

- Schwarzschild, Roger 2002. Singleton indefinites. *Journal of Semantics* 19, 289–314.
- Sharvy, Richard 1980. A more general theory of definite descriptions. *The Philosophical Review* 89, 607–624.
- Stalnaker, Robert 1970. Pragmatics. *Synthese* 22, 272–289.
- Strawson, Peter 1950. On referring. *Mind* 59, 320–344.
- Strawson, Peter 1954. A reply to Mr. Sellars. *Philosophical Review* 63, 216–231.
- Westerståhl, Dag 1984. Determiners and context sets. In: J. van Benthem & A. ter Meulen (eds.). *Generalized Quantifiers in Natural Language*. Dordrecht: Foris, 45–71.
- Winter, Yoad 1997. Choice functions and the scopal semantics of indefinites. *Linguistics & Philosophy* 20, 399–467.
- Winter, Yoad 2001. *Flexibility Principles in Boolean Semantics*. Cambridge, MA: The MIT Press.

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42. Specificity

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Abstract

Specificity is a semantic-pragmatic notion that distinguishes between different uses or interpretations of indefinite noun phrases. Roughly speaking, it corresponds to the referential intentions of the speaker using an indefinite noun phrase. The speaker can intend to refer to a particular entity using an indefinite noun phrase, or not. This very general communicative option is mirrored in the linguistic category of specificity, which has become a central notion in analyses of syntactic as well as semantic phenomena. This article reviews different types of specificity discussed in the research literature: (i) referential specificity, (ii) scopal specificity, (iii) epistemic specificity, (iv) partitive specificity, (v) topical specificity, (vi) noteworthiness as specificity, and (vii) discourse prominence as specificity. It also presents recent approaches to specificity, including choice function approaches. Based on this review, the article argues that there is a core semantic notion of specificity, namely “referential anchoring”, which connects the semantic properties of specific indefinites with their discourse properties.

1. Introduction

Specificity is a semantic-pragmatic notion that distinguishes between different uses or interpretations of indefinite noun phrases. It is related to the communicative or pragmatic

notion of “referential intention”. A speaker uses an indefinite noun phrase and intends to refer to a particular referent, the referent “the speaker has in mind”. This communicative function of the indefinite affects sentence and discourse semantics in various ways. Specificity was originally introduced to describe the different potential of two types of indefinites to introduce discourse referents. In subsequent work, this contrast was related to the referential properties of indefinites in opaque contexts and to the scopal behavior of indefinites with respect to extensional operators. In the course of time, specificity has been employed to describe further contrasts, such as different epistemic states of the speaker, different grades of familiarity and different levels of discourse prominence. The intuitive contrast between specific and non-specific indefinites was quickly adopted. The new notion of specificity spread throughout the linguistic community, from formal semantics and pragmatics to syntax, as well as to descriptive and functional linguistics, and as a consequence, a large number of different types of specificity has been introduced. There is no agreed set of semantic and pragmatic properties of specific indefinites. Rather, specific indefinites have been characterized in several ways, as for instance, (i) (direct) referential terms, (ii) rigid designators, (iii) always showing wide scope, (iv) signaling the certainty of the speaker about the identity of the referent, (v) licensing discourse anaphora, (vi) being presuppositional, and (vii) signaling discourse prominence. It is controversial which of the mentioned characteristics are essential for a definition of specificity. Research on specificity in the last four decades has not only proven very productive, introducing new theories and tools such as the use of choice functions. It has also deepened our understanding of the semantics and pragmatics of indefinites and of the interpretation of noun phrases in general. Furthermore, research has defined new questions and challenges for the semantics-pragmatics interface as well as the semantics-syntax interface. Yet, questions about the nature of specificity are still open: What are the linguistic phenomena that should count as good instances of specificity contrasts? Is specificity just a general communicative principle or a proper semantic category? If the latter is the case, how can the semantic contrast between a specific and a non-specific indefinite be modelled?

Traditional grammarians did not address the contrast associated with specificity directly. They were certainly aware of different readings of indefinites, such as referent establishing, generic, and predicational readings, as well as subclasses thereof, such as dependent readings and examples that refer to “particular individuals”. However, they did not explicitly use or name the concept of specificity. The first wave of investigations on specificity was initiated by Karttunen’s (1968, 1969/1976) observation that a certain type of indefinites licenses discourse anaphors in contexts in which other indefinites do not. The contrast was first associated with Quine’s (1956, 1960) observation that indefinite noun phrases in opaque contexts show an ambiguity that is similar to the *de re* vs. *de dicto* readings of definite noun phrases, and it was termed “specific” vs. “non-specific” (Baker 1966). Karttunen proposed two alternative analyses: in his first analysis Karttunen (1968) assumed two lexical representations, while Karttunen (1969, 26/1976, 378), Fodor (1970) and the generative semanticists put forth an account in terms of scope. Partee (1970) argued that specificity corresponds more closely to Donnellan’s (1966) distinction between referential vs. attributive readings for definites. Specific indefinites directly refer to their referents and the sentence asserts a predicate of this referent, while non-specific indefinites contribute their descriptive content to the assertion. Kripke (1977 based on a talk in 1971), however, maintained that this contrast is pragmatic, as it follows from general communicative principles and does not show truth-conditional effects.

Fodor & Sag (1982) have summarized the discussions on specificity of the first decade in their seminal paper “Referential and Quantificational Indefinites”. They propose that noun phrases with the indefinite article are lexically ambiguous between a referential (or specific) interpretation and an existential (or non-specific) interpretation. They argue that specific indefinites differ in their semantic properties from non-specific ones: they allow *de re* readings in opaque contexts, show special scope behavior and make an epistemic contribution. Subsequent theories have focused on particular aspects and claims of Fodor and Sag’s investigation, such as the exceptional scope behavior of indefinites (Farkas 1981, Ruys 1992, Abusch 1994, Reinhart 1997, Winter 1997, Kratzer 1998, Chierchia 2001, Schwarz 2001), or the parallelism between contrasts in opaque contexts and epistemic readings in transparent contexts (Farkas 1994, Kamp & Bende-Farkas submitted).

Other research traditions associate specificity with discourse-linking (Pesetsky 1987), partitivity (Enç 1991), presuppositionality (Yeom 1998, Geurts 2010), the contrast between weak and strong quantifiers (Diesing 1992, de Hoop 1995), topicality (Cresti 1995, Portner 2002, Endriss 2009), or discourse properties like topic continuity and referential persistence (Givón 1983), or noteworthiness (MacLaran 1982, Ionin 2006). Specificity has also become an important category underlying syntactic phenomena such as *wh*-movement and island violations (e.g. Pesetsky 1987, Szabolcsi & Zwarts 1992, Diesing 1992, de Hoop 1995). There is an increasing interest in exploring the crosslinguistic differences in the encodings of specificity, such as articles in Bantu (Givón 1973), St’át’imcets (Lillooet Salish) (Matthewson 1999) and Maori (Chung & Ladusaw 2004), differential object marking in Turkish (Enç 1991) and Spanish (Leonetti 2004), and indefinite pronouns in Russian (Dahl 1970, Ioup 1977, Geist 2008), to name just a few.

The broad variety of data associated with specificity, the different types of specificity, and the multitude of theories of specificity make a comprehensive overview and a straightforward classification of this notion very difficult (but see Karttunen 1968, 1969/1976, Fodor 1970, Abbott 1976, Fodor & Sag 1982, Abusch 1994, Farkas 1994, 2002, Yeom 1998, Ruys 2006, Kamp & Bende-Farkas 2006, Ionin 2006, Endriss 2009). The various uses of the notion are related in one way or another to the communicative or pragmatic notion of “referential intention”, according to which the speaker uses a specific indefinite to refer to an object “s/he has in mind”. These uses can roughly be classified into seven types of specificity, illustrated by the following pairs of sentences:

- (1) a. Paula believes that Bill talked to *an important politician*.
(→ there is an important politician)
- b. Paula believes that Bill talked to *an important politician*.
(but there is no important politician)
- (2) a. If *a friend of mine from Texas* had died in the fire, I would have inherited a fortune. (possible reading: there is a friend of mine and if he ...)
- b. If *each friend of mine from Texas* had died in the fire, I would have inherited a fortune. (not possible: for each of my friends, if one of them ...)
- (3) a. *A student in Syntax 1* cheated in the exam. I know him: It is Jim Miller.
- b. *A student in Syntax 1* cheated in the exam. But I do not know who it is.
- (4) a. 50 students entered the room. I knew *two girls*.
- b. 50 students entered the room. They greeted *two girls* (already in the room).

- (5) a. *Some ghosts* live in the pantry; others live in the kitchen.
 b. There are *some ghosts* in this house.
- (6) a. He put *a/this 31 cent stamp* on the envelope, and only realized later that it was worth a fortune because it was unperforated.
 b. He put *a/#this 31 cent stamp* on the envelope, so he must want it to go airmail.
- (7) a. There was a king and the king had a daughter and he loved his daughter ...
 b. #There was a king and the season was very short and hot ...

The different types of specificity are characterized as follows: (i) specificity in opaque contexts (*referential specificity*) expresses a contrast between a reading that allows existential entailment (1a) and a reading that does not (1b); (ii) *scopal specificity* (often also including type (i)) refers to the ability of certain indefinites to escape scope islands like the conditional in (2a), that a universal quantifier cannot escape (2b); (iii) *epistemic specificity* expresses the contrast between speaker's knowledge (3a) and speaker's ignorance (or indifference) (3b) about the referent of the indefinite; (iv) specificity is sometimes associated with different types of familiarity such as d-linking, partitivity, and presuppositionality: the indefinite is part of an already introduced set, as in (4a), or not, as in (4b); (v) specificity is also related to topicality as in (5a), where the topical element can be understood as a specific expression. There are two further notions of specificity that concern the forward referential potential of indefinites: (vi) *specificity as noteworthiness* assumes that the presentative *this* in (6) signals that the speaker intends to assert a noteworthy property of the referent, as in (6a), while (6b) is reported to be infelicitous since no such property is mentioned. (vii) *specificity as discourse prominence* refers to one aspect of discourse prominence, namely "referential persistence" or "topic shift", i.e. the potential of an indefinite to introduce a referent that will be mentioned again and that may even become a topic in the subsequent discourse as in (7).

There are different ways to group these types of specificity together: Fodor & Sag's (1982) notion of specificity covers the types (i) to (iii), while Farkas (1994) argues that epistemic specificity, scopal specificity, which, in her view, includes referential specificity, and partitive specificity are independent of each other and can cross-classify. Still they show the common effect of reducing the restrictor set of the indefinite, i.e. the set of potential referents is restricted to a few, or possibly to only one element. This concept of "referential stability" (Farkas & von Heusinger 2003) can be extended to various types of specificity and motivate why languages use the same encodings for these types. However, in this survey I maintain the stronger hypothesis that there is a core semantic notion of specificity which is defined in terms of "referential anchoring": the referent of a specific indefinite is functionally dependent on the referent of another expression (von Heusinger 2002). This is a generalization of the original claim by Fodor & Sag (1982) with some crucial modifications (see also Kamp & Bende-Farkas 2011, Onea & Geist 2011). It covers the types (i) to (iii), but also allows establishing links to familiarity oriented or discourse-oriented notions of specificity.

In section 2, I present different types of encodings and typical linguistic contexts for specificity contrasts. These will later function as tests for specific vs. non-specific readings. Section 3 discusses the relation between (referential) specificity in opaque contexts and the relation to *de re* vs. *de dicto* readings of definites. Section 4 presents the crucial

observation about the “exceptional” scope behavior of indefinites and the discussion of choice functions as a more adequate representation for indefinites. Section 5 provides a brief overview of epistemic readings of indefinites and their relation to the *referential* vs. *attributive* readings of definites. Section 6 introduces the unifying view of specificity as referential anchoring based on the observations and theoretical discussions made up to this point. Sections 7 and 8 discuss the characterization of specificity in terms of familiarity (d-linking, partitivity, presuppositionality) and topicality, respectively. Section 9 presents intriguing correlations between the sentence semantic properties of specific indefinites and their discourse behavior. Finally, section 10 summarizes the findings and presents some of the many open research questions.

2. Specificity as a grammatical phenomenon

This article primarily focuses on specificity distinctions within indefinite noun phrases. It is generally assumed that indefinite noun phrases in argument positions make two semantic contributions: they express an existential assertion and they introduce a discourse referent (see articles 37 (Kamp & Reyle) *Discourse Representation Theory* and 41 (Heim) *Definiteness and indefiniteness*). Depending on the theory and the type of indefinite, the one or the other aspect is more prominent. Indefinites in English have the form of an indefinite article with a simple or modified noun as in *a book, an interesting book, a book recommended by Professor Schiller*, etc. However, languages provide more lexical items, intonational patterns or syntactic configurations to express indefiniteness in general, or certain aspects of it, see (8a-f) for English:

- (8) a. Every student recited a poem of Pindar.
 b. Every student recited this_{indef} poem of Pindar.
 c. Every student recited SOME poem of Pindar.
 d. Every student recited a certain poem of Pindar.
 e. Every student recited at least one poem of Pindar.
 f. Every student recited poems of Pindar.

(8a) is the unmarked form with the indefinite article, the indefinite or presentative *this* in (8b) forces a specific (or referential) reading, the focused *some* in (8c) allows a wide scope reading more easily than the form with the indefinite article in (8a); the specificity marker *a certain* in (8d) forces a wide scope or a functional reading (see section 4), the expression *at least one* in (8e) uncontroversially corresponds to a quantificational reading, while the bare noun in (8f) only allows for a narrow scope reading. Other languages encode specificity contrasts in their article system. For example, Moroccan Arabic has a definite article *l-* and two indefinite articles (in addition to the bare form also expressing indefiniteness): the specific indefinite article *wahed-l-*, composed of the numeral ‘one’ and the definite article (9a), and the non-specific indefinite article *shi* (9b), from Fassi-Fehri (2006, 15).

- (9) a. Ja wahed l-weld.
 came one the-boy
 ‘One (individuated) boy came.’

- b. Ja shi weld.
 came some boy
 ‘Some (non-identified) boy came.’

There is no quantitative or systematic overview of languages with specific articles, but it seems that there is a considerable number of such languages (see e.g. Givón 1973 for Bantu, Matthewson 1999 for in St’át’imcets (Lillooet Salish) and Chung & Ladusaw 2004 for Maori). We also find other morpho-syntactic contrasts expressing specificity: Many languages show a complex system of indefinite pronouns (see Haspelmath 1997 for an overview). Russian, for example, provides different indefinite pronouns composed of *wh*-words, such as *kakoj*, and additional elements. *Koe-kakoj* signals speaker identifiability (10a) and *kakoj-to* indicates speaker ignorance, (10b) (Dahl 1970, Geist 2008):

- (10) a. *Koe-kakoj* student spisyval na ekzamene. Ego zovut Ivan Petrov.
 koe-wh student cheated on exam he is-called Ivan Petrov
 ‘A student [known to the speaker] cheated on the exam. His name is Ivan Petrov.’
 b. *Kakoj-to* student spisyval na ekzamene. Ja pytajus’ vyjasnit’, kto eto byl.
 wh-to student cheated on exam I try to find-out who it was
 ‘A student [not known to the speaker] cheated on the exam. I am trying to figure out who it was.’

Turkish uses accusative case to express specificity of the direct object, as discussed in section 6. There are many more means for marking specificity by lexical items, functional markers or other constructions. In the remainder we will mainly focus on the semantics of unmarked indefinite noun phrases like *a book*, but the analysis can be extended to the class of monotone increasing weak determiners, such as *a*, *several*, *some*, *three*. We will use particular encodings in order to support the one or the other reading.

Fodor & Sag (1982, 358–365; based on Karttunen 1968, Fodor 1970 and others) give a helpful list of linguistic indicators that favor either specific or non-specific readings of indefinites: (i) A main indicator is the content of the noun phrase: the more descriptive content a noun phrase has, the more likely it is to have a specific reading. (ii) Longer restrictive relative clauses represent a good indicator of specificity as well. Non-restrictive relative clauses trigger specific interpretations even more strongly. (iii) Topicalization and left dislocation strongly favor a specific interpretation. (iv) Indefinite or presentative *this* strongly, perhaps uniquely, favors a specific reading (cf. Prince 1981). (v) *There*-insertion is characteristically used for weak quantificational readings, but it also shows an additional discourse function as introducing referents and in this function it allows for referential (specific) indefinites. (vi) Imperatives only allow non-specific readings. This set of indicators together with particular determiners or indefinite pronouns constitute reliable diagnostics for most of the relevant cases of specific indefinites (see also article 12 (Krifka) *Varieties of semantic evidence*).

Karttunen wrote the two founding papers on specificity, and even though he was not the one to use the term for the first time, he has established it as a linguistic category. The paper *What do referential indices refer to?* from 1968 and the classic paper *Discourse referents* from 1969, which was reprinted in 1976, cover more or less the same phenomena and make the same claims with one important exception: Karttunen (1968) proposes

a lexical ambiguity theory of specificity, while Karttunen (1969/1976) suggests a scope analysis. Both papers argue for the introduction of the new concept of *discourse referents*, i.e. referents at an additional semantic-pragmatic discourse level in order to account for the potential of definite and indefinite noun phrases to act as antecedents for intersentential pronouns (see also articles 37 (Kamp & Reyle) *Discourse Representation Theory* and 38 (Dekker) *Dynamic semantics*). Karttunen makes the following observations: First, definite and indefinite noun phrases behave alike in that they introduce discourse referents in episodic contexts, while quantifiers do not, as (11) shows. Second, definite and indefinite noun phrases differ in the contexts in which they can introduce discourse referents. An indefinite in the scope of an intensional operator like *want* in (12) does not license discourse anaphors (at least in its prominent reading). Still, there is a certain class of indefinite noun phrases that does not follow this restriction, but they have “strikingly different” interpretations (Karttunen 1968, 11) and license discourse anaphora, as in (13). This is exactly the class that is characterized by the specificity indicators listed above.

- (11) a. Anna owns the Porsche. It is red.
 b. Anna owns a Porsche. It is red.
 c. Anna owns every Porsche. *It is red.
- (12) a. Chris wants to own the Porsche. It is red.
 b. Chris wants to own a Porsche. *It is red.
- (13) a. Chris wants to own this_{indef} Porsche. It is red.
 b. Chris wants to own a certain Porsche. It is red.
 c. Chris wants to own a Porsche he saw a day before. It is red.

Anaphoric pronouns play various roles in the investigation of specific indefinites: First, their analysis led to the discovery of specific indefinites, and they are one of the main phenomena that are expected to be better understood, once we have a good theory of specificity. Second, they are often used as a means to disambiguate between a specific and a non-specific reading, as in (3a) or (10a). It must be noted that the anaphor test can only be illustrative, since it is not clear whether the analysis of discourse anaphors is independent of the analysis of specificity. Moreover, specificity is not the only licenser for discourse anaphors—there are many more. Therefore, we cannot directly infer the specificity of an indefinite antecedent from an anaphoric pronoun. This is also the position of Karttunen (1968, 17–18): “the notion of ‘discourse referent’ as we have used it, is not at all the same as ‘the individual the speaker has in mind’.” Third, anaphoric pronouns, like *it* in (13), are taken as a strong argument for a referential reading of specific indefinites, assuming that the anaphoric pronoun is of the same referential type as its antecedent, which, however, is not uncontroversial, as already indicated by the last quotation from Karttunen (for further discussion see Partee 1970, Neale 1990, Heim 1991, Dekker 2003 and articles 38 (Dekker) *Dynamic semantics* and 40 (Büring) *Pronouns*).

3. Opaque contexts

According to first investigations of the topic, (referential) specificity was associated with the different readings of the indefinite noun phrases in opaque contexts created by

intensional verbs, verbs of propositional attitude, modals, future tense, conditionals, etc. (Quine 1960, Karttunen 1968, 1969/1976, Fodor 1970, Abbott 1976, and more recently Kamp & Bende-Farkas submitted, article 60 (Swanson) *Propositional attitudes*). It is argued that indefinites show a contrast that is similar to the *de re* vs. *de dicto* readings of definite noun phrases. Sentence (14) has two prominent readings: In the *de re* reading, the speaker identifies a referent with the definite description *the chairperson of the German Conservatives* and then makes the assertion that Paula has a singular belief about this referent, namely that Bill talked to her. In the *de dicto* reading the sentence asserts that Paula has a belief and that belief has the form of Bill's talking to the chairperson. The *de re* reading allows for the substitution of a referentially identical expression, i.e. if Angela Merkel is the chairperson, we can infer (15) from (14).

(14) Paula believes that Bill talked to the chairperson of the German Conservatives.

(15) Paula believes that Bill talked to Angela Merkel.

Indefinite noun phrases show a very similar contrast in opaque contexts, as in (16). There are two prominent readings, which we will also call *de re* vs. *de dicto* readings. Under the *de re* reading, the speaker refers to a particular referent she has in mind (e.g. Angela Merkel) by using the indefinite noun phrase and then makes the assertion that Paula has the singular belief that Bill talked to her. In the *de dicto* reading, the speaker just makes an assertion that Paula has the general belief that Bill was involved in the activity of talking to an important politician. The *de re* reading allows the two logical inferences of existential entailment (or existential generalization) and substitution of referentially identical expressions. We can infer the existential entailment (17) from the *de re* reading of (16), and together with the identity statement in (18) we can infer (19). The *de dicto* reading does not allow these inferences.

(16) Paula believes that Bill talked to an important politician.

(17) There is an important politician.

(18) an important politician = Angela Merkel

(19) Paula believes that Bill talked to Angela Merkel.

In the philosophical literature the contrast between the *de re* and the *de dicto* reading is often described in the following way: In the *de re* reading the speaker attributes a singular proposition (a proposition about a particular individual, i.e. a thing or a *res*) to the subject of the attitude verb, while in the *de dicto* reading an existential belief is attributed to the subject. The *de re* reading allows for different ways to fix the particular individual. In the default situation both the speaker and the subject of the attitude verb know that individual, but it is also possible that only the speaker or only the subject of the attitude verb knows that individual (see Kamp & Bende-Farkas submitted, n. 1). The latter case still allows for existential entailment and thus licenses discourse anaphora, but it does not correspond to the pretheoretical description of specificity as “the referent the *speaker* has in mind” or of the “referential intention of the *speaker*”.

In the following we present three accounts dealing with different readings of indefinites in opaque contexts: (i) the lexical ambiguity theory, (ii) the scope theory, and (iii) the type-shifting theory. The lexical ambiguity approach assumes two indefinite articles in the lexicon, a referential indefinite article and an existential indefinite article, which happen to be homophonous in English (Karttunen 1968, Fodor & Sag 1982, Kratzer 1998, among others), but which may be overtly expressed by different markers in other languages, such as in Moroccan (see above). Actually, it seems that the referential indefinite article of Fodor & Sag (1982) comes very close to the semantics of English indefinite *this* (Prince 1981). Karttunen (1968, 16) represents the specific reading as a constant in predicate logic, as in (21). Fodor & Sag (1982, 387) represent it by a referential operator a_{ref} which takes a set and picks out the referent the speaker has in mind in the actual world; see (22). They add in footnote 27 that the syntax of this operator corresponds to the epsilon operator of Hilbert & Bernays (1939), although they use a different semantics, namely Kaplan's (1978) semantics of demonstratives. Karttunen (1968, 16) represents the non-specific indefinite article by using Reichenbach's eta operator (originally also from Hilbert & Bernays 1939), as in (23). Like Russell's (1905) iota operator for definite noun phrases, the eta operator has a contextual definition that yields for (23) the two translations (24) and (25), which are in fact the two representations given by the scope theory.

(20) Paula believes that Bill talked to an important politician.

(21) BELIEVE(p, talked_to(b, c)) & important_politician(c)

(22) BELIEVE(p, talked_to(b, a_{ref} x [important_politician(x)]))

(23) BELIEVE(p, talked_to(b, η x [important_politician(x)]))

(24) \exists x [important_politician(x) & BELIEVE(p, talked_to(b, x))]

(25) BELIEVE(p, \exists x [important_politician(x) & talked_to(b, x)])

The scope theory (McCawley 1968, Karttunen 1969/1976, Fodor 1970) assumes that the indefinite article corresponds to an existential quantifier that binds the variable in the noun phrase and forms a quantificational expression that takes scope with respect to other operators including operators creating opaque contexts. It predicts the two representations (24) and (25), which express a wide scope (*de re*) reading and a narrow scope (*de dicto*) reading, respectively. One problem with this scope theory is that the wide scope representation (24) for the specific reading makes an existential assertion, which is too strong for fictional objects such as witches or dragons. Therefore, Fodor (1970) and Ioup (1977) assume that the quantifier expressing the specificity contrast does not assert (real world) existence, which led Abbott (1976, 2010) to conclude that it quantifies over individual concepts, rather than real world objects. The third theory, the type-shifting approach (Zimmermann 1993, van Geenhoven & McNally 2005) is based on the idea that indefinites like definites can either behave as regular arguments of type e , as properties of type $\langle e, t \rangle$, or as quantifiers of a higher type (see Partee 1987 and article 85 (de Hoop) *Type shifting*). Intensional verbs like *to want*, *to seek*, *to hunt*, *to owe*, etc. (which may occur intensionally with a simple NP object rather than a sentential

complement) can take the indefinite in any of its forms. In the property type $\langle e, t \rangle$ the indefinite is semantically incorporated into the predicate and does not introduce a discourse referent; therefore it cannot serve as an antecedent for anaphoric expressions. Although Zimmermann (1993) does not attempt to extend his analysis to complement clauses of the type (20), there are approaches that apply type-shifting rules to derive the two types for the two different readings of indefinites in complement clauses (e.g. Chung & Ladusaw 2004, Chierchia 2005).

The three theories differ in the following way: The type-shifting approach predicts that specificity arises only in opaque contexts. Specific indefinites are indefinites that take scope out of opaque contexts and license discourse anaphora, while non-specific indefinites are predicates that do not license definite anaphoric pronouns. The type-shifting approach explains specificity with the potential of introducing discourse referents. This view, however, is too broad, as other types of indefinites can also license discourse anaphors, as originally noted by Karttunen (see quotation above). The scopal approach correlates specificity with scope and accounts for the *de re* vs. *de dicto* reading by the different scope of the existential quantifier in (24) and (25). The lexical ambiguity approach predicts three logical forms for indefinites in opaque contexts: the *de dicto* reading is illustrated in (25), while (22) and (24) are two representations for *de re* readings. (22) is the *de re* reading where the speaker has a particular individual in mind, while (24) represents the reading where the subject of the attitude verb determines the individual. Fodor & Sag (1982) would only regard (22) as a specific or referential reading, and (24) as a wide scope non-specific or existential reading, since they only relate specific indefinites to the speaker, but not to other attitude holders. The contrast between (22) and (24) is often discussed as being similar to the contrast between referential and attributive readings of definites (Partee 1970 and see section 5 for more discussion).

Indefinites under two operators including opacity show more readings, as illustrated in (26) from Kripke (1977, 259)—similar observations go back to Bach (1968, 107), Karttunen (1969/1976), Fodor (1970).

(26) Hoover charged that the Berrigans plotted to kidnap a high American official.

- a.but he said they couldn't decide which one (to kidnap)
- b.but he didn't know which one (they plotted to kidnap)
- c.guess which one (he charged they plotted to kidnap)
- d. ... but he [i.e. Kissinger] was informed in time.

- (27) a. Hoover charged(the Berrigans_x plotted($\exists y$ [h-a-o(y) & x kidnap y]))
- b. Hoover charged($\exists y$ [h-a-o(y) & the Berrigans_x plotted(x kidnap y)])
- c. $\exists y$ [h-a-o(y) & Hoover charged(the Berrigans_x plotted(x kidnap y))]
- d. Hoover charged(the Berrigans_x plotted(x kidnap c)) & h-a-o(c)

Kripke assumes three readings, indicated by the continuations in (26a–c) and represented as (27a–c). There is obviously at least a fourth reading, given in (26d) and represented by (27d), according to which the speaker intended to refer to one particular high American official (according to Kripke this might have been Kissinger). Kripke (1977) claims on the basis of this example that if we understand specificity as a two-way distinction (similar to the referential vs. attributive contrast in definites), the notion of specificity cannot account for the three readings. Instead, he assumes that specificity

is a pragmatic notion which follows from general communicative principles. Karttunen (1969, 33/1976,382) uses similar examples to argue that specificity is not a simple two-way distinction, but “has a relative nature” and is best represented by the scope of the existential quantifier. According to their view of specificity as speaker intended referential expressions, Fodor & Sag (1982) would propose a specific reading (26d) and three non-specific readings (26a–c). For these and other examples, even more complex ones, involving opaque contexts (see Fodor 1970, Ioup 1977), the above theories yield the following options without providing clear criteria to decide between them: (i) The type shifting approach will assign a specific reading to the indefinite if it is interpreted higher than at least one intensional operator. (ii) The scope theory comes in two versions: (iia) According to Karttunen (1969/1976), Fodor (1970) and others, specific indefinites allow for special scope behavior, best represented by the scope of the existential quantifier. This corresponds to the *de re* vs. *de dicto* contrasts. (iib) Kripke (1977), Neale (1990) and others assume that indefinites differ in scope with respect to opaque contexts, explaining the *de re* vs. *de dicto* contrast, but they consider specificity a pragmatic notion orthogonal to this scope behavior. This is the standard position among many philosophers and formal semanticists. (iii) The lexical ambiguity approach predicts a referential reading, which does not interact with scope, and existential readings that show regular scope behavior. The widest scope existential reading shows the same truth conditions as the referential reading. This situation calls for additional criteria to distinguish between specific and non-specific indefinites, such as those provided by languages with particular specificity markers or structural constraints, as discussed in the next section.

4. Exceptional scope behavior

Fodor & Sag (1982) consider three types of specificity: referential specificity as discussed in the last section, scopal specificity discussed in this section, and epistemic specificity presented in section 5. To argue for their lexical ambiguity theory, they relate the specific vs. non-specific contrast to the central issue of the semantics-syntax interface: scope. Scopal specificity is defined as the interpretation of indefinites outside the scope of certain operators—in this section we focus on extensional quantifiers as in (28) (many authors also subsume under scopal specificity the behavior of indefinites in opaque contexts). In the scopal specific or wide-scope reading the indefinite refers to one girl such that five boys are in love with her. In the scopal non-specific, narrow-scope or dependent reading the value of the girl varies with the value of the boys. Here, indefinites show the same scope options as other quantifiers such as the universal quantifier in (29).

(28) Five boys on this street are in love with a girl on this street.

(29) Five boys on this street are in love with every girl on this street.

The ambiguity theory and the scope theory of specificity can both account for these data in languages that allow free Q(antifier) R(aising) and that do not restrict scope to surface order. Fodor & Sag (1982) make a stronger claim: They argue that specific indefinites are able to escape “scope islands”, while other quantifiers are not. Scope islands are created by *that*-complements (with lexical heads) as in (30), or by conditionals, as in (31):

- (30) a. John overheard the rumor that *each of my students* had been called before the dean.
 b. John overheard the rumor that *a student of mine* had been called before the dean.
- (31) a. If *each friend of mine from Texas* had died in the fire, I would have inherited a fortune.
 b. If *a friend of mine from Texas* had died in the fire, I would have inherited a fortune.

(30a) does not have a reading with wide scope for *each of my students*, i.e. there is no reading paraphrasable as: for each of my students, John overheard the rumor that the student had been called before the dean. Yet, the wide-scope reading is easily available for the indefinite *a student of mine* in (30b): There is a student of mine such that John overheard that the student had been called before the dean. The same holds for the conditional: (31a) has only one reading, according to which all of my Texan friends must die before I inherit a fortune. (31b) allows for the wide-scope reading of the indefinite, according to which there is a friend of mine such that if he dies I inherit a fortune. This observation is very stable and can be extended to other scope islands (see Fodor & Sag 1982, Ruys 1992, Szabolcsi 2010). It is called “exceptional wide scope”, “long-distance construal”, or “non-local scope”. Fodor & Sag’s (1982) lexical ambiguity theory predicts the exceptional wide-scope reading since the referential reading of the indefinite is scopeless and thus always entails widest scope. They argue that the data force us to accept that either the existential quantifier is not an adequate representation for all indefinites, or that it has a more flexible behavior with respect to scope islands. The latter option has serious consequences for the semantics-syntax interface and for a uniform treatment of all quantifiers. Besides this very general concern, Fodor & Sag (1982) present two further arguments against a scope theory with such flexible restrictions: the lack of intermediate readings and violations of conditions on variable binding in VP-deletion contexts. Ruys (1992) and Winter (1997) add a third observation concerning distributive readings of indefinites. In the following we only focus on the discussion of exceptional wide-scope readings and the prediction of the absence of the intermediate reading. (See Schwarz 2004 for VP-deletion contexts and Ruys 1992, Winter 1997, von Stechow 2000 for distributive readings.)

Fodor & Sag (1982) replace the proper name in (30b) by a universal quantifier in (32a) creating three different scope positions for the indefinite, as represented in (32b–d):

- (32) a. Each teacher overheard the rumor that *a student of mine* had been called before the dean.
 b. (a student of mine: y) [(each teacher: x) [x overheard the rumor that [y had been called before the dean]]]
 c. (each teacher: x) [(a student of mine: y) [x overheard the rumor that [y had been called before the dean]]]
 d. (each teacher: x) [x overheard the rumor that [(a student of mine: y) [y had been called before the dean]]]

The lexical ambiguity theory predicts two readings: a referential reading (with apparent widest scope) corresponding to the truth conditions of (32b) and an existential

narrow-scope reading (32d). It also predicts the unavailability of the intermediate reading (32c), which would be “for every teacher there is a possibly different student such that the teacher overheard the rumor that this student had been called before the dean”. This is because the existential quantifier cannot leave the scope island (assuming regular quantifier properties) and the referential reading always entails truth conditions corresponding to the widest scope reading. Fodor & Sag (1982) report that (32a) has no intermediate reading, which confirms their prediction. However, in reaction to this claim in a preprint, Farkas (1981) provides examples like (33a) that show three different scope readings for the indefinite, paraphrased as (33b–d), including the intermediate-scope reading (33c), which contradicts Fodor and Sag’s claim.

- (33) a. Every professor rewarded every student who read a book on the semantics-pragmatics interface.
 b. widest scope: a book > every professor > every student
 There is particular book on the s-p-i such that every professor rewarded every student who read that book.
 c. intermediate scope: every professor > a book > every student
 For every professor there is a certain (possibly different) book on the s-p-i, such that the professor rewarded every student who read that book.
 d. narrowest scope: every professor > every student > a book
 Every professor rewarded every student who read a (= any) book on the s-p-i.

Particular readings can be brought out or forced by using certain forms: a very short and uninformative indefinite, as *a book*, tends to trigger the narrowest-scope reading as in (34a); a very informative and descriptively rich indefinite as in (34b) or an indefinite that contains a proper name or a demonstrative expression as in (34c) tends to trigger the widest-scope reading.

Indefinites with pronouns in their descriptive content that are bound by some higher operator are forced to take scope under this operator, as in (34d).

- (34) a. Every professor rewarded every student who read a book.
 b. Every professor rewarded every student who read a book on the semantics-pragmatics interface that was discussed recently on the LinguistList.
 c. Every professor rewarded every student who read a book that Prof. Schiller/this professor had recommended.
 d. Every professor rewarded every student who read a book that she had recommended.
 e. Every professor rewarded every student who read a certain book.
 f. Every professor rewarded every student who read the first book that she had recommended.
 g. Every professor rewarded every student who read *SOME* book.

Before we discuss the different approaches to the two problems, namely the exceptional wide-scope behavior of indefinites and intermediate readings, we have to distinguish between different kinds of intermediate readings and introduce the appropriate terminology (Schwarz 2001, Endriss 2009). In all intermediate readings (34d–g), the indefinite varies with the value for the universal quantifier *every professor*, but in different ways.

In (34d) the intermediate-scope reading goes back to an overtly expressed variable x in the descriptive content *book x has recommended* that is bound by a higher operator, here by *every professor*. The set of books depends on the professors and so the selected book varies with the choice of professors, exhibiting a so-called “apparent intermediate-scope” reading. The specificity marker *a certain* in (34e) triggers a so-called “wide-scope functional” reading that allows for the widest-scope reading, similar to (33b). But it also licenses a reading according to which professors systematically select books. This can be described by a function with widest scope, yet the books vary with the professors yielding “apparent intermediate scope” for the book. If the function is explicitly expressed, as in (34f), we have to use a functional definite noun phrase with apparent intermediate scope. Finally, there is also a “genuine intermediate-scope” reading, as in (34g), often triggered by *some* or even more strongly by accented *SOME*. Here the indefinite actually takes scope over the universal quantifier *every student*. The difference between this “genuine intermediate” scope reading and the “(wide-scope) functional (apparent) intermediate reading” is that books co-vary unsystematically in the former case and systematically (according to a “method”) in the latter case. Functional readings are restricted to nameable and informative functions (see Hintikka 1986, Endriss 2009, 92–101), such as *the first book she has recommended or his supervisor*.

We compare four general strategies to account for the exceptional scope behavior and intermediate-scope readings: (i) Under the *long-distance scope shift* approach (dubbed so by Schwarz 2001) fewer restrictions than normal are ascribed on movement to the existential quantifier. The other approaches all assume that the indefinite is not moved but stays in situ. (ii) In the *existentially closed choice function* approach, scope is derived by assuming that the indefinite article introduces a choice function variable that can be bound freely at different scope sites (Winter 1997); (iii) In the *contextually determined choice function* approach the free choice function variable is contextually determined (Kratzer 1998) or existentially bound at the discourse level (Matthewson 1999), and (iv) Under the *singleton indefinite or implicit domain restriction* approach the indefinite is enriched by descriptive material until it expresses a singleton and therefore gives the illusion of wide scope, similarly to other domain restriction approaches (Portner 2002, Schwarzschild 2002). Approach (i) stands in the tradition of the scopal theory, while Kratzer’s *choice function* approach (iii) is an instantiation of Fodor and Sag’s ambiguity theory. The *existentially closed choice function* approach (ii) comes in both variants: Reinhart (1997) assumes lexical ambiguity, whereas Winter (1997) is just a scopal approach with choice functions.

A choice function f is defined as an operation that assigns to any non-empty set one of its elements (It is not defined for empty sets—we ignore this, but see Winter 1997 for a discussion).

(35) f is a choice function: $\text{ch}(f)$ iff $P(f(P))$, where P is nonempty

The indefinite *a book* is represented by $f(\text{book})$, with the choice function variable f that is either existentially bound, as in (36c) (Reinhart 1997, Winter 1997) or free, i.e. is determined by the speaker or some other salient agent in the context, as in (36d) (Kratzer 1998). Note that this choice function must not be available for the hearer. If the hearer knows the referential intentions of the speaker or the method to identify the object, we have to use a definite expression as in (34f) above, rather than an indefinite one.

- (36) a. Peter reads a book.
 b. $\exists y[\text{book}(y) \ \& \ \text{read}(p, y)]$
 c. $\exists f [\text{ch}(f) \ \& \ \text{read}(p, f(\text{book}))]$
 d. $\text{read}(p, f(\text{book}))$
 e. $\text{read}(p, \epsilon_x [\text{book}(x)])$

Given that there are books and a speaker-given choice function, the representations with choice functions have the same truth conditions as the classical representation (36b) with an existential quantifier. Furthermore, the representations are equivalent to the indexed epsilon formula in (36e) (Egli 1991, Egli & von Heusinger 1995), where the epsilon operator (Hilbert & Bernays 1939) forms a term out of a predicate. Its interpretation is a choice function and the index allows binding this choice function by some operator or contextual parameter. The epsilon notion has the advantage of providing a formal representation of the indefinite as a term-creating operator—similar to the iota operator. However, we will use the more common choice function notation.

The widest-scope reading of the indefinite in a scope island (37a) has the representation (37c) for a flexible scope theory. The existential choice function approach is represented in (37d) with the paraphrase: There is a choice function such that every professor rewarded every student who read the book on the semantics-pragmatics interface selected by that choice function. (37e) is the representation with a contextually given choice function. Again, all formulas are equivalent given that there are books and one contextually given choice function.

- (37) a. Every professor rewarded every student who read a book on the semantics-pragmatics interface.
 b. wide scope: a book on the s-p-i > every professor > every student
 There is a particular book on the s-p-i, such that every professor rewarded every student who read that book.
 c. $\exists y[\text{book-on-s-p-i}(y) \ \& \ \forall x[\text{professor}(x) \ \rightarrow \ x \ \text{rewarded every student who read } y]]$
 d. $\exists f[\text{ch}(f) \ \& \ \forall x[\text{professor}(x) \ \rightarrow \ x \ \text{rewarded every student who read } f(\text{book-on-s-p-i})]]$
 e. $\forall x[\text{professor}(x) \ \rightarrow \ x \ \text{rewarded every student who read } f(\text{book-on-s-p-i})]$

In the following we focus on the intermediate-scope reading of (38a), as paraphrased in (38b) and the representation (38c) for the flexible scope theory. The existentially closed choice function approach introduces a choice function variable attached to the indefinite *in situ* and binds it by an existential quantifier that has scope between the two universal quantifiers, as in (38d). Since the existential quantifier of choice functions is not subject to island constraints, this configuration is not prohibited.

- (38) a. Every professor rewarded every student who read a book on the semantics-pragmatics interface.
 b. intermediate scope: every professor > a book on the s-p-i > every student
 For every professor there is a certain (possibly different) book on the s-p-i, such that the professor rewarded every student who read that book.

- c. $\forall x[\text{professor}(x) \rightarrow \exists y[\text{book-on-s-p-i}(y) \ \& \ x \text{ rewarded every student who read } y]]$
 d. $\forall x[\text{professor}(x) \rightarrow \exists f[\text{ch}(f) \ \& \ x \text{ rewarded every student who read } f(\text{book-on-s-p-i})]]$

The contextually determined choice function approach assumes that the choice function variable is contextually determined, entailing a wide-scope reading (similar to the original Fodor and Sag approach), as in (37e) above. The intermediate reading, however, can be forced by a bound variable in the descriptive content, e.g. *book on the s-p-i she has recommended*. Thus the set of books depends on the professor and the selected element co-varies with the values for professors, as in (38e), yielding an “apparent intermediate” or “pseudoscope” reading (Kratzer 1998).

- (38) e. $\forall x[\text{professor}(x) \rightarrow [x \text{ rewarded every student who read } f(\text{book-on-s-p-i } x \text{ recommended})]]$

The representation (38e) leads to a new problem: If two professors have recommended the same books, the choice function f would select the same book, since the sets are extensionally identical. This is too strong a restriction for the intermediate reading, which intuitively allows for different choices of books depending on professors, even if they recommend the same set of books. Therefore, Kratzer (1998) introduces a “Skolemized” choice function in (38f), i.e. a contextually given Skolem function g that takes one individual argument (or parameter) and a set argument and yields one element of the set. Note that the latter representation is equivalent to a representation with an ordinary Skolem-function f_{sk} , as in (38g) given that there are books and speaker-given Skolem functions.

- (38) f. $\forall x [\text{professor}(x) \rightarrow [x \text{ rewarded every student who read } g(x)(\text{book on the s-p-i } x \text{ has recommended})]]$ with g assigning choice functions to professors such that the choice function selects a book on the s-p-i that the professor has recommended
 g. $\forall x [\text{professor}(x) \rightarrow [x \text{ rewarded every student who read } f_{sk}(x)]]$ with f_{sk} assigning books on the s-p-i to professors such that the professor has recommended it

Schwarzschild (2002) proposes an alternative view on the exceptional scope behavior of indefinites. He applies the domain restriction approach of other quantifiers and shows that enriching the descriptive material of the indefinite leads to truth-conditional effects that are equivalent to Kratzer’s approach. The wide-scope reading is entailed by an indefinite that is restricted to a singleton set (‘singleton indefinite’), while the intermediate-scope reading is derived by a restriction resulting in a function that depends on the highest quantifier, as in (38h), expressing a functional reading. Even though domain restriction is necessary for other quantifiers, it is not clear whether the restriction to a singleton set is always justified, as examples with partitives show (see Endriss 2009, 136).

- (38) h. $\forall x [\text{professor}(x) \rightarrow [x \text{ rewarded every student who read } a \text{ book on the s-p-i } x \text{ had put on top of her}_x \text{ reading list.}]$

So far all four theories do quite well, although by different means. The flexible scope theory and the existential choice function approach reconstruct the different readings by different scopes of the existential quantifier for the indefinite and the choice function, respectively. The contextual choice function approach and the domain restriction approach both use contextually given information to fix the referent; they allow for “apparent” intermediate-scope readings via wide-scope functions. These two types of analyses correspond to the two types of intermediate scope readings. The first group accounts for “genuine” intermediate-scope readings by existential binding at different levels, while the second group accounts for “functional apparent intermediate scope” by assuming a contextually given function.

Following Schwarz (2001), Chierchia (2001) and Roberts (2007) we can make the following observations: (i) functional indefinites allow for widest scope, but also for apparent intermediate scope; (ii) not all non-narrowest scope indefinites are functional, i.e. there is a difference between genuine intermediate scope and functional apparent intermediate scope; (iii) the difference becomes evident in downward entailing contexts, as discussed below. The specificity marker *a certain* triggers functional readings, while *some* favors non-functional, i.e. genuine scope readings. The literature does not agree whether the indefinite article allows for both readings. Schwarz (2001) maintains that in English it only has a non-functional reading, while Kratzer (1998) opts for both readings following the lexical ambiguity theory of Fodor & Sag (1982). Endriss (2009) argues that the German indefinite article *ein* also allows for both readings. We discuss the two readings with examples involving *a certain* and *some* for clarity: Observation (i) is vindicated by (39a), which shows a functional reading with the *supervisor-of*-function for the indefinite *a certain professor*. In this reading, the value for professor systematically co-varies with the value for student yielding apparent intermediate scope.

- (39) a. Every student read every article a certain professor has written, namely his supervisor.
 b. Every student read every article some professor has written.

(39b) allows for an intermediate reading, where we can unsystematically assign professors to students. Observation (ii) concerns the difference between the two readings. In a situation where we have three students with supervisors from Stuttgart and two of the students read every article by their supervisors while the third one read every article by a professor from MIT, (39a) becomes false, while (39b) is true. For addressing observation (iii) we consider the downward entailing contexts in (40):

- (40) a. No student read every article a certain professor has written, namely his supervisor.
 b. No student read every article some professor has written.

A situation where one student read all the papers of a professor from MIT makes (40b) false, while (40a) may be true. The situation where no student read every article by his supervisor (but perhaps every paper by the MIT professor), verifies (40a), but not necessarily (40b). This shows that we have two different intermediate scope readings. There are clearly distinct readings for *a certain* and *some* conforming to the lexical ambiguity theory of Fodor & Sag (1982) with the contextually given functional reading

corresponding to the specific reading and the genuine scope reading to the non-specific reading. However, we have to add the following observations: First, it is controversial whether indefinite noun phrases with an indefinite article are ambiguous in the same way. Second, if the contrast also holds for the indefinite article (Kratzer 1998), we still have to modify Fodor & Sag's (1982) original prediction. Specific indefinites show not only a widest-scope "object" reading, but also a widest-scope functional reading, which can in turn depend on further parameters yielding different kinds of "apparent" intermediate scopes. Third, Fodor and Sag were not correct in predicting the lack of the genuine intermediate reading for existential indefinites. There is clear evidence that an existential indefinite can take exceptional scope. This has to be explained by a different mechanism (e.g. Ebert, Endriss & Hinterwimmer 2009 propose that embedded indefinite topics can take genuine intermediate scope). We have learned from the discussion of scopal specificity that the differences in the scope behavior of indefinites are not a very reliable indicator for a specific reading. Before we discuss another aspect of the distinction between specific and non-specific readings in the next section, we have to make some observations with respect to the representation of indefinites as choice functions presented in this section.

Using choice functions allows dissociating the scope of the indefinite from its descriptive content. While the descriptive content stays in situ, the choice function variable can be bound at different places in the sentence representing different scopal properties of the indefinite. Choice functions also capture the intuitive idea that a specific indefinite can be understood as selecting an element out of a set according to a certain method. In a very general sense, choice functions are term-creating operations corresponding to type shifting from a set to an individual, which seems necessary for independent reasons. Furthermore, by representing specific indefinites as choice functions, we can give similar representations for definites and specific indefinites as we can understand the iota operator as a contextually given choice function that is available to speaker and hearer, while a specific indefinite is represented by a hearer-unknown choice function (Egli & von Stechow 1995, Chierchia 2005, Roberts 2007). On the other hand, choice function approaches are controversial, as the representation of indefinites with choice functions seems to be too flexible: Choice functions do not allow for existential entailments. It is an open issue whether this is a welcome result for fictional objects (see Ruys 2006) or whether this has to be repaired (see Winter 1997). Perhaps specific indefinites presuppose their referent in some way—see section 6 for further discussions. Choice functions are defined for all non-empty sets, but we only use very partial choice functions for representing indefinites, actually only those defined for the relevant set (see Kamp & Bende-Farkas 2006, section 12). Existentially bound choice functions predict wrong readings in downward entailing contexts (see Schwarz 2001, Chierchia 2001 for discussion and additional restrictions on choice function construals). This problem, however, does not arise with contextually bound choice functions (see Kratzer 2003). A final criticism is that once we are forced to use Skolemized choice functions, i.e. functions with one individual argument and a set argument, we may as well take Skolem functions with n -individual arguments and abandon in this way the problematic choice functions (see Hintikka 1986, Steedman 2007, Kamp & Bende-Farkas submitted, Onea & Geist 2011 among others).

There are alternative approaches to the flexible scope behavior of indefinites that are non-configurational, i.e. they assume different mechanisms of interpretation, rather

than different representations. Abusch (1994) formulates such an approach in discourse representation theory using Cooper storage for keeping track of the different dependencies. Below, I give a brief sketch of the indexical approach of Farkas (1994, 1997 and more recently Brasoveanu & Farkas 2009) that operates on dependencies between assignment functions (see also Enç 1991). Farkas (1994, 1997) assumes that the semantic content of a sentence consists of the main predication *MP* and a set of arguments constraining conditions. Indefinite noun phrases contribute a discourse referent *x* together with a descriptive content *DC*. The main predication and the descriptive content are interpreted via Kaplan-style evaluation indices with indefinites being free to choose the evaluation index for the descriptive content; it need not be the same as the evaluation index of the main predicate (following an observation by Enç 1986 on the temporal index). Evaluation indices may be free or bound. In the latter case the index must be restricted to a particular value due to local properties. A free index may get any value that is available in the context (or discourse). The indefinite article is unmarked and does not contribute any restrictions, whereas reduced *some*, [*sm*], or indefinite *this* impose particular constraints. This account allows for modeling the different readings of indefinites without assuming lexical ambiguity, a configurational scope theory, or a representation in some way or other. The different scope options of (41a) are derived by different indexations:

- (41) a. Every student speaks an Indo-European language.
 b. Narrow scope:
 $(\forall_x (x: \text{student}(x))_{G'} (y_{G''} \text{I-E language}(y) \text{ speak}(x,y))_{G''})_g$
 c. Wide scope:
 $(\forall_x (x: \text{student}(x))_{G'} (y_g \text{I-E language}(y) \text{ speak}(x,y))_{G''})_g$

In the narrow-scope reading (41b) the value of *y* (standing for the indefinite) is fixed by the local assignment function G'' , an update of the assignment function G' , which is introduced by the universal quantifier. Thus, the value of *y* co-varies with the value of the universal quantifier. In the wide-scope reading (41c), the initial function g determines the value of *y*, which is therefore fixed by the context and does not vary with the universal quantifier. This mechanism allows for modeling the intermediate scope of indefinites as well. In a recent modification, Brasoveanu & Farkas (2009) can even store and retrieve quantificational dependencies in order to account for more complex functional readings. The indexical approach can also account for complex examples discussed in the literature where the variable and the descriptive content of an indefinite noun phrase are evaluated according to different indices (i.e. double indexation). The indexical theory is the most flexible theory with respect to the scope of indefinites discussed so far. Therefore it needs additional restrictions to express certain scope preferences and to prohibit overgeneration of the mechanism. It raises the question of what has to be represented in the logical form and what should rather be integrated into the interpretation process.

Summarizing the discussion of specificity and exceptional scope behavior of indefinites, we have seen on the one hand that Fodor & Sag's (1982) claim that only specific indefinites show exceptional scope behavior is not correct, since other indefinites can take exceptional scope by independent mechanisms, as well, and on the other hand, we have seen that there are two different kinds of intermediate exceptional scope readings: the functional or systematic co-variation and the genuine scope or unsystematic co-variation reading. If this contrast corresponds to the specific vs. non-specific contrast, and

we have good reasons to assume this, we can conclude that scope is not a sufficient means to account for specificity. This brings us back to the original intuition about the relation between the pragmatic concept of referential intention and the linguistic category of specificity, which will be investigated in more detail in the next section.

5. Epistemic specificity

From the very first discussion, specificity has been closely related to the “referential intentions” of the speaker, paraphrased as “the speaker has a particular individual in mind” (Karttunen 1968, 20). Farkas (1994) uses the term “epistemic specificity” to describe the contrasts that we find in contexts without any other operator and that are caused just by the option of a referential intention, as illustrated in (42) from Karttunen (1968, 14). It is interesting to note that we do not find this example in Karttunen (1969/1976), where he defends a scope theory of specificity.

- (42) a. I talked with a logician.
 b. I talked with Rudolf.
 c. I talked with a famous philosopher.
 d. I talked with the author of *Meaning and Necessity*.
 e. ..., and not with a linguist.
 f. ..., therefore I now understand the first and second syllogism.

The paraphrases in (42b–d) are possible if the speaker has talked to Rudolf Carnap, a famous philosopher and the author of *Meaning and Necessity*, and the speaker has this referent in mind. Thus (42a) in its specific reading is an answer to the question “Who did you talk with this morning?”. Karttunen (1968, 14) adds: “The speaker has a certain referent in his mind; and, in his knowledge, there also are some properties associated with that particular individual. Any of these properties could presumably be used to describe the individual.” The non-specific reading of the indefinite is an answer to “What kind of person did you talk with this morning?”. This reading is favored by the continuations in (42e–f) and the contrastive accent on *logician*. In the classical example from Fodor & Sag (1982, 355, their (1)), the indefinite is in subject (and topic) position in (43).

- (43) a. A student in syntax 1 cheated on the final exam. It was the guy who sits in the very back.
 b. A student in syntax 1 cheated on the final exam. I wonder which student it was.
 c. A student that Betty used to know in Arkansas cheated on the exam.
 d. A friend of mine cheated on the exam.
 e. Someone cheated on the exam.

In the specific interpretation (43a) the speaker “has a referent in mind” and makes an assertion about this referent. In the non-specific reading (43b), the speaker just makes an assertion that the set of students in the syntax class who cheated on the final exam is not empty. The reading can be disambiguated by the usual means listed in section 2: the specific meaning is triggered by adding more descriptive material as in (43c–d), and the non-specific one by the uninformative *someone* in (43e). In the following, we focus on the relation between specificity and the contrast between referential and attributive

readings for definites. In a next step we discuss different ways to represent the two concepts “the speaker has the referent in mind”, and “the speaker can uniquely identify the referent”. This discussion brings us to the problem of how to represent speaker-given, but discourse-new and hearer-new information. This question is addressed by briefly reporting on the discourse-oriented account of epistemic specificity by Kamp & Bende-Farkas (submitted).

The contrast between epistemic specific readings and epistemic non-specific readings is often paralleled by Donnellan’s (1966) contrast between a referential reading and an attributive reading of definites as in (44) (see Partee 1970 for discussion).

- (44) a. The man who lives in Apt. 3 is insane.
 b. The man who lives in Apt. 3 is Smith and, Smith is insane.
 c. Whoever lives in Apt. 3 is insane.

In the referential reading of (44a), paraphrased as (44b), the speaker identifies an individual by the definite description and then asserts about this individual that he or she is insane. In the attributive reading, as in the paraphrase (44c), the speaker asserts that *whoever lives in Apt. 3* is insane. Donnellan (1966) maintains that (44a) has two different semantic forms corresponding to the two paraphrases. (44b) is a singular proposition and (44c) a general proposition; they also differ in truth conditions (e.g. if there is no man living in Apt. 3). Stalnaker (1970) and Kaplan (1978) follow Donnellan’s position and provide semantic representations for referential definite noun phrases. Kripke (1977), however, argues that the sentence only has the attributive (or Russellian) reading (44c) (its “semantic reference”), but the speaker can have a certain referential intention (“speaker’s reference”) as in (44b). Thus the difference between the referential and the attributive reading is located in the pragmatics of using expressions. Neale (1990), Heim (1991) and article 41 (Heim) *Definiteness and indefiniteness* give overviews of the controversial discussion of the semantic or pragmatic status of this distinction. They conclude that it is a pragmatic distinction. Ludlow & Neale (1991) discuss the contrast for indefinites and also conclude that the specific vs. non-specific contrast is not part of the semantics (in the sense of truth conditions), but pragmatically motivated. The difference between referential definites and specific indefinites is that for the former, the hearer must also be able to identify the intended referent, while for specific indefinites the intended referent must be unfamiliar for the hearer (Dekker 2004, 369); nevertheless s/he has to establish a permanent representation for that referent. Thus, Stalnaker (1998, 16) holds that the difference between specific and non-specific indefinites is crucial for discourse structure: “The account I am sketching suggests that this difference matters, not to the interpretation of the indefinite expression itself, but only to the evaluation of subsequent statements made with pronouns anaphoric to the indefinite expression.” Another aspect is noted by Kamp & Bende-Farkas (submitted) based on Hintikka (1967) and Kaplan (1978), who argue that the difference in (44) becomes truth-conditionally relevant once we use the definite NP in (44a) as the complement of an attitude verb like *want*, as in (45), or the indefinite NP in (42a) as the complement of *believe*, as in (46).

(45) John wants to murder the man who lives in Apt. 3.

(46) John believes that Lauri talked with a logician.

Both sentences have two readings: In the *de re* reading, either the speaker or the attitude holder can identify the referent and the sentence asserts a relation between the subject, the referent and a property. In the *de dicto* reading the sentence expresses a relation between the subject and a property. This perspective connects epistemic specificity with referential specificity as discussed in section 3, rather than with scopal specificity.

The concept of “the referent the speaker has in mind” has been modeled in different ways. Fodor & Sag (1982) propose a referential interpretation of the indefinite, similar to indexical expressions—it appears that they take indefinite *this* as the prototypical specific indefinite. The discussion of the specificity marker *a certain* in English shows that some modifications of Fodor & Sag’s original concept are necessary. First, it is not always the speaker who is “responsible” for the referent, but some other salient agent in the context, or the subject of the sentence. For the latter case, see example (47) from Higginbotham (1987), where one can felicitously use *a certain* even in a situation in which only George can identify the student in (47b).

- (47) a. George (to Lisa): I met a certain student from Austin today.
 b. Lisa: George said that he met a (certain) student from Austin today.

The second modification is that the use of *a certain* need not trigger wide scope for the indefinite, as illustrated in (48) from Hintikka (1986) and already discussed in the last section.

- (48) a. Every true Englishman adores a certain woman.
 b. namely the Queen
 c. $\forall y [y \text{ is a true Englishman} \rightarrow y \text{ adores } a_{\text{ref}}(\text{woman})]$
 d. namely his mother
 e. $\forall y [y \text{ is a true Englishman} \rightarrow y \text{ adores } f(y)]$ and f is a function from Englishmen into their mothers

Besides the reading with wide scope for *a certain woman* as forced by (48b) and represented in (48c), the sentence has also a reading in which the indefinite takes narrow scope due to a functional wide-scope reading, which is represented by the Skolem function f in (48e). For a discussion of natural functions and the alternative between choice functions and Skolem functions see section 5. There are different ways to characterize the “vague” function of “having in mind”. Yeom (1998) assumes that the speaker can identify the referent of the indefinite by acquaintance and he proposes the function of “having cognitive contact to”. This function is transitive, i.e. it is sufficient that the speaker has access to someone who has cognitive contact to the referent. Other approaches use an “identifying property” or an “identifying idea” for restricting the domain of the indefinite to a singleton (Portner 2002, Schwarzschild 2002, Breheny 2003, Umbach 2004). The functional approach as well as the domain restriction allow for different scopal behavior, as illustrated in the previous section.

A final question concerns the distinction between speaker representation, hearer representation and discourse representation or common ground. Approaches to epistemic specificity assume that the speaker has particular knowledge of the referent or of the methods to identify the referent. It is crucial that this knowledge is not in the common ground. If it were also available to the hearer, the speaker would have used a definite

expression. The additional knowledge about the referent can be modeled in restrictions on the belief states or worlds of the relevant agents (e.g. Farkas 1994, Alonso-Ovalle & Menéndez-Benito 2010). An epistemic specific indefinite receives a rigid representation in the speaker's knowledge state, which must then be negotiated into the common ground. One way to model this negotiation is to assume some kind of presupposition accommodation (e.g. Yeom 1998, Geurts 2010, see section 8). Kamp & Bende-Farkas (submitted) extend the epistemic view from a speaker perspective to a hearer perspective. They distinguish between a *specific use* of an indefinite by the speaker and a *specific interpretation* by the hearer. The speaker signals by means of a linguistic form associated with specificity (such as *a certain*) that the hearer should create a stable representation for the indefinite introduced. Under this account, specific indefinites behave more like hearer-new proper names, which force the hearer to establish a stable representation for the subsequent discourse. The account also hints at the discourse function of specific indefinites discussed as "referential persistence" or "topic continuity" (Givón 1983) in section 9.

6. Referential anchoring

Different contrasts associated with different kinds of specificity can be best unified by the following generalization: In its prototypical use, the concept of specificity is associated with the communicative notion of referential intention. However, specificity also covers relations between discourse entities, which can only be said to have "referential intentions" of the involved discourse items in a very abstract way. Rather, it seems that specificity in this sense is a grammaticalized means to structure the relations among discourse items: A specific indefinite is *referentially anchored* to a salient discourse participant or another discourse referent, i.e. "the referent of the specific expression is linked by a contextually salient function to the referent of another expression" (von Heusinger 2002, 45). Under this account, the context has to provide two parameters: the anchoring function and the anchor itself. The speaker has to be able to specify the anchoring function, which must be unfamiliar to the hearer in the same way as the intended referent must be unfamiliar. Still the hearer has to represent the fact that there is an anchoring function. The anchor, however, must be familiar to both speaker and hearer, which allows speaker and hearer to share the scopal properties of the indefinite. This concept of specificity is a refinement of Fodor & Sag's (1982) original account in terms of referential (Kaplan-style) expressions. Below we first discuss the modifications and then give a brief overview of different versions of referential anchoring proposed in the literature.

Karttunen (1968) represents specific indefinites as individual constants, similar to proper names, while Fodor & Sag (1982, 388) give an indexical interpretation of specific indefinites, analogously to the use of demonstratives, but with the unfamiliarity condition for indefinites. They model specific indefinites with a contextual index c_{IR} for *intended referent*. Other representations of specific indefinites in the same tradition include the descriptive content as well, as in (49b), while (49a) provides the existential interpretation of the indefinite (from Heim 1991, 518, cf. also article 41 (Heim) *Definiteness and indefiniteness*).

- (49) a. $\llbracket a_{quant} N \rrbracket = \lambda Q. \exists x. [N(x) \ \& \ Q(x)]$
 b. $\llbracket a_{ref} N \rrbracket$ is defined only if there is a unique individual that the speaker of the sentence has in mind, and this individual is N

In the approach presented here, the uniqueness condition in the definition (49b) is captured by a function from the anchor to the referent: $f(\text{anchor}) = \text{referent}$, different versions of which we discuss below. The first modification concerns potential anchors. It has been observed that besides the speaker other attitude holders can also be anchors for the specific indefinite. In one reading of (50), Paula has a referential intention and therefore the sentence asserts that Paula has a singular belief about that referent, which entails the existence of an important politician, as discussed in section 3.

(50) Paula believes that Bill talked to an important politician.

It is often assumed that the anchor must be an attitude holder, who can have referential intentions. This is not always the case, as illustrated by examples in which the anchor is a variable bound by a quantifier, as in (51) and (52). Both examples have readings where the specific indefinite systematically co-varies with its anchor (or binder), giving rise to the apparent intermediate reading discussed in section 4.

(51) Every husband had forgotten a certain date—his wife’s birthday.

(52) Every professor rewarded every student who read a book on the semantics-pragmatics interface.

For these cases, we have to make an additional modification concerning the content of the function from anchor to referent. It is not enough to say that the professor has a certain book in mind, but we need systematic co-variation between professors and books, as shown in section 4. Thus the anchoring function does not concern the “referential intention” of the professor or the husband (or what he has in mind, which would be somewhat contradictory) but the assignment between husbands and dates or professors and books. These functions must be natural and informative (see the discussion above). (53) and (54) demonstrate that even though the function must have certain properties and must be contextually given, the exact definition of the function may be unknown even to the speaker. It is a controversial issue whether the speaker should in principle be able to recover the content of the function or not. Yeom (1998) for example argues that there must be a causal chain from the speaker to the agent who is responsible for the content of the function.

(53) The teacher gave every child a certain task to work on during the afternoon.

(54) Each reporter was assigned to a certain politician by the editor of the paper.

We can summarize the characterization of referential anchoring as follows: In the prototypical case the anchoring function takes the speaker as its argument, and its value is the referent of the specific indefinite. However, besides the speaker, other arguments may occupy this position. The content of the function can vary from “x has y in mind” to “there is a natural and informative function from x to y”. With these two modifications in place the concept becomes more flexible than Fodor and Sag’s account, as it also covers functional apparent intermediate-scope readings. We present three different approaches that spell out referential anchoring by means of (i) anchoring relations in DRT, (ii) Skolemized choice functions and (iii) Skolem functions.

Kamp & Bende-Farkas (2006, based on a manuscript from 2001) use anchored representations in DRT. They distinguish between external anchors, i.e. functions that relate a discourse referent to an object in the world (like proper names to their bearers) and internal anchors, i.e. functions that relate the representation to other discourse referents. These two kinds of anchors allow them to model their distinction between the specific *use* of an indefinite by the speaker and the specific *interpretation* by the hearer. The speaker's specific use is represented by an external anchor to the object that is the intended referent of the indefinite, while the internal anchor is used in the hearer's representation between a representation of the speaker and the discourse referent for the specific indefinite. Speaker and hearer must negotiate the reference and align their representations. However, what is important here is that the internal anchor of the hearer is similar to the referential anchors discussed above.

Von Heusinger (2002 based on earlier work) cashes out the idea of referential anchoring in terms of parameterized or Skolemized choice functions, better known from Kratzer (1998) or Chierchia (2001, 2005). The idea is that the indefinite article can translate into the complex pronominal element f_x with x being a parameter that might be bound by some context agent or some quantifier phrase that has wider scope than the indefinite. The function f applied to the anchor yields a choice function that is applied to the set denoted by the descriptive content of the indefinite yielding the referent, as in (55) adapted from Roberts (2007).

(55) Referential anchoring with parameterized choice functions

- i. complex pronominal element f_x
- ii. x parameter (= anchor), the argument of f , binding is pragmatically given
 - a) might be bound by some context agent (speaker etc.)
 - b) might be bound by a wider scope QP to yield intermediate scope
- iii. $f(x)$: a choice function that takes a set denoted by DC [descriptive content; Kult] as its argument and yields an element of that set

Onea & Geist (2011) have developed a different implementation of the original idea. They assume a classical account of indefinites as existential quantifiers with additional pragmatic enrichment operations. One such operation is domain restriction (Schwarzschild 2002), another one is referential anchoring. They convincingly argue that domain restriction and referential anchoring have different contextual triggers and semantic effects, as domain restriction enriches the descriptive content of the indefinite and reduces the associated set, while referential anchoring directly identifies one element of the set. They start with the classical semantics of an indefinite (as given in (49a), repeated as (56i)). They achieve domain restriction with the relation $R(x,y)$, i.e. via relational restriction of the descriptive content, as in (ii). Finally, they allow for referentially anchoring $m(c) = x$, which guarantees the singleton set condition. The anchoring function m and the anchor c are free variables and must get values from the context.

(56) referential anchoring as pragmatic enrichment (Onea & Geist 2011)

- i. lexical semantics: $\lambda Q. \exists x. [N(x) \ \& \ Q(x)]$
- ii. domain restriction $\lambda Q. \exists x. [N(x) \ \& \ Q(x) \ \& \ R(x,y)]$
- iii. referential anchoring $\lambda Q. \exists x. [N(x) \ \& \ Q(x) \ \& \ R(x,y) \ \& \ m(c) = x]$

All three approaches represent specific indefinites by a function that makes the referent of the indefinite unique with respect to the anchor (the speaker, some other agent or a quantifier phrase). The approaches differ on some other issues that are independent of the idea of referential anchoring, such as the question of lexical ambiguity of the indefinite article and the representation of the anchor as a parameterized choice function or as a Skolem function (see Chierchia 2005 and Onea & Geist 2011 for discussion).

Even though there is no agreement about the representation of the indefinite article in English, other encodings seem to need a common semantics for different kinds of specificity, as illustrated by differential object marking in Turkish (Enç 1991, von Heusinger & Kornfilt 2005): in this language all definite direct objects and specific indefinite direct objects are case-marked, while non-specific indefinites lack case. The case marker *-I* (representing the allophones *-i*, *-ı*, *-u*, *-ü*) signals referential specificity in (57b), scopal specificity in (58b) and epistemic specificity in (59b). Kornfilt (p.c.) notes that (58b) may also have a narrow-scope reading, which must be licensed by an additional condition, such as a defined relation or some kind of d-linking.

- (57) a. Bir öğrenci arı-yor-um. Bul-a-mı-yor-um.
 a student look+for-Pr.Prog.-1.sg. find-Neg.Abil-Neg.-Pr.Prog.-1.sg.
 'I am looking for a student. I can't find him/one.'
- b. Bir öğrenci -yi arı-yor-um. Bul-a-mı-yor-um.
 a student-Acc. look+for-Pr.Prog.-1.sg. find-Neg.Abil-Neg.-Pr.Prog.-1.sg.
 'I am looking for a student. I can't find him/*one.'
- (58) a. Her öğrenci bir kitap oku-du.
 every student a book read-Past-(3.sg.)
 'Every student read a book.' (different ones)
- b. Her öğrenci bir kitab-ı oku-du.
 every student a book-Acc read-Past-(3.sg.)
 'Every student read a book.' (the same one/ones)
- (59) a. (Ben) bir kitap oku-du-m.
 I a book read-Past-1.sg.
 'I read a book.'
- b. (Ben) bir kitab-ı oku-du-m.
 I a book-Acc read-Past-1.sg.
 'I read a certain book.'

In summary, the concept of referential anchoring provides a consistent account of specificity. It links the pragmatic concept of referential intention to a semantic representation with an anchoring function and an anchor. The anchor must be familiar to speaker and hearer, while the content of the function must not be familiar to the hearer (and is generally familiar to the speaker). Still, the hearer has to establish a permanent representation for the specific indefinite, based on the assumption of the existence of such an anchoring function. This account is related to the other concepts of specificity, including familiarity-based or discourse-based concepts, discussed in the next sections.

7. D-linking, partitivity and presuppositionality

Partitive specificity has been related to other types of specificity since Enç (1991), who discusses direct object marking in Turkish. However, it is clearly independent of scopal and epistemic specificity (Abbott 1995, Farkas 1994, van Geenhoven 1998). We still discuss the properties of partitive indefinites and the relation of partitive specificity to other types of specificity, since partitive indefinites show interesting properties quite similar to specific indefinites. Indefinites generally introduce new discourse referents together with a description. Partitive indefinites pick out one referent from a discourse-familiar group. Obviously, such indefinites presuppose existence and behave like strong quantifiers. Pesetsky (1987, 107) introduces the term d(iscourse) linking for the different presuppositions of *which* as opposed to *who*: “Roughly, *which*-phrases are *discourse-linked* (*d-linked*), whereas *who* and *what* are normally not d-linked.” Since wh-phrases can be understood as a kind of indefinite noun phrase, this contrast between d-linked and not-d-linked wh-phrases was transferred to indefinites. Enç (1991) claims that differential object marking in Turkish (i.e. the Acc-case suffix *-I*) expresses specificity and that specificity can be reduced to partitivity, as in (60).

- (60) a. Oda-m-a birkaç çocuk gir-di.
 room-1.sg.-Dat. several child enter-Past
 ‘Several children entered my room.’ (Enç 1991, ex. 16)
- b. İki kız-ı tanı-yor-du-m.
 two girl-Acc. know-Prog.-Past-1.sg.
 ‘I knew two girls.’ (Enç 1991, ex. 17)

The first sentence introduces a set of children, and the accusative case in the second sentence indicates that the two girls are part of that set. Thus the expression *two girls* presupposes existence. Enç takes this observation as a strong indicator that such an expression is specific and proposes that specificity can be derived from partitivity, or more exactly from familiarity of the superset involved.

Diesing (1992) and de Hoop (1995) take partitivity as an instance of Milsark’s (1974) contrast between a weak (cardinal, non-specific) and a strong (presuppositional, quantificational, specific) interpretation. In (61a) the indefinite *some ghosts* receives a weak interpretation, whereas in (61b) it gets a strong or partitive interpretation, i.e. it presupposes that there are other groups of ghosts.

- (61) a. There are *some ghosts* in this house.
 b. *Some ghosts* live in the pantry; others live in the kitchen.

Diesing (1992) and de Hoop (1995) also discuss this contrast with respect to syntactic phenomena such as *there*-constructions and scrambling. Alternative approaches link specificity to presuppositionality (Yeom 1998, van Geenhoven 1998, Krifka 2001, Geurts 2010). However, it has often been shown that partitive indefinites can have both a specific and a non-specific reading, as in (62) and (63) from Farkas (1994). The partitive *one of Steve’s sisters* receives a scopally non-specific reading in (62), and an epistemic non-specific reading in (63).

- (62) John wants to marry one of Steve’s sisters. (He doesn’t care which)

(63) One of Steve's sisters cheated on the exam. (We have to find out which)

Closer inspection of the Turkish data confirms this observation. The explicit partitive with accusative case in (64) has an (epistemic) specific reading whereas the non-case-marked explicit partitive in (65) only allows for a non-specific reading (see von Heusinger & Kornfilt 2005, 32).

(64) Alibüro-ya çocuk-lar-dan *iki* *kız-ı* al-acak
 Alioffice-Dat. child-pl.-Abl. *two* *girl-Acc.* take-Fut.
 'Ali will hire, for the office, two (specific, particular) girls of the children.'

(65) Alibüro-ya çocuk-lar-dan *iki* *kız* al-acak
 Alioffice-Dat. child-pl.-Abl. *two* *girl* take-Fut.
 'Ali will hire, for the office, two girls of the children.'

In sum, partitive indefinites are not specific indefinites, although both show a kind of discourse anchoring. Partitives are discourse anchored by their superset, which is given, while specific indefinites are discourse anchored by the referential intention of the speaker (or some other agent). In both cases the indefinites are presuppositional and the descriptive content is restricted (as in the case of domain restriction).

8. Topicality

Topicality has also been closely related to specificity. Languages that show differential object marking depending on specificity, like Turkish, obligatorily mark the direct object if it is topicalized by means of left-dislocation (Kornfilt 1997, 190–192). Portner & Yabushita (2001) assume that the restrictor set of the indefinite is topical, either explicitly as in the case of partitives, or implicitly via other information. Portner & Yabushita (2001) argue on the basis of Japanese and Portner (2002) on Chinese data that a topical and very narrow restrictor set triggers specificity effects. This perspective on specificity is very similar to Schwarzschild's domain restriction approach (see section 5) and it is based on a discourse topic view. A different approach assumes that the whole indefinite is topical in the sense of a sentence or "aboutness" topic (see Cresti 1995, Endriss 2009 and article 72 (Roberts) *Topics*). The intuitive idea is that the speaker introduces the topic by a separate speech act. Thus, the topic is identified independently of the assertion in the sentence, giving rise to typical specificity contrasts. Endriss (2009) and Ebert, Endriss & Hinterwimmer (2009) model intermediate scope readings by assuming nested topic-comment structures. In this way they account for the difference in readings between (66) and (67).

(66) Every student will leave the party if some lecturer shows up.

(67) Every student announced that she will leave the party if some lecturer shows up.

Both examples show a wide-scope reading (i.e. they will leave if Prof. Schiller shows up), and a functional wide-scope reading (i.e. they will leave if their supervisor shows up), but only (67) shows a genuine intermediate reading (i.e. Ann will leave if Prof. Schiller shows

up, Mary will leave if Prof. Wagner shows up, etc.). Ebert, Endriss & Hinterwimmer (2009) explain the possibility of intermediate scope in (67) by assuming nested topic-comment structures triggered by the verb *announce*. This approach nicely models the possibility of genuine intermediate scope and thus complements the view of specificity as referential anchoring developed above. It seems that one cannot reduce specificity to topicality since in section 5 we discussed different kinds of “intermediate” epistemic specific readings without a nested topic-comment structure. Thus topicalization is different from specificity, even though some of the effects are very similar.

9. Discourse prominence

Indefinites introduce new items or referents into a discourse. Referentially anchored indefinites are specific indefinites that have special referential and pragmatic properties: They have wide scope or functional wide scope, and they are anchored to some other discourse item. These properties seem to correlate with discourse prominence. Discourse prominence itself is a vague concept, but I present three aspects that are related to specificity: (i) “noteworthiness”, (ii) “referential persistence” and (iii) “topic continuity”. English has an indefinite use of the proximal demonstrative *this* that introduces an indefinite that does not interact with other operators, much like a deictically used demonstrative. The use of indefinite *this* is licensed if it introduces a discourse referent that becomes the theme of the subsequent discourse (Prince 1981) or that is “noteworthy”, i.e. has an unexpected and interesting property (McLaran 1982, Ionin 2006), as illustrated by the contrast below (Maclaren 1982, 88).

- (68) a. He put $\sqrt{a}/\#$ this 31 cent stamp on the envelope, so he must want it to go airmail.
 b. He put $\sqrt{a}/\sqrt{}$ this 31 cent stamp on the envelope, and only realized later that it was worth a fortune because it was unperforated.

Both sentences introduce a discourse referent, and there is no other operator and no referential vs. attributive contrast. Nothing prevents either indefinite from introducing a discourse referent. Still, there is an important difference: the indefinite marked by *this* in (68b) introduces a significant topic for the subsequent discourse. Indefinite *this* signals particular, interesting, new information, while unmarked indefinites signal that they introduce a discourse referent with more or less important properties. Different concepts of discourse prominence include Givón’s (1983) notions of “referential persistence” and “topic continuity”: Referential persistence is the property of being frequently picked up in the subsequent discourse, and topic continuity is the property of becoming or remaining the topic of the discourse. There are different quantitative measures for these kinds of prominence, including the number of anaphoric links, the distance to the first anaphoric link and the probability of becoming the topic of the discourse. Specific indefinites show a much higher degree of referential persistence and topic continuity than non-specific indefinites. (see Givón 1983 for an overview, Chiriacescu & von Heusinger 2010 for a study on specific indefinite direct objects in Romanian).

The relation between the semantic concept of specificity as referential anchoring, the pragmatic concept of specificity as referential intention and the different types of discourse prominence are not well-understood. A pragmatic account may go like this: The

use of a specific indefinite forces the hearer to establish a permanent discourse referent. By Gricean maxims, the speaker would only force the hearer to do that if s/he intends to say more about that referent. Givón (1983) argues that it is the other way around. Diachronic data show that special markers for indefinites are first introduced to mark their discourse prominence, then the speaker's intention, and finally such a marker may acquire semantic properties such as specificity or referentiality (see Stark 2002 for a study on the diachronic development of specificity markers in Italian). This brings us back to the first observations concerning specificity namely to the "strikingly different" interpretations of indefinites with respect to licensing discourse referents (Karttunen 1968, 11), and to Stalnaker's (1998) remark on the discourse function of specific indefinites, quoted in section 5.

10. Summary

The semantic-pragmatic category "specificity", which is motivated by the communicative principle of referential intentions, is used for different contrasts associated with the interpretation of indefinites. The contrasts include different interpretations of indefinites in opaque contexts, exceptional scope behavior, epistemic contrasts, partitive contrasts, topical vs. non-topical readings and different grades of discourse prominence. I have argued that there is a core notion of specificity underlying the intuitive concept, namely referential anchoring. The referent of a specific indefinite is functionally dependent on some discourse participant or on another expression in the sentence. The anchor must be familiar to speaker and hearer, while the content of the anchoring function must be unfamiliar to the hearer (to distinguish specific indefinites from definites). Still, the hearer has to accommodate the fact that there is a function and must establish a permanent representation for the specific indefinite. I have shown that this approach is quite flexible and can account for various particular constraints associated with special specificity markers. However, it cannot explain all phenomena associated with different types of specificity, which might get different kinds of explanations (such as genuine intermediate scope indefinites via embedded topics). I discussed the similarities between specific indefinites and partitive indefinites as well as topic indefinites and showed that they are independent notions, but with similar effects. Finally, I compared the semantic properties of specific indefinites with their discourse pragmatic functions, which opens up a new domain of research, namely the interaction of semantic and pragmatic properties of nominal expressions with discourse properties.

The present version of this paper developed over a long period of time, during which I had the opportunity to discuss earlier versions with many colleagues. I am especially indebted for very detailed and helpful comments on earlier versions to Barbara Abbott, Gennaro Chierchia, Sofiana Chiriacescu, Cornelia Ebert, Donka Farkas, Ljudmila Geist, Jeanette Gundel, Irene Heim, Stefan Hinterwimmer, Tania Ionin, Elsi Kaiser, Hans Kamp and Edgar Onea. The views presented in this article most probably do not correspond to the views of any of the people mentioned above. Needless to say that all remaining errors are mine. I gratefully acknowledge the support for this research by the German Science Foundation (SFB 732 Incremental Specification in Context) and by the Fritz Thyssen Foundation and the VolkswagenStiftung (opus magnum).

11. References

- Abbott, Barbara 1976. *A Study of Referential Opacity*. Ph.D. dissertation. University of California, Berkeley, CA.
- Abbott, Barbara 1995. Some remarks on specificity. *Linguistic Inquiry* 26, 341–346.
- Abbott, Barbara 2010. *Reference*. Oxford: Oxford University Press.
- Abusch, Dorit 1994. The scope of indefinites. *Natural Language Semantics* 2, 83–135.
- Aloni, Maria 2001. *Quantification under Conceptual Cover* (ILLC Dissertation Series 2001-1). Amsterdam: ILLC, University of Amsterdam.
- Alonso-Ovalle, Luis & Paula Menéndez-Benito 2010. Modal indefinites. *Natural Language Semantics* 18, 1–31.
- Bach, Emmon 1968. Nouns and noun phrases. In: E. Bach & R. T. Harms (eds.). *Universals in Language*. New York: Holt, Rinehart & Winston, 90–122.
- Baker, C. Leroy 1966. *Definiteness and Indefiniteness in English*. MA thesis. University of Illinois, Urbana, IL.
- Brasoveanu, Adrian & Donka Farkas 2009. Exceptional scope as discourse reference to quantificational dependencies. In: P. Bosch, D. Gabelaia & J. Lang (eds.). *Logic, Language, and Computation*. Berlin: Springer, 165–179.
- Breheny, Richard 2003. Exceptional-scope indefinites and domain restriction. In: M. Weisgerber (ed.). *Proceedings of Sinn und Bedeutung (= SuB) 7* (Arbeitspapiere des Fachbereichs Sprachwissenschaft 114). Konstanz: University of Konstanz, 38–52.
- Chierchia, Gennaro 2001. A puzzle about indefinites. In: C. Checchetto, G. Chierchia & M.-T. Guasti (eds.). *Semantic Interfaces: Reference, Anaphora and Aspect*. Stanford, CA: CSLI Publications, 51–89.
- Chierchia, Gennaro 2005. Definites, locality, and intentional identity. In: G.N. Carlson & F. J. Pelletier (ed.). *Reference and Quantification. The Partee Effect*. Stanford, CA: CSLI Publications, 143–178.
- Chiriacescu, Sofiana & Klaus von Heusinger 2010. Discourse prominence and pe-marking in Romanian. *The International Review of Pragmatics* 2, 298–322.
- Chung, Sandra & William A. Ladusaw 2004. *Restriction and Saturation*. Cambridge, MA: The MIT Press.
- Cresti, Diana 1995. *Indefinite Topics*. Ph.D. dissertation. MIT, Cambridge, MA.
- Dahl, Östen 1970. Some notes on indefinites. *Language* 46, 33–41.
- Dekker, Paul 2004. The pragmatic dimension of indefinites. *Research on Language and Computation* 2, 365–399.
- Diesing, Molly 1992. *Indefinites*. Cambridge, MA: The MIT Press.
- Donnellan, Keith 1966. Reference and definite descriptions. *Philosophical Review* 75, 281–304.
- Ebert, Christian, Cornelia Endriss & Stefan Hinterwimmer 2009. Embedding topic-comment structures results in intermediate scope readings. In: *Proceedings of the North Eastern Linguistic Society (=NELS) 38*. Amherst, MA: GLSA, University of Massachusetts, 246–258.
- Egli, Urs 1991. (In)definite Nominalphrase und Typentheorie. In: U. Egli & K. von Heusinger (eds.). *Zwei Aufsätze zur definiten Kennzeichnung* (Arbeitspapiere des Fachbereichs Sprachwissenschaft 27). Konstanz: University of Konstanz, 1–28.
- Egli, Urs & Klaus von Heusinger 1995. The epsilon operator and E-type pronouns. In: U. Egli et al. (eds.). *Lexical Knowledge in the Organization of Language*. Amsterdam: Benjamins, 121–141.
- Enç, Mürvet 1986. Towards a referential analysis of temporal expressions. *Linguistics & Philosophy* 9, 405–426.
- Enç, Mürvet 1991. The semantics of specificity. *Linguistic Inquiry* 22, 1–25.
- Endriss, Cornelia 2009. *Quantificational Topics. A Scopal Treatment of Exceptional Wide Scope Phenomena*. Dordrecht: Springer.
- Farkas, Donka 1981. Quantifier scope and syntactic islands. In: R. Hendrik et al. (eds.). *Papers from the Regional Meeting of the Chicago Linguistic Society (=CLS) 17*. Chicago, IL: Chicago Linguistic Society, 59–66.

- Farkas, Donka 1994. Specificity and scope. In: L. Nash & G. Tsoulas (eds.). *Actes du Premier Colloque Langues & Grammaire*. Paris: University of Paris VIII, 119–137.
- Farkas, Donka 1997. Evaluation indices and scope. In: A. Szabolcsi (ed.). *Ways of Scope Taking*. Dordrecht: Kluwer, 183–215.
- Farkas, Donka 2002. Specificity distinction. *Journal of Semantics* 19, 213–243.
- Farkas, Donka & Klaus von Heusinger 2003. *Stability of Reference and Object Marking in Romanian*. Ms. Stuttgart, University of Stuttgart.
- Fassi-Fehri, Abdelkader 2006. *Determination Parameters in the Semitic Diglossia*. Ms. Rabat, University of Rabat.
- Fodor, Janet 1970. *The Linguistic Description of Opaque Contexts*. Ph.D. dissertation. MIT, Cambridge, MA. Reprinted: Bloomington, IN: Indiana University Linguistics Club, 1976.
- Fodor, Janet & Ivan Sag 1982. Referential and quantificational indefinites. *Linguistics & Philosophy* 5, 355–398.
- van Geenhoven, Veerle 1998. *Semantic Incorporation and Indefinite Descriptions. Semantic and Syntactic Aspects of Noun Incorporation in West Greenlandic*. Stanford, CA: CSLI Publications.
- van Geenhoven, Veerle & Louise McNally 2005. On the property analysis on opaque complements. *Lingua* 115, 885–914.
- Geist, Ljudmila 2008. Specificity as referential anchoring: Evidence from Russian. In: A. Grønn (ed.). *Proceedings of Sinn und Bedeutung (= SuB) 12*. Oslo: ILOS 2008, 151–164.
- Geist, Ljudmila & Edgar Onea 2010. Epistemic Determiners and Referential Anchoring. Paper presented at the *Workshop on Epistemic Indefinites*, June 10–12, University of Göttingen.
- Geurts, Bart 2010. Specific indefinites, presupposition, and scope. In: R. Bäuerle, U. Reyle & T.E. Zimmermann (eds.). *Presupposition and Discourse*. Bingley: Emerald, 125–158.
- Givón, Talmy 1973. Opacity and reference in language: An inquiry into the role of modalities. In: J.P. Kimball (ed.). *Syntax and Semantics, vol. 2*. New York: Seminar Press, 95–122.
- Givón, Talmy (ed.) 1983. *Topic Continuity in Discourse. A Quantitative Cross-Language Study*. Amsterdam: Benjamins.
- Haspelmath, Martin 1997. *Indefinite Pronouns*. Oxford: Clarendon Press.
- Heim, Irene 1982. *The Semantics of Definite and Indefinite Noun Phrases*. Ph.D. dissertation. University of Massachusetts, Amherst, MA. Reprinted: Ann Arbor, MI: University Microfilms.
- Heim, Irene 1991. Artikel und Definitheit. In: A. von Stechow & D. Wunderlich (eds.). *Semantik. Ein internationales Handbuch der zeitgenössischen Forschung (HSK 6)*. Berlin: de Gruyter, 487–535.
- von Heusinger, Klaus 2002. Specificity and definiteness in sentence and discourse structure. *Journal of Semantics* 19, 245–274.
- von Heusinger, Klaus & Jaklin Kornfilt 2005. The case of the direct object in Turkish: Semantics, syntax and morphology. *Turcic Languages* 9, 3–44.
- Higginbotham, James 1987. Indefinites and predication. In: E. Reuland & A. ter Meulen (eds.). *The Representation of (In)definiteness*. Cambridge, MA: The MIT Press, 43–70.
- Hilbert, David & Paul Bernays 1939. *Grundlagen der Mathematik*. Vol. II. 2nd edn. Berlin: Springer.
- Hintikka, Jaakko 1967. Individuals, possible worlds, and epistemic logic. *Noûs* 1, 33–62.
- Hintikka, Jaakko 1986. The semantics of ‘a certain’. *Linguistic Inquiry* 17, 331–336.
- de Hoop, Helen 1995. On the characterization of the weak-strong distinction. In: E. Bach et al. (eds.). *Quantification in Natural Language*. Dordrecht: Kluwer, 421–450.
- Ionin, Tania 2006. This is definitely specific: Specificity and definiteness in article systems. *Natural Language Semantics* 14, 175–234.
- Ioup, Georgette 1977. Specificity and the interpretation of quantifiers. *Linguistics & Philosophy* 1, 233–245.
- Kamp, Hans & Ágnes Bende-Farkas 2006. *Specific Indefinites: Anchors and Functional Readings*. Ms. Stuttgart, University of Stuttgart.
- Kamp, Hans & Ágnes Bende-Farkas submitted. Epistemic specificity from a communication-theoretical perspective. *Journal of Semantics*.

- Kaplan, David 1978. Dthat. In: P. Cole (ed.). *Syntax and Semantics 9: Pragmatics*. New York: Academic Press, 241–244.
- Karttunen, Lauri 1968. *What Do Referential Indices Refer To?* Santa Monica, CA: RAND Corporation. <http://www.rand.org/pubs/papers/2008/P3854.pdf>. December 9, 2010.
- Karttunen, Lauri 1969/1976. Discourse referents. In: *Proceedings of the 1969 Conference on Computational Linguistics*. Sång-Säby, Sweden, 1–38. Reprinted in: J. McCawley (ed.). *Syntax and Semantics 7: Notes from the Linguistic Underground*. New York: Academic Press, 1976, 363–385.
- Kornfilt, Jaklin 1997. *Turkish*. London: Routledge.
- Kratzer, Angelika 1998. Scope or pseudoscope? Are there wide-scope indefinites? In: S. Rothstein (ed.). *Events and Grammar*. Dordrecht: Kluwer, 163–196.
- Kratzer, Angelika 2003. *A Note on Choice Functions in Context*. Ms. Amherst, MA, University of Massachusetts. December 2003.
- Krifka, Manfred 2001. Non-novel indefinites in adverbial quantification. In: C. Condoravdi & G. Renardel. *Logical Perspectives on Language and Information*. Stanford, CA: CSLI Publications, 1–40.
- Kripke, Saul 1977. Speaker's reference and semantic reference. *Midwest Studies in Philosophy* 2, 255–276.
- Leonetti, Manuel 2004. Specificity and object marking: The case of Spanish and Catalan. *Journal of Linguistics* 3, 75–114.
- Ludlow, Peter & Stephen Neale 1991. Indefinite descriptions: In defense of Russell. *Linguistics & Philosophy* 14, 171–202.
- Maclaren, Rose 1982. *The Semantics and Pragmatics of the English Demonstratives*. Ph.D. dissertation. Cornell University, Ithaca, NY.
- Matthewson, Lisa 1999. On the interpretation of wide-scope indefinites. *Natural Language Semantics* 7, 79–134.
- McCawley, James 1968. The role of semantics in a grammar. In: E. Bach & R. T. Harms (eds.). *Universals in Linguistic Theory*. New York: Holt, Rinehart & Winston, 124–169.
- Milsark, Gary 1974. *Existential Sentences in English*. Ph.D. dissertation. MIT, Cambridge, MA.
- Neale, Stephen 1990. *Descriptions*. Cambridge, MA: The MIT Press.
- Onea, Edgar & Ljudmila Geist 2011. Indefinite determiners and referential anchoring. *International Review of Pragmatics* 3.
- Partee, Barbara 1970. Opacity, coreference, and pronouns. *Synthese* 21, 359–385.
- Partee, Barbara 1987. Noun phrase interpretation and type-shifting principles. In: J. Groenendijk, D. de Jongh & M. Stokhof (eds.). *Studies in Discourse Representation Theory and the Theory of Generalized Quantifiers*. Dordrecht: Foris, 115–144.
- Pesetsky, David 1987. Wh-in situ. Movement of unselective binding. In: E. Reuland & A. ter Meulen (eds.). *The Representation of (In)definiteness*. Cambridge, MA: The MIT Press, 98–129.
- Portner, Paul 2002. Topicality and (non-)specificity in mandarin. *Journal of Semantics* 19, 275–287.
- Portner, Paul & Katsuhiko Yabushita 2001. Specific indefinites and the information structure theory of topic. *Journal of Semantics* 18, 271–297.
- Prince, Ellen 1981. On the inferencing of indefinite-this NPs. In: A. Joshi, B. Webber & I. Sag (eds.). *Elements of Discourse Understanding*. Cambridge: Cambridge University Press, 231–250.
- Quine, Willard van Orman 1956. Quantifiers and propositional attitudes. *Journal of Philosophy* 53, 177–187. Reprinted in: L. Linsky (ed.). *Reference and Modality*. Oxford: Oxford University Press, 1971, 101–111.
- Quine, Willard van Orman 1960. *Word and Object*. Cambridge, MA: The MIT Press.
- Reinhart, Tanya 1997. Quantifier scope: How labor is divided between QR and choice functions. *Linguistics & Philosophy* 20, 335–397.
- Roberts, Craige 2007. Specificity and Incomplete Descriptions. Handout. University of Massachusetts, Amherst, MA. March 27, 2007.
- Russell, Bertrand 1905. On denoting. *Mind* 14, 479–493.

- Ruys, Eduard 1992. *The Scope of Indefinites*. Doctoral dissertation. Utrecht University, Utrecht.
- Ruys, Eduard 2006. Unexpected wide scope phenomena. In: M. Everaert & H. van Riemsdijk (eds.). *The Blackwell Companion to Syntax*, vol. 5. Oxford: Blackwell, 175–228.
- Schwarz, Bernhard 2001. Two kinds of long distance indefinites. In: R. van Rooy & M. Stokhof (eds.). *Proceedings of the 13th Amsterdam Colloquium*. Amsterdam: ILLC, 192–197.
- Schwarz, Bernhard 2004. Indefinites in verb ellipsis. *Linguistic Inquiry* 35, 244–253.
- Schwarzschild, Roger 2002. Singleton indefinites. *Journal of Semantics* 19, 289–314.
- Stalnaker, Robert 1970. Pragmatics. *Synthese* 22, 272–289.
- Stalnaker, Robert 1998. On the representation of context. *Journal of Logic, Language, and Information* 7, 3–19.
- Stark, Elisabeth 2002. Indefinites and specificity in Old Italian texts. *Journal of Semantics* 19, 315–332.
- von Stechow, Arnim 2000. Some remarks on choice functions and LF-movements. In: K. von Heusinger & U. Egli (eds.). *Reference and Anaphoric Relations*. Dordrecht: Kluwer, 193–228.
- Steedman, Mark 2007. *Surface-Compositional Scope-Alternation Without Existential Quantifiers*. Ms. Edinburgh, University of Edinburgh. Draft 5.2, Sept 2007, <http://www.iccs.informatics.ed.ac.uk/~steedman/papers.html>. December 9, 2010.
- Szabolcsi, Anna 2010. *Quantification*. Oxford: Oxford University Press.
- Szabolcsi, Anna & Frans Zwarts 1992. Weak islands and an algebraic semantics for scope-taking. *Natural Language Semantics* 1, 235–284.
- Umbach, Carla 2004. Cataphoric indefinites. In: C. Meier & M. Weisgerber (eds.). *Proceedings of Sinn und Bedeutung (= SuB) 8* (Arbeitspapiere des Fachbereichs Sprachwissenschaft 177). Konstanz: University of Konstanz, 301–316.
- Winter, Yoad 1997. Choice functions and the scopal semantics of indefinites. *Linguistics & Philosophy* 20, 399–467.
- Yeom, Jae-Il 1998. *A Presuppositional Analysis of Specific Indefinites: Common Grounds as Structured Information States*. New York: Garland.
- Zimmermann, Thomas E. 1993. On the proper treatment of opacity in certain verbs. *Natural Language Semantics* 1, 149–179.

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43. Quantifiers

1. Introduction
2. Scope of the present study
3. Determiner Quantifiers
4. Extending the logical types of determiners
5. Adverbial Quantifiers
6. Concluding remarks
7. References

Abstract

The presentation distinguishes broadly between Determiner (D-) Quantification and Adverbial (A-) Quantification, with the former being much better studied and understood than the latter. We present D-quantification first and use it to study novel types of quantification