
kid-Plu chocolate-Dat like very much-Aor
'Kids like chocolate very much.'

b. Fransızlar zımba-yı icat et-ti.
French stapler-Acc invent-Pst.3sg
'French invented the stapler.'

c. Bilgisayar tüm hayatımız-ı değiştir-di.
computer whole life-Poss.1pl-Acc alter-Pst.3sg
'The computer altered the whole of our lives.'

The claim concerning the predicate nominals headed by *bir* may not be as obvious as this. We repeat the claim here.

(240) The expression *bir*, under one of its readings, has the following category:

$$bir_k \quad := \quad S_{[\mathrm{n}]} \backslash NP / N_{[\mathrm{k}]} \quad : \quad \lambda k \lambda x . \mathbf{Ins}(x, k) \wedge |x| = 1$$

which when applied to a kind denoting N expresses the predicate "λx[is a group of individuals that instantiates the kind denoted by N and that has the cardinality 1". The syntactic feature [n] indicates that what results from the application of *bir* to a kind denoting noun is a nominal predicate, rather than a verbal one.

Now let us go on with some contrasts between NPs headed by bir_k and other predicative NPs. By predicative NPs we mean those NPs that can occur at "predicative positions" exemplified by the italicized NPs in the following examples from Williams 1983.

(241) a. John became *a doctor*. (*ibid.* ex. 3)

b. Every acorn grows into *a tree*. (*ibid.* ex. 6)

Now consider the following discourse, where (242b) and (242c) are meant as alternative continuations to (242a).

(242) a. Bu kardeşim Hasan
this sibling-Poss.1sg H.
'This is my brother Hasan.'

b. Kendisi bir akademisyendir.
he a academician-Cop.3sg
'He is an academician.'

c. Kendisi akademisyendir.
he academician-Cop.3sg
'Lit: He is academician.'

There is a subtle difference between (242b) and (242c), which we will take up below. The significance of these examples for the moment is that they are both acceptable. Now we will introduce a "kind reference blocking" item, namely a locative modifier involving a proper name, into the picture. Observe the following contrast.

(243) a. Kendisi Sabancı Üniversitesi-nde akademisyen-dir.
he S. University-Loc academician-Cop.3sg
'Lit: He is academician at Sabancı University.'

b. *#Kendisi Sabancı Universitesinde bir akademisyen-dir.
he S. University-Loc a academician-Cop.3sg
'He is an academician at Sabancı University.'

Our explanation for the oddness of (243b) is that the locative modifier provides an anchor to a specific situation which contradicts the general kind-referring interpretation provided by the bir_k headed nominal predicate. The constraint in operation in (243b) can also be stated as follows: Being an academician at Sabancı University is not general enough to qualify as a kind description. This data also shows that indefinite copular complements are headed by bir_k. This we think is the source of the subtle difference between (242b) and (242c). (242b), which involves bir_k, appears to be attributing to the subject somewhat more general properties of academics as compared to (242c). In our judgement, the latter is more appropriate for stating the occupation of the subject, without implying much beyond this. Given the lack of a

thorough pragmatic analysis, our remarks on the difference between (242b) and (242c) have to remain suggestive.

Deniz Zeyrek (p.c.) observes that cases like (243b) improves significantly with a slight change in context as in the following.

(244) Kahramnımız Sabancı Universitesinde bir akademisyen-dir.
our antagonist S. University-Loc a academician-Cop.3sg
'Our antagonist is an academician at Sabancı University.'

We think that this improvement is expected, given that "story beginning" contexts like (244) above are the places where we would like to led the hearer first to form a general image of the antagonist described.

Another asymmetry between a bir_k indefinite and a predicative NP is observed in the context of the verb *seç* ('elect'). bir_k indefinites are banned from the direct object slot of this verb, as can be observed in (245).[18]

(245) Ahmet-i (*bir) denetçi seçtiler.
A.-Acc (a) auditor elect-Pst-Plu
'They elected Ahmet auditor.'

The ungrammaticality in (245) is expected, given the intuitive implausibility of electing someone an instance of a kind. Compare (245) with the following example, which involves a verb that is more compatible with kind denotations.[19]

(246) Ahmet-i (bir) denetçi yaptılar.
A.-Acc (a) auditor make-Pst-Plu
'They made Ahmet an auditor.'

[18] Nilsson (1985:47) cites a similar example involving a bare plural:

i Kardeşlerimi temsilciler seç-ti-ler.
sibling-Plu-Poss.1sg representative-Plu chose-Pst-Plu
'It was the representatives who chose my brothers'
'*They elected my brothers representatives.'

She correctly observes that the only reading is " '(It was) the representatives (who) chose my brothers' ". The ungrammaticality of a bare plural as the object of *seç* ('elect') is expected, given that bare plurals are cross-linguistically associated with kind denotations. However the above data concerning bare plurals is only suggestive, as we do not provide an analysis of bare plurals in the thesis.

[19] Once again we need to lean on intuitions for the relevant difference between *seç* ('elect') and *yap* ('make').

The presence of *bir* is acceptable in (246), especially if *bir denetci* ('an inspector') is interpreted as an occupational attribute, rather than associated with a contextually specified particular business.

5.2.2 Obligatory Acc-marking

The proposal in (237) above entails that if a nominal is not suitable for a kind-based denotation, then it cannot go ∅-marked when appearing as an argument of a verb subcategorized for an e type argument, it has to receive Acc. When we look at the list of structures that require Acc-marking given in (225) above on page 122, except for genitive-possessive constructions and related structures bearing the *(s)I* suffix, it is obvious that the structures listed there cannot be treated as kind terms. Any sort of "anchoring" to a discourse referent blocks the possibility of kind denotation. For instance Carlson (1977:316) observed that the following type of bare plurals never denote a kind.

(247) a. parts of that machine

b. people in the next room

c. books that John lost yesterday

We argue that a similar blocking of kind denotation applies to genitive-possessive constructions as well. Let us observe that Turkish genitive-possessive constructions lack a "kind-modifying" reading as in *men's shoes*. They only have "referent-specifying" reading.[20] The former type of "kind-modifying" readings are realized by possessive compounds like those in Kelepir's (2001) 'fish soup' example repeated here.

(248) Bugün bir balık çorbası içtim.
today a fish soup-Poss.3sg drink-Pst.1sg
'Today I drank fish soup.'

As predicted, ∅-marking is licensed due to the availability of kind interpretation for *balık çorbası* ('fish soup'), although it bears the possessive suffix *-(s)I*.

Another support for the incompatibility of genitive-possessive constructions with kind denotations comes from examples like the following:

[20]The "kind-modifying" vs. "referent-specifying" terminology is due to Partee and Borschev 2005.

(249) a. Bundan kapı(*-nın) kolu yap-acağız/ol-maz.
this-Abl door(-Gen) knob-Poss.3sg make-Fut.2pl/become-Neg
'We will make a door knob out of this./This wouldn't make a door knob.'

b. Senden şirket(*-in) müdür-ü yapacağız/olmaz.
you-Abl firm(-Gen) director make-Fut.2pl/become-Neg
'We will make a firm director out of you/You wouldn't make a firm director.'

The constructions in (249) intuitively select for kind denoting NPs, and we think this is why they do not accept genitive-possessives at the kind term requiring slot.

The above discussion indicates that our proposal is successful in arriving at a generalization of the form 'X → Acc', namely that whenever a kind denotation is unavailable Acc is obligatory.

The above point also has a bearing on the issue of why certain verbs favor Acc-marked objects over ∅-marked ones (see §3.2.7.2). Most such verbs are pragmatically odd for existentially quantifying over their direct objects, and doing this over instances of general kind denotations.

5.2.3 Acc vs. Other Case-markers

Some authors have claimed that not only Acc but all the case markers in Turkish give rise to specific readings (Aygen-Tosun 1999; Kennelly 2003; Kılıçaslan 2006; Nakipoğlu 2009). However, we observed in §3.2 that, generally, whatever interpretive effect is induced by Acc, that effect is optional for other cases. The topic of this section is the nature of this asymmetry between Acc and other case-markers.

An important difference between -Acc and other cases is that -Acc is the only case that is necessarily referential. Other cases can have predicative interpretations besides referential ones. In order to clarify the distinction, consider the following asymmetry between -Acc and -Dat.

(250) a. Misafir-ler-e sandalye fırlat-tı-lar.
visitor-Plu-Dat stool throw-Pst-Plu
'They threw stools at the visitors.'

b. Misafir-ler-e sandalye-yi fırlat-tı-lar.
visitor-Plu-Dat stool-Acc throw-Pst-Plu
'They threw the stool at the visitors.'

c. Misafir-ler-i sandalye-ye oturt-tu-lar.
visitor-Plu-Dat stool-Acc seat-Pst-Plu
'They seated the visitors to stools.'
'They seated the visitors to the stool.'

(250a) does not involve any particular stool. The term *sandalye* ('stool') can best be analyzed as a kind term, especially given that it is number neutral.[21] (250c) has (at least) the following two readings: (i) the guests are seated, it was all stools where they were seated; and (ii) the guests are seated to a salient contextual stool. The second reading is rather implausible, though possible. When it comes to (250b), the only available reading is the one that involves a contextually salient stool. This difference illustrates what we mean by *Acc is the only case that is necessarily referential*. It should be noted that being referential in the above sense does not exclude reference to kinds. For instance in one of the readings of the following sentence, although no particular stool is involved, the Acc-marked NP is still referential, it refers to a particular kind.

(251) Ayşe sandalye-yi sev-di
A.-Nom stool-Acc like-Pst.3sg
'Ayşe liked the stool.'

A similar pattern can be observed for indefinites. All the non-subject case-markers other than Acc can appear as copular complements, receiving predicative interpretations.

(252) a. Mektup Ali-ye.
letter A.-dat
'The letter is for Ali.'

b. Mektup Ali-de.
letter A.-Loc
'Ali has the letter. (lit: The letter is at Ali)'

[21] See Krifka *et al.* 1995 for an argument that noun incorporation structures are best analyzed as involving kind terms.

c. Mektup Ali-den.
letter A.-Abl
'The letter is from Ali.'

d. Çocuklar Ali-yle.
children A.-Ins
'The children are with Ali.'

e. *Çocuklar Ali-yi.
children A.-Acc

All the sentences (except the last one) are fully saturated clauses. The last one with the Acc-marking is only interpretable as an elliptical utterance, as in the following exchange.

(253) a. Ali mi çocuklar-ı park-a gotür-dü?
A. QPart cildren-Acc park-Dat take-Past
'Was it Ali who took the children to the park?'

b. Hayır, çocuklar Ali-yi...
no children A.-Acc
'No, the children *took* Ali *to the park*.' (italics indicate elided constituents)

Now we will argue that the above asymmetry between Acc and other case-markers can be accounted for in coherence with our interpretation of bare indefinites ('bir_k N') given in §5.2.

First let us observe that the predicative force of non-Acc cases does not stem from the nominal they attach to. This can be seen by replacing the proper name *Ali* in (252a–d) with a personal pronoun—the paradigm case of a non-predicative expression—, and observing that the predicative interpretation stays intact. This shows that non-Acc markers contribute predicates on their own. This state of affairs justify the assignment of the following predicative interpretation to a dative NP like *Ali-ye*.

(254) *Ali-ye* $:=$ $S_{[\mathrm{n}]}\backslash NP$: $\lambda x.to'ali'x$

which expresses that *Aliye* is a predicate which is true of objects (which includes individuals, events, actions and so on) that stand in a to' relation to the individual Ali. The actual content

of to' need not concern us here. It may be a very general conceptual category like 'directedness' to be further specified by the context or verbal semantics. The dative marker itself gets the following catgory:

(255) *-Dat* := $S\backslash NP\backslash NP$: $\lambda x\lambda y.to'xy$

When it comes to combining dative NPs with verbal predicates, we are faced with a type-mismatch problem. Verbs are traditionally taken to denote relations among individuals, and it is impossible to combine a property with an individual seeking functor. For the solution of this problem we follow Zimmermann (1993); Ladusaw (1994); van Geenhoven (1998); van Geenhoven and McNally (2005) and others in assuming that verbs may directly subcategorize for properties as their arguments. This means that a dative object seeking verb like *ver* ('give') has the following category:

(256) *ver* := $S\backslash NP_{[\mathrm{nom}]}\backslash NP_{[\mathrm{acc}]}\backslash(S_{[\mathrm{n}]}\backslash NP)$: $\lambda p\lambda x\lambda y\exists e.give'xye \wedge p(direction'e)$

Now a sentence like (257a) can receive the interpretation in (257b).

(257) a. John Ali-ye kitabı verdi.
J.-Nom A.-Dat book-Acc give-Pst.3sg
'John gave ali the book.'

b. $\exists e.give'(the'book')j'e \wedge to'ali'(direction'e)$

(257b) says that there exists an event which is an event of John withdrawing the possession of a contextually salient book, and which is directed toward Ali.

Now let us observe how the above treatment of datives (which we claim applies to other case-markers except Acc) coheres with our analysis of indefinites. Take the following discourse:

(258) a. Ali-ye neden kızdın?
A.-Dat why get angry-Pst.2sg
'Why are you angry at Ali.'

b. Çünkü önemli bir konferans-a katıl-ma-dı.
because important a conference-Dat attend-Neg-Pst.3sg
'Because he didn't attend an important conference.'

c. Çünkü önemli bir kitab-ı getir-me-di.
because important a book-Acc bring-Neg-Pst.3sg
'Because he didn't bring an important book.'

The answer in (258b) is ambiguous between an existential reading where there is an important conference that Ali missed, and a narrow indefinite reading where the problem with Ali is that he did not attend to any important conference at all. Such kind of ambiguity is absent for (258c), which seems to have only the reading where there is an important book that Ali failed to bring.

We argue that the above difference between Acc and dative marking follows from the fact that dative marker can be combined with two sorts of *bir* NPs, whereas Acc-marker is applicable only to the non-kind oriented *bir* NP. To put it differently, the dative marked sentence is ambiguous because it may involve either the kind oriented bir_k or the determiner bir_d, whereas the Acc-marked sentence has the latter option only.

Let us first illustrate how the "specific" readings are derived. For the Acc-marked (258c) the task is straightforward. The bir_a modified NP *önemli bir kitap* ('an important book') is a Skolem term of the form $sk_{important' book'}$. Being an ordinary argument it must be marked with Acc-case and saturate the direct object slot of the verb *getir* ('bring'). The resulting interpretation looks like this:[22]

(259) $\neg(bring' sk_{important' book'} a')$

This formula is true if and only if an important book can be found in the discourse model such that Ali didn't bring it (see the model theory in Chapter 4).

As for the dative-cased (258b), there exists two possibilities as to whether bir_k or bir_d will participate in the derivation. The bir_k option was not available for the Acc-marked (258c), because NPs headed by bir_k look for predicates, which is something Acc is not, but the dative marker is.

[22]It is immaterial what we assume for the scope of negation.

First let us take bir_d which yields the following interpretation for the dative marked NP *önemli bir konferans-a* ('an important conference-Dat'):

(260) *önemli bir konferans-a* := $S_{[\mathrm{n}]}\backslash NP$: $\lambda x.to'sk_{imp'\,conf'}\,x$
important a conference-Dat

We interpret *katıl* along the assumptions made above as follows:

(261) *katıl* := $S\backslash NP_{[\mathrm{nom}]}\backslash(S_{[\mathrm{n}]}\backslash NP)$: $\lambda p\lambda x\exists e.attend'xe \wedge p(direction'\,e)$
attend

Applying this verb to the dative NP (260), we get:

(262) *önemli bir konferansa katıl* := $S\backslash NP$: $\lambda x\exists e.attend'xe \wedge to'sk_{imp'\,conf'}(direction'\,e)$
important a conf.-Dat attend

We can either apply the negation operator now, or—assuming with Kelepir (2001) that Turkish negation is clausal—after the dropped subject (i.e. Ali) is specified. In either case, the interpretation we arrive at is the following.

(263) (258b) := S : $\neg(\exists e.attend'ali'e \wedge to'sk_{imp'\,conf'}(direction'\,e))$

which captures the "specific conference" interpretation we are after. This formula is true if and only if we can find an important conference in the model such that Ali failed to attend it.

Now let us illustrate how the "non-specific conference" reading for (258b) is derived. The only difference from the above case is that we have bir_k instead of bir_d. This kind selecting operator is assumed to apply to the kind term *onemli konferans* ('important conference').[23] Under this interpretation of *bir* the NP *önemli bir konferans* takes the following category.

(264) *önemli bir konferans* := $S\backslash NP/(S\backslash NP\backslash NP)$: $\lambda v\lambda y\exists x.\mathbf{Ins}(x,\mathbf{imp'conf'})\wedge |x|=1\wedge v\,x\,y$
important a conf.

When we apply this existential quantifier over instances of kinds to the dative marker, we obtain the following.

[23] We gloss over the details of how *bir* is "infixed" to the nominal, sufficing to note that the most straightforward way of doing it is to use crossed composition (see §4.1).

(265) *önemli bir konferans-a* := $S\backslash NP$: $\lambda y \exists x.\mathbf{Ins}(x, \mathbf{imp'conf'}) \wedge$
important a conf.-Dat $|x| = 1 \wedge to' x\, y$

Then this predicate is absorbed by the verb *katıl*, the dropped subject is specified and the negation operator is applied. The result is:[24]

(266) (258b) := S : $\neg[\exists e[attend' ali' e \wedge \exists x.\mathbf{Ins}(x, \mathbf{imp'conf'}) \wedge |x| = 1 \wedge to' x\,(direction' e)]$

As desired, the existential quantification over instances of the kind "important conference" falls within the scope of negation, resulting in a "non-specific conference" reading.

The present explanation for the ambiguity of non-Acc-marked cases with respect to negation applies to other scope phenomena like nominal quantification and attitude verbs as well. This provides further justification for the proposal in (237).

5.2.4 Discourse-linking Revisited

In this section we discuss what the present proposal makes of "reference domain specification" (Nilsson 1985) or discourse-linking (Enç 1991) effects associated with Acc.

Let us first discuss a proposal from the literature. Zidani-Eroğlu (1997:§2.4) claims that out-of-the-blue Acc-marked indefinites can still be subsumed under a discourse-linking account. This is done by proposing that the discourse-linking presupposition carried by the Acc-marked indefinite is accommodated in the sense of Lewis 1979. However, we will argue that the notion of accommodation does not afford a way to subsume out-of-the-blue Acc-marked indefinites under Enç's (1991) Acc-specificity (discourse-linking) correlation. Our argument is as follows.

The relevant type of accommodation is "presupposition accommodation", which Lewis (1979:340) explains thus:

> If at time t something is said that requires presupposition P to be acceptable, and if P is not presupposed just before t, then—*ceteris paribus* and within certain limits—presupposition P comes into existence at t.

[24] We ignore the prefix *çünkü* ('because') in our analysis of (258b).

Let us observe some clear cases that involve presupposition accommodation in the above sense. Take the following sentence:

(267) Yarın Ahmet-in kızının yaş günü.
tomorrow Ahmet-Gen daughter-Poss.3sg-Gen birthday-Poss.3sg
'Tomorrow is Ahmet's daguhter's birthday.'

Assume that you do not know whether Ahmet had a daughter or not until you've heard this utterance. Under normal conditions, upon hearing such an utterance you silently accommodate the speaker by adjusting your knowledge base by adding there that Ahmet has a daughter. The presupposition in question was contributed via the genitive-possessive construction. Another common presupposition trigger is intonational structure. Consider the following:

(268) Ali Aynur-u *görüyormuş.*
A. A.-acc see-Prg-Ev.Cop
'Ali has been seeing Aynur.'

This utterance carries the presupposition that whether Ali was seeing Aynur was an issue. If you were totally unaware of such a state of affairs at the time you heard this utterance, then there are a number of possibilities. You may think "Hmm, I didn't know that there was something between them" and adjust your beliefs accordingly; or you may interrupt the speaker and ask for some clarification. The point is that you have to take one of these options, if you care to stay engaged in a cooperative conversation.

In both of the cases examined above, in order for the uttered sentence to have a truth value certain other facts have to be in place. If they are not, you have to adjust your representation of the world so that they are in place. Now let us return to the case of Turkish Acc-marked indefinites, and observe some cases of presupposition accommodation. Assume you hear someone saying:

(269) Dekan-a bir *evrağ-ì* götür-eceğim.
dean-Dat a document-Acc take-Fut.1sg
'I will take a document to the dean.'

When uttered out-of-the-blue (269) needs some extra inference or some help from the speaker in order to be made sense of. It is important to note that (269), with the indicated

accentuation, arguably does not give rise to a Enç-style partitivity implication. We think hearing such a sentence is not likely to make someone picture a contextually established set of documents or items where one document is being picked from . A scenario likely to be accommodated upon hearing (269) is this. There is a certain document that the speaker needs to hand in to the dean, and s/he announces that s/he will now get engaged in doing so. The scenario we have in mind can be made clear by the following continuation.

(270) Dekan-a bir *evrağ-ì* götür-eceğim. Az sonra gel-iyorum...
dean-Dat a document-Acc take-Fut.1sg little later come-Prg.1sg
'I will take a document to the dean. I'll be back soon...'

The proper setting that would induce an Enç-style partitivity implication can be provided by altering the accentuation in (269) as follows:

(271) Dekana bir evrağ-ı *götüreceğìm*.
dean-Dat a document-Acc take-Fut.1sg
'I will take a document to the dean.'

Now it is fairly reasonable to accommodate a state of affairs where there exists a set of documents (numeral interpretation for *bir*), or with a somewhat longer stretch of imagination a set of objects (in which case *bir* may be determiner), from amongst which the document in question is picked.

All the cases we have been discussing thus far are cases of genuine accommodation. Now take the following sentences.[25]

(272) a. Duy-dun mu? Ahmet bir *ìşadamı-nı* kaçır-mış.
hear-Pst.2sg QPrt A. a businessman-Acc kidnap-RprPst.3sg
'Did you hear it? Ahmet has kidnapped a businessman.'

b. Duy-dun mu? Ahmet bir *travesti-yì* bıçaklamış.
hear-Pst.2sg QPrt A. a transvestite-Acc stab-RprPst.3sg
'Did you hear it? Ahmet has stabbed a transvestite.'

We do not see any grounds for claiming that the hearer of these sentences needs to accommodate a contextual set from which businessmen or transvestites are drawn. The hearer

[25]We chose "news" sentences for illustration so as to minimize the need for accommodation.

can simply add the semantic content of these utterances to her/his knowledge base without performing any extra adjustments, beyond those implied or entailed (but not presupposed) by the propositions expressed. For instance, the businessman kidnapped by Ahmet can be from any sector, societal class, nationality whatsoever. There is absolutely no restriction beyond businessman-hood. Likewise for the stabbed transvestite.

Now we will argue that Enç's (1991) partitivity effect is induced only under certain conditions and therefore is not in a direct association with the Acc-marker. Consider the following pair of examples:

(273) a. Dün bir doktor-u arabasını yıkarken gördüm.
yesterday a doctor-Acc washing his car saw.1sg
'Yesterday, I saw a doctor washing his car.'

b. Dün bir doktor-u hastasına sigara ikram ederken gördüm.
yesterday a doctor-Acc offering a cigarette to his patient saw-1sg
'Yesterday, I saw a doctor offering a cigarette to his patient.'

The crucial observation here is that (273a) is very likely to lead the hearer to think that the speaker is assuming that they have a specific set of doctors in their common ground prior to the utterance. The same cannot be said for (273b) though. It is perfectly acceptable as a discourse initiator. Why is there such a difference between these two sentences? Or, if Acc-marker implies discourse-linking, as Enç (1991) claims it to be, then why the hearer of (273b) can get away without linking the doctor to previous discourse? Our explanation, which needs to remain somewhat sketchy, is as follows.

The Acc-marker has no role in indicating discourse-linking. It only indicates the indefinite to its left is a generalized Skolem term. It should be underlined that it is not the Acc-marker that makes the indefinite a generalized Skolem term. A generalized Skolem term is a referential device that denotes a discourse referent in some real or possible situation. It comes with a descriptive content for the hearer to add an appropriate discourse referent to his or her discourse model. We can call this a kind of accommodation, but it should be observed that what is accommodated is the discourse referent itself, *not* a discourse-linking relation to a previously established discourse object. In this setting, there is no difference between what goes on in (273a) and (273b), as far as the syntax and interpretation of the Acc-marker is

concerned. The reason why the hearer of (273a) is lead to get a discourse-linked reading is simply that s/he cannot make sense of the utterance without doing so. The speaker of (273a) asks the hearer to create a doctor referent in her discourse model and tells something about this doctor. However under standard assumptions about the world there is nothing interesting about a doctor washing his car, *unless* this doctor is a familiar one. In (273b) on the other hand, it is enough that there is some doctor referent in the discourse model for the utterance to make sense, since given *any* doctor it is note-worthy that s/he is offering a cigarette to her/his patient, if we stick to the standard assumptions that doctors are there to cure their patients and smoking is bad for health.

We think that the principles that govern the (un)availability of a D-linked reading in cases like (273) is of the same kind of those that govern the "neutral" accentuation pattern of utterances we discussed in §3.3 above. If we compare the amount of uncertainty eliminated by the continuations after the interpretation has reached the NP *bir doktoru*, we see that an informational unit like *washing one's car* is a "narrow cohort item" if we are saying something about an unfamiliar doctor. This is so because *washing one's car* is not one of the attributes or actions that would be of interest about a doctor under normal conditions. If we are talking about an unfamiliar doctor, what we say of her/him should worth saying it. The attribute *offering his patient a cigarette* is such a predicate, as it is contradictory to what we would normal expect of a doctor.

We can also observe the negative effect of high predictability in the same context. For instance take the following sentence:

(274) Geçen gün bir doktor-u bir hastasıyla konuşur-ken gördüm.
passed day a doctor-Acc a patient-Poss.3sg-Ins talk-while see-Pst.1sg
'The other day, I saw a doctor talking to one of his patients.'

We are again compelled to accommodate a familiar set of doctors, this time because the predicate is highly predictable and therefore cannot be the point of the utterance.

Similar observations can be made in cases where the indefinite is in the focus of the sentence, suggesting that what is at issue is not the distinction between focal vs. non-focal information. Consider the following minimal pair:[26]

[26] "Net" is the name of a famous pub in Ankara.

(275) a. Dün gece Net'te bir profesör-ü gördüm.
yesterday night N.-Loc a professor-Acc see-Pst.1sg
'Last night I saw a professor at Net.'

b. Dun gece Net'te bir profesör-ü ağırladım.
yesterday night N.-Loc a professor-Acc host-Pst.1sg
'Last night I hosted a professor at Net.'

At the point where the interpretation reaches the NP *bir profesör*, the hearer expects something informative. That is, something which is not highly predictable and which eliminates alternatives that would be of interest to state about a professor. As the predicate *gör* in (275a) does not fulfil either of these conditions, we are compelled to employ a repair mechanism to make sense of the utterance (or equivalently to make sense of the speaker's intentions). The most immediately available repair is to think that the speaker is talking about a mutually known familiar professor. No such inferential repair mechanism is triggered for (275b) because, at least in some cultures, professors are important persons and it is interesting to report that one hosted a professor.

We believe that similar scenarios may be devised for any example that is put forward to motivate the claim that Acc-marker is a trigger for D-linking or partitivity. We close this section with an example from Enç 1991.

(276) a. Ali bir piyano-yu kirala-mak ist-iyor. Enç 1991:ex. 12
A. a piano-Acc rent-Inf want-Prg.3sg
'Ali wants to rent a piano.'

b. Ali bir piyano-yu yemek masası-na dönüştür-mek ist-iyor.
A. a piano-Acc dining table-Dat turn-Inf want-Prg.3sg
'Ali wants to turn a piano into a dining table.'

In our judgement when we replace the predicate *kiralamak*, which is highly predictable given a piano as the topic of the sentence, with a more "interesting" one, we are no longer forced to D-link the NP which was the case in the original utterance. We claim the difference between (276a) and (276b) is a case in point.

5.2.5 Opacity Revisited

In §3.2.4.1, we saw that Acc-marked objects of referentially opaque verbs like *ara* ('seek') receive a "transparent" reading (277b), whereas ∅-marked ones receive an "opaque" reading when animate (277a), and both type of readings when inanimate (278) (Dede 1986).

(277) a. Bir sekreter ar-ıyor-um. ("opaque")
a secretary seek-Prg-1sg
'I am looking for a secretary.'

b. Bir sekreter-i ar-ıyor-um. ("transparent")
a secretary-Acc seek-Prg-1sg
'I am looking for a secretary.'

(278) Bir kitap arıyor-um. Bulamıyor-um. "opaque/transparent"
a book looking for-1sg can't find-1sg
'I am looking for a book. I can't find it.'
'I am looking for a book. I can't find one.'

In this section we will argue that the difference between (277a) and (278) is not due to animate/inanimate distinction, but lies elsewhere.

First let us observe that in (279), even though we have an inanimate ∅-object, a "transparent" reading is not as likely to arise as it is in (278).

(279) Bir tornavida arıyorum. ("opaque"/?*"transparent")
a screwdriver seek-Prg.1sg
'I am looking for a screwdriver.'

suggesting that what is at issue may not be animacy.

We will follow Zimmermann (1993); van Geenhoven and McNally (2005) in assuming that referentially opaque verbs describe relations between individuals and properties on their "opaque" readings, while they describe relations between individuals and individuals in their "transparent" reading. In §5.1, we saw that Turkish coordinating conjunction data gives support to the claim that the types of the "transparent" and "opaque" objects are not identical. We follow van Geenhoven and McNally (2005) in assuming that this distinction is realized by

the ambiguity of the referentially opaque verb under consideration. For instance *ara* ('seek') receives the following categories:

(280) a. $ara \quad := \quad S\backslash NP_{[\mathrm{nom}]}\backslash NP_{[\mathrm{acc}]} \quad : \quad \lambda x\lambda y.seek'xy$

b. $ara \quad := \quad S\backslash NP_{[\mathrm{nom}]}\backslash (S_{[\mathrm{n}]}\backslash NP) \quad : \quad \lambda p\lambda y.seek'py$

With these assumptions the sentences in (277) get the following readings, respectively:

(281) a. $seek'sk_{secretary'}me'$

b. $seek'(\lambda s\lambda x.\mathbf{Ins}_s(x, \mathbf{secretary'}))me'$

(281a) is true in models where there can be found a secretary referent the speaker is seeking. (281b) on the other hand involves no secretary referent. It depicts a relation between the speaker and the property of being a secretary. The question is why we have an additional "transparent" reading when *secretary* is replaced by *book*. Our assumptions assign the following interpretation to such a sentence (which was exemplified in 278).

(282) $seek'(\lambda s\lambda x.\mathbf{Ins}_s(x, \mathbf{book'}))me'$

Now let us observe an important contrast. Take the following two discourses.

(283) a. Bir tornavida ar-ıyorum. Siz-de var mı acaba?
a screwdriver seek-Prg.1sg you-Loc exists QPrt I wonder
'I'm looking for a screwdriver. Just wondering if you have one.'

b. Bir kitap arıyorum. Sizde var mı acaba?
a book seek-Prg.1sg you-Loc exists QPrt I wonder
'I'm looking for a book. Just wondering if you have one/it.'

The speaker of (283a) can stop after uttering the sentence, and wait for the hearer to respond. However without any further clarification, (283b) is odd, unless we infer that the speaker is in need of a book for using it as an object (say to support something) or s/he is so bored that s/he can read anything. However these latter type of readings are not ones that we *usually* associate with people seeking books. Therefore when we hear someone say *Bir kitap arıyorum* ('I am looking for a book') we are inclined to think s/he is after a certain type

of a book, which is under normal conditions is likely to be a certain title. In such a case the speaker still announces that s/he is in the seeking relation with a property, rather than a particular book object. The property is being an instance of a certain title (say *Crime and Punishment*. As all the object-level instances of *Crime and Punishment* are identical for the purposes of someone who is after that title, an illusion of a "transparent" reading arises.

The mechanism we sketch above may need further elaboration or may be completely wide of the mark. However, we think it to be clear that whether a sentence like (278) gets a "transparent" or "opaque" interpretation cannot be raised without bringing the intentions of the speaker into the picture, strongly suggesting that we are dealing with an inferential effect rather than a grammatical one. For instance if you hear the sentence *Bir kitap arıyorum* ('I am looking for a book') from a person you see trying to adjust the height of a projector on a desk, it is unlikely to entertain the possibility that the speaker has a specific title in mind. The case is completely the reverse when you hear the same sentence from a person over the information desk or the counter in a bookshop.

Under the light of the above discussion we claim that whether a $\emptyset$-object of a referentially opaque verb gets a "transparent" or "opaque" reading is not related to animacy, but to a intricate interplay between grammar and inference. Grammar dictates that the $\emptyset$-marked indefinite object of *ara* ('seek') denotes a predicate which holds for the instances of a kind. All the possibilities from then on is due to inferential mechanisms that integrate the semantic meaning of the utterance to a very complex knowledge base.

5.2.6 Scope and Specificity Revisited

The analysis of Acc-indefinites as generalized Skolem terms discussed and modified in Chapter 4 affords us the flexibility concerning the scope behavior of Acc-marked indefinites in Turkish, which the thesis argued that we need to obtain. Likewise, the analysis of $\emptyset$-indefinites as existential quantifiers (over instances of kinds) that are syntactically confined to the immediately pre-verbal position entails the rigidity in their scope taking. In this section we discuss some examples that illustrate these points.

Let us return to an example we discussed on page 37.

(284) a. Her öğrenci bir metod-u izle-yecek.
every student a method-Acc follow-Fut
'Every student will follow a method.'

The suffix we gloss as 'Fut' in (284) can be one of a number of semantic categories. The prominent ones are future tense, conjecture, obligation, and so on. Let us assume that the speaker of (284) talks about a newly established regulation that students should follow. Again under certain idealizations, we will represent this modal relation simply with M. Now let us take a look at some of the logical forms that get assigned to (284). Consider the following.

(285) $\forall s.M(spk', s, s'_0) \rightarrow \forall x.stu'_{s'_0}\, x \rightarrow follow'_s sk^{(x)}_{method'_{s'_0}}\, x$

What (285) basically says is that in every situation that is in conformance with what the speaker of this utterance holds to be the rule (or regulation) in the speech situation s'_0, for every individual who is a student in the same speech situation s'_0, there is a method selected among what are considered to be methods in the speech situation s'_0 that s/he follows.

Now with a minimal modification in the situation index of the Skolem term restrictor $method'$, we can arrive at the slightly different interpretation represented as follows.

(286) $\forall s.M(spk', s, s'_0) \rightarrow \forall x.stu'_{s'_0}\, x \rightarrow follow'_s sk^{(x)}_{method'_s}\, x$

The difference between (285) and (286) is that in the latter the method set from which each student will pick one to follow is not determined in the speech situation. In this regard, (285) can be thought as a D-linked reading in the sense of Enç (1991), whereas (286) does not care about the particular set of methods from which each student is obliged to pick from; it is satisfied as long as each student follows some method or other. To put it in the terminology of §3.1.2, while (285) realizes the "free choice" reading, (285) realizes the "modal existential" reading.

Let us go on with further variations. Take the following logical form which differs from (285) in that the Skolem term is bound to the situation operator, rather than to the universal nominal quantifier.

(287) $\forall s.M(spk', s, s'_0) \rightarrow \forall x.stu'_{s'_0}\, x \rightarrow follow'_s sk^{(s)}_{method'_{s'_0}}\, x$

What (287) says is that in every situation that conforms to the current regulations there is a method that every student follows. This is simply to say that all the students should follow the same method. Another subtlety here is that the particular method that will be followed by all the students is picked from among what are considered to be methods in the speech situation, for the Skolem restrictor's situation index is s'_0.

A move similar to that taken when shifting from (285) to (286) can be taken here as well. Changing the situation index of the Skolem restrictor from s'_0 to s yields the following.

(288) $\forall s.M(spk', s, s'_0) \rightarrow \forall x.stu'_{s'_0}\, x \rightarrow follow'_s sk^{(s)}_{method'_s}\, x$

Here again all the students are required to follow the same method, but this method does not have to be picked from the current methods. Anything that counts as a method at the situation where students will make their choices is welcome for (288).

Now we come to the so called wide scope reading of the indefinite. This is captured by early Skolem specification where the Skolem term is specified to be independent of any LF-commanding operators. Here is the relevant logical form:

(289) $\forall s.M(spk', s, s'_0) \rightarrow \forall x.stu'_{s'_0}\, x \rightarrow follow'_s sk_{method'_{s'_0}}\, x$

This logical form is verified if a method can be found among the set of currently available methods such that every student are required to follow this method. Incidentally, it needs to be noted that a reading where the restrictor of an independent Skolem term is bound to the situation operator, given in (290) below, is not available thanks to the mechanics of Skolem term specification.

(290) $*\forall s.M(spk', s, s'_0) \rightarrow \forall x.stu'_{s'_0}\, x \rightarrow follow'_s sk_{method'_s}\, x$

Remember from the discussion on page 104 that at the point where a Skolem term is specified, it must chose as argument, at least one of the variables contributed by the operators that LF-command the Skolem term at the point of specification. This means that in order to arrive at logical forms like (289) and (290), where the Skolem term is independent of any operators, it must be specified before it enters within the scope of the nominal and the intensional operators. On the other hand remember from page 102 that the situation indices of Skolem restrictors are treated as free variables, and from page 81 that free variables are

treated as pronoun like terms that can get bound by LF-commanding operators. All these, taken together, entail that the Skolem term $sk_{method'_s}$ in (290) is impossible to obtain. In order for it to be independent it needs to be specified when not in the LF-command of the intensional operator, for the index of $method'$ to be specified to s it needs to be specified when in the LF-command of the intensional operator.

The reading represented in (289) falls under our general heading of "specific" in terms of our classification of Acc-marked indefinite interpretations given in §3.1.2. However, the sense in which we use the term "specific" rather corresponds to wide scope existential reading in more traditional treatments, and should be distinguished from other senses of specificity utilized in the literature (see Farkas 2002 for an overview). For instance we argued in §4.3.1 that one type of specificity, namely "functional readings", may better be covered by implicit domain restriction, rather than the generalized Skolem mechanism itself. There we argued that generalized Skolem term mechanism, without implicit domain restriction, delivers the traditional existential readings, where existential quantification is moved from logical form to model-theoretic evaluation.

A functional reading for our running example can be realized as follows:

(291) $\forall s.M(spk', s, s'_0) \rightarrow \forall x.stu'_{s'_0}\, x \rightarrow follow'_s sk^{(x)}_{\lambda z.method'_{s'_0}\, z \wedge C'z}\, x$

Here C' is assumed to be a contextually bound variable over predicates, which serves the purpose of further restricting the lexically specified restrictor of the Skolem term. In a particular context, C' may get bound to a predicate like $\lambda z.favors\text{-}most'z\mathbf{pro}$, which is a predicate that involves a free variable, designated as $\mathbf{pro}$. Under the assumption that this free variable gets bound by the nominal universal, we arrive at the following logical form:

(292) $\forall s.M(spk', s, s'_0) \rightarrow \forall x.stu'_{s'_0}\, x \rightarrow follow'_s sk^{(x)}_{\lambda z.method'_{s'_0}\, z \wedge favors\text{-}most'_{s'_0}\, z\, x}\, x$

This brings us a functional reading where each student is mapped to his/her favorite method, given that the restrictor $\lambda z.method'_{s'_0}\, z \wedge favors\text{-}most'z\, x$ will be a singleton for each choice of x due to the semantics of *most*. It is also possible that the situation index of the implicit restrictor C' gets bound by some situation constant other than s'_0, say some situation earlier in the same time line with s'_0. Such variation is welcome, for it affords a way to capture cases like each student follows the method that was once his/her favorite. There is also the possibility that the free variable gets bound to a contextually available referent,

say *harry'*. This is again a functional reading where the function in question is a constant function that maps each student to Harry's favorite method.

Another sense of specificity that we claim the generalized Skolem mechanism cannot capture on its own is "epistemic specificity". In (289), repeated below as (293), the only information the speaker has about the method that is required to be followed by every student could be that it is a method. In such a case, the speaker only knows that *there is* such a method.

(293) $\forall s.M(spk', s, s'_0) \rightarrow \forall x.stu'_{s'_0}\, x \rightarrow follow'_s sk_{method'_{s'_0}}\, x$

We will assume that epistemic specificity arises in cases where the speaker has more information concerning the referent of the indefinite then it is revealed by the form of her utterance. This is the reason why we think it should be handled by some extra-grammatical means, which is implicit domain restriction in the present case. One epistemically specific reading of our running example could be the following.

(294) a. $\forall s.M(spk', s, s'_0) \rightarrow \forall x.stu'_{s'_0}\, x \rightarrow follow'_s sk_{\lambda z.method'_{s'_0}\, z \wedge C_{s'_1}\, z}\, x$

where it is assumed that C' gets bound to $\lambda z.favors\text{-}most'_{s'_0}\, z\, harry'$. This reading models a case where the speaker knows more about the method that needs to be followed than she reveals in her utterance.

There are further possibilities that arise due to possible variations on the situation index of the restrictor $student'$ (see page 86), which we do not consider here.

The upshot of the above exercise is that each of the various interpretive categories attributed to the Acc-marker in the literature are only a subset of the available possibilities. This space of possibilities is provided through the interaction of CCG (augmented with generalized Skolem terms) and extra-grammatical sources of information like contextually driven implicit domain restriction.

Before we move to the discussion of the scope phenomena concerning $\emptyset$-indefinites and intermediate scope, let us take a note of how our treatment of Acc-marked indefinites as generalize Skolem terms compare with a related proposal from the literature. Working in a Situation Theoretic (Barwise and Perry 1981) setting, Kılıçaslan (2006) argues that the semantics of the Acc-marker (and case marking in general) is to signify that the argument

carrying the case suffix should be interpreted at a situation index that is different from the situation index of the main predicate. It is not clear to us at the moment whether the present account and Kılıçaslan's (2006) converge on what is meant by "situation". If there exists such a convergence, then we saw above that Kılıçaslan's (2006) generalization does not hold, as we can have logical forms where an Acc-marked has the same situation index with the main predicate. If the present notion of "situation" is not comparable to that of Kılıçaslan (2006), then it remains to be seen whether his generalization can be made to follow from the present assumptions.

Now let us turn to why the scope and interpretive flexibility available for Acc-marked indefinites is not available for ∅-marked ones. To illustrate let us consider the intermediate scope examples from page 27, repeated here slightly altered as (295).[27]

(295) a. Her dilbilimci önemli bir problem-Acc çöz-en her makaleyi oku-muş-tur.
every linguist important a problem-Acc solve-Rel every article-Acc read-Ev.Cop-Aor
'Every linguist has read every article that solves an important problem.'

b. Her dilbilimci önemli bir problem çöz-en her makaleyi oku-muş-tur.
every linguist important a problem solve-Rel every article-Acc read-Ev.Cop-Aor
'Every linguist has read every article that solves an important problem.'

The three scope possibilities for (295a), namely wide, intermediate, and narrow differ only in their respective Skolem specifications with regards the arguments of the Skolem term. They are as follows, respectively.

(296) a. $\forall x.ling'x \rightarrow \forall y.article'y \wedge solve'sk_{imp\text{-}problem'}y \rightarrow read'yx$

b. $\forall x.ling'x \rightarrow \forall y.article'y \wedge solve'sk^{(x)}_{imp\text{-}problem'}y \rightarrow read'yx$

c. $\forall x.ling'x \rightarrow \forall y.article'y \wedge solve'sk^{(y)}_{imp\text{-}problem'}y \rightarrow read'yx$

When it comes to (295b), where the indefinite is an existential quantifier, the only available reading, as far as the scope of the indefinite is concerned, is (297). This is so due to the lack of any mechanism that can move the existential quantifier to any other position from

[27] We change *çoğu* ('most') with *her* ('every') in order not to deal with the complications concerning the former. Nothing concerning the present discussion is affected with this change.

the immediately preverbal position that it is restricted to by the adjacency stipulation made in (237) above.[28]

(297) $\forall x.ling'x \rightarrow \forall y[[article'y \wedge \exists z.\mathbf{Ins}(z, \mathbf{imp\text{-}problem'}) \wedge solve'z\,y] \rightarrow read'y\,x]$

[28] Similar arguments apply for the scope of negation with respect to Acc-marked indefinites vs. ∅-marked indefinites as well.

CHAPTER 6

SUMMARY AND CONCLUSION

In a nutshell this thesis is an invitation to be sceptical about direct associations between syntactic categories and high level interpretive notions like "specificity", "discourse-linking", "newness" and so on. The rationale for such scepticism comes from the fairly established observation that natural language processing by humans involves a great deal of contextual and world-knowledge based inference, which is not unique to language understanding but is present in other domains of cognition as well. In this regard, for linguistic accounts dealing with high level notions like those mentioned above, those that make most of this already present source of information should be favored against those that replicate this information in their linguistic categories, on the grounds of standard evaluation criteria concerning scientific theories.

It should immediately be noted that the above remarks are not meant as a principled objection to pragmatically loaded syntactic categories, but are rather methodological in character. We are not opposed to the idea that there can be (and are) languages with morphosyntactic items that directly signal interpretive categories like "familiarity", "conspiracy", "previous mention" and so on. The point of the above paragraph is that one should start from minimal assumptions concerning what is unique to language (i.e. what we call "grammar") and enlarge this base only when what is considered to be outside of language (i.e. what we call "information") proves not to be adequate for the task at hand.

Of course it may turn out that language is not a domain where such distinctions like the above (or in more familiar terms, competence vs. performance, Chomsky 1957, 1965) are tenable, making language understanding a Type 2 problem, rather than a Type 1 problem in terms of the useful distinction of Marr (1977). However, we believe that the task of delim-

iting a grammatical core in exclusion of an extra-grammatical periphery is still the stronger hypothesis concerning language, and therefore it needs to be checked first. The thesis practices this general research strategy over a specific linguistic problem.

The thesis is mainly concerned with the effects of the presence vs. absence of Acc-marking on the interpretation of indefinite direct objects in Turkish. A number of previous proposals addressing this issue have come up with various interpretive categories associated with the Acc-marker. A representative list is:

(298) a. Discourse-linking (Nilsson 1985; Enç 1991; Zidani-Eroğlu 1997).

b. Specificity (von Heusinger 2002; von Heusinger and Kornfilt 2005).

c. Presuppositionality (Diesing 1992; Kennelly 1997; Kelepir 2001)

d. Individuation/Particularization (Nilsson 1985; Taylan and Zimmer 1994; Bolgün 2005; Kılıçaslan 2006)

e. Totality/Delimitedness (Nilsson 1985; Nakipoğlu 2009)

The contributions of the thesis can be listed as below.
Empirical Issues:

1. We have provided a clarification of the data concerning the interaction of Acc-marked indefinite objects with various intensional operators like modality, and attitude verbs (§3.2.4).

2. Our investigation led us to conclude that, contrary to some previous proposals (Kelepir 2001; von Heusinger and Kornfilt 2005; Hedberg *et al.* 2009 among others) Acc-marked indefinites can freely interact with modal operators, showing that claims associating the Acc-marker with specificity (in the sense of von Heusinger 2002), and existential presupposition (Diesing 1992; Kennelly 1997; Kelepir 2001) are not well-supported by the empirical facts (§3.2.3 and §3.2.5). We also showed that Acc-marked indefinites do not always guarantee "transparent" readings for *seek*-type verbs, contrary to Dede (1986); Kelepir (2001); von Heusinger and Kornfilt (2005); Hedberg *et al.* (2009), (§3.2.4.1).

3. We suggested to rethink the data concerning the scope of negation with respect to Acc-marked indefinites by clearing the way from confounding processes like "emphatic denial" and "contrast" (§3.2.6).

4. We provided challenge to the claim that what has been called "neutral intonation" is governed by purely grammatical means, and showed that certain information-theoretic notions like uncertainty and predictability should be taken into account in capturing how focus projects, and what counts as a "neutral" intonation in Turkish (§3.3).

Theoretical Issues:

1. We argued that analyzing Turkish Acc-marked indefinites as generalized Skolem terms in the sense of Steedman 2010 explains the flexibility in which such indefinites interact with nominal and intensional operators (§5.2.6).

2. We argued that certain interpretive phenomena like "functional readings", "epistemic specificity", and so on should be taken to be arising through the interaction of contextually driven implicit domain restriction and generalized Skolem terms, rather than being left to the responsibility of the latter alone (§4.3.1 and §5.2.6).

3. By making use of the interaction between generalized Skolem terms and the discourse context, we showed that each of the interpretive categories attributed to the Acc-marker in the literature realizes one among many available possibilities (§5.2.6).

4. On the basis of data from coordinating conjunctions, we argued that "semantic incorporation" accounts like van Geenhoven 1998; van Geenhoven and McNally 2005 are not tenable for the case of Turkish $\emptyset$-indefinites (§5.1).

5. On the basis of Chierchia 1998, we argued that Turkish $\emptyset$-indefinite objects are existential quantifiers over instances of kinds (§5.2).

6. We showed how this characterization provides a unified account of why certain structures obligatorily receive Acc-marker (§5.2.2).

7. We showed how our proposal concerning $\emptyset$-indefinites coheres with the differences observed between other non-subject case-markers and Acc (§5.2.3).

8. As for proposals attributing the Acc-maker a discourse-linking function (Enç 1991), we provided evidence that discourse-linking is effectuated only under certain contextual conditions. These conditions are argued to be governed by similar information-theoretic notions that are found to be effective in focus projection in Turkish (§3.2.2 and §5.2.4).

9. We made a proposal about why certain $\emptyset$-objects of referentially opaque verbs appear to be ambiguous between an "opaque" reading and a "transparent" reading, and showed that the issue is independent of the animate/inanimate distinction contrary to Dede (1986) (§5.2.5).

In conclusion, the thesis comes up with a proposal concerning the division of labor between grammatical and extra-grammatical aspects of indefinite noun phrase interpretation in Turkish. It is shown that a number of phenomena concerning indefinite noun phrase interpretation that has been directly associated with the Acc-marker can be made to follow from the interaction of grammatical and inferential processes. Considering the aims and the general outlook of the thesis, this result appears to be satisfactory.

We think the most significant shortcoming of the present thesis is its very crude treatment of syntactic phenomena concerning Turkish indefinites. It remains to be seen how a CCG account augmented with generalized Skolem terms perform in more complicated cases involving word order variation and extraction.

Another important shortcoming of the thesis is that the discussion concerning information-theoretic effects on focus projection remains only at an intuitive level. This area has to be addressed with far more systematicity and formal rigor.

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