

THAT thesis: A competition mechanism for anaphoric expressions

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ABSTRACT

Reference is a core property of language. In any given language, a number of expressions can be used to refer to new and familiar entities. This dissertation is concerned with the expressions that refer to familiar entities in a discourse. I explore a competition-based analysis, where the interpretation and the distribution of an anaphoric expression is determined by the presence of other anaphoric expressions in a given language. This competition mechanism makes use of semantically primitive properties such as meeting the *phi*-features that are composed into denotations that are universally available for anaphoric expressions. These denotations are lexicalized in language-specific ways. I argue that the denotations are then ordered by semantic strength, deriving a scale of anaphoric expressions. Given this scale, I propose an economy principle that chooses the least informative in a given context when multiple expressions successfully resolve to the intended referent.

The main theoretical advantage of the competition mechanism proposed in this dissertation is that a single mechanism can be applied to a wide range of overt and covert expressions across languages. I show how the mechanism can be used to derive various phenomena involving covert pronouns such as PRO and null pro, definite descriptions, demonstratives, as well as the use of abstract space in sign languages,

thus unifying separate principles that have been proposed in previous literature. Moreover, because the competition is not a primitive principle but a phenomenon fully derived from semantic denotations, we are able to make specific predictions based on the mapping between semantics and morphology. Empirically, the theory can account for exceptions to principles that have been proposed in previous literature in a constrained way. The mechanism makes very concrete a number of accommodation processes that conversation participants would make use of to interpret sentences that violate the economy principle. These processes make use of existing theories of focus and presupposition accommodations, and allow some level of exceptional behavior of anaphoric expressions (for example, a definite description being used in an anaphoric context where a pronoun would have been sufficiently informative) but with specific predictions on how it would be constrained.

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To 이영애, Hee Young Ahn.

1

Introduction

In this dissertation, I discuss a competition-based analysis of anaphoric expressions. I will define anaphoric expressions as those that refer to familiar entities, where ‘familiarity’ is defined by having a linguistic antecedent from prior discourse. This definition allows us to focus only on linguistically introduced referents rather than entities that

are familiar from common knowledge (cf. Roberts 2002; Heim 1982).

In any given language there are many different expressions available to refer to familiar entities. For example, in English, we can use a pronoun, a definite description, or a demonstrative description to refer to the linguist introduced in the first sentence in 1.

- (1) A linguist walked in. {She / The linguist / That linguist} was happy.

Many languages also make use of null arguments and bare nouns for anaphoric reference. This is shown in Korean and ASL below. Throughout this work, I use \emptyset to indicate null arguments, and show possible anaphoric expressions inside braces separated by a forward slash ('{ / }').

- (2) *namca-ka tulewassta. umak-i khyeci-ca { \emptyset / namca}-NUN*
man-NOM enter-PAST-DECL. music-nom on-as man-TOP
chwum-ul chwessta.
dance-ACC dance-PAST-DECL.
'A man walked in. Once the music was one, he danced.' [Korean]

- (3) BOY ENTER CLUB. MUSIC ON. { \emptyset / BOY} DANCE.
'A boy entered a club. Music was on. He danced.' [ASL]

While these expressions are often interchangeable, this interchangeability is not fully unconstrained. For example, while it is possible to use both the pronoun and the definite description in cases like 1, the pronoun and the definite description have different interpretive possibilities in cases like 4. Specifically, the pronoun *her* allows a covarying reading with the girl, the resulting meaning being 'every x such that x is a girl

thinks that Mary likes x' . The definite description, however, does not allow this reading as readily as the pronoun, and often refers to another girl that is not part of the quantification.

- (4) Every girl_i thinks that Mary likes {her_{i/j} / the girl*_{i/j}}.

In the formal semantic literature, there has not been a unified account of how these expressions interact with each other. Instead, a lot of disjoint proposals have been brought forth to account for what each of these expressions denote. For pronouns, there has been a long debate on whether they are variables that carry indices (cf. Kamp 1981) or hidden definite descriptions (cf. Evans 1980). For definite determiner *the*, researchers argue whether it presupposes uniqueness (cf. Frege 1892; Russell 1905), familiarity (Heim 1982), or both (Schwarz 2009). Null arguments have often been discussed in a language-specific manner, where the Romance type pro and the East Asian null arguments were contrasted in terms of their constraints and interpretations. See Duguine 2014 for the discussion of the two types of null arguments, and Kurafuji 2018 for a recent, choice-function analysis of Japanese null arguments. Bare nouns and their interpretation range have been discussed in a number of papers including Chierchia 1998b, Dayal 2009, and Jiang 2012. Their argument status as well as their definite readings have received a lot of attention. Lastly, demonstratives have been analyzed as deictic elements that refer rigidly to the referent that the speaker points out (cf. Kaplan 1977), or as special definite determiner that carries something more than just the uniqueness-denoting definite (cf. King 2008). It is impossible to do justice on the vast range of works that have been done on these expressions. What I would like to point out is that many of these works have been done in disjoint manners, specializing

in a particular morpheme in a specific language. How these expressions interact with each other in an anaphoric context, and how these expressions are lexicalized differently across languages have not been discussed much in formal studies.

While there hasn't been much formal discussion on the interaction between anaphoric expressions, we do know a lot about relative frequency and distribution of these expressions from corpus-based referent tracking studies. In studies such as Gundel et al. 1993 and Ariel 2001, referring expressions are organized into a scale based on how accessible their referents are in the mental representation of the discourse. The general pattern we see from these studies is that the more accessible the referent is, the simpler the anaphoric form is. For example, zero anaphor is at the very end of the accessibility scale proposed in Ariel 2001.

Thus, what we have so far is as follows: on the semantic side, we have detailed formal discussions on what individual expressions denote; on the referent tracking side, we have studies on relative frequency of these expressions from natural production data. The goal of this dissertation is to link these two areas of research. In other words, **I explore the underlying semantic denotations of the anaphoric expressions that naturally derive the distributional pattern we see.**

In this dissertation, I argue that the interpretive and distributional properties of an anaphoric expression is a result of a semantic/pragmatic competition. Anaphoric expressions are built by combining different semantically primitive properties such as being an entity or matching *phi*-features. While the denotations built from these properties are assumed to be universally available, languages differ on which denotations get lexicalized. The resulting expressions are naturally organized into a scale based on meaning:

the weakest to the strongest. Given this scale, a general economy principle chooses the least redundant that can successfully resolve the referent in the given context.

Thus, by using this competition mechanism, we are able to apply what has been learned about each of these anaphoric expressions from the wide range of previous work but in a way that naturally orders them into a scale. This allows us to derive the distributional patterns we see in natural production without requiring stipulated scales or principles. Because each denotation is built based on specific information that the morphosyntax of the language provides, we are able to make specific predictions on cross-linguistic variation, syncretism, as well as focus and context sensitivity without stopping at descriptive generalizations. This mechanism can be applied to a wide range of overt and covert expressions, including the use of space in sign languages, allowing us to unify a number of different primitive principles.

1.1 OVERVIEW OF THE DISSERTATION

CHAPTER 2: BARE NOUN BLOCKING

Chapter 2 begins with a novel generalization on bare argument languages. Bare argument languages are those that freely allow bare nouns in argument positions, and those I focus on in this chapter are Mandarin, Thai, Japanese, Korean, Lugwere, and Hindi. I observe that while all of these languages have been shown to allow definite readings of bare nouns, they diverge into two groups based on whether they allow anaphoric uses of bare nouns in intersentential anaphora. For example, in the schema shown in 5, only a subset of the bare argument languages allow the bare noun ‘book’ in the second

sentence.

- (5) I bought book. Book was expensive.

The languages that allow bare nouns in this context are Mandarin, Japanese, and Korean. The languages that do not are Thai, Hindi, and Lugwere. While this may at first seem like a lexical difference between the bare nouns of these languages, I propose that the availability of anaphoric bare nouns depends on the presence of morphologically simplex pronouns in the language. The intuition is as follows: if there is a simpler expression that can successfully refer to an entity anaphorically, then that expression would block the use of the more complex form. This generalization, which I call the Bare Noun Blocking generalization, is supported by closely observing the languages: Thai, Hindi, and Lugwere have simplex pronouns in the third person that are productive and freely used, while simplex pronouns in Mandarin, Japanese, and Korean are either non-existent or highly restricted.

The main advantage of analyzing the relative availability of anaphoric bare nouns in these languages as resulting from the competition with simplex pronouns rather than from a basic lexical difference is that we can capture context sensitivity. In contexts where two or more referents are available, bare nouns are again licensed even in languages like Hindi and Thai. This is readily explained by the fact that in such contexts, simplex pronouns cannot resolve the referent successfully. This shows us that the resistance of anaphoric uses is not something that is lexically determined but due to a competition with other available expressions.

CHAPTER 3: THE COMPETITION MECHANISM

In Chapter 3, I lay out the details of the competition mechanism for anaphoric expressions. I argue that semantically primitive properties such as being an entity or meeting the *phi*-restrictions are universally available for use in building anaphoric expressions. Different denotations built from conjoining these properties are then available for language-specific lexicalization. Thus, in English, the pronoun *she* lexicalizes the property of being an entity and female, while the definite description *the linguist* lexicalizes the property of being an entity and a linguist. In Korean, the bare noun ‘enehakca’ lexicalizes the property of being an entity and a linguist, but there is no lexicalization of the property that only carries *phi*-features like English pronouns.

These denotations are organized into a scale based on semantic strength, with the expression carrying the most restrictions at the top of the scale. I propose that there is an economy principle **Don’t Overdeterminate!** that requires that the lowest element of that scale that successfully resolves the referent be used. This principle can be derived from more general economy principles like Grice’s Brevity or Efficiency (Meyer 2014).

After presenting the competition mechanism, I go back to Bare Noun Blocking and show how the blocking would take place in formal terms. Then I discuss some main advantages of the competition mechanism. The first advantage is that we are now able to derive the accessibility scales of referring expressions that have been proposed in previous literature (Ariel 2001; Gundel et al. 1993). The second advantage is articulating how focus sensitivity plays a role in anaphora. While it has been known that focus and stress affects pronoun resolution from psycholinguistic literature on pronoun resolution, it was not clear how this could be predicted from the denotations of the expressions.

Making use of the economy principle and the resulting accommodation that utilizes domain widening, I explain how different anaphoric expressions get resolved to different antecedents. This allows us to explain various ‘exceptions’ that we see with traditional accounts of definite descriptions and their licensing conditions. The third advantage I discuss is an improved account of silent pronouns such as PRO and pro. While the distributional properties of these elements have been captured by separate primitive principles, I argue that the competition mechanism allows us to form a unified analysis of silent pronouns in line with the rest of anaphoric expressions.

CHAPTER 4: DEMONSTRATIVES

In Chapter 4, I extend this competition mechanism to demonstratives, focusing on the distribution of English demonstratives and how they compete with anaphoric pronouns and definite descriptions. The main novelty in this chapter is the claim that demonstratives encode non-familiarity. I identify two properties that are unique to demonstratives in comparison to anaphoric pronouns like *it* or definite descriptions: exophoric uses, where the speaker points out a referent in the immediate context as in (6a), and generic relative clauses as in (6b) that makes a general claim about anyone who meets the property denoted by the relative clause.

- (6) a. That_→ linguist is happy.
- b. Those who read never fail.

I group these two properties under the broader property of ‘non-familiarity’. I argue that demonstratives carry an additional property *R* that a pronoun or a definite description

does not carry. This additional property places demonstratives at the highest end of the scale. The use of that additional property suggests that the anaphoric pronoun or the definite description was not successful in resolving the reference, and so the information in R is inferred to provide an alternative way to resolve the referent than the anaphoric index. The property R can carry an exophoric pointing or the relative clause. I show that the competition mechanism allows us to make fine-grained predictions about the complementary distribution between pronouns and demonstratives. Specifically, English pronouns like *he* allows exophoric uses as well as generic relative clauses because there is no pronominal demonstrative available in the language. Only *it*, which has *that* as its minimal pair in inanimate reference, is restricted from exophoric uses and generic relative clauses. I end this chapter with discussions of languages that morphosyntactically distinguish an exophoric reference from an anaphoric one and suggest how this could be analyzed in terms of the underlying structure I propose for demonstratives.

CHAPTER 5: ANAPHORIC EXPRESSIONS IN ASL

In Chapter 5, I present a novel analysis of anaphoric expressions in ASL. While it has been shown through referent tracking studies such as Frederiksen & Mayberry 2016 and Czubek 2017 that ASL makes use of null arguments and bare nouns frequently in anaphora, there has been a lot more attention given to the use of the pointing gesture with the index finger (IX) and the use of abstract locations in the signing space (loci) to keep track of referents. In many sign languages, signers can associate a specific locus for a referent, and point back to that locus to refer to that person. Given this kind of data, it has been argued that loci are overt instantiations of indices that are used for pronoun resolution (Lillo-Martin & Klima 1990). In this chapter, I discuss in detail

other anaphoric expressions available in the language, including null arguments, bare nouns, as well as a different kind of IX that does not point to a previously established locus but points at a neutral direction (neutral IX). After establishing that IX to locus is neither obligatory nor frequent in natural production studies, I present a novel set of data from consultation sessions that look closely at the licensing condition of these anaphoric expressions in ASL. The main novel claims I make in this chapter are as follows. First, I confirm the data from referent tracking studies that null arguments and bare nouns are frequently used in ASL anaphora. Second, I show that neutral IX and IX to loci have different distributions and licensing conditions, unlike previously assumed. While neutral IX is licensed when there is a unique salient entity, IX to loci is licensed when there is a contrast drawn between competing referents. Third, based on these data points, I propose a new analysis of ASL anaphoric expressions where neutral IX is analyzed like a pronoun, while IX to locus is analyzed as a modifier similar to the *R* property discussed in Chapter 4 for demonstratives. The competition mechanism again allows us to better account for the distributional patterns we see in natural production data.

2

Bare Noun Blocking

2.1 INTRODUCTION

This chapter investigates a number of languages that freely allow bare nouns as arguments to predicates. Throughout this dissertation, I call them ‘bare argument lan-

guages', avoiding theory-specific terms such as 'NP languages'. I will be showing that there is a distinction that can be drawn between two types of bare argument languages, based on whether they allow an anaphoric interpretation of a bare noun that occurs in intersentential anaphora, as in the English schema shown in 7.

- (7) I bought book yesterday. Book was expensive.

Instead of arguing that this results from the denotation of bare nouns in respective languages, I argue that the presence of morphologically simplex pronouns ('simplex pronouns') determines whether anaphoric bare nouns are allowed in the language. Specifically, I argue that if a bare argument language has simplex pronouns for third person reference, it blocks anaphoric bare nouns. This generalization, called 'Bare Noun Blocking', will be discussed in detail in this chapter with a possible analysis motivated at the end.

Before looking at the data, I lay out some assumptions made in the chapter. The dichotomy between languages that have obligatory determiners and those that do not have led to several theoretical debates: whether they project DP or not (cf. Bošković 2008, a.o.), what syntactic and semantic correlates result from the structural difference if there is one, how determiner-less languages give rise to interpretations that languages with determiners convey with determiners. Whether these languages project a DP or not is not crucial to the discussion in this chapter, but will become more relevant in later chapters. I assume a structure with an index in the DP-spec position for all anaphoric nominal elements, thus assuming that bare argument languages also project DPs. The syntactic project of DP, however, is not crucial to my thesis, and an alternative without a

DP projection could be entertained without changing the main proposal. For example, as long as there is a way to transfer information about discourse referents to resolve anaphora, the DP does not have to be projected. These anaphoric mechanisms could be associated with a designated syntactic position like D, or not.

Another debate on bare argument languages towards which I stay neutral is whether demonstratives in these languages should be analyzed as modifiers or determiners. While I assume that there is a DP projected, the analysis I propose in this work will not be affected by whether demonstratives occupy a DP position or adjoin to NP as modifiers. The proposal I make in this work is that of semantic denotations and the corresponding hierarchy based on entailment. Once this is set, languages may have different ways to map these denotations to morphology. Thus, my analysis is compatible with either account of demonstratives.

Throughout this chapter, bare argument languages are defined as languages that freely allow bare nouns (with no determiner) to be arguments to predicates. Bare argument languages discussed in this chapter include nominal classifier languages (Japanese, Mandarin, Korean, Thai, etc.), Slavic languages (Russian, Belarusian, Polish, etc.), a sign language (ASL), a Bantu language (Lugwere), as well as Hindi.

2.2 DATA

I focus on Thai, Mandarin, Japanese, and Korean, Hindi, and Lugwere in this section. These otherwise unrelated languages all share the property that they freely allow bare nouns to serve as arguments to predicates.

In Hindi, it has been shown that the bare noun must be receive a definite, or at least a specific interpretation. This is shown in 8, where the oddness of the sentence suggests that the bare noun *cuuha* ('mouse') refers to a unique mouse, or at least a specific one.

- (8) #*caroN taraf cuuha hai.*
four ways mouse is
'The mouse/A particular mouse (the same one) is everywhere.' [Hindi; Dayal 2004]

Recent literature, however, specifies at least two kinds of definiteness distinguished across languages. There has been a debate on whether the definite determiner *the* in English requires uniqueness or familiarity. While classic accounts like Russell 1905 and Frege 1892 argue that a definite description requires that the referent be unique in the given context, Heim (1982) shows that the definite description can occur in contexts where uniqueness is not met, arguing that it requires that the referent be familiar by being previously established in the context. Schwarz (2009) argues that both uniqueness-based and familiarity-based analyses of definite descriptions are necessary to account for cross-linguistic data. He shows that unlike English, many languages morphosyntactically distinguish these two kinds of definiteness, and calls the uniqueness-denoting one the weak definite (*thew*), and the familiarity-denoting one the strong definite (*thes*). For example, Fering, a North Frisian dialect, has two separate morphological forms of the definite determiner based on this distinction: the a-form for weak definites, and the d-form for strong definites. The standard dialect of German has a morphophonological distinction, where the weak form can contract when preceded by a preposition, while the strong form cannot. There are also languages like Thai where only the strong form is overtly marked with a demonstrative. Jenks (2015) argues that

the weak form appears as a bare noun in Thai. These patterns are summarized in the table in 9.

(9) Weak and strong definites across languages

	English	Fering [Ebert 1971b]	German [Schwarz 2009]	Thai [Jenks 2015]
UNIQUE	<i>the</i>	<i>a</i>	<i>im</i>	N
FAMILIAR	<i>the</i>	<i>di</i>	<i>in dem</i>	N CL DEM

With the weak vs. strong distinction in definites, we can go back to bare argument languages and examine which kind of definiteness their bare nouns denote. What we observe is that all of the languages being examined allow uniqueness-denoting bare nouns. The examples are shown below, where the bare nouns refer to the unique moon. Every sentence is elicited from a native speaker by the author unless noted otherwise.

(10) *tsuki-ga k.*

moon-NOM big

‘The moon is big.’

[Japanese]

[Ryochiro Kobayashi, p.c.]

(11) *tal-i palk-ta.*

moon-NOM bright-DECL

‘The moon is bright.’

[Korean]

(12) *yuèliàng hn dà.*

moon very big

‘The moon is big.’

[Mandarin]

[Yuyin He pc.]

- (13) *duaN-can* (#*duaN nán*) *sàwàaN mâak.*
 moon (CLF that) bright very
 ‘The moon is very bright.’

[Thai]

[Jenks 2015]

- (14) *ómw-eeri gw-aaká.*
 3-moon 3SM-shines
 ‘The moon shines.’

[Lugwere]

[Andrew Nalani, p.c.]

- (15) *chand chamak raha hai.*
 moon shine AUX.PROG AUX.PRS
 ‘The moon is shining.’

[Hindi]

[Ankana Saha, p.c.]

However, we immediately see that the bare argument languages diverge into two types when we look at familiarity-denoting interpretation. In intersententially anaphoric contexts, Japanese, Mandarin, and Korean allow the bare noun to pick up the referent anaphorically from the previous sentence as shown below.

- (16) *watashi-wa hon-o kat-ta. hon-wa takaka-ta.*
 I-TOP book-ACC buy-PAST book-TOP expensive-PAST
 ‘I bought a book. The book was expensive.’

[Japanese]

[Ryoichiro Kobayashi, p.c.]

- (17) *Wo mai-le yi ben shu. Shu hen gui.*
 I buy-ASP one CL book book HEN expensive
 ‘I bought a book. The book was expensive.’

[Mandarin]

[Yuyin He, p.c.]

- (18) *ecey chayk-ul sa-ss-ta. chayk-un pissa-ss-ta.*
 yesterday book-ACC buy-PAST-DECL book-TOP expensive-PAST-DECL
 'I bought a book yesterday. The book was expensive.' [Korean]
 [Milee Ahn, Jubee Sohn, p.c.]

On the other hand, Hindi, Thai, and Lugwere do not allow the bare noun to refer to the familiar referent introduced in the previous sentence. In Eastern and Western dialects of Hindi, the example in 19 is highly degraded and also has a novelty effect. For example, an informant responded that if the bare noun is used in the second sentence, it may refer to another book. This interpretation was not shared by the other informant, who nevertheless agreed that the anaphoric use is highly degraded.¹

- (19) *Maine ek kitab kharid-i. *(Vo) kitab mehngi thi.*
 1SG.ERG one book.SGF buy-PAST.SGF (that)book.SGF expensive be.PAST.SGF
 'I bought a book. The book was expensive.' [Hindi]
 [Diti Bhadra, Vyom Sharma p.c.]

In Thai, examples like 20 results in a generic reading, where the property of being clever is interpreted to be a general property of students rather than the specific student denoted by the antecedent (Jenks 2015).

¹This judgment is not shared by all speakers, though. In later consultations, two other native speakers who identify themselves with the standard dialect of Hindi accepted the bare noun in this context (Ankana Saha, Utpal Lahiri, p.c.). Because three out of five still rejected 19, and because the two groups of speakers showed a systematic difference in their rating of the demonstrative description (*vo kitab* ‘that book’), I postpone the discussion of the variation to Section 2.7.1 and continue to assume that bare nouns are degraded at least in the non-standard dialects of Hindi.

- (20) *miawaan phom cee kap nakrian khon nin. nakrian chalaat maak.*
yesterday I meet with student CLF INDEF student clever very
‘Yesterday I met a student. Students are very clever.’ [Thai; Jenks 2015]

In Lugwere, examples like 21 also results in a novelty effect as in Hindi, where the child mentioned in the second sentence sounds like a different child.²

- (21) *N-á-yágííri ó-mw-aaná. Ó-mw-aana ?(óo-yo) y-á-ba-ire*
1SG.SM-PST-meet.PFV AUG-1-child. aug-1-child 1-DEM.I 1SM-PST-be-PFV
mu-sanyúcí.
1-happy
‘I met a child. A child was happy.’ [Lugwere]
[Andrew Nalani, p.c.]

The table below summarizes the data so far. I call the languages that allow bare nouns in the anaphoric context as ABN (Anaphoric Bare Noun) languages, and call the languages that do not as *ABN languages.

	ABN	*ABN
(22)	Korean, Mandarin, Japanese	Hindi, Thai, Lugwere
	Bare nouns allow	Bare nouns restrict
	anaphoric use	anaphoric use

ABN: Anaphoric Bare Noun

What is the difference between ABN and *ABN languages? Do their bare nouns have different denotations or restrictions? I will argue in the next section that the interpre-

²The judgments were collected by the author in an elicitation session with a native Lugwere speaker, Andrew Nalani, in a collaboration with Jenneke van der Wal, and a part of the collected data is presented in Ahn & vander Wal 2019.

tation of the bare noun is consistent across all of the languages. What differs between these two language groups is argued to be the availability of *other* anaphoric elements in the languages, specifically pronominal anaphors.

POSSIBLE EFFECT OF TOPICHOOD

Before moving onto discussing the generalization, I want to point out that all of the examples presented in this work have the bare noun appearing in the subject position. One might question whether the subject position, which often allows topics to appear, is special in allowing anaphoric uses. In fact, Jenks (2018) argues that Mandarin bare nouns allow anaphoric uses only in subject position because they are in topic positions. There are two reasons that the distinction between ABN and *ABN languages in this work is orthogonal to the subject position or topichood. First, even in subject positions, Hindi, Thai, and Lugwere do not allow bare nouns to have anaphoric uses. This suggests that there is a distinction between these two groups of languages regardless of the syntactic position. Second, in ABN languages, anaphoric bare nouns are possible in non-subject positions. The data reported in Jenks 2018 includes sentences as in 23 where the bare noun *nuren* ('woman') is not in a topic position. When four native speakers of Mandarin were consulted about 23, two out of four speakers accepted the sentence, while the other two responded that it is degraded.

- (23) *You ge nuren sha le Lisi. Jingcha huaiyi na ge nuren*
have CLF woman kill LE Lisi police suspect that CLF woman
nashihou shou le shang.
at.that.moment suffer LE injury
'A woman killed Lisi. Police suspect that the woman suffered an injury.'

Thus, we see a mixed response for anaphoric bare nouns in non-subject positions. Whether this is due to dialectal variations or other factors is left for future investigation. I also consider some level of interspeaker variation based on how productive morphologically simplex pronouns are for respective speakers. This is discussed at the end of the chapter.

In Korean, bare nouns are more systematically possible in non-subject positions and with non-topic-marking case-marker, as shown in 24.

- (24) *namca-ka tulewa-ss-ta. na-nun namca-lul chyetapwa-ss-ta.*
 man-NOM enter-PAST-DECL I-TOP man-ACC stare-past-DECL
 ‘A man entered. I stared at the man.’ [Korean]

Because ABN languages allow anaphoric bare nouns in non-subject or non-topic positions (to an extent, considering the mixed response in Mandarin), and, more crucially, because *ABN languages do not allow anaphoric bare nouns even in subject positions, I argue that subjecthood and topichood are orthogonal to the distinction I draw between ABN and *ABN languages.

2.3 BARE NOUN BLOCKING GENERALIZATION

I present a novel generalization on the distribution of anaphoric bare nouns in intersentential contexts in ABN and *ABN languages.

(25) Bare Noun Blocking

If a bare argument language has morphologically simplex pronouns ('simplex

pronouns') for 3rd person reference, bare nouns are blocked from intersentential anaphora involving one salient entity.

In this generalization, simplex pronouns are defined as expressions that can stand alone without the NP and refer anaphorically. The English counterparts of these will be personal pronouns like *she* and *it*. The term simplex pronoun is used in contrast to morphologically complex, adnominal anaphors that contain the NP like the demonstrative description in English (*that book*).

I further propose that ABN languages lack linguistically productive simplex pronouns, unlike *ABN languages. What does it mean for a language to lack simplex pronouns? It means that there is no pronominal form that is readily available for anaphoric reference in the language. When such reference is necessary, a full adnominal anaphor (or a phonologically reduced form) that has the NP complement is used. This distinction is summarized in the table below. Note that what I call the ‘adnominal anaphor’ of each language makes use of a demonstrative followed by an NP complement. I use the term ‘adnominal anaphor’ instead of the term ‘demonstrative description’ to refer to these because it is not the case that all demonstratives allow anaphoric uses in these languages. As will be shown in the discussion of each language below, languages like Korean, Japanese, and Lugwere have a three-way distinction in demonstratives, and only one or two of them allow anaphoric uses. The table below shows the most frequently used anaphoric demonstrative for each language: *ku* for Korean, the *a*-series for Japanese, and Series II demonstratives for Lugwere.

(26) Third person reference

		Simplex Pronouns	Adnominal Anaphors
ABN	Korean		ku salam
	Japanese		ano hito
	Mandarin		na ge ren
*ABN	Thai	kǎo, mán	nan nakrian
	Hindi	vo	vo kitab
	Lugwere	strong pronouns	om'waan oo-yo

Note that while both ABN and *ABN languages have adnominal anaphors available, Japanese, Korean, and Mandarin do not have simplex pronouns readily available. Below, I discuss each language in turn, starting with *ABN languages. This discussion will clarify what it means for ABN languages to lack simplex pronouns.

2.3.1 THAI

We start with Thai, a *ABN language that has simplex pronouns. Thai has a full paradigm of pronouns, including third person pronouns, as shown in 27. The animate pronoun *kǎo* and the inanimate pronoun *man* are used in third person reference, and there is an optional plural marking that is possible with *pûak* that precedes the pronoun *kǎo* for plural referents.

(27) Personal pronouns:

	SG	PL
1	chǎn	rao
2	kun	
3	kǎo, man	pûak kǎo

- (28) Demonstrative: *nán* (NP)

Thai has a separate system of demonstratives that is independent of personal pronouns. The demonstrative *nán* can be used adnominally or pronominally, as shown in the example below from Jenks 2015. The noun ‘student’ can be dropped, leaving only the classifier and the demonstrative.

- (29) (*nákrian*) *khon nán* / (*kháw*) *chalàat mâak*.
 student CLF that 3P clever very
 ‘That student was clever.’ [Jenks 2015]

In summary, Thai is similar to English in having morphologically distinct, independent systems for personal pronouns and demonstratives that are used for third person reference.

2.3.2 HINDI

Hindi is different from Thai in that it does not have a separate system of third person pronouns that are distinct from demonstratives. Third person pronouns are morphologically identical to the demonstratives used in the language, as shown in 30.

- | <p>(30) <u>Personal pronouns:</u></p> <table style="margin-left: 20px; border-collapse: collapse;"> <tr> <th style="text-align: left;"></th> <th style="text-align: center;">SG</th> <th style="text-align: center;">PL</th> </tr> <tr> <td style="padding-top: 10px;">1</td> <td style="text-align: center;">main</td> <td style="text-align: center;">ham</td> </tr> <tr> <td style="padding-top: 10px;">2</td> <td style="text-align: center;">aap</td> <td></td> </tr> <tr> <td style="padding-top: 10px;">3</td> <td style="text-align: center;"><i>vo</i></td> <td style="text-align: center;"><i>ve</i></td> </tr> </table> | | SG | PL | 1 | main | ham | 2 | aap | | 3 | <i>vo</i> | <i>ve</i> | <p>(31) Demonstrative:</p> <p style="text-align: center;"><i>vo</i> (NP)</p> |
|--|-----------|-----------|----|---|------|-----|---|-----|--|---|-----------|-----------|--|
| | SG | PL | | | | | | | | | | | |
| 1 | main | ham | | | | | | | | | | | |
| 2 | aap | | | | | | | | | | | | |
| 3 | <i>vo</i> | <i>ve</i> | | | | | | | | | | | |

While the morphological form is shared with demonstratives, third person pronouns in Hindi are freely available in the pronominal form that does not carry the NP. This pronoun can be used readily in anaphoric and covarying cases. The pronominal form is preferred in contexts as in 32 over the full demonstrative description where the demonstrative precedes the noun *admi*. Two native speakers responded that they would use the pronoun *vo* instead of the full adnominal phrase *vo admi*, and that they would not naturally produce just the bare noun *admi* for the intended anaphoric interpretation. All examples in Hindi were elicited from two native speakers of Hindi.

- (32) *Maine ek admi dekh-a. vo (admi) bahut vyast tha.*
 1SG.ERG one man see-PAST.SGM that/he (man) very busy be.PAST.SGM
 'I saw a man. That man/he was very busy.'

The oblique form *us* is shown when *vo* appears in a dative position as in 33.

- (33) *Maine ek paudha kharid-a. maiN use/usko/ (us paudhe-ko)*
 1SGM.ERG one plant.SGM buy-PAST.SGM 1SGM 3SG.DAT (that plant-DAT)
roz pani de-ta huN.
 daily water give-IMPRF.SGM be.PRS.1SG
 'I bought a plant. I water it (give water to it) everyday.'

Another property of Hindi demonstratives that will become relevant later in the chapter is that they are not grammatically marked for gender. Hindi nouns are grammatically marked, with *admi* ('man') marked as masculine, and *kitab* ('book') marked as feminine. These grammatical markings are not realized overtly on the demonstrative itself.

Thus, what we see in Hindi is that while the third person pronouns share the morphological form with demonstratives, they are freely available for any anaphoric reference,

like regular personal pronouns we find in languages like English and Thai.

2.3.3 LUGWERE

The Bantu language Lugwere is classified as JE17 in Maho's (2009) updated version of Guthrie's classification is spoken in the Pallisa district of Uganda by around 621,000 people (2014 census, via Ethnologue, Simons & Fennig 2017). Lugwere nouns are divided into noun classes, which are visible in the noun prefix, the augment, and the demonstrative. A small sample of the noun classes and the corresponding demonstrative forms taken from Ahn & vander Wal 2019 are shown below.

	noun class	aug+NPx	dem I	dem II	dem III
(34)	1	o-mu/o-mw	o-no	oy-o	o-di
	2	a- β a	β a-no	a- β o	β a-di
	3	o-mu/o-mw	gu-no	ogw-o	gu-di
	4	e-mi/e-my	ji-no	eej-o	ji-di
	5	e-ri/e-i	li-no	ery-o	li-di

The demonstratives in all three forms can be used pronominally or adnominally, and in anaphoric uses involving just one salient entity, the pronominal form is preferred by the native speaker (Ahn & vander Wal 2019). An anaphoric reference using the second series is shown below, with the NP *ó-mw-aaná* ('child') being optional, in which case the demonstrative *óo-yo* (Series II) would appear alone as a pronoun.

- (35) *N-á-yágííri ó-mw-aaná. (Ó-mw-aan')* *óo-yo y-á-ba-ire*
 1SG.SM-PST-meet.PFV AUG-1-child. aug-1-child 1-DEM.I 1SM-PST-be-PFV

mu-sanyúci.

1-happy

'I met a child. That child/He was happy.'

[Ahn & vander Wal 2019]

Thus, we see a pattern similar to Hindi, where the demonstratives can be freely used in pronominal forms, to function like personal pronouns. Lugwere also makes use of subject and object markers that appear on verbs and function in a way similar to pronouns.

2.3.4 KOREAN

We now move on to Korean, an ABN language. What we observe in Korean is that, unlike *ABN languages, there is no morphologically simplex pronoun for third person reference. Instead, the full demonstrative description that consists of a demonstrative and an overt NP complement are used. This is shown in 36. Note that unlike first and second person pronouns, third person pronouns are identical to the full demonstrative description that is translated as 'that person'.

(36) Personal pronouns:		
	SG	PL
1	na	wuli
2	ne	nehuy
3	ku salam	ku salam-tul

(37) Demonstrative:	
	ku salam: 'that person'

Korean has a three-way distinction in demonstratives. Unlike the proximal *i* and the distal *ce* which are restricted to exophoric uses, *ku* is restricted to an anaphoric use (Ahn 2017). This anaphoric demonstrative *ku* can appear with an overt NP complement

to serve as an anaphoric expression, and this replaces the third person pronoun uses. The full NP ‘person’ can be used as in 36, or the demonstrative description can be phonologically reduced as in 38. For example, the complex morpheme *kyay* in 38 is a result of combining the demonstrative *ku* with a free morpheme *ay* ('kid'). The reduced form is used as an informal pronoun in the language.

- (38) *kyay* = *ku-ay*
 DEM kid
 ‘that kid’ (informal anaphoric expression)

The pronominal use of the demonstrative *ku* is only available in literary contexts in the written language. Even when it is used in the written language, it is restricted to referring to a singular third person male. For other genders, Korean again uses a complex morpheme: *ku* with a bound morpheme *nye* ('female') or *ku* with a free morpheme *kes* ('thing'), which mean ‘that female’ or ‘that thing’, respectively.

Thus, Korean gives us a nice example of a language that does not have morphologically simplex pronouns. It differs from Thai in not having a morphologically distinct set of personal pronouns from demonstratives, and it further differs from Hindi in not allowing pronominal uses of the demonstrative forms. In all of these contexts, the full adnominal form with the NP appears. While there can be some phonological reductions, it is clear that the NP is present in the underlying structure.

2.3.5 JAPANESE

Japanese is similar to Korean in that all of its third person reference are done with morphologically complex expressions that consist of the demonstrative and a bound or a free nominal morpheme. Japanese also has a three-way distinction in demonstratives: *ko/a/so*. In Kitagawa 1979, *ko* is described as [+proximal] and [-distal], while *a* is [-proximal] and [+distal]. The *so* series is analyzed as the unmarked form that is [-proximal] and [-distal]. While it has been observed that only the *so*-series allows covarying readings (Hoji et al. 2003), both the *a*-series and the *so*-series allow intersentential anaphoric contexts (Sawada & Sawada 2011).

What we find is that all expressions categorized as pronouns in the language are reduced forms of adnominal demonstratives, containing the demonstrative *ko/a/so* with a free or a bound morpheme. For example, (39a) combines the demonstrative with a free morpheme *hito* ('person'), while (39b) combines the demonstrative with a bound morpheme *itsu* meaning 'guy', which is not a free morpheme in the language (Ryoichiro Kobayashi, Michael Erlewine pc).

- (39)
- a. *a/so-no hito*
DEM-GEN person
'that person'
 - b. *ko/a/so-itsu*
DEM-guy
'this/that guy'

2.3.6 MANDARIN

Mandarin has a two-way distinction in demonstratives: *zhe* is proximal, while *na* is distal. The demonstratives appear with a classifier and a noun following them, as shown in 40.

- (40) *zhe/na ge ren*
this/that CL man
'This/that person' [Mandarin]

The use of the demonstrative description with *na* in anaphoric contexts such as co-varying and donkey sentences is discussed in Jenks 2018. The pronominal use of the demonstratives, however, is much more restricted than the adnominal use. The demonstratives *zhe* or *na* can be used pronominally, for example, with a pointing gesture in an exophoric use, as in the case shown below. In 41, the speaker can point out a person in context and introduce that person.

- (41) *Na/zhe shi wo de baba.*
DEM be 1sg poss father
'This/that is my father.'

The pronominal use of the demonstrative is not felicitous in intersentential anaphoric contexts, where it is intended to pick up the referent of the antecedent noun 'book'.

- (42) *Wo mai-le yi ben shu. *Na hen gui.*
I buy-textscasp one CL book DEM HEN expensive
Intended: 'I bought a book. The book was expensive.'

Mandarin does have a pronoun *ta* which is distinguished in gender and animacy (male, female, and inanimate) in writing. While the distinction between male, female, and inanimate has been introduced later in the language, the spoken language does not make this distinction. In addition, *ta* in spoken language is often restricted to human nouns or high animate nouns (cf. Sun 2006). Inanimate referents are referred to by demonstratives. When asked about the intersentential contexts discussed in this work, native speakers of Mandarin commented that they would only use the pronoun *ta* in a written language, but would use the bare noun or the full demonstrative description (*na ge ren* ‘that person’) in such contexts (Yujing Huang, Yingtong Liu, p.c.).

Thus, simplex pronouns in Mandarin are also highly constrained. They are used more in the written language, and often speakers prefer to use the bare noun or the full demonstrative description in intersentential anaphora. It may be that some speakers of Mandarin may treat *ta* as a regular pronoun even in the spoken languages, there is no systematic data at this point to support this. I discuss a possible investigation of this at the end of the chapter.

2.3.7 SUMMARY: ABN vs. *ABN LANGUAGES

In summary, what we see is a clear distinction between *ABN languages like Thai, Hindi, and Lugwere and ABN languages like Korean, Japanese, and Mandarin in the availability of simplex pronouns. *ABN languages either have an independent set of personal pronouns that are distinct from demonstratives like Thai, or they freely allow pronominal uses of their demonstratives. In ABN languages, on the other hand, we observe the following: first, they do not have a separate system of simplex pronouns

that correspond to the English personal pronouns like *she* or Thai personal pronouns like *kǎo*; second, all of their anaphoric expressions are adnominal anaphors, meaning that they are (reduced forms of) demonstrative descriptions that carry the demonstrative and the NP in the underlying structure; third, their demonstratives are not free morphemes that can occur in isolation as in Hindi.

The observation we made in this section is compatible with the Bare Noun Blocking generalization: the languages that do not allow anaphoric bare nouns in intersentential anaphora (*ABN languages) are the ones that have simplex pronouns readily available. We now move on to a possible analysis of how this generalization might work.

2.4 PRELIMINARY ANALYSIS

In this section, I provide a preliminary analysis that can capture the distribution presented above. A full theory that also covers other anaphoric expressions is presented in Chapter 3.

The simplex pronoun and the anaphoric bare noun P are analyzed as follows. For the time being, I will be using the ι operator that returns the unique entity that meets the restrictions in the context. This will be updated in the next chapter, as I will be separating the anaphoricity provided by the index from uniqueness.

$$(43) \quad [\![\text{pronoun}_\phi]\!] = \iota x: \text{entity}(x) \wedge \phi(x)$$

$$(44) \quad [\![P_{\text{DEF}}]\!] = \iota x: \text{entity}(x) \wedge \phi(x) \wedge P(x)$$

Thus, the pronoun returns the unique entity in the context that satisfies the phi-feature restrictions (indicated as ‘ $\phi(x)$ ’). The anaphoric noun has the same denotation but further restricts the referent to something that is P . Note that in my analysis, nouns can also have *phi*-restrictions. This is not surprising as nouns across languages do have grammatical features marked on them (cf. Evans 1980; Sauerland 2008b). Whether nouns carry phi-restrictions or not is not crucial for my analysis, and the $\phi(x)$ in 44 can be removed without affecting the theory.

The adnominal anaphor that consists of a demonstrative and an overt NP will be analyzed as carrying yet another restricting property as shown below.

$$(45) \quad \llbracket \text{DEM}_R P \rrbracket = \iota x: \text{entity}(x) \wedge \phi(x) \wedge P(x) \wedge R(x)$$

The additional property, which I call R , will further be discussed in Chapter 4, where I propose a novel analysis of demonstratives in English as well as other languages. This R restriction can carry exophoric restrictions such as a locative variable in case of pointing, as well as properties denoted by relative clauses. Demonstratives across languages have been shown to have a property that contrasts with regular pronouns or definite determiners. In Chapter 4, I show that this additional property R and its constraints allow us to derive such properties of demonstratives: in its exophoric and anaphoric uses. For now, it is sufficient to note that demonstrative descriptions carry an additional property than the anaphoric bare noun.

The three expressions, the pronoun, the bare noun, and the adnominal anaphor, have denotations that are parallel and minimally different in the number of restrictions they carry. Thus, I argue that these expressions are organized into a scale based on their

semantic strength. I will call this the Determinacy Scale, and order the scale from the least determinate to the most determinate. The least determinate simply means that it carries the least amount of restrictions to pinpoint the referent. For example, the pronoun, which only marks some *phi*-features, is less determinate than a bare noun that also indicates a property that the intended referent must have. For example, the animate pronoun *kǎo* returns the unique animate entity, while the bare noun *nakrian* returns the unique animate entity that is also a student.

- (46) Determinacy Scale: {pronoun, N_{DEF}, DEM N}

2.4.0.1 COMPETITION

Now consider the intersentential anaphora discussed above. The first sentence introduces a discourse referent, that can be picked up by anaphoric expressions that appear in the subsequent discourse. Let's assume that in the schema shown in 47, the introduction of the student in the first sentence results in a domain that only contains one student.

- (47) I saw student. {pronoun / N_{DEF} / DEM N} was happy.

The pronoun that refers to the unique animate entity (assuming we are looking at the animate pronoun *kǎo* in Thai) would return that unique student because she is the only animate entity in the domain. The bare noun *nakrian* ('student') would also return the student given that she is the only student in the domain. The demonstrative description would also return the unique student for the same reason. Thus, in this

simplified context, all three expressions are possible in 47.

Given multiple expressions that are compatible in a context, we might assume that an economy principle of some kind could play a role in choosing which expression to use. I argue that an economy principle, which I will call ‘Don’t Overdeterminate’, would choose the least redundant expression out of the available expressions.

This is what happens in Hindi and Thai: the anaphoric bare noun is blocked in this context because there is a more succinct expression that can be used in its place. The use of the bare noun in this context might actually suggest that there is not a unique entity in the context and that the information carried by the noun helps resolve the anaphora. Thus, unless there is a contrast with other potential antecedents, the pronoun is used.

In ABN languages, however, there is no simplex pronoun to compete against, and block, the bare noun. Thus, the bare noun is freely available to anaphorically refer to the student introduced in the previous sentence. The adnominal anaphor is higher in the scale, and thus would not block the use of the bare noun.

2.5 ADVANTAGE OF THE COMPETITION-BASED ANALYSIS

Analyzing the difference between ABN and *ABN languages based on the competition between simplex pronouns and bare nouns has an advantage over arguing that ABN and *ABN languages have different bare noun denotations: capturing context sensitivity. As soon as another potential referent is added to the context, even *ABN languages allow bare nouns to be used anaphorically. This is shown in Hindi, where the anaphoric use of the bare noun *kitab* ('book') is felicitous, but the pronoun *vo* is not, in a context

where the speaker has also bought a cup (Vyom Sharma, Ankana Saha, p.c.). This is shown in 48.

- (48) *Maine ek kitab aur ek cup kharid-a. Kitab mehngi thi.*
1SG.ERG one book.SGF and one cup buy-PAST.SGF book.SGF expensive
be.PAST.SGF
'I bought a book and a cup. The book was expensive.' [Hindi]

Thai bare nouns are also reported to allow anaphoric uses sometimes in longer discourse with more distance between the antecedent and the bare noun (Jenks 2015; Footnote 7). While he does not specify whether the anaphoric reading tracks with the presence of competing referents, it is quite possible that a longer discourse results in introducing other potential referents.

This context sensitivity is difficult to explain under analyses where Thai and Hindi bare nouns are lexically restricted from referring anaphorically. Under the competition-based analysis, however, it is readily explained. As soon as we have two competing referents that could serve as antecedents to the pronoun, the pronoun cannot successfully disambiguate and resolve the referent. Thus, the pronoun no longer competes in the scale, leaving the bare noun as the lowest element in the scale.

2.6 SLAVIC LANGUAGES

We now turn to Slavic languages Russian and Polish. At the first glance, these languages seem to be counterexamples of the generalization presented above. All of these languages

have a rich set of grammatically marked pronouns but allow bare nouns in intersentential anaphora, though at varying degrees.

However, I will argue that this can be accounted for by the theory. There is a systematic difference between the the pronouns of *ABN languages like Hindi, Thai, and Lugwere and the pronouns of these languages: that the latter group are grammatically marked for gender. Because these grammatical genders are lexically encoded in the nouns themselves, this suggests that Slavic pronouns have nouns present in their underlying structures. In other words, these pronouns are adnominal anaphors in disguise. Because adnominal anaphors do not compete with a bare noun, we predict Slavic bare nouns to be possible in intersentential anaphora.

2.6.1 BARE NOUNS IN INTERSENTENTIAL ANAPHORA

What we find in these languages is that bare nouns are more or less felicitous in intersententially anaphoric contexts. The data, collected from several native speakers, are shown below.

RUSSIAN

(Lena Borise, Katia Gushchanskaya, Yury Kukushkin, pc)

In Russian, bare nouns can be used in intersentential anaphora. Personal pronouns and proximal demonstrative that can be used in anaphoric contexts inflect for grammatical gender and case.

- (49) *Ja kupil-a knig-u vera. Knig-a byl-a dorog-aja.*
 1SG buy-PST.F book-ACC yesterday Book-NOM be-PST.F expensive-F
 'I bought a book yesterday. The book was expensive.'

While speakers noted that the demonstrative pronoun *éta* or the pronoun *aná* are preferred, they all accepted this sentence as being anaphoric.

- (50) *Ja vstreltil-a enin-u. enin-a byl-a grustn-aja.*
 1SG meet-PST.F woman-ACC woman-NOM be-PST.F sad-F
 'I met a woman. The woman was sad.'

Interestingly, with neuter pronoun the anaphoric use seems to be degraded (Lena Borise, pc). The other two consultants also responded that *anó* is preferred in this context.

- (51) *?Ja posadil-a derev-o dva goda nazad. Derev-o rast-iot oen'*
 1SG plant-PST.F tree-ACC two years ago tree-NOM grow-PRS.3SG very
bystro.
 fast
 'I planted a tree two years ago. The tree grows very fast.'

Non-subject positions also allow anaphoric bare nouns as shown below.

- (52) *Ja kupil-a knig-u vera. Ja otkryl knigu.*
 1SG buy-PST.F book-ACC yesterday 1SG open-PST.M book-ACC
 'I bought a book yesterday. I opened the book.'

- (53) *?Ja posadil-a derev-o dva goda nazad. Ja polival derevo kadyj den.*
 1SG plant-PST.F tree-ACC two years ago 1SG water tree-ACC every day
 'I planted a tree two years ago. I water the tree every day.'

While in both cases there was a sense of redundancy and a preference of the pronoun form, both sentences were accepted in the anaphoric interpretation.

POLISH

(Zuzanna Fuchs, Marek Majer, pc)

Data from Polish are slightly more varied, though they point towards the same direction as Russian: bare nouns are possible in anaphoric contexts, though they sound redundant.

As in Russian, bare nouns, personal pronouns, and proximal demonstratives can be used in anaphoric cases. Personal pronouns and demonstratives inflect for grammatical gender and case.

- (54) *Wczoraj kupiam map. Mapa bya droga.*
yesterday bought-1SG.PST map.ACC map.NOM be.3SGF.PST expensive.F
'Yesterday I bought a map. The map was expensive.'

For both consultants, the bare noun sounded redundant. Pro-drop is most natural, with the pronoun *ona* being possible in a different word order (*Bya ona droga.*). The demonstrative *ta* was reported to be possible but in an exclamative context (*Droga bya ta mapa!*). The demonstrative used pronominally was also degraded for the speakers.

- (55) *Posadziam drzewo. Podlewaam drzewo codziennie.*
plant.1SGF.PST tree.ACC Water.1SGF.IMP tree.ACC everyday
'I planted a tree. I watered the tree everyday.'

In the object position, the pronoun *je* was most natural, with the demonstrative being

degraded. The bare noun was also accepted but much degraded.

- (56) *Kot wszed do pokoju. Kot spojrza na mnie.*
Cat.NOM walk.into.3SGM.PST in room cat.NOM look.3SGM.PST on 1SG
'A cat walked into the room. The cat looked at me.'

The overt noun was again accepted but with the note of redundancy and degradedness. Pro-drop was the most natural way to refer to the cat anaphorically, with pronoun sounding very formal, and the demonstrative being highly degraded.

Thus, what we see from Polish data is that the bare noun is more degraded than that of Russian. Pro-drop is often the most natural choice in Polish, which was not offered as an alternative by Russian consultants.

2.6.2 GRAMMATICALLY MARKED PRONOUNS ARE ADNOMINAL ANAPHORS IN DISGUISE

Slavic languages have both demonstrative pronouns and personal pronouns. The proximal demonstrative is used most commonly in anaphoric contexts, either pronominally or adnominally. Going back to Bare Noun Blocking, this seems to provide a counterexample because these languages have pronouns but allow anaphoric bare nouns. However, note that Slavic pronouns are grammatically marked for case, gender, person and number. For pronouns to carry grammatical gender marking, the arbitrary grammatical features that are lexicalized for nouns must be transferred to pronouns. I argue that this suggests that pronouns carry in their underlying structure the NP that provides this lexically determined grammatical feature. If the NP is not present, it is hard to

explain how these different gender features would be marked in the pronouns.

Note that Hindi and Thai simplex anaphors are not grammatically gendered. The simplex pronouns in Thai only mark animacy, which is naturally specified by the animacy of the referent, and the simplex pronouns of Hindi (the pronominal demonstratives) do not carry gender. Hindi provides a particularly nice test case for this because Hindi nouns do have arbitrary gender marking like Slavic languages.

Thus, I argue that Slavic pronouns and demonstratives are adnominal anaphors in disguise, carrying the NP property in their denotations. The distinction between the personal pronoun *aná* and the demonstrative *éta* would then be on the presence of the demonstrative *R* property for the latter.

$$(57) \quad [\![\text{aná}]\!] = [\![\text{aná knig-a}]\!] = \iota x: \phi(x) \wedge \text{book}(x)$$

$$(58) \quad [\![\text{éta}]\!] = [\![\text{éta knig-a}]\!] = \iota x: \phi(x) \wedge \text{book}(x) \wedge R(x)$$

Analyzing pronouns as hidden forms of full DP descriptions is not novel. Elbourne (2008) argues that English pronouns are hidden definite descriptions. I depart from Elbourne's analysis in that I make a distinction between naturally gendered pronouns like those of Hindi and Thai, where I argue that there is no larger underlying form. Taking this approach of categorizing pronouns would predict English pronouns to be also simplex forms with no nouns present in the underlying form, because English, at least the modern language, pronouns only mark natural gender. Whether this would be appropriate for English and how this would apply to various related languages that still do have productive grammatical gender on nouns and pronouns are outside the scope

of this dissertation and are left for future investigation.

2.6.3 YET ANOTHER COMPETITION

Before concluding this chapter, I want to mention the following discussion from Jenks 2018, where he discusses anaphoric uses of bare nouns in Mandarin. He observes that in Mandarin, demonstrative descriptions are used for various forms of anaphoric reference while bare nouns are restricted from anaphoric uses except in subject positions. To explain this, he proposes that there is a general principle to maximize indexation whenever possible. Specifically, he proposes the following principle *Index!* as a corollary to *Maximize Presupposition!* (Heim 1991).

(59) *Index!*

Represent and bind all possible indices

Jenks argues that there are two kinds of definites in classifier languages, one that denotes uniqueness (ι) and one that carries an index and denotes familiarity (ι^x), following the dichotomy proposed in Schwarz 2009.

- (60) a. $\llbracket \iota \rrbracket = \lambda s_r. \lambda P_{<e,st>}. : \exists!x[P(x)(s_r)].\iota x P(x)(s_r)$
 b. $\llbracket \iota^x \rrbracket = \lambda s_r. \lambda P_{<e,st>} \lambda Q_{et}. : \exists!x[P(x)(s_r) \wedge Q(x)].\iota x P(x)(s_r)$

The principle *Index!* requires that whenever ι^x is possible, ι^x is chosen over ι . Because Jenks associates the bare noun to ι and the demonstrative description to ι^x , this amounts to saying that whenever the demonstrative description is possible, it is used over the

bare noun in classifier languages. This explains why Mandarin does not allow anaphoric bare nouns in non-subject positions. To explain why anaphoric bare nouns are allowed in the subject position, Jenks argues that subjects are continuing topics. The pragmatic functions of topic marking overrides and neutralizes the effect of *Index!* according to his theory.

As shown previously in the chapter where I discussed the possible effect of topichood in Mandarin anaphoric bare nouns, the judgments on anaphoric bare nouns in non-subject positions are actually quite mixed. Specifically, the following sentences 61 and 62, repeated from Jenks 2018 were accepted by two and three of four native speakers in my follow-up, respectively.

- (61) *Jiaoshi li zuo-zhe yi ge nansheng he yi ge nusheng. Wo*
classroom inside sit-PROG one CLF boy and one CLF girl I
zuotian yudao #(na ge) nansheng.
yesterday meet that CLF boy
'There are a boy and a girl sitting in the classroom. I met the boy yesterday.'
- [Jenks 2018]

- (62) *You ge nuren sha le Lisi. Jingcha huaiyi na ge nuren*
have CLF woman kill LE Lisi police suspect that CLF woman
nashihou shou le shang.
at.that.moment suffer LE injury
'A woman killed Lisi. Police suspect that the woman suffered an injury.'
- [Jenks 2018]

We also saw that in languages like Korean, where topic marking is done by case-marking and not by syntactic positions, non-topic-marked bare nouns can refer anaphorically,

as shown in 63.

- (63) *ecey swuep cwung-ey kaswu-ka tulewassta. cen-ey #(ku)*
yesterday class middle-DAT singer-NOM came.in before-DAT ku
kaswu-lul pon kiek-i nassta.
singer-ACC see.pp memory-NOM emerged
'Yesterday a singer came to class. I remembered seeing the singer before.'

Thus, it is unclear how robust this topichood effect might be across other classifier languages. However, the intuition presented in Jenks 2018 as well as the principle *Index!* seem necessary in Mandarin to account for the distinction between uniqueness-denoting and familiarity-denoting interpretations in the language. Bare nouns in bare argument languages have a number of possible interpretations. They can be interpreted as indefinite, kind-denoting, uniquely definite, or familiar. Therefore, it would be important to maximize the anaphoric marking whenever possible, as Jenks argues. I argue that both types of economy principles exist in the language. The principle I propose in this work, *Don't Overdeterminate!*, considers all forms available for an anaphoric reference and chooses the least redundant form. Jenk's *Index!* compares different interpretations available for a noun in Mandarin and determines how to maximize the marking to indicate that target interpretation. These two principles are likely to overlap specifically in contexts like the ones I looked at in this chapter, the intersententially anaphoric contexts. This is a context in which bare nouns as well as demonstrative descriptions are possible. *Don't Overdeterminate!* chooses the bare noun, while *Index!* chooses the demonstrative description. I suggest that this type of clash in two different kinds of economy principles is the cause of the mixed judgments we find across speakers. How different economy principles interact in overlapping contexts and whether this interac-

tion is absolutely determined or dependent on specific speakers or context, are left for future investigation.

2.7 SUMMARY AND IMPLICATIONS

In this chapter I have presented a survey of bare argument languages and categorized them into ABN languages (that allow anaphoric bare nouns) and *ABN languages (that do not). The Bare Noun Blocking generalization was proposed to argue that languages with simplex pronouns block anaphoric bare nouns in intersentential contexts. This was explained by the intuition that anaphoric expressions are organized into a scale based on their meaning, and that when multiple expressions are able to resolve the referent successfully, the simplest form with the least amount of redundant information blocks the use of more complex forms due to economy considerations. This idea was used to explain the difference between ABN and *ABN languages. In *ABN languages like Hindi, Thai, and Lugwere, simplex pronouns block bare nouns. In ABN languages like Korean, Japanese, and Mandarin, there are no simplex pronouns to block bare nouns, and thus the bare nouns are the lowest elements in the scale. For Slavic languages like Russian and Polish, I showed that while these languages have a rich set of personal pronouns and pronominal demonstratives, bare nouns are possible in intersentential anaphora. But what seems to be an exception turns out to be compatible with the prediction of the Bare Noun Blocking generalization because the pronominal anaphors of these languages are grammatically marked for gender, suggesting the presence of a noun in the underlying structure. Thus, I argue that Slavic pronouns and pronominal demonstratives are actually adnominal anaphors, and thus when ordered by strength

of meaning, these expressions appear higher in the scale. This explains why bare nouns would be possible in intersentential anaphora.

2.7.1 REMAINING QUESTIONS

2.7.1.1 TWO KINDS OF PRONOUNS

In discussing the data from Russian and Polish, I argued that Slavic pronouns have nouns in their underlying structure and supported this argument by showing that pronouns carry lexically-determined gender of the noun. By making this argument, I draw a distinction between two possible kinds of pronouns: the truly simplex type that only carries *phi*-features, and the complex type that carries the denotation of the noun as well.

This brings us to the classic discussion in semantics on what pronouns denote. Since Geach 1980, the problem of scope in intersentential anaphora has received much attention. For example, in 64, the traditional accounts of the indefinite noun denoting an existential quantifier and pronouns being a variable bound by that quantifier, we run into a scope problem as in (64a): the variable *x* in *whistles(x)* is outside the scope of the existential quantifier.

(64) A man_i walks. He_i whistles.

- a. $\exists x[\text{man}(x) \wedge \text{walks}(x)] \ \& \ \text{whistles}(x)$

The two general approaches to this problem were the dynamic approach and the e-type

approach. In the dynamic approaches (Heim 1982; Kamp 1981; Groenendijk & Stokhof 1991), the referents introduced by the indefinite noun are transferred across the syntactic scope of the quantifier, allowing *x* in (64a) to be bound by the existential quantifier. In the e-type approaches (Evans 1980; Cooper 1979), the meaning of the pronoun is updated so that it is a definite description rather than a variable. Thus, *he* in 64 has the denotation of ‘the man’.

Coming back to the proposal presented in this work, it would be important to determine how the distinction between simplex and complex pronouns I present in this work relates to the debate between dynamic and e-type approaches. Also relevant is my discussion of the grammatical gender marking as evidence for the underlying noun. In English, which the dynamic and e-type debate has focused on the most, there is no productive or obligatory grammatical marking on pronouns, though other related languages still maintain the marking on pronouns. It would be interesting to look at languages like German, and test how grammatical vs. natural gender marking on pronouns affect interpretation.

2.7.1.2 VARIATION

It is crucial to note that the data presented in this chapter are from consultations with 3-5 native speakers and thus are preliminary. Nevertheless, the differences in ABN and *ABN languages show are quite defined and consistent, thus providing a nice starting point for the hypothesis presented in this work. There were, however, two languages that showed speaker variations: Mandarin and Hindi. In this section, I discuss these two languages and show that the data are still compatible with the predictions of the

generalization. In particular, I show that the Bare Noun Blocking generalization in fact specifically predicts Mandarin and Hindi to be the ones showing variation unlike other languages discussed in this chapter. This is because the status of their simplex pronouns is relatively less defined: if there is a variation in speakers in the use and interpretation of simplex pronouns, the Bare Noun Blocking generalization would predict a variation in the acceptability of anaphoric bare nouns.

The variation in the Mandarin data has been pointed out several times in this chapter. For example, while it is established that anaphoric bare nouns are licensed in the subject position (Jenks 2018), anaphoric bare nouns in non-subject position showed some level of variation across speakers. For Hindi, the variation was on the acceptability of bare nouns in both subject and object positions. Out of five consultants, three speakers rejected anaphoric bare nouns in either position, while two speakers accepted them in both. Note that the two speakers who accepted the anaphoric bare noun identified themselves with the standard dialect of Hindi, while the speakers who rejected the anaphoric bare noun identified themselves with Eastern or Western dialects of Hindi. While a more systematic investigation with a larger set of conditions and participants would be necessary to more conclusively explain the data, the theory presented in this chapter does provide some explanation on why there might be more variation in Mandarin and Hindi than other languages discussed.

Note that the main argument of the Bare Noun Blocking generalization depended on the status of simplex pronouns in a given language. Korean is a clear example of a language that lacks simplex morphemes that serve as third person pronouns. There is no separate morpheme that can be used as a pronoun in third person, and the only available expressions for that function are full demonstrative descriptions with nouns

obligatorily overt. Thai, on the other hand, is a clear example of a language that has a full system of simplex pronouns. Not only does the language freely allow pronominal uses of demonstratives (unlike Korean), Thai also has a separate set of morphemes that are specifically used as third person pronouns.

If we develop a scale that measures the productiveness of simplex pronouns, Mandarin and Hindi are placed somewhere in the middle, with Korean at the bottom and Thai at the top. Mandarin does have a separate morpheme *ta* that can be used for third person pronouns, so it is higher in the simplex pronoun scale than Korean. However, the morpheme is highly constrained in that it is used more in the written language and often constrained to animate referents (Sun 2006), so it is below Thai in the scale. Hindi does not have a separate set of morphemes for third person pronouns, and thus is lower than Thai in the simplex pronoun scale. But because the pronominal form of the demonstrative is freely used as pronouns unlike Korean, it is higher than Korean in the scale. Thus, it is possible for both languages that there is a variation across speakers in the status of simplex pronouns. This variation could be regional or dialectal, and it could also be a systematic change occurring across time in either direction. In either case, it is interesting to note that the two languages that have a relatively unclear status of simplex pronouns are the languages that show variation across speakers in the availability of anaphoric bare nouns. This is compatible with the predictions of the current theory. The next step is to determine whether the speaker's intuition about the simplex pronoun in the language can predict that speaker's acceptance of the anaphoric bare noun. The theory would predict that if a speaker of Mandarin or Hindi has acquired the morpheme *ta* or the pronominal demonstrative *vo* as a truly simplex pronoun with no underlying noun in the denotation, that speaker would reject the anaphoric bare

noun. How to determine whether a pronoun has an underlying noun in the structure or the denotation remains as a task that has to be taken up in the future.

3

The competition mechanism

OVERVIEW

In this chapter, I lay out the details of the competition mechanism of anaphoric expressions. This theory will make use of the following three as main ingredients:

1. **a language-universal scale of anaphoric denotations**, that are built from semantically primitive properties such as being an entity or having *phi*-features, and ordered by entailment relation from the weakest to the strongest.
2. **a language-specific mapping between semantics and morphosyntax**, mapping each or groups of denotations to linguistic forms.
3. **an economy principle** that chooses the weakest (lowest) element in the scale when more than one anaphoric expression can successfully resolve the referent.

After presenting the theory in detail, I discuss how this theory can be applied to the Bare Noun Blocking generalization introduced in the previous chapter. The following additional advantages are discussed:

- Derivation of patterns found in referent tracking studies such as Gundel et al. 1993 and Ariel 2001 solely from the denotations.
- Specific predictions on the effect of focus sensitivity in anaphoric resolution.
- Improved semantic account of silent pronouns such as PRO and Romance-type little pro.

In discussing these, I show that the theory provides theoretical and empirical advantages. Theoretically, it presents a unified theory of a number of unrelated observations and primitive principles. Empirically, it better accounts for exceptions in such principles by articulating the effects of focus and accommodation.

3.1 MAIN INTUITION

The Bare Noun Blocking Generalization from Chapter 2 suggests that the anaphoric ability of an expression in a language may be affected by the presence of another expression in the language that is simpler in form. This was shown by closely comparing ABN (Anaphoric Bare Noun) languages like Mandarin, Japanese, and Korean, which allow anaphoric bare nouns, to *ABN languages like Thai and Hindi, which do not allow anaphoric bare nouns in intersentential anaphora. The generalization I drew from observing that only the *ABN languages have a full paradigm of simplex pronouns is the following.

(65) **Bare Noun Blocking**

If a bare argument language has morphologically simplex pronouns ('simplex pronouns') for 3rd person reference, bare nouns are blocked from intersentential anaphora involving one salient entity.

Thus, what we see is that the presence of an anaphoric expression in a language could affect the distribution of another anaphoric expression present. This motivates us to pursue a competition-based theory of anaphoric expressions. In such a theory, the inventory of anaphoric expressions in a language would be organized in terms of semantic and/or syntactic complexity, and the availability of a semantically weaker element would block the use of the more complex element in the scale. This idea will be worked out formally in this chapter, starting with the discussion of the ingredients necessary for the theory. After laying out the theory in Section 3.2, I go back to the Bare Noun Blocking generalization in Section 3.3 and show how this can be formally analyzed under

this theory.

In addition to accounting for the Bare Noun Blocking generalization, this theory has the advantage of deriving many of the patterns repeatedly found in narrative cohesion studies such as Ariel 2001 and Gundel et al. 1993. In these studies, the choice of an anaphoric expression is investigated against the relative saliency of the antecedent determined by recency or prominence. I will show in Section 3.4 that the scales of anaphoric expressions proposed in these studies can be derived solely from the denotations I propose in this theory.

I end the chapter with two additional advantages of this theory. The first is the incorporation of focus sensitivity in anaphor resolution. While there have been many theories proposed to account for the distribution of certain anaphoric expressions, we repeatedly find that whether an anaphoric expression is licensed in a sentence depends highly on contextual and information structure, such as whether there is contrast with another potential antecedent, and whether the expression is focused. Because my theory proposes a constraint on a scale derived purely from entailment patterns and not on a specific lexical item, it allows for this kind of dependency on information structure. I discuss how focus and the context affect the felicitousness of an anaphoric expression in Section 3.5.

The second advantage is an improved semantic account of silent pronouns PRO and pro in English and Romance languages. While principles such as Avoid Pronoun Principle (Chomsky 1981) and Overt Pronoun Constraint (Montalbetti 1984) continue to be widely used to explain the restriction of overt pronouns against these silent elements, I show in Section 3.6 that these hardwired principles are too strong and cannot account

for the exceptional behaviors of overt pronouns when they are focused. Then, I present how these silent elements can be added to the scale of anaphoric expressions at the lower end. The interaction between the economy principle and focus semantics allows not only for a unified account for all interactions between overt and silent pronouns, but also covers the empirical grounds more accurately.

3.2 INGREDIENTS

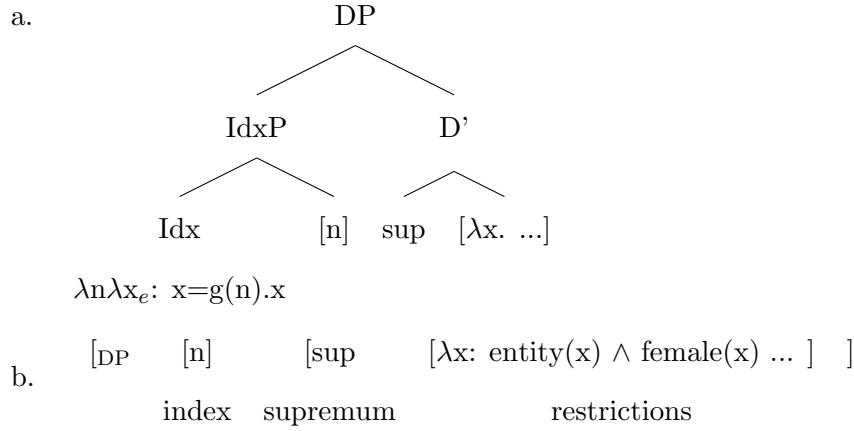
3.2.1 STRUCTURE OF AN ANAPHORIC DP

An anaphoric expressions in a given language will be analyzed as containing three main parts. The first is the index that is used for binding purposes in anaphoric relations as well as bound-variable relations. The second is an operator that takes a set of entities and returns the maximal entity, which can be implemented with a supremum operator or the iota operator. The third is a set of restrictions that restrict the set of entities to the intended referent.

I propose the following structure for anaphoric DPs. The index is composed at the spec-DP position, crucially above the operator in D which returns the maximal individual that satisfies the properties denoted by the series of NPs adjoined. The index is not part of the restriction of the supremum operator, in contrast to what is generally assumed (Heim & Kratzer 1998; Elbourne 2005; Schwarz 2009; Patel-Grosz & Grosz 2017). This is to ensure that the semantic richness of the NP has an effect on whether an anaphoric DP is felicitous in the context. If the index is part of the restriction, the DP would always identify the intended referent uniquely, bleeding the need for different

levels of NP content that could help in determining the target referent. This point is elaborated later in this section.

(66) **Structure of an anaphoric expression:**



The *Idx* head is a partial function of type $\langle n, \langle e, e \rangle \rangle$ that takes a natural number n and an e -type individual x and returns the individual x . The function is defined if and only if x is identical to the entity assigned at the n 'th coordinate of the assignment function g . Thus, the role of *Idx* is to add a presupposition that ensures that the individual taken as the input is the one carrying the correct index. This ensures that coreference with an antecedent that carries a certain index as well as variable binding will be possible.

(67) $\llbracket \text{Idx} \rrbracket = \lambda n \lambda x : x = g(n). x$

Occupying the head of the DP is a supremum operator *sup* which takes a set S as its input and return the smallest individual x such that all individuals y in S form part of x .

$$(68) \quad \llbracket \text{sup} \rrbracket = \lambda P. \iota x. \forall y (P(y) \leftrightarrow y \sqsubseteq x)$$

'the smallest individual x such that all individuals y that is P form part of x '

The supremum operator differs from the more commonly used *iota* operator in that it does not require existence or uniqueness. The reason for using the supremum operator over the iota operator is that the presuppositional requirement of *Idx* takes care of the existence as well as the uniqueness: it requires that the entity be identical to the familiar entity assigned at a given index. This ensures that the existential and the uniqueness presupposition usually contributed by the iota operator are both satisfied for the DP to return an individual. At this point, it is not crucial to choose one over the other, because the resulting interpretation of DP is the same regardless of which operator we choose, except for the fact that the *iota* operator would restrict the output to those that satisfy the existential and uniqueness presupposition already at D'. The supremum operator has a theoretical advantage that it carries just the minimal amount of function that is sufficient for the interpretation of DP to compose. The *iota* operator has the advantage that we are making use of already existing operation that is commonly associated with definite and pronoun denotations. I leave the choice of the operator at D more or less open: regardless of whether existence or uniqueness is checked at D', the resulting DP will be an entity that is uniquely identifiable and identical to the entity assigned at the given index.

Note that the set of restrictions are shown in the structure without a syntactic label. It is left open whether these restrictions always project an NP in the syntax, or a lower projection. For example, it is possible that only those expressions that carry an overt NP (like the bare noun, the definite description, and the demonstrative description) are

the ones that syntactically project an NP, and the expressions like the null argument and pronouns do not project an NP at all and have an intransitive D head, or project a smaller phrase like a *phi*P. The syntactic projection is not crucial to the main theory presented here, and thus I leave open the question of whether there is a syntactic projection of NP or not in the expressions without overt nouns. It is only crucial that the expressions carry the relevant restrictions in the semantic denotations.

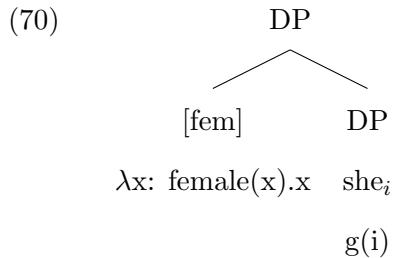
3.2.1.1 MOTIVATION FOR SEPARATING THE INDEX FROM THE RESTRICTION

One main novelty in my account is that the index is composed with the rest of the structure at a much higher position, at the spec-DP position. This diverges from many traditional accounts where anaphoric elements are assumed to carry the index as part of its core restriction in the NP (see Schwarz 2009; Jenks 2015; Patel-Grosz & Grosz 2017 on anaphoric definites and Elbourne 2005; Heim & Kratzer 1998 for assuming that pronouns denote the index). For example, in Schwarz 2009, where definites are distinguished between uniqueness-denoting weak forms and familiarity-denoting strong forms, strong definites are analyzed as carrying an anaphoric index y in its restriction as shown in 69. In (69a), the definite description takes a situation variable s_r and the property P denoted by the noun, presuppose that there is a unique x such that x is P in s_r , and return that unique x . In (69b), the denotation is identical except now the presupposition is that x is P in s_r and equal to the referent of y (indicated in bold), the index, returning that x .

- (69) a. $\llbracket \text{the}_W \rrbracket = \lambda s_r. \lambda P: \exists!x(P(x)(s_r) \ \iota x.P(x)(s_r))$ Weak
 b. $\llbracket \text{the}_S \rrbracket = \lambda s_r. \lambda P. \lambda y: \exists!x(P(x)(s_r) \ \& \ x=y) \ \iota x[P(x)(s_r) \ \& \ x=y]$ Strong

The analysis in Schwarz 2009 is adopted in a number of subsequent analyses of the strong definite cross-linguistically. While details differ, the underlying assumption is that the index is part of the restriction of the anaphoric definite: a strong definite of the form $[D_n P]$ returns the unique entity that is P and equal to an entity assigned at index n .

In traditional accounts of pronouns, the pronoun is analyzed as carrying the denotation of the index itself, either as an *e*-denoting individual (Heim & Kratzer 1998) or as an *et*-type NP (Elbourne 2005). Details differ regarding how the *phi*-features of pronouns are composed with the pronoun, but the shared intuition is that the pronouns denote indices and are restricted by the value of the index: they either refer to the entity assigned at the given index or are only true of such entities. Their structures are shown below.

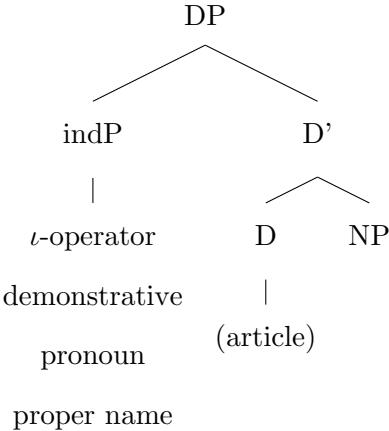


Thus, in semantic literature, the prevalent assumption is that the index occurs lower in the structure, restricting the meaning of the pronoun or the definite.

In the syntactic literature, there has been arguments that the indexical elements appear higher in the structure. These discussions are mostly based on the respective order in which different parts of a nominal phrase appears across languages. Giusti

(2015) argues that the spec-DP position hosts all indexical elements including the index, the iota-operator, as well as pronouns and proper names.

(71)



Hsu & Syed (2019) argue that the indP in Giusti 2015 needs to be further broken down into a number of more specific projections, presenting data that show that a number of elements categorized as indexical in her analysis can co-occur in many languages.

The reason I separate the index from the set of restrictions in the NP is to tease apart the two functions of an anaphoric expression. The first function is to carry the index that determines which referent it should refer to. The second function is to uniquely identify that intended referent. While these two functions are often taken to be the same function, I argue that these two functions are actually separate and taken care of by two separate mechanisms.

First, consider traditional accounts where the index is part of the restriction of the NP. This suggests that an anaphoric DP indexed at 7 for example returns the unique entity that is at 7. With the index as a restriction, there would not be any ambiguity

in which referent it refers to. This suggests that there would not be any reason for choosing between different NP content to figure out who the referent is. However, what we see is that the NP content does affect anaphor resolution by disambiguating the intended referent.

- (72) I saw a boy_i talking to a man_j. @?He_i looked happy.

Note that the reference of *he* is ambiguous in 72. I indicate this ambiguous use of a pronoun with the '@?' sign to distinguish it from syntactic or semantic degradedness. While many semantic works simply assume that the index on the pronoun is enough to resolve the anaphora to the boy who carries the same index, it is not at all clear how this is done in actual language use. A felicitous use of a pronoun *he* is only possible when there is one salient male to refer to as in 73.

- (73) I saw a boy_i. He_i looked happy.

Moreover, as soon as we use the definite description in 74, the presence of two accessible male antecedents is no longer a problem.

- (74) I saw a boy_i talking to a man_j. The boy_i looked happy.

What this suggests is that the form of the anaphoric expression actually facilitates the intended reference. If the index is part of the restriction, anaphoric resolution to the intended referent is always guaranteed, regardless of the form of the expression. Thus, we would not predict the felicity difference between 72 and 74.

Thus, while the index makes sure that the entity denoted by the DP is identical to the targeted antecedent, the restrictions at the NP level must ensure that the set of entities is sufficiently restricted to refer uniquely to that referent. Under this account, the degradedness associated with the pronoun ambiguity in 72 is articulated formally as resulting from the presupposition failure at the *Idx* head.

Note that this change in the index position does not affect the analysis of bound readings of anaphoric expressions. The role of the index is assumed to only indicate the linked relation between the antecedent and the anaphoric expression. The quantifier does not bind the anaphoric expression itself but just the antecedent, and the referent of the co-indexed anaphoric expression covaries with the antecedent. Here is a way in which I formalize this, following intuitions from Büring 2004 and Chierchia 2019. The crucial assumption in this line of research is that traces are pronouns are distinguished: by syntactic status of antecedents in Büring 2004 and by the nature of binding in Chierchia 2019. Following Chierchia 2019 I argue that while traces are bound like variables by quantifiers, pronouns can only receive its reference by a dynamically transferred assignment function. This means that while pronouns are familiar in referring to referents that are already present in the assignment function, variables are not. Consider the example in 75.

- (75) Every girl₇ thinks that Mary likes her₇.

In Chierchia 2019, it is assumed that discourse referents are introduced at theta-positions, such as the agent role for *think*, and assigned the index. For example, *every girl* in the agent role of *think* introduces a discourse referent that is a girl and assigns the

referent at the coordinate 7 of the assignment function. The pronoun *her* in the theme of the predicate *like* also introduces a discourse referent, but that discourse referent is familiar, in that there is a referent that has already been introduced and present in the assignment function that it refers to. In the case of pronoun *her*, it is identified as the referent assigned at the coordinate 7.

The quantifier *every* raises just like regular quantifiers, and quantifies over its trace *x* as shown in 76. The agent position of *thinks* introduces a discourse referent *y* that is equated with *x* and restricted to girls. The agent and theme positions of *likes* also introduces discourse referents *z* and *a* respectively.

$$(76) \quad \forall x [\exists y y=x \wedge \text{girl}(y) \rightarrow \exists z z=\text{Mary} \wedge \exists a a=7 \wedge \text{likes}(a)(z)]$$

3.2.2 SEMANTIC CATEGORIES

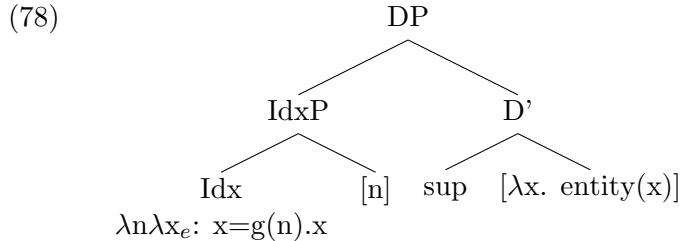
I identify a number of semantic categories that contribute to anaphor resolution by restricting the domain of accessible entities to the intended referent. These involve semantic notions such as being an entity as well as grammatically derived notions such as referring to 3rd person. I propose that the following semantic categories in 77 are universally available and take part in anaphor resolution.

$$(77) \quad \text{Semantic categories:}$$

$\text{entity}(x)$	true if x is an entity
$\phi(x)$	true if x meets the requirements of person, gender, animacy, and number
$P(x)$	true of x if $P(x)=1$
$R(x)$	true of x if x is true of the focused property R

The NP portion of the anaphoric DP structure consists of those restrictions, starting with the most broad restriction of being an entity and adding on further restrictions.

In this section, we discuss each property in some detail. The most basic property of being an entity, which is the minimal requirement for any kind of anaphoric reference. Because being an entity is the broadest restriction in an anaphoric reference, the purpose of this property is purely type-theoretic, meaning that this does not have a semantic contribution other than forming some set over which the supremum operator can operate. An anaphoric expression that contains only this restriction in the NP with an index n would return the maximal entity that is indexed at n .



As discussed earlier, I leave open whether this restriction of being an entity has to be syntactically projected or not.

Another way in which the set of potential antecedents could be restricted is by using *phi*-features, such as person, gender, animacy, and number. While I group all of these

features into one property for now, I leave open the possibility of this property being further broken down. For example, there is a lot of cross-linguistic evidence suggesting that among grammatical features, person features have a special status (cf. Kratzer 2009). This may mean that for certain languages, the person feature is its own semantic category separate from the rest of the features. While I do not go into details of the hierarchy in different *phi*-features, I do discuss how this theory derives the third-person restriction of demonstrative and definite descriptions and accounts for exceptions like imposters in Section 3.3.5.

It is important to note that the restriction $\phi(x)$ is only concerned with *semantically*-interpreted features. In the distinction between natural and grammatical gender, for example, only the natural gender determines whether $\phi(x)$ is true or not. The grammatical feature, on the other hand, is assumed to be carried only by the noun and syntactically matched on the pronoun.³

In addition to person, gender, animacy, and number information of the potential antecedents, additional properties could be used to restrict the set of potential antecedents. For example, an anaphoric expression may carry an NP complement that denotes an *et-type* property of being a linguist. This would contribute in identifying the intended referent by further restricting the set. Such properties are referred to as *P* in 77.

I also propose that there is an additional type of properties that anaphoric expressions may implement in order to resolve anaphora. This property is referred to as *R*, and will be shown to have important differences from the *P* property. It can only host an exophoric pointing gesture or a relative clause, and has an effect of bleeding the

³Thanks to Florian Schwarz for pointing out this distinction.

anaphoric index. In Chapter 4, I will motivate an analysis where demonstratives across languages lexicalize a binary supremum operator that takes both P and R as part of its restriction. For now, however, it is enough to know that this R property is separate from P in attaching with a different mechanism, and that denotations that carry both P and R would naturally be placed higher in the scale than denotations that only carry P .

These properties are universally available, and free to combine with each other to form denotations that can be used to lexicalize different anaphoric expressions. Here are some denotations that could result from conjoining the properties in 77:

- (79) a. $\lambda x. \text{entity}(x)$
- b. $\lambda x. \text{entity}(x) \wedge \phi(x)$
- c. $\lambda x. \text{entity}(x) \wedge P(x)$
- d. $\lambda x. \text{entity}(x) \wedge R(x)$
- e. $\lambda x. \text{entity}(x) \wedge \phi(x) \wedge R(x)$
- f. $\lambda x. \text{entity}(x) \wedge \phi(x) \wedge P(x)$
- g. $\lambda x. \text{entity}(x) \wedge \phi(x) \wedge P(x) \wedge R(x)$

Note that any combination is possible. These denotations are assumed to be universally available. In a given language, these denotations can be lexicalized on its own or in groups with adjacent denotations. Because each language can choose to morphosyntactically realize a subset of the denotations, this leads to cross-linguistic variation. Across languages, however, we would predict that only adjacent blocks of denotations would be lexicalized together. In other words, this theory predicts that no language would

lexicalize (79b) and (79g) as one morpheme while lexicalizing (79c) through (79f) as a different morpheme.

3.2.3 LANGUAGE-SPECIFIC LEXICALIZATIONS

The ordered set of denotations proposed in the last section would be available for a language to lexicalize morphosyntactically. I present an example of how some languages would divide and lexicalize these denotations.

I argue that English lexicalizes the following three denotations overtly. Pronouns are analyzed as carrying restrictions of being an entity and meeting the *phi*-features, while definite descriptions are analyzed as additionally specifying the property *P* with the NP complement. The additional *R* property is carried by the demonstrative description. The mappings are shown in 80.

- (80) a. $\llbracket \text{she}_n \rrbracket = \sup [\lambda x. \text{entity}(x) \wedge \text{female}(x)]$
- b. $\llbracket [\text{the girl}]_n \rrbracket = \sup [\lambda x. \text{entity}(x) \wedge \text{female}(x) \wedge \llbracket \text{girl} \rrbracket(x)]$
- c. $\llbracket [\text{that girl}]_n \rrbracket = \sup [\lambda x. \text{entity}(x) \wedge \text{female}(x) \wedge \llbracket \text{girl} \rrbracket(x) \wedge R(x)]$

Note that definite descriptions in English may carry more than one *et*-type property because adjectives can be adjoined to NP. The number of properties that an NP can carry is not restricted, and I argue that all of these adjoined modifiers are composed via Predicate Modification to create one *P* property.

The *R* property, on the other hand, cannot be carried by an adjectival modifier. I argue that in English, this *R* property is occupied by an exophoric pointing gesture or

with a restrictive relative clause. Note that English demonstratives license restrictive relative clauses unlike pronouns:

- (81) a. Those who read
 b. *They who read

This distinction plays a crucial role in Chapter 4 where I lay out the structure and the denotation of demonstratives. For now, it is enough to note that in English, the presence of the *R* property is denoted by the demonstrative morpheme, and that the presence of an additional restriction distinct from the *P* property places the demonstrative description higher in the scale of anaphoric expressions.

These lexicalizations are ordered in terms of entailment, and thus we derive the scale of anaphoric expression in English:

- (82) ⟨pronoun, definite description, demonstrative description⟩

In bare argument languages, the anaphoric bare noun carries the denotation corresponding to the definite description in English. The demonstrative description in these languages will carry the denotation corresponding to the demonstrative description in English, carrying the additional property *R*. As I will elaborate later in Section 3.3, some bare argument languages like Mandarin, Korean, and Japanese will be argued to lack a lexicalization of what corresponds to pronouns in English. Thus, the set of anaphoric expressions in Korean, for example, would be as follows.

(83) Korean: $\langle N, ku\ N \rangle$

- a. $\llbracket N \rrbracket = \iota x: \text{entity}(x) \wedge \phi(x) \wedge P(x)$
- b. $\llbracket ku_R\ P \rrbracket = \iota x: \text{entity}(x) \wedge \phi(x) \wedge P(x) \wedge R(x)$

Other bare argument languages like Hindi and Thai that do have simplex pronouns will be analyzed as lexicalizing the following three denotations.

(84) Thai: $\langle \text{pronoun}, N, nán\ N \rangle$

- a. $\llbracket \text{pronoun} \rrbracket = \iota x: \text{entity}(x) \wedge \phi(x)$
- b. $\llbracket N \rrbracket = \iota x: \text{entity}(x) \wedge \phi(x) \wedge P(x)$
- c. $\llbracket nán_R\ P \rrbracket = \iota x: \text{entity}(x) \wedge \phi(x) \wedge P(x) \wedge R(x)$

In Italian, which makes use of null pro, all four of the denotations are used, with pro only carrying the entity restriction.

(85) Italian: {pro, pronoun, DEF, DEM}

- a. $\llbracket \text{pro} \rrbracket = \iota x: \text{entity}(x)$
- b. $\llbracket \text{pronoun} \rrbracket = \iota x: \text{entity}(x) \wedge \phi(x)$
- c. $\llbracket N \rrbracket = \iota x: \text{entity}(x) \wedge \phi(x) \wedge P(x)$
- d. $\llbracket na_R\ P \rrbracket = \iota x: \text{entity}(x) \wedge \phi(x) \wedge P(x) \wedge R(x)$

Languages make use of PRO as well, and in Section 3.6, I argue that PRO lexicalizes the broadest denotation of just being an entity and that pro differs from PRO in carrying one additional property not discussed above. However, I postpone the discussion of the silent pronouns PRO and pro until that section and leave this out in the remaining

discussion.

Note that bare argument languages make use of silent pronouns extensively as well. However, I will be showing that simply analyzing the silent pronoun in all bare argument languages like the Romance type is not satisfactory. In Section 3.3.3 I discuss how silent pronouns in different bare argument languages might differ from each other. Specifically, I argue that the silent pronoun in ABN languages is best analyzed as choice functional elements as analyzed in Kurafuji 2018. This results in the silent pronouns not competing with the rest of the anaphoric expressions.

3.2.4 SCALE DERIVED OF MEANING

Thus, so far, I have proposed a scale of anaphoric expressions that is universal and derived of meaning. While languages may choose only a subset of these denotations to morphosyntactically realize, the scale which is ordered by relative complexity in meaning, remains consistent. Also, another language-universal restriction would be predicted on the lexicalization pattern of anaphoric expressions. As hinted at above, the theory predicts that no language would lexicalize non-adjacent blocks of denotations into one morpheme to the exclusion of denotation(s) in between.

Given this scale, I propose that there is an economy principle that applies at lexical insertion and requires that the element with the least amount of restrictions be chosen. Before presenting the economy principle, I discuss the domain in which the principle would apply.

3.2.5 DOMAIN

Here I articulate the notion of a domain that contains accessible antecedents. Given a context, the domain is simply a set containing a witness per accessible antecedent.

- (86) **Domain:** a set containing a witness per accessible antecedent
- a. accessible antecedents: determined by syntax (c-command; locality) and semantics (discourse referents)

I argue that this domain is grammatically defined. A referent is part of the domain if it has been semantically assigned an index as a discourse referent, or if it is occupying a syntactic position that c-commands the anaphor (but not local enough to violate Condition B).

For instance, given a context as in 87, only the bus and the woman would be considered accessible antecedents, even though the information that the bus was full suggests that there were many other entities in the context which is being described.

- (87) The bus was full. A woman₇ said that she₇ was not feeling well.

The domain is dynamically updated and can also be adjusted when accommodation is necessary for coherent interpretation. The two operations that I make use of are domain widening and domain restriction. In the case of domain widening, the given domain at a context is widened to include other contextually-relevant entities. I argue that domain widening occurs when focus interacts with anaphoric expressions. This

can be seen in 88, where the first sentence introduces a boy as a discourse referent and assigns it an index 1. While the most felicitous and simple anaphoric expression in the second sentence would have been a pronoun, a demonstrative description can also be used.

- (88) A boy₁ walked in. THAT boy₁ looked happy.

Note that there is only one boy in the domain given the first context. I argue that the presence of focus on the demonstrative description results in widening the domain to include other boys potentially relevant for the context. For example, if an addressee hears the sentence in 88, she might try to accommodate and create a coherent narration by assuming that there is at least one other boy that the speaker is thinking of, that did not look happy.

Domain restriction is visible when an underspecified pronoun occurs. Consider 89.

- (89) A woman₃ was at the wheel. Another woman₄ got in the car. She did not look happy.

Note that in this context, the pronoun *she* is underspecified because there would be two female entities in the domain. However, the pronoun in 89 systematically refers to the second woman, as shown in a different example in Roberts 2002 as well. I argue that this is another accommodation mechanism that the addressee may use when an underspecified anaphoric expression occurs. While semantically the pronoun would fail to restrict the domain to a unique entity, the addressee may restrict the domain

to contain only the most salient or recently introduced entities to uniquely identify a referent. These processes on the domain are discussed in more detail in Section 3.5.

3.2.6 ECONOMY PRINCIPLE

I propose the following principle *Don't Overdeterminate!*, which, informally, chooses the lowest element in the scale of anaphoric expressions that can successfully resolve the referent. The formal definition is given below in 90. The principle blocks an anaphoric expression β if there is α which is an anaphoric expression that is alternative to β for which the intension of the predicate applied to α (given the domain D and the assignment function g) entails the intension of the predicate applied to β .

(90) **Don't Overdeterminate!**

Block β if

$$\exists \alpha : \alpha \in \text{ALT}(\beta) \wedge \forall P_{<e,t>} \lambda \omega P_\omega(\llbracket \beta \rrbracket^{D,g}) \subseteq \lambda \omega P_\omega(\llbracket \alpha \rrbracket^{D,g})$$

The main effect of 90 is to block any redundant expression when a simpler form is available. This principle can be derived from more general economy principles such as Grice's Brevity, or Efficiency proposed in Meyer 2014, which rules out an LF ϕ if there is an alternative LF ψ that has the same denotation.

An LF ϕ is ruled out if there is a distinct competitor ψ such that

- a. $\psi \in ALT(\phi)$
- b. $\llbracket \psi \rrbracket = \llbracket \phi \rrbracket$

Another relevant and similar economy-based principle is *Minimize DP!* (Patel-Grosz & Grosz 2017). In looking at German personal pronouns and demonstrative pronouns, they propose that the two morphemes differ structurally in carrying an index. This distinction reflects the weak vs. strong distinction in definites (Schwarz 2009), but unlike Schwarz who leaves open whether the index in the strong definite is syntactically projected or not, Patel-Grosz & Grosz (2017) argues that the demonstrative projects an additional phrase, the strongDP, that carries the index. In discussing the relative markedness of demonstrative pronouns in German, Patel-Grosz & Grosz (2017) argue that there is an independent economy-based principle that restricts unnecessary projections: if the context allows the pronoun to resolve reference, the additional projection of the strongDP is not preferred.

My economy principle differs from that of Patel-Grosz & Grosz 2017 in several ways. First, the present principle is based on semantic entailment, ruling out a lexical entry D if D entails its alternative in a given world. *Minimize DP!* is syntactically based, restricting unnecessary syntactic projections. Also, I assume that all anaphoric DPs contain an anaphoric index in spec-DP, which is not compatible with the analysis Patel-Grosz & Grosz (2017) make for personal pronouns in German. In Chapter 4, I propose an analysis of demonstratives that does not involve an additional syntactic complexity, but instead a replacement of the anaphoric index that is available for pronouns.

This makes the structure-based economy principle incompatible.

I argue that the principle *Don't Overdetermine!* applies at lexical insertion. The economy principle chooses the semantically weakest element in the scale that can uniquely identify the intended referent.

To illustrate, let's look at the following context in 92.

(92) A boy walked in.

a. A boy₃ walked in.

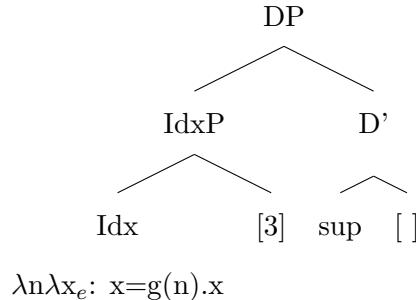
The sentence in 92 introduces a boy discourse referent and assigns it at the 3rd coordinate of the domain that keeps a record of accessible antecedents. This is represented by the indexing in (92a).

(93) DOM: {boy₃}

The sentence in 92 continues with the next sentence containing an anaphoric DP indexed at 3. The DP indexed at 3 would have a structure as shown in (94a) where the spec-DP position is filled with the index 3 suggesting that the intended referent must be identical to the entity assigned at the 3rd coordinate. The restriction is unspecified at LF, and at lexical insertion the choice of the anaphoric expression is made.

- (94) [DP₃] looked happy.

a.



Now consider the anaphoric expressions available in English.

- (95) a. $\llbracket \text{he} \rrbracket = \text{sup } [\lambda x. \text{entity}(x) \wedge \text{male}(x)]$
 b. $\llbracket \text{the boy} \rrbracket = \text{sup } [\lambda x. \text{entity}(x) \wedge \text{male}(x) \wedge \text{boy}(x)]$
 c. $\llbracket \text{that}_R \text{ boy} \rrbracket = \text{sup } [\lambda x. \text{entity}(x) \wedge \text{male}(x) \wedge \text{boy}(x) \wedge R(x)]$

The pronoun *he* returns the maximal individual in the domain that is male. Because there is only one male in the domain, the denotation of D' would return the boy that is identical to the referent indexed at 3, thus meeting the presupposition of the Idx. Thus, the DP successfully returns the boy assigned at 3. The definite description and the demonstrative description are all semantically compatible as well, because the unique male in the given domain is the unique male that is a boy.

The economy principle requires that the weakest element in the scale, namely the pronoun, be chosen. Thus, the DP₁ in 94 is realized as *he*. While *the boy* and *that boy* are also compatible and possible, they are less felicitous and redundant sounding. I argue that the use of these higher elements in the scale are still made possible when they interact with focus and create a contrastive context. Given the economy principle,

the use of a higher element in the scale suggests that the uniqueness presupposition of the lower element was not met, because if it was met, the higher element would have been blocked. Thus, the higher expressions are only possible when contrast adds to the domain in the way that the uniqueness presupposition fails.

This is where domain widening applies. Depending on the form of the expression, the way domain gets widened differs. For example, if the definite description *the boy* is used, the contrast is drawn between the referent of *the boy* and a referent of an alternative description such as *the man*. The addressee who hears 96 might try to make sense of the discourse by accommodating and assuming a contrastive context. This accommodation would involve adding some entity that is not the boy that the speaker is considering.

- (96) A boy₃ walked in. The boy₃ looked happy.

The domain widening pattern for the demonstrative description differs from that for the definite in that the contrast is drawn among referents that share the property of being a boy. Note that the implication of using the demonstrative description is that the uniqueness requirement of the definite description was not met. This suggests that there is at least one more boy in the given context, leading to a domain widening that adds another boy. Thus, when the demonstrative description is used, the domain is widened to include other boy entities, and the interpretation is that this particular boy at 3 was happy in contrast to other boys that the speaker may have seen before. The stress pattern of the definite and the demonstrative also correspond to this difference: the NP complement *boy* is stressed when the definite is used, while the demonstrative *that* is stressed when the demonstrative is used.

- (97) a. A boy₃ walked in. The BOY₃ looked happy.
 b. A boy₃ walked in. THAT boy₃ looked happy.

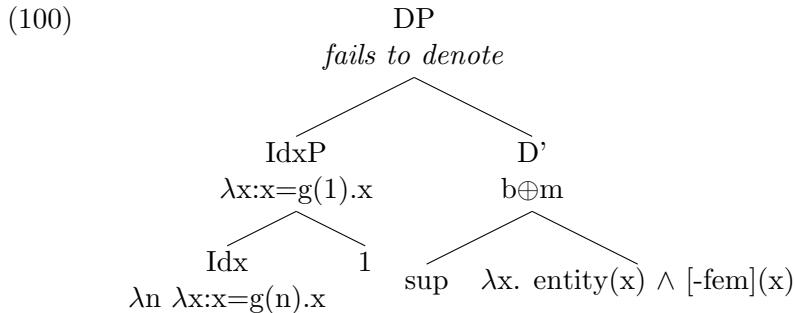
Now consider the second context in 98. In this context, there are two accessible antecedents: the boy₁ and the man₂.

- (98) A boy₁ was talking to a man₂. [DP₁] looked happy.

The domain is thus created with two witnesses:

- (99) DOM: {boy₁, man₂}

In this context, the pronoun *he* fails to denote. Given the denotation of *he*, D' returns the maximal individual that is male in the domain. Note that because in our domain there are two males, D' returns the plural individual consisting of the boy and the man, represented as b⊕m in the structure below. This denotation of D' fails to satisfy the presupposition of Idx, which requires that the individual denoted in D' be identical to the individual indexed at 1, which is the boy.



Thus, *he* is no longer a compatible expression. With *he* removed, the lowest element in the scale is the definite description *the boy*. Thus, the economy principle requires that *the boy* be used in 98. The use of the demonstrative description would still be possible, given that the domain is widened so that there is contrast drawn between the boy at 1 and other boys that the speaker has in mind.

With the details of the theory laid out, we return to the Bare Noun Blocking generalization discussed in Chapter 2. I show in Section 3.3 how the generalization can be formally analyzed using the theory presented in this section.

3.3 GOING BACK TO BARE NOUN BLOCKING

We now go back to the Bare Noun Blocking phenomenon discussed in the previous chapter. We observed that bare argument languages divide into two categories based on whether they allow their definite bare noun to occur in intersentential anaphora in a context schematized in 101:

- (101) I bought book. Book was expensive.

The languages were divided between ABN (anaphoric bare noun) and *ABN languages as follows:

- (102) Two categories of bare argument languages

ABN	*ABN
Korean, Mandarin, Japanese	Hindi, Thai, Lugwere
Russian, Polish	

The generalization I drew is that this division corresponds to the presence of morphologically simplex pronouns in the language: if a bare argument language has simplex pronouns for third person reference, bare nouns are blocked in intersentential anaphora involving one salient entity. I discuss here how this could be analyzed formally using the mechanism introduced here.

3.3.1 SCALES AND DENOTATIONS FOR BARE ARGUMENT LANGUAGES

I argue that simplex pronouns in bare argument languages should be mapped onto the denotation in 103, which returns the unique entity that meets the *phi*-restrictions. For simplicity, I abbreviate the *IdxP* as [n]. The *phi*-features could specify person, number, gender, as well as animacy.

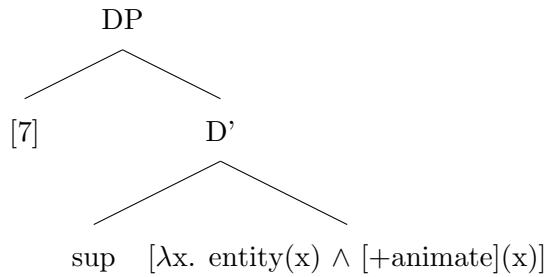
$$(103) \quad [\text{pronoun}] = \sup [\lambda x: \text{entity}(x) \wedge \phi(x)]$$

For example, the Thai pronoun *kǎo₇* would carry specifications of being third person and animate and return the maximal entity that is animate and male, if that individual is identical to the individual assigned at the 7th coordinate. For simplicity, all restrictive properties are conjoined at the complement position for the D head. I do not make a specific claim on how the properties are structured in the syntax. It may be that each property is projected separately, or it may be that they are all adjunctions on the NP.

The exact details would not affect the main thesis.

$$(104) \quad [\![\text{kǎo}]\!] = \sup [\lambda x: \text{entity}(x) \wedge [+animate](x)]$$

(105)



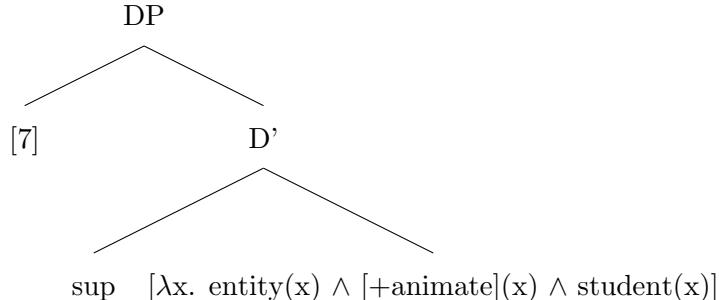
The definite bare noun carries the additional property P which is denoted by the NP.

$$(106) \quad [\![P_{\text{DEF}}]\!] = \sup [\lambda x: \text{entity}(x) \wedge \phi(x) \wedge P]$$

The bare noun *nakrian* ('student') indexed 7 in Thai would thus have the following denotation.

$$(107) \quad [\![\text{nakrian}]\!] = \sup [\lambda x: \text{entity}(x) \wedge [+animate](x) \wedge [\![\text{student}]\!](x)]$$

(108)



Note that some bare argument languages, specifically the classifier languages, are analyzed as having kind-denoting nouns of type e (cf. Chierchia 1998b, Dayal 2012, Jiang 2017, a.o.). For these languages, it would be necessary to either use the typeshifting operator to typeshift the kind-denoting noun to a property (cf. Jenks 2018), or make use of the kind-level ι operator that takes a kind-denoting entity as its argument and return the maximal entity that instantiates the kind in the given context (Dayal 2012; Jiang 2017).

3.3.2 COMPETITION

Given these denotations, we can look at how the two expressions would go through a competition in an *ABN language like Thai. For simplicity, I present the example in an English schema.

- (109) I met student_i yesterday. [DP_i] is smart.

The student in the first sentence contains an index (let's say 7) and the DP in the second sentence is coindexed with the student. This allows us to know that the target referent is the student in the first sentence, which is the only salient entity in the context outside the speaker. The domain of referents built by having one witness per potential antecedent contains the student indexed at 7 as well as the speaker indexed at 6.

- (110) DOM: {sp₆, student₇}

There is only one entity that is 3rd person, namely the student at 7. Thus, the 3rd person

pronoun *kǎo* can uniquely identify the intended referent and satisfy the presupposition of the index. The bare noun is also compatible, though it is not the weakest element in the scale.

- (111) a. $\llbracket \text{kǎo} \rrbracket = \sup [\lambda x: \text{entity}(x) \wedge [-\text{fem}](x) \wedge [+ \text{animate}](x)]$
 b. $\llbracket \text{nakrian} \rrbracket = \sup [\lambda x: \text{entity}(x) \wedge [+ \text{animate}](x) \wedge \llbracket \text{student} \rrbracket(x)]$

The economy principle chooses the lowest expression in the scale, which is the pronoun *kǎo*, and blocks the bare noun from being realized. Because the bare noun is blocked, when it is used, it is interpreted as a generic, as discussed in Jenks 2015. The adnominal anaphor where the demonstrative precedes the noun is not relevant in Thai, because even though it is compatible and can uniquely identify the referent, it is more complex than the definite noun (in carrying the additional *R* property) and thus does not block the bare noun.

In ABN languages like Korean, on the other hand, there is no simplex pronoun like *kǎo* that can block the anaphoric use of the bare noun. Instead, as discussed in detail in Chapter 2, they make use of adnominal demonstratives, which would be analyzed as following:

- (112) $\llbracket \text{DEM}_R P \rrbracket = \sup [\lambda x \text{ entity}(x) \wedge \phi(x) \wedge \text{student}(x) \wedge R(x)]$

The two denotations that compete are as follows:

- (113) a. $\llbracket \text{haksayng} \rrbracket = \sup [\lambda x: \text{entity}(x) \wedge [+ \text{animate}](x) \wedge \llbracket \text{student} \rrbracket(x)]$

- b. $\llbracket \text{ku}_R \text{ haksayng} \rrbracket = \sup [\lambda x: \text{entity}(x) \wedge [+animate](x) \wedge \llbracket \text{student} \rrbracket(x) \wedge R(x)]$

Without the pronoun, the bare noun is the weakest element in the scale for referring anaphorically to the student. Thus, in Korean, the bare noun *haksayng* can be used anaphorically. The adnominal anaphor that is frequently used in the language is more complex in carrying the additional *R* property, and thus does not block the bare noun like the simplex pronouns do in *ABN languages.

3.3.3 WHAT ABOUT NULL ARGUMENTS?

While I have discussed the denotations for pronouns and bare nouns in these languages, I haven't discussed null arguments, which are very frequently used in bare argument languages. Null arguments in classifier languages have been discussed at length, from the debate on whether they should be analyzed as ellipsis to analyzing them as choice functional elements. I assume in this work that null arguments in bare argument languages are choice functional elements, following the analysis proposed for Japanese null arguments in Kurafuji 2018. This is because null arguments in these languages are not restricted to definite or anaphoric uses (see Kurafuji 2018 for discussion of non-anaphoric uses of Japanese null arguments). Korean is also a language where the null argument seems to be used not only for anaphoric uses but also kind and indefinite readings. These uses are illustrated below.

- (114) *chinkwu-ka kkoch-ul satacwessta. imi pang-ey [kkœh-i] kkwak chassnuntey.*
 friend-NOM flower-ACC bought.me yesterday already room-DAT
 tightly full
 ‘My friend bought me flowers, though flowers have already filled up the room.’
 [Indefinite]
- (115) *konglyong-un myelcongtwayssta-ko haciman [konglyong-un] acik say-uy mosup-ulo wuli kyeth-ey namaissta.*
 dinosaur-TOP became.extinct-COMP say-but still bird-GEN
 form-INSTR 1pl side-DAT remain
 ‘They say dinosaurs are extinct, but they remain around us in forms of birds.’
 [Kind]
- (116) *ecey thokki-lul halwucongil capass-nuntey onul-to [thokki-lul]
 yesterday rabbit-ACC all.day caught-but today-too
 halwucongil capassta.*
 all.day caught
 ‘Although I caught rabbits all day yesterday, I caught rabbits all day again
 today.’

[Narrow-scope]

Because my constraint applies only to purely anaphoric elements, where purely anaphoric elements that receive their reference through the index that points back to the dynamically transferred entities from discourse, I assume that the null anaphors in these languages do not enter into competition with pronouns or definite bare nouns.

3.3.4 SLAVIC LANGUAGES

Now we turn to Slavic languages. The observation is that while Slavic languages such as Russian and Polish make use of grammatically rich set of pronouns, bare nouns are possible in anaphora, though at varying degrees. I argue that the pronouns in these languages are in fact adnominal anaphors in disguise. The grammatical marking on the noun suggests that there is a noun in the structure that bestows its grammatical features to the pronoun or the demonstrative (cf. Sauerland 2007).

$$(117) \quad [\![\text{éta}]\!] = [\![\text{éta knig-a}]\!] = \iota x: \phi(x) \wedge \text{book}(x) \wedge R(x)$$

With the adnominal anaphor being higher in the scale, there is no blocking of the anaphoric bare noun predicted in the theory.

3.3.4.1 SLAVIC INTERNAL VARIATION: EFFECT OF PRO?

There is an interesting difference between Russian and Polish. While the data are preliminary, I observed that Russian speakers were more likely to accept bare nouns in intersentential anaphora than Polish speakers.

If Slavic pronouns are analyzed as adnominal anaphors that do not block the use of bare nouns, how would we account for this difference? An interesting observation from the preliminary set of data is that the Polish speakers often preferred to use null pronouns in the place of the bare noun. While I cannot provide a detailed discussion of this difference, I suggest that this difference between Polish and Russian may be due to

the presence of null pro in the scale of anaphoric expressions in Polish, in contrast to Russian. This explanation receives support from observations made in many studies that null pro is far more frequent and widely used in Polish than Russian (cf. McShane 2009, a.o.). It maybe that null pro is more like the Romance type in Polish, and thus enters the scale of anaphoric expression. The null pro would be placed lower than an anaphoric bare noun, and thus would block the use of bare nouns in intersentential anaphora. Support for analyzing Polish null pro as actual anaphoric elements can be found in studies like Kibort et al. 2006.

Empirically corroborating the contrast between Polish and Russian with respect to null pro is left for future investigation. However, the correlation between the relative frequency of null pro and the respective dispreference of anaphoric bare nouns is interesting to note. The competition theory would be able to account for this correlation as long as the null pro is considered to be part of the anaphoric scale for Polish but not for Russian. This could be due to a semantic difference where null pro is truly anaphoric in Polish but not in Russian, or simply due to mere frequency, where null pro is not frequent and highly restricted in Russian, thus not entering the competition.

3.3.5 ADVANTAGES

There are several advantages of analyzing the Bare Noun Blocking generalization in terms of the competition based theory presented in this chapter.

LICENSING OF ANAPHORIC BARE NOUNS IN *ABN LANGUAGES First, note that Hindi and Thai bare nouns aren't always blocked from anaphoric use. Recall from last chap-

ter that when there is another entity introduced with a noun, the bare noun is again available for intersentential anaphora.

- (118) *Maine ek kitab aur ek cup kharid-a. Kitab mehngi thi.*
 1SG.ERG one book.SGF and one cup buy-PAST.SGF book.SGF expensive
 be.PAST.SGF
 'I bought a book. The book was expensive.' [Hindi]

This exceptional licensing of anaphoric interpretation of bare nouns is predicted from the theory because the restriction on the anaphoric bare noun results from a competition with other anaphoric expressions. Thus, we predict the bare noun to be used anaphorically when the weaker forms, in this case the pronoun, are not available. A contrastive setting where there is more than one potential antecedent is one such context.

- (119) DOM: {book, cup}

Note that the pronoun *vo* is no longer a possibility in Hindi because the maximal individual that satisfies the restrictions would be a plural individual consisting of a book and a cup.

- (120) $\llbracket \text{vo} \rrbracket = \sup_{\text{book} \oplus \text{cup}} [\lambda(x) \text{ entity}(x) \wedge \phi(x)]$

This plural individual cannot compose with the index, because the index presupposes that the individual denoted by its sister is identical to the individual assigned at the index. Because there is only one entity assigned at the index, the presupposition is not

satisfied, and results in undefinedness. Thus, the lowest possible expression in the scale is the bare noun.

3RD PERSON RESTRICTION AND IMPOSTERS Another welcome prediction of the proposal is that we can articulate the 3rd person restriction of definite and demonstrative descriptions shown in 121. Note that in order to refer back to the speaker, only the pronoun *I* can be used. Even if the speaker is the only linguist in the given context, the use of the definite or the demonstrative description is unavailable.

- (121) I_i met a boy_j. I_i / The linguist*_{i/j/k} / That linguist*_{i/j/k} talked to him_j.

This is in line with the theory. First person pronouns are analyzed in full parallel to 3rd person pronouns, carrying *phi*-feature specifications only.

- (122) $\llbracket I \rrbracket = \sup \lambda x. \text{entity}(x) \wedge [+ \text{participant}, + \text{speaker}](x)$

Because there is always a unique individual or plural individual that corresponds to the speaker, the pronoun is always able to uniquely identify the speaker. Thus, the economy principle would always block the use of more complex elements such as the definite and the demonstrative description.

Note, however, that it has been shown in various works that 1st person reference of definite descriptions is indeed available sometimes. Examples of what Collins & Postal (2012) call ‘imposters’ are shown below. The binding relations suggest that the DP *the present authors* have both 1st and 3rd person features while the DP *yours truly* seems

to only have 3rd person agreement (cf. Furuya 2017).

- (123) a. In this reply, the present authors_i (= the writers of the reply) attempt to defend ourselves_i / themselves_i against the scurrilous charges which have been made.
- b. Yours truly (=speaker) runs/*run in the morning.

This use of definite descriptions for 1st person reference is not available for all kinds of nouns. It seems that the nouns often refer to the agent of the speech (the present authors, this reporter) and is in the formal register. Specifically, I argue that the constraints on the distribution of impostaers reflects the contexts in which the pronoun might be unavailable due to formality issues. The idea is that because the pronoun is unavailable, the lowest element in the scale ends up being the definite description.

While English does not mark honorifics morphosyntactically, we see this effect of formality in the use of 2nd person pronouns in many languages. For example, the 3rd person plural form of the pronouns are used for 2nd person pronouns in formal contexts in languages like German and Spanish. This is analyzed as there being a gap in the 2nd person pronoun in the formal register and the unmarked 3rd person plural pronoun filling in that gap (cf. Sauerland 2008a).

A similar phenomenon may be happening at a lexical level. If we assume that in certain written, formal registers there is a gap in the 2nd person pronoun, the scale immediately would select the next simplest description, which is the definite description, hence the use of *the present authors* in (123a). A similar explanation would be applied to (123b), where the use of *yours truly* is assumed to reflect the formal register. The

fact that imposters often occur in formal registers suggest that this analysis may be on the right track.

In Korean, the link between the formal register and the use of bare nouns is more articulated. While Korean has 1st and 2nd person pronouns in the formal register, there is a gap for the 2nd person pronoun in the formal register. Thus, in Korean, when speaking with an addressee in a formal register, the addressee must be referred to with a noun instead of a pronoun. Examples are shown below:

- (124) a. *sensayngnim-kkey insa tuli-le wasss-upnita.*
teacher-DAT.HON greeting give.HON-to come-PAST-DECL.HON
'I came to say hi to you (= the teacher).'
- b. *halmeni-ka choyko-yeo-yo.*
grandma-NOM best-COP-DECL.HON
'You (= the grandma) are the best.'

FORM OF ADNOMINAL ANAPHORS We saw in this section that ABN languages like Korean, Mandarin, and Japanese make use of adnominal anaphors and bare nouns in anaphoric reference. A question arises on why adnominal anaphors would be so common in these languages. If a pronoun can block the bare noun in *ABN languages, wouldn't the bare noun block adnominal anaphors as well? We would then predict adnominal anaphors to be blocked from intersentential anaphora as well. There are two possible reasons, which are mutually exclusive.

The first reason could be that there is another competition happening in parallel to the choice of anaphoric expressions. This was discussed in Section 2.6.3, where I discussed the principle *Index!* in Jenks 2018 that requires that a classifier language like

Mandarin maximize marking of the presence of the index. This results in choosing the demonstrative description over bare nouns when the noun is interpreted anaphorically. The motivation for this is that bare nouns in classifier languages have a number of different interpretations. In order to specify that the noun be interpreted anaphorically, as opposed to as an indefinite or a kind, the anaphoric use could be marked with the demonstrative. I have noted that this competition between a bare noun and a demonstrative description due to *Index!* could co-occur and interact with the competition between the anaphoric bare noun with other forms of anaphoric expressions due to *Don't Overdetermine!*. The frequent use of adnominal anaphors in bare argument languages might be due to this interaction between the two competitions occurring simultaneously.

Another reason that adnoinal anaphors are quite felicitous in anaphoric contexts may be due to the fact that the NP part of the adnominal anaphor in these languages rarely repeats the same noun given as the antecedent. For example, in Korean, regardless of what NP was used to describe the referent, the adnominal form *ku salam* ('that person') is used to refer to humans, and *ku kess* ('that thing') is used to refer to inanimate entities. The NP part can also carry extralinguistic information about the status of the speaker in relation to the referent. For example, the phonologically reduced anaphor *kyay* (*ku ay* 'that kid') can only be used if the speaker at least as old as the referent, while *ku pwun* ('that person (honorific)') is necessary for referents who are older than the speaker. The demonstrative descriptions in Mandarin would also often use the demonstrative *na* followed by the classifier, such as *na ge* ('that thing'). While Japanese anaphors can be decomposed into the demonstrative part and a noun part, these are often morphophonologically reduced and does not involve repeating the noun verbatim. Thus, I could argue that when the adnominal anaphor is used instead of the definite

bare noun, the NP carries additional information than just the noun. It could be formality, gender information of the entity, or categorization (through classifiers). And the marking of such factors might suppress the use of the bare noun that is chosen by the competition.

3.3.6 SUMMARY

In summary, we have seen in this section that the competition-based theory presented in this chapter can successfully account for the Bare Noun Blocking generalization. One advantage of the theory that surfaced in discussing the Bare Noun Blocking generalization is the flexibility of the competition-based theory. I showed that analyzing the unavailability of an anaphoric bare noun in Hindi and Thai as resulting from a competition with a simplex pronoun is better than lexically encoding this restriction in the bare noun. This allowed us to account for why bare nouns do allow an anaphoric reference when contrasted with another accessible antecedent.

In the following sections, I discuss additional theoretical and empirical advantages of this theory.

3.4 ADVANTAGE 1: DERIVING THE SCALE OF FAMILIARITY

Studies on anaphora have received a lot of attention in various fields in linguistics (Karttunen 1976, Nunbert 1978, Hawkins 1978, 1984, 1991, Clark & Marshall 1981, Grosz 1981, Heim 1982, Maclaran 1982, Givon 1983, Ariel 1988, Kronfeld 1990). Especially in referent tracking studies, various kinds of familiarity scales and accessibility scales have

been proposed.

In this section, I argue that the competition-based theory presented in this chapter can derive the ordering of anaphoric expressions that have been proposed in these referent tracking studies. I discuss in particular the scales proposed in Ariel 2001 and Gundel et al. 1993.

Ariel (2001) argues that the choice of a referential expression depends on the accessibility of the mental referent. She proposes the following Accessibility Hierarchy:

- (125) **Accessibility Hierarchy** [Ariel 2001]

full name > long definite description > short definite description > last name
> first name > distal demonstrative + modifier > proximate demonstrative + modifier > distal demonstrative + NP > proximate demonstrative + NP
> distal demonstrative > proximate demonstrative > stressed pronoun > unstressed pronoun > cliticized pronoun > verbal person inflections > zero

Ariel argues that accessibility depends on three parameters as shown below.

- (126) a. Informativity (the amount of lexical information an expression contains)
b. Rigidity (the ability to pick a unique referent based on form)
c. Attenuation (the reduction in phonological size)

While these parameters are intuitive and readily applicable across languages, the main advantage of the competition mechanism presented in this chapter is the fact that scales like 125 is *derived* and not described as a primitive principle. Because the scale is derived

fully from meaning, this also removes the need for stipulated parameters.

In my theory, the sole parameter used for the ordering is what corresponds to Ariel's informativity. Semantic categories are identified and denotations are built in the respective order. Once the denotations are built, everything else is derived. The order of denotations in the scale of anaphoric expressions is completely derived from semantic strength based on entailment. Languages that morphologically mark a certain denotation or block of denotations are naturally predicted to order those anaphoric morphemes in the respective order. Because the morphology of the anaphoric expression guides us to the specific denotations (for example, an expression with an NP complement corresponds to a denotation with the *P* restriction, while a pronoun with a gender-specific morpheme corresponds to a denotation with *phi*-restrictions), the scale also derives the respective phonological material. The morpheme with the least amount of overt material would carry the least amount of restriction because languages are guided by the content of the morpheme in mapping the morpheme to the (set of) denotations. Thus, attenuation is no longer a necessary parameter. Because the information (the restrictions carried by a given denotation) is evaluated at the *Idx* head to ensure that it can uniquely identify the intended referent, Ariel's Rigidity parameter is also derived.

Thus, what we end up with is a simpler theory that can derive the hierarchy in 125.

In Gundel et al. 1993, six different cognitive statuses are organized in a scale called the 'Givenness Hierarchy' as shown in 127. The first line describes the state of the given referent in the mental domain that keeps track of referents. For example, 'in focus' means that the referent is uniquely salient in the mental domain.

(127) The Givenness Hierarchy:

in focus	> activated	> familiar >
it	that, this, this N	that N
the N	indefinite this N	a N
uniquely identifiable	> referential	> type identifiable

The statuses are implicationally related, in that each state entails entails the state(s) to its right.

Note that the current theory is restricted to anaphoric expressions, those that carry indices, and thus does not include the indefinite *a* in the scale. The pronominal uses of the demonstratives will be discussed later in Chapter 4.

The competition-based theory differs from Gundel et al. (1993)'s hierarchy in that the scale is based on semantic meaning rather than the saliency level of the referent. In Gundel's work, saliency of the referent is the measure that determines the choice of the anaphoric expression. One disadvantage of directly mapping saliency levels to specific anaphoric expressions is that this mapping is quite arbitrary. For example, there is no inherent reason that a pronoun would be mapped to being 'activated in memory' as opposed to 'in focus' or 'familiar'. The saliency levels are also not articulatable. It is hard to determine how formal semantics would formalize 'activated in memory' different from 'familiar', for example.

The competition theory proposed here has an advantage over Gundel's Hierarchy in accounting for language variation. We already saw that based on the presence of pronouns, bare nouns may or may not refer to the uniquely salient entity in the context. This is because in my theory, the felicitousness of an anaphoric expression depends on

the relative availability of other expressions in the language. In Gundel et al. 1993, however, the scale fixes a specific state of a referent directly to a morpheme. Thus, the different distribution of bare nouns in ABN and *ABN languages is not predicted: pronouns are fixed to entities that are in focus, while definite nouns are fixed to familiar entities. In order to account for this, they would have to either argue that languages have different mappings between cognitive states and morphemes, or that the status of the referent in intersentential anaphora is different in ABN and *ABN languages. The competition theory allows us to account for the variation in bare argument languages without having to make such stipulations.

I have made the following two points in this section. First, the competition-based theory proposed here can derive the scales previously proposed in referent tracking studies such as Ariel 2001 and Gundel et al. 1993. Second, because the ordering of the scale is solely derived from semantic richness rather than stipulated, the current theory is better able to account for empirical data, such as the variation within bare argument languages.

An additional advantage is that because the present theory is semantically based, clear, testable predictions can be made. The scales in previous analyses depend on vague notions of saliency, which makes it difficult to form empirical predictions. However, my theory builds only on semantic entailment and focus effects, predicting relative degradedness as well as joint reference in a given context.

3.5 ADVANTAGE 2: FOCUS SENSITIVITY

In this section, I articulate how focus sensitivity plays a role in the choice of an anaphoric expression in this theory. I will show that the contrast implied by choosing the higher element results in a contrastive reading, that is also reflected on the stress pattern. I propose that the only time when a higher element is licensed is when the stress pattern and the given context allow for a domain widening as an accommodation mechanism. In other words, I argue that only when the context allows the addressee to widen the domain with inferred referents can the element higher than the weakest compatible choice be used.

3.5.1 CONTRAST DETERMINED BY FOCUS

Consider the intersentential sentences in English.

- (128) A student₁ walked in. [DP₁] looked happy.

I argued that English makes use of the following subset of anaphoric expressions:

- (129) {pronoun, *the P*, *that P*}

Because the domain only contains a single student, the restriction carried by the pronoun is sufficient in uniquely identifying the referent and satisfying the presupposition of *Idx*. Thus, by *Don't Overdeterminate!*, the pronoun *he* would be chosen over higher elements.

Note, however, that the higher elements such as the definite description *the student* and the demonstrative description *that student* are less felicitous and redundant sounding, but nevertheless grammatical.

- (130) I met a student. He / The student / That student looked happy.

How would the economy principle account for the licensing of the higher elements? I argue that this is due to the accommodation that the addressee makes. Note that the definite description is fully felicitous in 131, where there is a contrast between the student and the professor.

- (131) I met a professor talking to a student₁. The student₁ looked happy.

The demonstrative on the other hand, does not become felicitous with this kind of contrast. What it requires is a contrast with another student, as in (132b).

- (132) a. I met a professor talking to a student₁. That student₁ looked happy.
b. I met a student yesterday. Today I met another student₁. That student₁ looked happy.

I argue that the contrast between 130 on one side and 131 and (132b) on the other is exactly the accommodation that the addressee makes. For example, when the addressee hears the definite description in 133, the addressee must infer that the speaker intends to draw a contrast between the student and some other entity, say the professor.

- (133) I met a student₁. [The student]₁ looked happy.

The same explanation goes for the demonstrative, but using a contrast with another student. The addressee must accommodate and infer that the speaker is contrasting the particular student in 1 to another student.

- (134) I met a student₁. [That student]₁ looked happy.

Note that this difference is reflected in the way these DPs are stressed. While the pronoun *he* does not require any special stress for the anaphoric interpretation in 130, the definite description carries stress on the NP complement, while the demonstrative description carries stress on the demonstrative *that*.

- (135) a. I met a student₁. The STUDENT_F looked happy.
b. I met a student₁. THAT_F student looked happy.

The stress pattern with the rules of focus-marking (Schwarzschild 1999) suggest that in (135a), the contrast is between the student and some non-student entity, while in (135b), the contrast is between that particular student and some other student.

In the rest of this section, I formalize this in terms of domain widening triggered by the implicature of using the non-weakest expression. First, I show how domain widening would take place when higher elements are used. Then, I show that focusing the weakest element also has a similar effect as using a higher element. The effect of using the higher element is shown to be similar to the effect of focus.

3.5.2 LICENSING HIGHER ELEMENTS WITH CONTRAST

Let's go back to the sentence in 136. The domain of potential antecedents built from the first sentence only contains the unique student, assigned at the 1st coordinate.

- (136) A student₁ walked in. He₁ / The student₁ / That student₁ looked happy.

When the addressee hears the pronoun used in the second sentence to refer to the student, there is no conflict with the prediction of the economy principle. However, when the definite description *the student* is used, the addressee must accommodate. Given the economy principle, the choice of an anaphoric expression suggests that that expression was the weakest compatible form, and that the expressions weaker in than the chosen element failed to satisfy the presupposition of *Idx*. Thus, upon hearing *the student*, the addressee must infer that the pronoun failed to satisfy the presupposition of the *Idx*. The only context in which the pronoun would fail the presupposition of the *Idx* would be where the domain consists of more than one male entity. In such contexts, the denotation at *D'* would refer to the plural individual containing both of those male entities, thus failing to satisfy the presupposition of *Idx* that requires that the entity returned at *D'* be identical to the entity assigned at the 1st coordinate.

The addressee thus accommodates and widens the domain to include such an entity. Thus, the accommodated domain now would look like 137.

- (137) DOM: {student₁, y₂}

In widening the domain, the form and the denotation of the anaphoric expression must be considered. For example, the definite description *the student* denotes the maximal entity in the domain that is a student. If the definite was licensed, that means that the definite was able to uniquely identify the intended referent. This suggests that the added referent is a non-student.

If a demonstrative description is used, the implication is that the definite description failed to uniquely identify the intended referent, which then suggests that there is at least one more student in the domain. Thus, the addressee would accommodate and widen the domain as 138.

- (138) DOM: {student₁, student_y}

The different ways in which contrast is drawn is reflected on the stress pattern of the anaphoric expressions. Note that the definite description carries focus on the NP complement *student*, while the demonstrative description carries it on the demonstrative. The respective contrastive set predicted by the theory follows straightforwardly from f-marking rules such as Avoid F-Mark and Givenness in Schwarzschild 1999.

- (139) a. I met a student₁. The STUDENT_F looked happy.
b. I met a student₁. THAT_F student looked happy.

I have suggested so far that when an anaphoric expression that is higher in the scale than the weakest compatible expression is used, the addressee accommodates this sentence by widening the domain to create a contrastive setting. This would predict that if the

addressee is not able to create a contrastive set easily, the use of the higher expressions would be more degraded.

This is evidenced by comparing the intersentential anaphora in 134 repeated here in 140 to a quantified sentence. Specifically, the quantified version seems to be more degraded than the intersentential version (thanks to Gennaro Chierchia for pointing this out).

(140) I met a student₁. [That student]₁ looked happy.

(141) #Every student₁ said that that student₁ was happy.

I argue that the degradedness results from the content of the sentence leading to difficulty in generating contrastive sets. The main difference comes from the fact that in 140, there is only one instance in which contrast must be drawn, while 141 is statement about a quantification over multiple instances. There has to be a contrast with the student in each of these instances, but it is not obvious who the student may be drawing the contrast with.

As soon as we change the context to allow such contrastive reading within each instance being quantified, the demonstrative description gets better.

(142) Every student₁ said that only that student₁ should go to the movies.

Two changes were made in 142. First, the predicate in the embedded clause was changed from *was happy* to *should go to the movies* to create a context in which a choice among

several options is highlighted. Second, I added the focus-sensitive operator *only* to highlight this choice. It seems that as soon as we create a contrastive setting among student candidates, thus providing alternatives within each instance being quantified over, the use of *that student* becomes more felicitous.

3.5.3 DOMAIN ADJUSTMENT TRIGGERED BY FOCUS

There is an interesting set of data in English intersentential anaphora involving conjoined subjects. What we find in examples in 143 is that even when the naturally gendered pronoun allows us to uniquely identify the intended referent, it is not allowed when the antecedent is part of a conjunction.

- (143) a. A boy and a girl walked in. #He looked happy.
 b. A boy and a girl walked in. #She looked happy.
 c. I saw a boy and a computer. #It was broken.

Note that this is not the case with person and number features.

- (144) a. You and I will go to the mall. You will be happy. [person: 2nd vs. 1st]
 b. You and John will go to the mall. He will be happy. [person: 2nd vs.
 3rd]
 c. John and the kids will go to the mall. ?He will be happy.[num: sg vs. pl]

This may at first suggest that pronouns may not come with gender specification and later receive gender features from syntactic operations as explored in works such as

Kratzer 2009 or that gender information is presupposed in pronouns but do not enter computation as in Sauerland 2009. However, this is confined only to conjoined subjects, as shown by the following examples.

- (145) A boy invited a girl_i. She_i said yes.

Thus, we can maintain that pronouns carry *phi*-features that restrict the referent, and that it is a property of conjoined arguments that restricts the use of a pronoun to refer to one of the conjuncts. Formally, this would mean that a conjoined subject introduces as a discourse referent the plural individual consisting of both of the conjuncts, rather than introducing two separate discourse referents. The discourse referent introduced by this conjunct can only be picked up together, and thus a pronoun such as *he* cannot refer to the male part of the discourse referent. Thus, we are able to explain why only the plural pronoun *they* can be used in the sentence repeated in 146: only those pronouns that can refer to the plural individual are compatible.

- (146) A boy and a girl walked in. @?He / They looked happy.

- a. Discourse referent introduced: b \oplus g
- b. $[\text{he}] = \sup [\lambda x. \text{entity}(x) \wedge \text{male}(x)]$ (intended) b
- c. $[\text{they}] = \sup [\lambda x. \text{entity}(x)]$ b \oplus g
- d. Only *they* successfully refers to the plural individual b \oplus g.

There is an interesting effect of stress that is noteworthy. Note that in the following example with the same conjoined subject, the stress on the pronoun *he* does allow a successful reference to the boy.

- (147) A boy and a girl walked in. HE_F looked happy.

In order to confirm that this is an effect of stress, I compare 147 with 148, where the predicate instead of the pronoun is stressed. Stressing the predicate allows us to destress the pronoun more easily, and the result is degraded.

- (148) A boy and a girl walked in. $\text{@?}He$ [LOOKED HAPPY]_F.

Also contrast 148 to 149, where the pronoun *they* appears in the same destressed position.

- (149) A boy and a girl walked in. They [LOOKED HAPPY]_F.

Thus we see that while *they* is fully felicitous in this context without carrying any stress, the pronoun *he* must be stressed to refer.

I suggest that this is due to stress on the pronoun triggering a contrastive context. In order to parse the sentence, the addressee may try to accommodate this by adjusting the domain. I suggest that one such adjustment involves taking each conjunct out of the plural individual and adding them to the domain, from 150 to 151.

- (150) DOM: { $b \oplus g$ }

- (151) DOM (adjusted): { $b \oplus g$, b , g }

The stressed pronoun HE_F in 147 may be evaluated against this adjusted domain, with

contrast drawn between the targeted referent *b* and the alternatives.

One desirable consequence of this is that we can account for the fact that the stress on *he* results in suggesting not only that the girl did not look happy, but that it is not the case that both looked happy. This is derivable from the adjusted domain in 151.

Further, note that in the same sentence, the definite description *the boy* with stress on *boy* is fully felicitous.

- (152) A boy and a girl walked in. [The boy]_F looked happy.

This is also an effect of accommodation. The domain set up by the first sentence contains a singular entity. Thus, the addressee would predict a pronoun would be used. However, if the speaker intends to refer to just one of the conjuncts, the definite description containing stress on the NP would be used to trigger domain adjustment. Note that if we focus the predicate instead of the anaphoric DP as in 153, the anaphoric reference is much more degraded.

- (153) A boy₁ and a girl walked in. ^{②?}The boy₁ [LOOKED HAPPY]_F.

Thus it seems that there are generally two ways in which the domain could be adjusted. It could be widened by adding an additional entity – probably including entities that were also introduced in previous discourse, but earlier. If there is a conjoined entity in the domain, the conjuncts could be added to the domain separately.

The domain adjustment is not unconstrained, however. Note that the demonstrative

description in this context is quite degraded regardless of stress.

- (154) A boy and a girl walked in. #THAT_F boy looked happy.

I argue that this is because the accommodation one would need to make to interpret this sentence requires more than one adjustment to the domain. The initial state of the domain contains a single conjoined object $b \oplus g$. The reference to the boy requires the accommodation of separating the conjuncts and adding them to the domain. But the use of the demonstrative description suggests that this is still not sufficient. The demonstrative requires that there be an additional boy in the domain. This suggests that the domain adjustment is restricted and can only be done once to accommodate the sentence. If one accommodation does not resolve the requirement of the economy principle, it is rendered infelicitous.

3.5.4 PUTTING THESE TOGETHER

What we have seen so far in this section is that focus affects the felicitousness of using an anaphoric expression in a given context. Focus licenses elements that are higher than the weakest compatible element in the scale, and focus licenses domain adjustments. I have shown that domain adjustment is not completely unconstrained, showing that the domain cannot be repeatedly adjusted to accommodate a given anaphoric expression.

In the next section, I show that this domain adjustment mechanism triggered by focus allows us to articulate contexts in which anaphoric expressions seem to show exceptional distributions.

3.5.5 FOCUS SENSITIVITY EXPLAINING THE EXCEPTIONS

Consider the following contrast, with the latter example adopted from Heim 1991.

- (155) a. Every boy thinks that John likes [him/?the boy].
b. John gave every child a gift he enjoyed more than [?him/the child].[Heim
1991]

The two examples above have a contrast that cannot be explained by traditional accounts of definite descriptions. In both (155a) and (155b), the anaphoric element marked by brackets are in the scope of the quantifier. However, in (155a) only the pronoun *him* seems felicitous while in (155b) *him* is not felicitous and the definite *the child* is felicitous. Examples like (155b) was used to show that definite descriptions allow binding, so it is surprising that the definite description does not seem licensed in (155a).

Under the current theory where the anaphoric ability of an expression depends on the availability of other anaphoric expressions, the contrast in 155 can be captured. First note that the non-bound-variable version in 156 also shows the same contrast as in 155, suggesting that this is not a property of bound-variable readings.

- (156) a. A boy₁ thinks that John likes [him₁?the boy₁].
b. John gave a child₂ a gift he enjoyed more than [?him₂/the child₂].

The contrast is readily accounted for by the theory. In (156a), the domain contains the boy introduced in the first sentence and John. Because John cannot bind *him* due

to Condition B, there is only one potential antecedent in the domain, which is the boy assigned index 1. Thus, the economy principle chooses the pronoun *he*, and the definite description is blocked. On the other hand, in (156b), John is outside of the binding domain and can bind the anaphor. Thus, the domain now contains both John and the child as potential antecedents. With two potential antecedents, the pronoun is no longer able to uniquely identify the child. Thus, the next weakest element *the child* is licensed.

We have already seen that bound-variable reading is possible for all of these anaphoric expressions due to the index in the DP structure. Thus, regardless of what theory we assume to account for donkey anaphora in (155b), the contrast in 155 can be argued to result from the competition between the two anaphoric expressions.

This proposal has an additional advantage of accounting for the following novel observation. Note that while the definite description is quite degraded as discussed and repeated in (157a), the demonstrative description *that student* with stress on *that* is better, as shown in (157b).

- (157) a. ?Every student thinks that John likes the student.
 b. Every student thinks that John likes THAT_F student.

Following the arguments developed in the last section, I suggest that (157b) is licensed when the addressee accommodates the use of the higher element by widening the domain to include other students. This kind of adjustment is assumed to be not too difficult, as the situation described in (157b) implies that there is more than one student that is relevant. Thus, (157b) could be interpreted as drawing a contrast between students in

each student's mind. This can be tested like in the last section by adding *only*:

- (158) Every student thinks that John only likes THAT_F student.

Adding *only* highlights the contrast that is being drawn, and the use of the demonstrative is much more felicitous than the use of the definite. The relative difficulty in licensing the definite even with stress and *only* as in 159 seems to be due to the kind of alternatives the stress on the definite evokes, which requires that non-student entities be added to the domain. It seems relatively harder to infer the existence of other non-student entities in the given context than to infer the existence of other student entities.

- (159) Every student thinks that John only likes [the STUDENT]_F.

In summary, I have shown in this section that focus sensitivity can be nicely captured in this theory. Because the anaphoric ability of an expression depends not only on its lexical denotation but also on competition with other elements as well as the contextual information including the set of accessible antecedents, focus can have an effect on the anaphoric ability by triggering domain widening or adjustment. This would be much harder to capture in analyses that restrict all expressions of a certain category (say pronoun or definite description) to a specific anaphoric configuration. This theory allows us to more systematically predict felicitous levels of different anaphoric expressions given the context.

3.6 ADVANTAGE 3: COMPETITION WITH SILENT PRONOUNS PRO AND PRO

The third advantage of the current theory that I discuss in this chapter is an improved account of silent pronouns such as PRO and pro. After reviewing some exceptions to Avoid Pronoun Principle (Chomsky 1981), I argue that PRO should be analyzed as occupying the lowest end of the anaphoric scale, and that it is ambiguous between the two denotations below.

$$(160) \quad [\![\text{PRO}]\!] = \sup [\lambda x. \text{entity}(x)]$$

$$(161) \quad [\![\text{PRO}]\!] = \sup [\lambda x. \text{entity}(x) \wedge [-\text{self}](x)]$$

I further argue that the null pro in Romance languages such as Spanish and Italian should be analyzed as having the same denotation as 161, carrying only the [-self] restriction in addition the entity property. So, while English maps both of the denotations above to PRO, Spanish and Italian may further distinguish the two as PRO and pro, respectively. By analyzing pro as 161, I show that we are able to derive the principles that have been proposed to account for the distribution of pro in comparison to overt pronouns.

3.6.1 PRO

We start with the well-known observation that overt pronouns are not felicitous when PRO is licensed.

- (162) a. John_i prefers [_α PRO_i going to the movies alone].
b. *John_i prefers [_α his_i going to the movies alone].

Chomsky accounts for this with the Avoid Pronoun Principle.

- (163) **Avoid Pronoun Principle** (Chomsky 1981)
Avoid lexical pronoun when possible.

The assumption here is that PRO in these cases are a pronominal element that competes with the overt pronoun. PRO has since been argued to be an anaphor or an element distinct from either a pronoun or an anaphor, resulting in larger distinctions between pronouns and anaphors subsuming the Avoid Pronoun Principle (see Hornstein 2007, Bouchard 1985 for alternative analyses of PRO).

As pointed out by many including Bouchard (1985), Avoid Pronoun Principle does not strictly block the use of overt pronouns. This is shown by Bouchard (1985)'s examples below.

- (164) a. [PRO_i/his_i going to the movies] always relaxes John_i.
b. John_i thinks that [PRO_i/his_i going to the movies every week] would be fun.

This leads Bouchard (1985) to argue that PRO can be either anaphoric or pronominal. To account for 162, Bouchard proposes the following principle more generally applicable to pronouns and anaphors.

(165) **Elsewhere Principle**

[Bouchard 1985]

In two closely related constructions, do not put a pronoun in a position in one construction where an anaphor is possible in the same position in the other closely related construction, that is, in a position where the pronoun will be interpreted as coreferential with an NP that can Bind that position in the other construction.

The argument is as follows. PRO in 162 is bound structurally, and thus should be considered an anaphor. The overt pronoun competes with the anaphoric PRO in 162 and is blocked. On the other hand, PRO in 164 is not bound and is pronominal. A pronominal PRO is in free variation with overt pronouns, and thus both forms are available.

However, I show below that the overt pronoun becomes more felicitous in 162 when stressed.

(166) Jimin_i prefers [_α HIS_i going to the movies].

Imagine a context where we are deciding who should go to the movies this weekend. If Jimin prefers that he goes but not others, 166 would not be completely ruled out. While speakers vary on the judgment, the fact that the overt pronoun gets better in a contrastive setting suggests that a strict restriction on PRO's distribution such as that proposed in Chomsky 1981 and Bouchard 1985 may undergenerate.

Here is how the current theory may account for the data. I repeat the sentences below, showing the degradedness of overt pronouns in (167a), the relative felicitousness

of overt pronouns in (167b), and the stressed pronoun in (167c).

- (167) a. *John_i prefers [_α his_i going to the movies alone].
b. [PRO_i/his_i going to the movies] always relaxes John_i.
c. Jimin_i prefers [_α HIS_i going to the movies].

In order to discuss the difference between PRO and overt pronouns more accurately, I propose another property that has not been discussed in previous sections. This property is represented as [-self](x) and restricts the anaphoric expression from referring to the referent by using reflexivity. Reflexivity is a property on verbs that fills the object argument of the verb with the referent of the subject argument. For example, Reinhart & Siloni (2005) propose the following reflexivization operator in 168.

(168) **Lexical Reflexivization Operation (OP)**

$$OP(\lambda x \lambda y. R(x,y)) \rightarrow \lambda x. R(x,x)$$

The [-self] property restricts the anaphoric expression from receiving its referent through reflexivization. This means that the referent of the anaphoric expression must be available through discourse, rather than through grammatical reflexivity. In recent analyses of Weak Cross Over phenomena, pronouns and traces are distinguished (see Büring 2004), and this distinction is analyzed as a distinction between pronouns that receive their reference through dynamically transferred assignments and traces that are bound (cf. Chierchia 2019). This idea can be implemented with the use of this restriction against reflexivity. While the entity property allows both kinds of anaphoric entities, the restriction against reflexivity rules out those that are bound by quantifiers or controlled

by syntactic antecedents.

The denotations relevant in this competition are shown below. PRO has the broadest restriction, and thus the weakest semantic content: it simply requires that the referent be entity. Because all referents are assumed to be entities, PRO ends up being the unmarked anaphor that can refer to any entity. I propose that every anaphoric expression above PRO carries the [-self] requirement. Thus, the denotation of the pronoun is updated to carry both the [-self] restriction and the *phi*-restrictions.

$$(169) \quad [\text{PRO}] = \lambda x: \text{entity}(x)$$

$$(170) \quad [\text{pronoun}] = \lambda x: \text{entity}(x) \wedge [\text{-self}](x) \wedge \phi(x)$$

The main contrast I want to draw between (167a) and (167b) is reminiscent of Bouchard's intuition: that PRO in (167a) is more anaphor-like and more pronoun-like in (167b). However, Bouchard's analysis cannot account for why for some speakers (167c) is felicitous in a contrastive context.

Instead of determining the nature of PRO based on syntactic configurations, I argue that PRO in English is ambiguous between two denotations. The first is the broad denotation in 169. The second is a slightly more restrictive denotation in 171.

$$(171) \quad [\text{PRO}] = \lambda x: \text{entity}(x) \wedge [\text{-self}](x)$$

The property [-self] denotes a restriction on resolving its reference by reflexivization. For instance, an anaphoric expression in this work is assumed to carry an index infor-

mation in its structure, and that index is used to resolve reference through dynamically transferred assignment functions. An alternative way of resolving reference would be by making the predicate reflexive and sharing the variable with the subject argument of the verb.

None of the other anaphoric expressions in the scale other than PRO allows reflexive reference due to Condition B (Chomsky 1981), and so they are analyzed as carrying the [-self] property. Note that Romance pro is also assumed to carry this restriction, and the denotation in 171 is in fact the denotation I propose for Romance type null pro.

Thus, the intuition from Bouchard is maintained in this analysis: PRO can be an anaphor or a pronoun. The difference is that while Bouchard argues that PRO is always an anaphor when structurally bound as in (167a), I argue that in a structurally bound configuration as in (167a), both of the denotations are possible.

The principle in 165 that chooses the anaphor over the pronoun whenever possible can be derived from the entailment-based ordering in the scale proposed in this chapter. If the weakest compatible denotation is the one not carrying the [-self] property, we would expect that this be used whenever the syntactic structure allows the reflexivization mechanism, thus accounting for (167a). When this is syntactically not possible as in (167b), we would expect the next weakest compatible denotation, the one that is not allowed to use the reflexivization mechanism, would be chosen.

In (167a), the antecedent *John* is in a subject control relation with PRO. There are two options for PRO, which are the broadest denotation that allows reflexivization, and the second weakest denotation that disallows reflexivization. Because both are available in the context, the economy principle chooses the broadest denotation in 169,

thus blocking the pronoun.

In (167b), however, the antecedent is not in an obligatory control relation. In this context, PRO must be further restricted against reflexivization because there is no antecedent in the structural position that would allow reflexivization. Thus, the weakest compatible denotation is 171 The economy principle would again choose PRO over the pronoun. The overt pronoun is predicted to evoke contrast, and this prediction seems to hold.

How would we account for (167c)? I argue that the focus on the pronoun again triggers domain widening. The addressee accommodates by widening the domain and adding more potential antecedents. These antecedents would serve as alternatives to Jimin. The contrastive context no longer licenses a reflexive mechanism for resolving anaphora because the contrast is being made between different potential antecedents in the domain, while the reflexivization mechanism is not part of the domain. Thus, with the overt pronoun focused, (167c) becomes more felicitous for some speakers.

3.6.1.1 RESTRICTED DISTRIBUTION OF PRO

I conclude this section with a suggestion on why PRO might be so restricted in its distribution. The reference of PRO is restricted to matrix subject, matrix object, or universal quantifiers (Epstein 1984), and it can only be the subject of a nonfinite clause (Martin 2001), as shown below.

- (172) a. Kerry attempted PRO to study physics.
 b. *Pam believes PRO solved the problem.

While there has been a lot of syntactic analyses for why PRO is restricted, what I would like to hint at is that the competition-based theory and the weak semantic content of PRO may allow us to derive this restriction without PRO-specific stipulations.

The distinction I highlighted in this section was the two ways of anaphorically referring to something. The first was the dynamic transfer of currently active discourse referents overt dynamic connectives such as conjunctions. This way of resolving anaphora is assumed for all of the anaphoric expressions discussed in this work. The second is by having a reflexive semantics and simply referring to a syntactically local antecedent, as shown to be available for the broadest denotation of PRO in 169.

Thus, all anaphoric expressions higher than PRO in the scale are more marked in the sense that they are restricted to [-self] entities, while PRO is unmarked and can refer by reflexivization or by dynamic transfer of indices. Use of the unmarked element in a pair of expressions where one is marked often leads to the implicature that the context did not satisfy the conditions for the marked expression to be used. This is derivable from Maximize Presupposition! (Heim 1991) For example, the use of the indefinite suggests that the uniqueness presupposition of the definite was not met. The reference to a plural entity by plural markings is also argued to result from the use of the unmarked plural marker that suggests that the atomicity requirement of the marked singular marker is not met (Sauerland et al. 2005). A similar kind of competition may be in use, where PRO becomes restricted to local antecedents due to the implicature that results from not using the more marked anaphoric expressions. Moreover, the universal tendency to prefer overt morphosyntactic markings over covert operations (cf. Chierchia 1998b) may further restrict PRO to only local antecedents, leaving index-based resolution to higher elements such as overt pronouns.

3.6.2 ROMANCE PRO

Another well-known observation involves the silent pronoun *pro* in Romance languages such as Italian, Spanish, and Romanian. The distribution of *pro* has been often contrasted to that of overt pronouns, leading many researchers to propose principles that determine how the relative use of each expression results in certain interpretations. For example, Montalbetti (1984) proposes the Overt Pronoun Constraint (OPC) shown below in 173, to account for the unavailability of bound variable reading with full pronouns.

- (173) Overt Pronoun Constraint (OPC): [Montalbetti 1984]
Full pronouns cannot be interpreted as bound variables except for those syntactic environments where null pronouns are not allowed.

Examples of data accounted for by the principle are shown in 174 and 175.

- (174) a. Nadie_i sabe que pro_{i/j} vendrá.
‘Nobody_i knows that he_{i/j} will come.’

b. Nadie_i sabe que él*_{i/j} vendrá.
‘Nobody_i knows that he*_{i/j} will come.’

c. Ningún compañero_i puede decir que María se haya enamorado de él_{i/j}.
‘No classmate_i can say that Mary is in love with him.’ (Rigau, 1986)

d. Ningún estudiante_i piensa que (sólo) El_{i/j} pasó el examen.
‘No student_i believes that only he_i passed the exam.’

- (175) a. *Todo estudiante_i cree que pro_i es inteligente.*
 every student thinks that pro is intelligent
 ‘Every student_i thinks that he_i is intelligent.’
- b. *Todo estudiante_i cree que el_{*i/j} es inteligente.*
 every student thinks that pro is intelligent
 ‘Every student_i thinks that he_j is intelligent.’ [Montalbetti 1984]

Another principle is concerned with which expression is used when representing focal information. Brucart (1987) proposes the Principle of Lexicalization of Pronouns, arguing that new information must be contributed by overt pronouns rather than pro.

- (176) a. Qui et va veure?
 ‘Who saw you?’
- b. TU em vas veure.
 ‘You saw me.’

- (177) Principle of Lexicalization of Pronouns [Brucart 1987]
 those pronouns which contribute new information to the discourse must have phonetic realization

The silent pronoun pro is additionally restricted syntactically: it can only appear in the subject position (Camacho 2016 on Brazilian Portuguese).

- (178) a. *O Paulo_i convenceu o Pedro_j que pro_{i/*j/*k} tinha que ir embora.*
 the Paulo convinced the Pero that pro had to go away
- b. *O Paulo_i convenceu o Pedro_j que ele_{i/j/k} tinha que ir embora.*
 the Paulo convinced the Pero that pro had to go away
 ‘Paulo convinced Pedro that he had to go away.’

3.6.2.1 ANALYSIS

I argue that the denotation of pro in Romance carries less restrictions than that of overt pronouns, specifically lacking the *phi*-features. The denotation is shown in 179.

$$(179) \quad [\text{pro}] = \sup [\lambda x: \text{entity}(x) \wedge [-\text{self}](x)]$$

In this analysis the distinction between pro and overt pronoun lies at pro not carrying *phi*-restrictions. One may wonder how inflection on verbs can arise with pro if pro does not carry *phi*-features. I argue that the features responsible for verb agreement can be found higher in the DP, separate from possible restrictions inside the NP. There are independent evidences for *phi*-features being above DP, such as DP coordination and gender agreement discussed in Sauerland 2009. The distinction then is that pronouns internally restrict the referent with their *phi*-features, while pro does not. The features that trigger verb inflection may come from the antecedent and occupy a higher position in the DP.

I show that the competition-based theory given the denotation for pro above can account for the data presented here.

First, let's look at the Overt Pronoun Constraint by Montalbetti 1984, which restricts the bound variable reading when overt pronouns are used. I repeat the example containing a universal quantifier from Montalbetti 1984 below.

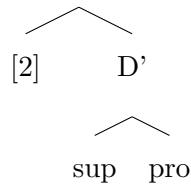
- (180) a. *Todo estudiante_i cree que pro_i es inteligente.*
every student thinks that pro is intelligent
'Every student_i thinks that he_i is intelligent.'

- b. Todo estudiante_i cree que el*i/j es inteligente.
 every student thinks that pro is intelligent
 ‘Every student_i thinks that he_j is intelligent.’

The example looks similar to the c-commanding example we discussed in English in Section 3.5.5. The domain is a singleton containing a witness for the student.

(181) DOM: {student}

(182) DP



- a. $\llbracket D' \rrbracket = \text{sup}(\lambda x: \text{entity}(x)) = \text{the unique entity}$ the student
- b. $\llbracket DP \rrbracket = \text{the unique entity}$ (presupposition: identical to the referent assigned at 1)

The index then will be lambda-extracted to be quantified by the universal quantifier higher in the tree. Because pro can successfully refer to the student, the scale of compatible anaphoric expressions is as follows.

(183) {pro, *él*}

The economy principle chooses pro and blocks *él* from referring to the antecedent, explaining the pattern in 180. The weakest compatible expression pro felicitously allows

the bound variable reading in (180a), while the non-weakest pronoun *él* is blocked from referring to the antecedent. This is exactly the same pattern we see in English, where the definite noun is blocked from referring to the uniquely present antecedent. The only difference is that the competition is taking place lower in the scale for Romance languages, because these languages morphologically realize pro, an element with a weaker denotation than pronouns.

Recall that in the English sentences, the definite noun and the demonstrative description were licensed if focused to trigger a contrastive context. The prediction this theory makes is that if focus has a similar role in null-subject Romance languages, focusing the overt pronoun and adding other mechanisms to highlight the contrastive context may allow bound readings of the overt pronoun as well.

This prediction is borne out. In Spanish, if we create a contrastive context in which we know that every boy thinks that *he*, but not others, is intelligent, the bound reading of the overt pronoun *él* with contrastive focus in 184is indeed possible (Maria del Mar Bassa p.c.).

- (184) *Todo chico cree que ÉL es inteligente.*
every boy thinks that he is intelligent.
'Every boy_i thinks that he_i is intelligent.'

The second datapoint to be derived is the use of overt pronouns when carrying new information. Unlike Brucart (1987) who proposes a principle that simply restricts the function of carrying new information to overt pronouns, Mayol (2010) proposes to analyze overt pronouns in Romance as marking contrastive topic to account for the same set of data. Note, however, that both proposals do not take into consideration the status

of pro and how it interacts with the overt pronoun in these contexts. For contrastive contexts to be licensed, it is necessary for the domain to have at least two potential referents. This definition alone can account for why pro is not licensed in contrastive contexts. Thus, what I show is that a separate principle is not necessary to account for the use of overt pronouns in contexts of contrast or novel information. This has an additional advantage over Mayol (2010)'s analysis because overt pronouns do not always encode contrast. For example, if the use of pro is not available for some reason (syntactic, pragmatic, etc.), an overt pronoun would be used without necessarily encoding a contrastive information.

This was tested by creating a context where there are two individuals: a boy and a girl. In such contexts, pro is ruled out because it cannot uniquely identify the referent. In this context, the pronoun is the weakest element, and thus would be licensed without requiring a contrastive information. In 185, the pronoun *él* was not seen as carrying any kind of contrastive focus (Maria del Mar Bassa p.c.).

- (185) *Un chico estaba hablando con una chica. Él quería invitarla a la fiesta.*
 a boy was speaking with a girl he wanted invite.her to the party
 ‘A boy was speaking with a girl. He wanted to invite her to the party.’

3.6.2.2 PRO VS. PRO

The semantic denotations I proposed for PRO and pro are repeated below.

- (186) $\llbracket \text{PRO} \rrbracket = \lambda x: \text{entity}(x)$

$$(187) \quad [\![\text{pro}]\!] = \sup [\lambda x: \text{entity}(x) \wedge [-\text{self}](x)]$$

For English, I extended the intuition from Bouchard 1985 in arguing that some uses of PRO actually involve the denotation in 187. For Romance languages, I assume that PRO and pro denote 186 and 187, respectively. One place where we see the distinction between PRO and pro is when impersonal entities serve as antecedents. PRO can be antecedeted by impersonal entities such as Italian *si* (cf. Chierchia 1995). This is not possible with pro, as shown by the contrast below.

(188) Italian *si*:

- a. $\text{si}_j \in \text{cercato di } [\text{PRO}_j \text{ vincere}]$.

‘People tried to win.’

- b. $*\text{si}_j \in \text{detto che } \text{pro}_j \text{ vinceranno}$.

si said that pro will win.

[Chierchia 1995]

The competition-based theory can account for this difference if impersonal entities cannot license dynamically transferred indices. I argue that pro, being restricted from reflexivization, does not have a way to refer to the impersonal referent. PRO, on the other hand, can make use of the reflexivization mechanism to refer to the referent of *si*.

3.7 SUMMARY

In this chapter, I presented the formal analysis of the competition mechanism. Semantically primitive properties are conjoined to form denotations, a subset of which can be

lexicalized in a language. These denotations differ in semantic strength, and thus are ordered into a scale. When multiple anaphoric expressions can successfully resolve the referent in a context, the economy principle *Don't Overdetermine!* chooses the lowest element in the scale, the one that carries the least amount of information.

The main advantages of this theory are as follows. Theoretically, the competition mechanism presents a unified theory of a number of unrelated observations including the Bare Noun Blocking generalization, focus sensitivity, and competition between overt and covert pronouns. It also derives the scales that have been proposed as primitive principles in referent tracking studies from denotations only. Empirically, it better accounts for exceptions and variations in the data by articulating the effects of focus and accommodation.

4

Demonstratives

OVERVIEW

The goal of this chapter is to extend the competition mechanism of anaphoric expressions to demonstrative descriptions. I argue that demonstratives should be analyzed

as carrying one additional property R in their denotation, thus being placed highest in the scale. Previous approaches to demonstratives have either faced undergeneration problems from encoding too many restrictions or faced overgeneration problems from not differing enough from denotations of pronouns or definite descriptions. The current study takes a closer look at the distribution of demonstratives and shows that there are two properties that seem to be unique to demonstratives when compared with the anaphoric pronoun *it* and definite descriptions: a) allowing exophoric uses, where an entity present in the immediate context is referred to, and b) allowing generic readings with relative clauses. These two properties can be grouped into a broader category of non-familiarity, meaning that an exophoric use or a generic relative clause do not require that the referent be familiar in the context. I propose that this is the main characteristic of the additional property that demonstratives carry, which I call the R property. The competition mechanism that determines the distribution of pronouns relative to pronominal demonstratives like *that* predicts that animate pronouns, which do not have demonstrative counterparts, would freely allow demonstrative uses, which is borne out. This has implications on previous accounts of demonstratives that placed focus on the lexical distinction between pronouns and demonstratives. In addition, the competition mechanism predicts the anaphoric use of demonstratives to be least preferred, only available as a last-resort option in English. This prediction is also borne out with experimental evidence.

After establishing these generalizations, I propose a formal analysis of demonstratives, where demonstratives lexicalize a binary supremum operator, which differs from the supremum operator used in the previous chapters in carrying one additional argument slot. I propose that this additional property R replaces the anaphoric index slot to serve

as an additional argument to the binary supremum operator, and that this accounts for the properties of demonstratives discussed in the chapter. I end the chapter with a discussion of languages that morphosyntactically distinguish an exophoric reference from an anaphoric reference, and suggest how this would fit into the syntactic and semantic proposal I make.

4.1 INTRODUCTION

This chapter focuses on the analysis of demonstratives. There are two types of demonstratives in English, the pronominal demonstrative like the ones shown in (189a) and the adnominal demonstratives as in (189b).

- | | | |
|-------|-----------------------------------|-----------------------------|
| (189) | a. that, those | [Pronominal demonstratives] |
| | b. that linguist, those linguists | [Adnominal demonstratives] |

There are various uses of demonstratives in English. The use that is most discussed in the literature is what is often called the deictic use, where an entity is pointed out in the immediate context as in 190. Note that the term ‘deictic’ covers a broader range of items that receive their reference from context. For example, terms like the first person pronoun *I* and temporal terms like *today* are deictic because their denotations depend on who the speaker is and what the date is in the given context. I use a narrower term ‘exophoric’ to refer to uses like 190, and restrict it to third person reference of demonstratives that refer to entities present in the context. Exophoric uses always carry some kind of a demonstration that shows where the referent is: a pointing gesture is com-

monly used, but eyegaze and other gestures could be used. I indicate this demonstrative gesture with the symbol → that follows the linguistic expression that accompanies it.

- (190) That_→ boy looks happy. [Exophoric]

Other uses of demonstratives that I will focus on include the anaphoric uses as in 191 and generic uses that make use of relative clauses as in 192.

- (191) I met a boy_i. That boy_i looked happy. [Anaphoric]

- (192) That which rolls gathers no moss. [Generic]
[Elbourne 2013]

I will show later in the chapter that other uses of demonstratives that have been identified in the literature can be categorized into one of these three main uses of demonstratives: exophoric, anaphoric, and generic. For example, what has been called the ‘quantifying-in’ (QI) uses of demonstratives as in 193 (King 2008) is a subset of the generic relative clause reading, while the emotive uses like 194 (Lakoff 1974) is a subset of familiarity.⁴

- (193) Every king cherishes that clerk who crowned him. [QI]
[King 2008]

- (194) How's that toe? [Affective]

⁴The idea is that by suggesting that he is familiar with the problematic toe, the nurse conveys affectiveness.

[Lakoff 1974]

There has been a number of attempts in the previous literature to account for these different uses of demonstratives. However, as I will show in the next section, these approaches have either focused only on a few specific uses of demonstratives and thus run into undergeneration issues, or have left the denotation of demonstratives too broad to run into overgeneration issues. After discussing these in Section 4.2, I will point out that the main problem of the previous approaches is in that demonstratives are not analyzed in terms of how they compete with pronouns and definite descriptions. While it is often assumed that demonstrative descriptions compete with uniqueness-denoting definite descriptions (Wolter 2006; Nowak 2014), I show that the semantically derived competition mechanism and the morphology of English result in two separate competitions: the pronominal demonstrative competes with pronouns and the adnominal demonstrative competes with definite descriptions. In each pair of competing expressions, the demonstrative carries an additional *R* property that the pronoun or the definite description does not carry. Separating these two competitions allow us to better account for the distribution of demonstratives in English.

In the analysis I propose, I present two properties that seem to be unique to demonstratives and not available to anaphoric pronouns and definite descriptions: exophoric use and generic readings of relative clauses, both of which can be described in terms of non-familiarity (not requiring familiarity). Based on this, I present in Section 4.3 an analysis that characterizes demonstratives as carrying this non-familiarity property. Two desirable predictions from analyzing demonstratives using the competition mechanism are a) the demonstrative use of some but not all pronouns, and b) the markedness

of demonstratives in anaphoric contexts. These advantages are discussed in Sections 4.4 and 4.5, respectively. A syntactic analysis compatible with the semantic analysis proposed in Section 4.3 is provided in Section 4.7, and in Section 4.8, I discuss three languages that morphosyntactically mark exophoricity, suggesting an analysis for the underlying structure. Section 4.9 concludes.

4.2 DEMONSTRATIVES: TWO APPROACHES

In this section, I give an overview of the previous accounts of demonstratives. The previous approaches to analyzing demonstratives can be categorized into two broad categories. The first approach, which I call the exophoric approach, involves analyzing demonstratives as inherently exophoric entities. Kaplan 1969 and Roberts 2002 are two analyses that can be categorized into the exophoric approach. The second approach involves minimally extending the semantics of definite descriptions to capture the meaning and the distribution of demonstratives. I review Wolter 2006, King 2008, and Elbourne 2008 under this category, as well as Nowak 2014 for a recent improvement on Elbourne 2013. I call the second approach the extended definite approach.

After reviewing each approach, I discuss some empirical challenges each approach faces. Specifically, I will show that the exophoric approach undergenerates due to its focus only on the exophoric use. The extended definite approach, on the other hand, allows different uses of demonstratives, but is yet too weak and faces overgeneration problems. I will be adopting and improving the extended definite approach by restricting it.

4.2.1 THE EXOPHORIC APPROACH

The first approach highlights the exophoric uses of demonstrative descriptions. Traditionally pronouns and demonstratives are discussed as separate semantic elements. While pronouns receive a lot of discussion of their anaphoric properties, demonstratives rarely appear in studies of anaphora. Instead, work on demonstrative descriptions as in *that person* assume that they are fundamentally different from pronouns in referring to an entity in the context of speech with a demonstration such as pointing (see the entry on demonstratives in *The Routledge Pragmatics Encyclopedia* (Cummings 2010)).

Kaplan (1977) argues that demonstratives differ from definites and pronouns in having a rigid, wide-scope interpretation. This is illustrated by the contrast between (195a) and (195b), where the demonstrative description *that person* rigidly refers to John, unlike the definite.

(195) (Pointing at John) If John and Mary switched places...

- a. ...that person would be a woman. (false)
- b. ...the person I'd be pointing at would be a woman. (true) [Kaplan 1977]

Note, however, that this rigid reference is not obligatory with the demonstrative *that*. If we interpret *that* anaphorically by introducing a referent in previous discourse and not use pointing as in 196, the rigid reference is no longer obligatory or possible.

(196) (John is sitting on the right) Let's assume that I keep pointing to the person on the right. If John and Mary switched places, that person would be a woman.

(true)

More recent studies have shown that demonstratives are not restricted to exophoric uses. For example, they are used in anaphoric readings and bound variable readings shown below.

- (197) a. I saw a dog. That dog looked happy.
b. Every dog in my neighborhood, even the meanest, has an owner who
thinks that that dog is a sweetie. [Roberts 2002]

Despite these observations, however, the assumption that remains in this first approach is that demonstratives fundamentally differ from pronouns in having an exophoric meaning. Thus, what we see in these works is first analyzing demonstratives as encoding exophoricity and then deriving the non-exophoric readings from that basic, exophoric meaning. For example, see Diessel (2006) where they argue that the non-exophoric uses of *that* are extensions of the basic, exophoric use that serves to realize joint attention. This assumption is exemplified by the semantic analysis of demonstratives in Roberts 2002, where demonstratives are analyzed as presupposing a demonstration. Below I present a brief overview of her analysis.

4.2.1.1 ROBERTS 2002: PRESUPPOSING A DEMONSTRATION

Roberts (2002) proposes a unified analysis of definite descriptions, pronouns, and demonstratives, where the only difference between them is the content of the presupposition. A definite description requires that there be a unique referent in the set of discourse

referents that meets the description in the NP. The informal description of the definite is given in 198, followed by the full denotation is given in 199.

(198) Given a context C , use of a definite description NP_i presupposes that there is a discourse referent i in the Domain of C which is the unique familiar discourse referent contextually entailed to satisfy the (possibly liberalized) descriptive content of NP_i .

- (199) For context $C = \langle \text{Sat}_C, \text{Dom}_C \rangle$, if a definite NP with descriptive content Desc is felicitous in C then:
- a. $\exists i \in \text{Dom}_C [\forall \langle w, g \rangle \in \text{Sat}_C [\text{Desc}(w)(g(i))]]$
 - b. $\forall k \in \text{Dom}_C [\forall \langle w, g \rangle \in \text{Sat}_C [\text{Desc}(w)(g(k))] \rightarrow k=i]]$
 $(\text{Desc}(w)(g(i)))$ is true iff the individual assigned to i by g has the property denoted by Desc in world w)

For pronouns, an additional presupposition is added. A pronoun requires the notion of saliency (Roberts 2002), which is roughly defined as a subset of discourse referents that are salient in the given discourse. The pronoun presupposes that there is a discourse referent that is not only unique but also salient. The informal description is shown in 200, followed by the formal denotation in 201.

(200) Given a context C , use of a pronoun Pro_i presupposes that there is a discourse referent i familiar and salient in C which is the most salient discourse referent satisfying the descriptive content suggested by the person, number and gender of Pro_i .

- (201) For context $C = \langle \text{Sat}_C, \text{Dom}_C \rangle$, with salient discourse referent $\text{Sal}_C \subset \text{Dom}_C$; pronoun with Desc (given by prerson, number, gender) is felicitous in C if:
- a. $\exists i \in \text{Sal}_C [\forall \langle w, g \rangle \in \text{Sat}_C [\text{Desc}(w)(g(i))]]$
 - b. $\forall k \geq_{\text{Salient}} i [\forall \langle w, g \rangle \in \text{Sat}_C [\text{Desc}(w)(g(k))] \rightarrow k=i]$
 $(x \geq_{\text{Salient}} y \text{ iff } x \text{ is at least as salient as } y)$

The demonstrative description has an additional presupposition, which involves a demonstration. The presupposition is that there is a familiar demonstrated referent that meets the description of the NP. The informal description is shown in 202, followed by the formal denotation in 203.

- (202) Presupposition of Demonstrative NPs (Informal):

Given a context C, use of a (non-)proximal demonstrative NP_i presupposes (a) that there is an accompanying demonstration δ whose unique demonstratum, correlated with a weakly familiar discourse referent by virtue of being demonstrated, lies in the direction indicated by the speaker at a (non-)proximal distance to the speaker, and (b) that the weakly familiar discourse referent for the demonstratum is the unique familiar discourse refrent contextually entailed to satisfy the (possibly liberalized) descriptive content of NP_i .

- (203) Given a context of evaluation C, with common ground CG s.t. $\text{Dom}_{CG} \subseteq \text{Dom}_C$, and discourse referent S s.t. $\forall i \in \text{Dom}_{CG} \forall \langle w, g \rangle \in \text{Sat}_{CG} [\text{speaker}(w)(g(i)) \leftrightarrow i = S]$, if a [\pm proximal] demonstrative NP_i with (possibly liberalized) descriptive content Desc is felicitous in C, then

- a. $\exists \sigma [\sigma \in \text{Dom}_{CG} \& \forall \langle w, g \rangle \in \text{Sat}_{CG} [\text{demonstration}(w)(g(\sigma)) \&$

- accompanies(w)(g(σ), *utterance*(NP_i))] &
- b. $\exists j \in \text{Dom}_{\text{CG}} [\forall <w,g> \in \text{Sat}_{\text{CG}} [\pm \text{proximal}(w)(g(j), g(S)) \&$
demonstratum(w)(g(j), g(s), σ)] & $\forall K \in \text{Dom}_{\text{CG}}$
 $[\forall <w,g> \in \text{Sat}_{\text{CG}} [\pm \text{proximal}(w)(g(k), g(S)) \& \text{demonstratum}(w)(g(k),$
g(S), σ)] $\rightarrow k=j]$ & *Desc*(w)(g(j))] &
- c. $j=i$]]

Thus, in Roberts 2002, demonstratives inherently require the presence of some demonstration unlike pronouns and definite descriptions. The non-exophoric uses are analyzed in Roberts 2002 as being derived from this basic, exophoric denotation, where the notion of ‘demonstration’ is weakened to apply to non-physical demonstration to a linguistic entity.

4.2.1.2 ANAPHORIC DEMONSTRATIVES

While Kaplan (1969) does not have a story for demonstratives used in anaphoric contexts, Roberts (2002) extends her analysis of exophoric demonstratives to account for discourse deictic and anaphoric uses of demonstratives. Two changes are made. First, the *demonstratum* is an actual entity in exophoric uses, while the *demonstratum* is a linguistic object like an NP or a sentence for anaphoric uses. Second, while in the exophoric demonstrative the requirement is that the returned referent be identical to the *demonstratum* (the entity pointed to), the anaphoric demonstrative instead requires that the returned referent be identical to the discourse referent introduced by that *demonstratum*.

Thus, in her story, there are two separate ways in which anaphoric reference is made. For pronouns, they simply refer to the most salient and familiar entity, while demonstratives refer through a linguistic deixis. Roberts (2002) argues that there are felicity differences between pronouns and anaphoric demonstratives that support this difference. Specifically, she argues, pooling examples from Isard 1975 and Maclaran 1982 that demonstratives are licensed by weak familiarity, which is a contextual familiarity contrasted from strong familiarity that is established through previous mention in discourse. She notes that this is even more so when the weakly familiar entity is in contrast to a strongly familiar entity. In 204, for example, the linguistically mentioned entity is *nineteen*, while the result of squaring nineteen is not. The demonstrative refers to the latter entity. In 205, there is no weakly familiar entity and thus the demonstrative is less felicitous.

- (204) First square nineteen, then cube it/that. [Isard 1975]
- a. *it*: ‘nineteen’
 - b. *that*: ‘nineteen squared’

- (205) A car drew up at the door. Two dark-suited men got out of it/the car/?this/?that, then it/?this/?that disappeared down the drive again. (after Maclaran 1982)

Roberts argues that these requirements of novelty and contrast derive from the exophoric denotation of demonstratives. For example, contrast is argued to be based on proximity distinctions that are central to demonstratives, while novelty is argued to derive from the fact that the entity was just introduced by the accompanying gesture.

Below is a summary of approach 1.

Approach 1: The Exophoric Approach	[Kaplan 1969; Roberts 2002]
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- Demonstratives are inherently exophoric, carrying restrictions on proximity and referring to the demonstratum.
- The anaphoric uses derive from the inherently exophoric meaning, where the demonstratum is a linguistic entity and the reference is to the discourse referent introduced by that demonstratum.
- Felicity and distributional differences in pronouns and demonstratives are derived by the proximity and gesture requirements of demonstratives.

4.2.1.3 UNDERGENERATION

I show that while the differences in felicity and distribution discussed in Roberts 2002 are robust, the encoding of exophoricity in the lexical denotation of demonstratives is too strict, leading to undergeneration problems.

First, note that the distinction between the pronoun and the demonstrative in 205 disappears when the demonstrative appears with an NP complement. I focus on the distal demonstrative and set aside the affective uses of proximal demonstratives (cf. Potts & Schwarz 2010; Davis & Potts 2010; Lakoff 1974; Kim 2018 for more discussion of affective uses of proximal and distal demonstratives across languages).

- (206) A car drew up at the door. Two dark-suited men got out of it/the car/that car, then it/that car disappeared down the drive again.

This contrast between pronominal and adnominal demonstratives is hard to capture in Roberts's story because demonstratives are assumed to carry proximity and exophoric requirements regardless of the presence of the NP complement.

In fact, this distinction between pronominal and adnominal demonstratives seems crucial. What we observe is that the adnominal demonstrative is much more felicitous in non-exophoric uses, as discussed in Ahn & Davidson 2018. In this paper, we present data showing that exophoricity is neither restricted nor inherent to demonstratives. Specifically, we focus on demonstrative descriptions and how their anaphoric and exophoric ability does not differ from pronouns. Consider the anaphoric uses in 207 and exophoric uses in 208. What we show is that when we compare adnominal demonstratives with pronouns, what determines the exophoric use isn't the lexical category of demonstratives but the presence of the co-speech pointing gesture.

- (207) a. I met a girl_i yesterday. She_i / That girl_i looks happy today.
b. Every time I see a linguist, I talk to that linguist / her.

- (208) a. I met a girl_i yesterday. She_→ / That_→ girl looks happy today.
b. Every time I see a linguist, I talk to that_→ linguist / her_→.

The distinction between pronominal and adnominal demonstratives cannot be captured in the exophoric account which associates the whole category of demonstratives with

exophoricity. I will argue later in the chapter that the difference in pronominal and adnominal demonstratives results from the competition that occurs in two separate scales. The pronominal demonstrative competes with *it* in the pronominal scale, while the adnominal demonstrative competes with the definite in the adnominal scale. I show that the interpretations available in the alternatives in respective scales leads to the more restricted distribution of pronominal demonstratives.

4.2.2 THE EXTENDED DEFINITE APPROACH

What we have seen in the exophoric approach is that lexically encoding a restriction of exophoric demonstration is too strong and that it runs into undergeneration problems. Non-exophoric uses of demonstratives as well as exophoric uses of pronouns are difficult to account for in this approach. The extended definite approach takes the opposite direction. Instead of lexically encoding a restriction, the denotation of a definite description is minimally updated to apply to demonstratives. This is done by adding a different domain to the uniqueness evaluation of definites as in Wolter 2006, or by adding an unspecified property that can further restrict the demonstrative as in King 2008 and Elbourne 2005. These studies are discussed in turn.

4.2.2.1 WOLTER 2006

Wolter (2006) argues that both the definite *the* and the demonstrative *that* in English have a uniqueness-based semantics, but differ in the situations against which this uniqueness is evaluated. The [default] and [non-default] distinction is built on Stal-

naker's (1977) discussion of the two ways a world (situation) variable is used when a sentence is uttered. Situation variables associated with the main predicate determine the truth value of the proposition, while situation variables associated with nominal constituents fix the reference of referential expressions to establish what proposition has been uttered. Wolter calls the situation variables with the former use the [default] situations, and the rest of situation variables the [non-default] situations. The demonstrative determiner is further specified to require its NP complement be evaluated against a non-default situation. The definitions of the definite and the demonstrative determiner are shown below:

- (209) a. $\llbracket \text{the}_n \rrbracket$: $\lambda P.P(s_n)$ is a singleton set.
If defined, denotes $\iota x.P(x)(s_n)$

b. $\llbracket \text{that}_n \rrbracket$: $\lambda P.P(s_n)$ is a singleton set and s_n is non-default.
If defined, denotes $\iota x.P(x)(s_n)$

c. Given a sentence A, a situation variable s is a default situation just in
case it is bound in A. Otherwise s is a non-default situation.

The default situation used for *the* is the one that is defined to interpret the main predicate of the sentence, while the one used for *that* is non-default. This non-defaultness can be both the ‘zoomed-in’ context that is provided by exophoricity, or recency in anaphoric contexts, or ‘zoomed-out’ context which is provided by pointing to an entity the addressee is not familiar with.

- b. A woman_i entered from stage left. Another woman_j entered from stage right.

That woman_j was carrying a basket of flowers. [Roberts 2002]

- c. That bucket is full of water. [Zoom-out]

Note that the only contribution of the [non-default] situation is that the demonstratives are marked in contrast to definites: while definites refer to the uniquely salient entity in a given context, demonstratives refer to those that are not that uniquely salient entity because if it were uniquely salient, the definite would be used to refer to it. The exact way in which demonstratives are constrained to allow exophoric uses is not formally implemented, and assumed to be determined by situational variables and indices.

4.2.2.2 KING 2008 AND ELBOURNE 2013

Another way the denotation of a definite was extended to account for demonstratives is shown in works like King 2008 and Elbourne 2013. The details are slightly different, but the main idea shared by the two works is that demonstratives carry an additional property than a definite. For example, the definite description *the F* returns the unique x that is F, while the demonstrative description *that F* returns the unique x that is F and G.

This additional G property can cover a wide range of properties. In King 2008, the content of this additional property is determined by speaker intentions:

- (211) a. perceptual intentions (accounts for direct reference; speaker is perceiving

- the referent at the time of utterance)
- b. descriptive intentions (all other uses; speaker intents to talk about this referent)

In exophoric uses, this additional property simply returns an identity function with the demonstratum in both works. A schema is given in 212.

$$(212) \quad [\text{that guy}] \text{ (pointing to Paul)} = \iota x: [\text{guy}](x) \wedge [\lambda x. \text{ identical to Paul}](x)$$

In anaphoric uses, G carries an index information, as shown in the schema below, where y is an index.

$$(213) \quad [\text{that guy}] = \iota x: \text{guy}(x) \wedge x=y$$

In descriptive uses as in 214, the additional property is a redundant property that simply repeats the description. This is shown in 215.

$$(214) \quad \text{That student who scored one hundred on the exam...} \quad [\text{King 2008}]$$

$$(215) \quad [\text{that student who scored one hundred on the exam}] = \iota x: [\text{student who scored...}](x) \wedge [\text{student who scored...}](x)$$

Thus, what we see in the extended definite approach is adding an additional property or presupposition to definite descriptions to account for demonstratives. The additional restriction is not specified and does not in fact have to have any semantic result. For ex-

ample, in King 2008 and Elbourne 2013, the additional property G can be a semantically redundant function.

Approach 2: Extended Definite approach

- Demonstratives are definite descriptions with an additional property
- This property is underspecified and can denote identity with the pointee for exophoric uses, denote identity with an index for bound-variable uses, or be trivial for descriptive uses.

4.2.2.3 OVERGENERATION

The similarity we find in all three of these approaches is that the denotation of a demonstrative is not much different from a definite description or a pronoun. A demonstrative ends up having a denotation of a pronoun with an NP complement, or a definite description with an indexical property. In Wolter 2006, the non-default situation is defined as those that are not the topic situation. This, following the dichotomy of variables in Stalnaker 1977, ends up being the anaphoric variables. What this means is that Wolter's analysis would predict demonstratives to behave exactly like familiarity-denoting strong definites in Schwarz 2009. While there is a large overlap between strong definites and demonstratives, this overlap is not complete. In King 2008 and Elbourne 2013, too, the additional property that demonstratives carry basically ends up being indices or trivial properties.

Recall again the schema from Elbourne 2013, where demonstratives are analyzed as a definite with an additional property G . In exophoric uses, G equates the referent with the demonstratum as in 216. In descriptive uses, G is trivial as in 217.

- (217) that F = the x: F(x) & x=x [Descriptive]

The denotations above can represent both Elbourne and King’s analyses, ignoring the details on how indexing occurs. Note that, because G is trivial in 217, the descriptive use is semantically equivalent to a definite description. This runs into problems of overgeneration because definite descriptions and demonstrative descriptions do not completely overlap in their uses. Nowak (2014) observes and presents this problem, proposing an alternative analysis. In the next subsection, I give an overview of his arguments.

4.2.2.4 NOWAK 2014

The main set of data that are problematic are pointed out in Nowak (2014), where it is observed that in King and Elbourne's analyses, there is no way to predict the contrast below.

- (218) a. The universe is bright.
b.???That universe is bright.

He further shows that descriptive uses of demonstratives are interchangeable with the

definite when there is a relative clause present.

- (219) a. That guy who wrote King Lear also wrote Romeo and Juliet.
 b. The guy who wrote King Lear also wrote Romeo and Juliet.

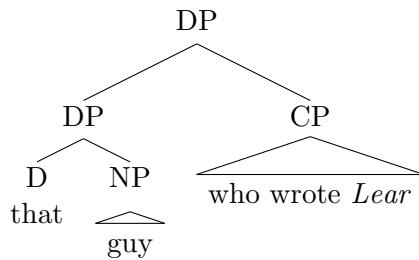
Nowak (2014) updates the analysis of demonstratives to account for the patterns in 218 and 219. He proposes that the *G* property in the denotation of demonstratives proposed in Elbourne 2013 must be further restricted so that it cannot be trivial. This is done by adding a presupposition that requires that the *G* property further restricts the denotation of *F* as in 220.

- (220) $\llbracket \text{that } F \rrbracket = \text{the } x: [F(x) \wedge G(x)]$ defined iff $(F \cap G) \subset F$

Nowak maintains the dichotomy between exophoric and descriptive uses of demonstratives, where the *G* property equates the referent to the demonstratum in exophoric uses. The non-trivial requirement is not problematic for exophoric uses, because *G* does point out a specific referent from the denotation of the NP complement *F*. For descriptive uses, only those that satisfy the presupposition in 220 are predicted to be felicitous.

For example, Nowak argues that in 219, the CP part of the relative clause can occupy the *G* property, which satisfies the presupposition in 220. The structure he assumes is as follows:

(221)



On the other hand, the demonstrative use in 218 is not felicitous because there is no additional property that can occupy the G position. With the same logic, he is able to account for the degradedness of the following example:

(222) #That author of King Lear also wrote Romeo and Juliet.

He argues that there is no syntactic way of decomposing *author of King Lear* into two properties to fill the G property, and thus the sentence is degraded.

REMAINING ISSUES In summary, Nowak (2014) further restricts the denotation of demonstratives by proposing that the *G* property cannot be trivial. This resolves an overgeneration problem that the analysis in King 2008 and Elbourne 2013 run into, for example, the failure to predict the contrast in 218.

However, Nowak's analysis still runs into overgeneration problems because it is not the case that any property can occupy *G* to license the demonstrative. For example, note that the adjective *bright* does not license the demonstrative in globally unique contexts as in 223. Because the adjective *bright* can be decomposed into a separate property, Nowak's account for 222 cannot hold here.

- (223) a. The bright universe
 b.???That bright universe

Thus, we will need to further restrict this additional property so that we are able to predict contrasts as in 223.

Another problem that arises in Nowak 2014 is that of undergeneration. There are descriptive uses of demonstratives that do not need an overt relative clause or other properties that can fill the *G* property. 224 from his work is such an example.

- (224) That author of *Principia* (gesturing at Russell) looks friendly, but I wouldn't try to get an autograph from that one (gesturing at Whitehead).

For these uses, Nowak must assume an exophoric denotation. For example, he argues that *that author of Principia* in 224 denotes the following.

- (225) the x: [author of *Principia*(x) \wedge Russell = x]]

Because the property of being Russell is non-trivially restrictive in the denotation of being authors of Principia, Nowak argues that this use is felicitous.

I argue, however, that 224 does not strictly require an exophoric context to be felicitous. For example, even if we are in a context where exophoric use is not available due to the referents not being present in the immediate context, the demonstrative use is felicitous.

- (226) Yesterday I read about an [author of *Principia*]_i. Today, I learned about another [author of *Principia*]_j. [That author (of *Principia*)]_j was interesting.

Because G is either a property that maps to a syntactically overt material like the relative clause or an identification through exophoric reference, the licensing of the demonstrative in 226 is not predicted by Nowak's analysis. Thus in a way, we go back to the problems of the first approach in undergeneration. For the remainder of the chapter, I propose an alternative analysis of demonstratives that can maintain the intuition in the extended definite approach but avoid the overgeneration problem of King 2008 and Elbourne 2013 as well as the undergeneration problem of Nowak's update on the extended definite approach.

4.2.3 PREVIEW OF THE PROPOSAL

In this work, I adopt the main intuition from the extended definite approach, where demonstratives are assumed to carry an additional property than definite descriptions. However, I elaborate on this intuition by making the following claims. First, I distinguish between pronominal and adnominal demonstratives in English. Pronominal demonstratives are analyzed as carrying the denotation of a pronoun and the additional property R . Adnominal demonstratives are analyzed as carrying the denotation of a definite description with the additional property R . This distinction means that we now have a two-way split in the scale: while pronominal demonstratives compete with pronouns, adnominal demonstratives compete with definite descriptions. Second, a close observation of the distribution of demonstratives in comparison to the anaphoric pronoun *it* and definite descriptions shows that there are two properties that are unique

to demonstratives: allowing exophoric references and allowing a generic reading with relative clauses. I will further argue that these two properties can be grouped into a broader category of non-familiarity. Third, I argue that this non-familiarity is the main property of R . I suggest that the use of the pronominal or adnominal demonstrative implies that the restrictions carried by the anaphoric pronoun or the definite description, respectively, was not sufficient in resolving the reference. And thus, the information carried by R functions as an alternative to the anaphoric index in resolving the referent.

This way of analyzing demonstratives results in a number of desirable predictions. The first prediction is on the exophoric and generic uses of pronouns like *he*. While I focus on the anaphoric pronoun *it* for the first part of this section, I show that the competition-based mechanism correctly predicts that the animate pronoun *he* would allow exophoric uses and generic readings of relative clauses, just like demonstratives. In other words, I show that some pronouns can be ambiguous between truly anaphoric uses and demonstrative-like uses ('demonstrative pronouns'), and that the competition mechanism and the morphological paradigm of English correctly predict this.

The second desirable prediction is that the anaphoric use of demonstratives would be a last-resort type of interpretation available for demonstratives. If R carries properties that can replace the anaphoric index to resolve the reference, making this R carry anaphoric information would be the least-preferred choice in the interpretation of the demonstrative. I argue that the anaphoric interpretation of a demonstrative is a last-resort that only comes out when no pointing or relative clause information is available, and that when there is either pointing or relative clause information available, demonstratives must compose with it in a meaningful way. I support this claim with an experimental evidence, where adults seem to accommodate the anaphoric interpre-

tation of a demonstrative only when pointing is not available. I also show that children show a difference, where they have a difficulty in interpretation demonstratives if the pointing information is not provided. I suggest that these two sets of experiments show us the last-resort-like property of anaphoric demonstratives, which in turn explain the markedness properties we find with demonstratives in English and German.

The last sections of this chapter are devoted to giving a syntactic analysis of this *R* property. Given the semantic properties I discuss in the earlier sections, namely the complementarity with indices, and cross-lingusitic patterns where exophoricity is morphosyntactically marked, I explore a syntactic analysis where *R* bleeds the use of the anaphoric index.

4.3 ANALYSIS

4.3.1 DEMONSTRATIVES CARRY *R*

I argue that demonstratives carry an additional *R* property in either its pronominal or adnominal form. Thus, the pronominal demonstrative like *that* or *those* without NP complements would have the same restrictions as the pronoun like *it* but with an additional *R* property as shown below.

$$(227) \quad [\![\text{that}]\!] = \sup [\lambda x. \text{entity}(x) \wedge \phi(x) \wedge R(x)]$$

The adnominal demonstratives like *that boy* or *those girls* would carry the same restrictions as a definite description with *R*.

$$(228) \quad [\![\text{that NP}]\!] = \sup [\lambda x. \text{entity}(x) \wedge \phi(x) \wedge [\![\text{NP}]\!](x) \wedge R(x)]$$

4.3.1.1 TWO SCALES

Distinguishing pronominal and adnominal demonstratives this way leads to having two separate scales: the pronominal scale and the adnominal scale. The pronominal scale would have the pronoun and the pronominal demonstrative, as shown below.

$$(229) \quad \text{Pronominal scale: } \{it, that\}$$

The adnominal scale, on the other hand, would contain the definite description and the demonstrative as shown below.

$$(230) \quad \text{Adnominal scale: } \{\text{the girl}, \text{that girl}\}$$

This additional R property is responsible for placing the demonstrative at the end of either of the scale. Because it carries the most amount of restrictions, the economy principle does not choose this expression unless the property in R is crucial in resolving the referent. I will show that this is what results in the markendess and the feeling of redundancy when demonstratives are used in contexts where anaphoric pronouns and definite descriptions are possible.

What goes into this restriction of R ? I will show in the next section that when we compare pronominal demonstratives with the anaphoric pronoun *it* and adnominal demonstratives with definite descriptions, two properties surface as being unique to

demonstratives. These two properties are a) allowing an exophoric reference where entities present in the immediate context are referred to, and b) having generic readings of relative clauses. I discuss these in turn.

4.3.2 TWO UNIQUE PROPERTIES OF DEMONSTRATIVES

In this section, I discuss two properties that seem to be unique to demonstratives when they are compared to the anaphoric pronoun *it* and definite descriptions. I focus on the inanimate pronoun *it* for this section because this is the expression that forms a minimal pair with the pronominal demonstrative *that* in only differing in the presence of *R*. The animate pronouns will be the focus of Section 4.4.

4.3.2.1 EXOPHORIC USE

Note that demonstratives like *that* or *that boy* allow exophoric uses, where an entity present in the immediate context is referred to.

- (231) (Pointing at a window decoration) I like that_→.

- (232) (Pointing at a boy) That_→ boy was in my class.

This is different from both the anaphoric pronoun *it* and definite descriptions.⁵

⁵It has been claimed in Wolter 2006 that pointing is possible with definite descriptions, as her example in (i). However, it seems that pointing with definite descriptions is highly degraded. Even when it is possible, the pointing gesture seems to precede the linguistic utterance of *the cat*, suggesting that the role of the pointing might be different in case of definite descriptions:

(233) (Pointing at a window decoration) *I like it_→.

(234) (Pointing at a boy) *The_→ boy was in my class.

The degradedness of exophoric pointing becomes even clearer when more than one instance of pointing occurs within an utterance. First note that pointing to multiple referents in a sequence is possible with demonstratives:

(235) I like that_→ but not that_→.

(236) That_→ computer is new, but that_→ computer is old.

This is not possible with *it* or definite descriptions:

(237) I like it_→ but not it_→.

(238) The_→ computer is new, but the_→ computer is old.

What we can conclude from this set of data is that demonstratives, unlike anaphoric pronouns and definite descriptions, allow exophoric pointing to compose restrictively with the meaning of the rest of the DP.

the speaker might point out a unique referent by pointing and then use the definite description to refer uniquely.

(i) (Pointing at a cat) The cat needs feeding.

4.3.2.2 GENERIC READING

Another property that seems to be unique to demonstratives is the generic interpretation of relative clauses. First note the following phrases:

(239) Those who read never fail.

(240) That which rolls gathers no moss.

The pronominal demonstratives followed by relative clauses refer generically to anyone or anything that satisfies the property denoted by the relative clause. The reading of 239, for example, is a generic sentence about whoever reads, without requiring some specific group of people to have been previously established.

Note that this is different from definite descriptions and pronouns like *it*:

(241) The people who read never fail.

(242) ?*It which rolls gathers no moss.

The definite description in 241 requires that some specific group of people to have been previously established. Even if it doesn't require that the specific group of people who read be previously established, it nevertheless requires that at least some domain of people is familiar to conversation participants, and that the speaker is discussing a subset of those people who read. The anaphoric pronoun *it* in 242, on the other hand,

is degraded when it appears with a relative clause. When an interpretation is forced, it can only refer to something familiar, with the relative clause only providing some supplementary information about the already-familiar entity.

4.3.2.3 NON-FAMILIARITY

I argue that the two properties discussed above, namely the exophoric use and the generic reading with relative clauses, can be grouped into a broader category of being **non-familiar**. What this means is that the referent of the DPs as in (243a) and (243b) are not previously established in the context.

- (243) a. That \rightarrow computer
 b. Those who read

This crucially differs from other kinds definite expressions like *the* and pronouns, which specifically require that the referent be familiar. There is nothing familiar about a referent I just pointed out in my utterance in (243a), or about the referents I described in (243b): I am specifying the defining property but not the actual referents themselves.

4.3.3 R CARRIES THIS NON-FAMILIARITY PROPERTY

I argue that the main characteristic of the additional *R* property that demonstratives carry is that of non-familiarity. What this *R* property suggests is that the anaphoric use of the pronoun and the definite description was not sufficient in resolving the referent.

What this means is that R is used as an alternative to the anaphoric index. An exophoric reference, for example, points out the intended referent instead of looking for a familiar referent in a given set of discourse referents. Generic relative clauses define a property that referents must carry, but do not require them to be previously established and indexed.

Thus, the use of demonstratives suggests that the referent must be resolved in a non-canonical way, where the canonical way would be to go through the set of familiar discourse referents. The resolution mechanism must take a different shape, like the exophoric pointing gesture or a relative clause.

The analysis of demonstratives is thus summarized as below. The denotation of a demonstrative carries an additional R property, which must be filled with either a pointing gesture or a relative clause. These properties replace the anaphoric index in resolving the reference, and this explains why demonstratives with pointing or relative clauses do not require the referent to be familiar.

(244) Demonstratives carry an additional property R in comparison to pronouns and definite descriptions.

- a. $\llbracket \text{that} \rrbracket = \sup [\lambda x. \text{entity}(x) \wedge \phi(x) \wedge R(x)]$
- b. $\llbracket \text{that NP} \rrbracket = \sup [\lambda x. \text{entity}(x) \wedge \phi(x) \wedge \llbracket \text{NP} \rrbracket(x) \wedge R(x)]$
- c. This additional property slot R can host the exophoric pointing gesture and a relative clause.

Given this analysis, two desirable predictions arise. The first concerns the interpretation of pronouns other than *it*. I show that because there is no direct competition between

animate pronouns like *he* in English and a pronominal demonstrative *that*, the animate pronouns also allow the demonstrative-like uses, specifically in allowing exophoric pointing and generic relative clauses. I show that this way of analyzing the interpretive range of pronouns in terms of the competition and scalar implicature allows us to make precise predictions about their distribution. The second prediction concerns the anaphoric uses of demonstratives. Because demonstratives carry an additional *R* property, the competition mechanism and the economy principle predict demonstratives to be used only when the property in *R* is crucial in resolving the reference. This means that the anaphoric use of a demonstrative would be the last resort option when neither pointing nor relative clause is available. After making this prediction, I show that there are some experimental evidence that supports this.

4.4 DEMONSTRATIVE PRONOUNS IN ENGLISH

So far I have focused only on the inanimate pronoun *it* because this forms a minimal pair with the pronominal demonstrative *that* with respect to the presence of *R*: *that* only differs from *it* in carrying this additional property *R*. In contrast, an animate pronoun like *he* does not have a minimal pair that carries all of its denotation plus the *R* property. In other words, English lacks animate pronominal demonstratives. The only pronominal demonstrative that the language has is *that*, which is restricted to inanimate references in most cases. This is shown more clearly by the morphological paradigm of English pronouns, definites, and demonstratives in 245.

- (245) English personal, definite, and demonstrative morphemes

		$\phi(x)$	$\phi(x) \wedge P(x)$	$\phi(x) \wedge P(x) \wedge R(x)$		
		p-pro	d-pro	d-adn	dem-pro	dem-adn
sg	he	–	–	the male	–	that male
	she	–	–	the female	–	that female
	it	–	–	the thing	that	that thing
pl	–	–	–	the males	–	those males
	–	–	they	the females	–	those females
	–	–	–	the things	those	those things

What we see in 245 is that while *it* has a lexical demonstrative counterpart *that*, *he* or *she* does not.

What we have seen so far is that while *that* allows both exophoric uses and generic readings with relative clauses, *it* resists both of these uses. Note that semantically, there is nothing that resists the addition of this *R* property to the denotation of *it*. I argue that the restriction of *it* to anaphoric uses is a result of a scalar implicature. Let's assume that the demonstrative is specified for carrying this additional property *R* as analyzed above. The pronoun *it* does not carry such specification. Thus, the use of *it* suggests that there was neither pointing nor relative clause available for the *R* position, which leaves only the anaphoric index.

What does this mean for pronouns like *he* which does not have a demonstrative counterpart as a minimal pair? This competition-based account would predict that *he* would not have such restrictions because there is no minimal pair that would compete in scale with it.

This prediction is borne out: *he* can allow both exophoric pointing and generic relative clauses. The exophoric pointing use is shown in 246, while the generic relative clause use is shown in 247.

(246) He_→ looks happy, but he_→ does not.

(247) He who reads never fails.

The relative clause use in 247 is archaic sounding, and might be on its way out of the modern English language. However, the exophoric use is robust, and this is shared with the feminine animate pronoun *she* as well:

(248) She_→ looks happy, but she_→ does not.

An alternative analysis to this competition-based story would be to assume syncretism between the anaphoric and the demonstrative uses of pronouns. In other words, *he* might be ambiguous between the truly anaphoric uses and the demonstrative uses. While this hypothesis is still viable, I present one additional argument that supports the competition-based mechanism instead.

It is not the case that *he* always allows an exophoric use. The distribution of the exophoric use of *he* seems to be tightly linked to the availability of the exophoric *that*. Specifically, in contexts where *that* can be used exophorically to refer to animate entities, it seems that the pronoun *he* is blocked.⁶ One place where *that* can be used for animate referents is in a presentational context, where the speaker is pointing out different

⁶Thanks to Florian Schwarz for pointing this out to me.

individuals to the addressee, as in 249.

- (249) That_→ is Jin, and that_→ is Jimin.

Note that in 249, the demonstrative *that* freely refers to animate entities. What is interesting is that it is in this specific context that the pronoun *he* seems to be much more degraded, as shown in 250

- (250) #He_→ is Jin, and he_→ is Jimin.

Another context in which we see this level of close-knit competition is in the case of relative clauses. I have shown that the pronominal *that* and *those* allow generic relative clauses. Note that unlike in exophoric uses where *those* is restricted to reference to inanimate entities, *those* can refer to animate entities when it serves as the head of the relative clause, which is indicated by the example in 239 repeated in 251.

- (251) Those who read never fail.

The plural pronominal demonstrative *those* competes with the pronoun *they* in English as shown in the chart in 245. The fact that *those* is restricted to inanimate entities in exophoric uses but not restricted in relative clauses would lead to the prediction that the pronoun *they* freely allows exophoric uses while the relative clause use is degraded. This is exactly what we see in the pattern with *they*: the exophoric use is fully felicitous as in 252, while the relative clause use is somewhat degraded as in 253. Even if a reading is forced on 253, we get a familiarity requirement just as in the case with *it*.

(252) They_→ look happy, but they_→ do not.

(253) ?They who read never fail.

Thus, what we see is that pronouns and demonstratives compete in a close-knit way, where the availability of the demonstrative in a given context is what determines whether the pronoun is possible in that same context. When demonstratives can be used for animate referents, as with *those* with relative clauses and *that* in pointing-out contexts, pronouns *they* and *he*, respectively, are blocked.

4.4.1 GOING BACK TO PRONOMINAL DEMONSTRATIVES

This discussion allows us to go back to the problems raised for previous approaches of demonstratives. I have argued that both the exophoric approach and the markedness approach cannot account for English demonstratives because pronominal and adnominal demonstratives differ in their interpretation and distribution. What we saw is that pronominal demonstratives are much more restricted (like German demonstratives) than adnominal demonstratives. This is not surprising given the current analysis, where pronominal demonstratives compete with the anaphoric pronoun *it*, while adnominal demonstratives compete with definite descriptions in the adnominal scale. Note that pronouns in English are restricted to anaphoric uses. Given the competition mechanism, it is predicted that the pronominal demonstrative *that* would only appear when the anaphoric information of *it* is not sufficient in resolving the referent. On the other hand, for the adnominal scale, there might be an independent economy principle that might motivate a speaker to use the demonstrative description instead of the definite

description. This is because in English, definite descriptions can also refer to non-familiar entities, in its uniqueness denoting form (cf. the weak definite in Schwarz 2009). Thus, if a speaker wants to ensure that the addressee interprets the DP anaphorically, the speaker might choose the demonstrative description which must carry an additional property (which includes the anaphoric index), over a definite description which does not obligatorily carry an index.

Thus, separating the adnominal and pronominal scales allows us to better account for the distributional patterns of demonstratives in English.

4.4.2 PREDICTION ON GERMAN

This theory also makes a prediction on German demonstratives. Unlike English, German has a full set of demonstrative pronouns that may compete with personal pronouns. This is shown in the table in 254.

(254) German personal, definite, and demonstrative morphemes

	$\phi(x)$	$\phi(x) \wedge P(x)$	$\phi(x) \wedge P(x) \wedge Q(x)$		
	p-pro	d-pro	d-adn	dem-pro	dem-adn
	er	der	der N	dieser	dieser N
sg	sie	die	die N	diese	diese N
	es	das	das N	dieses	dieses N
			die N		diese N
pl	sie	die	die N	diese	diese N
			die N		diese N

Because demonstrative pronouns only add the *R* information to the denotations of personal pronouns, the use of demonstrative pronouns in German would suggest that the anaphoric information of the personal pronouns was not sufficient in resolving the referent. This would lead to markedness, where the use of demonstrative pronouns suggests the need of the *R* property to refer successfully.

This is what we find: it is widely observed that demonstrative pronouns in German are more restricted than personal pronouns in distribution and interpretation. The exact nature of this restriction has been debated, with some researchers arguing that it is more syntactic and some arguing that it is semantic in nature. For example, sentences as in 255 were used to argue that demonstrative pronouns cannot be variable-bound (Wiltschko 1998).

- (255) a. Peter
- _i
- glaubt, dass er
- _i
- /*der
- _i
- stark ist.

Peter believes that he/DemPro is strong.

- b. [Jeder Mann]_i glaubt, dass er_i/*der_i stark ist.

Every man believes that he/DemPro is strong.

Hinterwimmer (2015), on the other hand, argues that demonstrative pronouns actually do allow BV-readings; just not grammatical subject ones, using examples such as 256.

- (256) a. *Peter_i glaubt von [jedem Kollegen]_j, dass der_j kluger ist*
 Peter believes of every-dat colleague that DemPro-nom smarter is
als er_i.
 than he
 ‘Peter_i believes of [every colleague]_j that he_j is smarter than him_i.’

- b. *Peter stellte [jedem Studenten]_j mindestens eine Frage, die*
 Peter posed every-dat student-dat at-least one question which
der_j nicht beantworten konnte.
 DemPro-nom not answer could
 ‘Peter_i asked [every student]_j at least one question that he_j couldn’t
 answer.’

(from Hinterwimmer 2015: 67, ex. 1617)

However, in later works, Hinterwimmer & Bosch (2016) argue that reference to subject is possible as long as the referent is not the topic, or the perspective center. For instance, in 257, the demonstrative pronoun can refer to the subject, but the subject is not the perspective center of the sentence.

- (257) [Jede Mathematikerin]_i machte auf Paul den Eindruck, als würde deren_i Intelligenz die seine bei weitem übersteigen.

‘[Every female mathematician]_i gave Paul the impression as if her DemPro_i intelligence would surpass his own by far.’

This markedness property has been analyzed in two different ways that in fact reflect the exophoric approach and the extended definite approach in many ways. The first approach is like the exophoric approach, where a lexically-specific restriction is added to demonstrative pronouns. For example, Hinterwimmer (2015) adds to the denotation of demonstrative pronouns a restriction against referring to the most salient referent, as in 259.

$$(258) \quad [\![\text{er}_{\text{sn}} \text{ NP}_m]\!]^g = \iota x(\text{male}(x)(g(s_n)) \wedge g(P_m)(x)(g(s_n)))$$

where g is the assignment function

$$(259) \quad [\![\text{der}_{\text{sn}} \text{ NP}_m]\!]^g = \iota x(\text{male}(x)(g(s_n)) \wedge g(P_m)(x)(g(s_n)) \wedge g(P_m) \neq P^*)$$

where P^* is the currently most salient property

- a. In potential binding configurations, P^* is the property of being (identical to) a variable A-bound by the DP functioning as the grammatical subject of the sentence containing the respective D-pronoun
- b. In non-binding configurations, $P^* = P_{\text{top}}$, where P_{top} is the property denoted by the NP contained in the most recent DP functioning as topic

The second approach is like the extended definite approach in that demonstrative pronouns are analyzed as carrying something additional to personal pronouns. For example, Patel-Grosz & Grosz (2017) argue that demonstrative pronouns in German carry an anaphoric index while personal pronouns do not. They further argue that there is an economy principle *Minimize DP!* that blocks unnecessary syntactic projections. In other words, they account for the restrictions and markedness of demonstrative pronouns by maximizing the use of personal pronouns and only licensing demonstrative

pronouns when necessary.

I take the intuition from both approaches but argue that the general competition mechanism and the non-familiar property *R* are sufficient to predict the effects we observe in German demonstrative pronouns. It is true that demonstrative pronouns show anti-saliency or anti-perspective center properties as argued in Hinterwimmer & Bosch 2018, but I suggest that this does not have to be lexically encoded in the denotation of demonstrative pronouns. Also, it is true that an economy-based principle blocks the use of demonstrative pronouns whenever possible, but it isn't because they carry indices unlike personal pronouns, as Patel-Grosz & Grosz (2017) argue. I assume that personal pronouns also carry indices. The competition is not between two syntactic structures but between two semantic denotations, and the demonstrative pronoun which carries an additional *R* property is restricted from anaphoric uses due to implications that arise when it is used over a personal pronoun. We have already seen similar effects in the competition between covert and overt pronouns in Romance languages. It would be interesting to know whether the resistance of perspective center reported in Hinterwimmer & Bosch 2018 is also present in Romance languages when overt pronouns are used.

Thus, we have seen that the competition mechanism and the analysis of demonstratives presented in this chapter predict a tighter competition in German which has a full paradigm of demonstrative pronouns. This prediction is borne out, and we can analyze it as one of many similar effects that result in different domains across languages.

4.5 ANAPHORIC DEMONSTRATIVES AS LAST-RESORT

The second prediction of this analysis is that demonstratives would not receive an anaphoric interpretation unless there is no property to fill the *R* position. This prediction arises from the requirement from the economy principle and the resulting implication when demonstratives are used. Recall that the economy principle requires that the lowest element in the scale that can resolve the reference be used. Thus, when a higher element is used in a given context, it suggests that the lower elements were not sufficient in resolving the referent.

This reasoning applies to contexts in which the demonstrative was used. Because demonstratives are placed at the higher end of the scale, when the speaker makes use of the demonstrative, it suggests that the pronoun or the definite description was not sufficient in resolving the referent and that the property carried in *R* was crucial in making this possible. More specifically, the *R* property serves as an alternative mechanism to anaphoric indices in identifying the referent.

It is not surprising then, that the anaphoric use of a demonstrative would be highly marked. The use of the demonstrative suggests that an additional property other than anaphoric indices must be used. If a demonstrative is used anaphorically, it is semantically equivalent to the denotation of a pronoun or a definite description, except that the meaning is derived in a redundant way, where the property that replaces the anaphoric index is again filled with an anaphoric index.

The resulting prediction is that an anaphoric use of a demonstrative would be used as a last resort option, when neither pointing nor relative clauses is available. In other

words, if there is a pointing gesture or a relative clause available to fill the *R* position, it is predicted that demonstratives would obligatorily combine with them in order to avoid redundancy.

In the next two sections, I show some experimental evidence that supports this prediction. In the first experiment, I show adult interpretation of demonstratives and pronouns with or without pointing. What we see in the result is that even in a context where the anaphoric interpretation is preferred, demonstratives obligatorily break the anaphoric link and receive an exophoric meaning if pointing is present. This is different from pronouns which maintain the anaphoric interpretation even if pointing is present. Without pointing, however, we see that demonstratives also receive an anaphoric interpretation, showing that adults do accommodate this last-resort use of demonstratives where the anaphoric index fills the *R* position. The second experiment shows that children seem to have a more difficult time accommodating for demonstratives without pointing. When the prompt contains the use of a demonstrative without pointing, children between ages 2 and 3 do not interpret it anaphorically, showing at-chance performance unlike adults. Only when they get to ages 4 to 5 do they become more adult-like in interpreting demonstratives without pointing anaphorically. Preliminary eyegaze data collected on the subset of the participants suggest that children are waiting for additional cues from the speaker when the demonstrative is used, which in turn suggests that children might notice that the *R* property is missing for demonstratives but do not automatically turn to the anaphoric option like adults.



Figure4.1: Sample video screenshot.

4.5.1 ACCOMMODATION OF ANAPHORIC DEMONSTRATIVES

The experiment presented in Ahn & Davidson 2018 was designed in response to the exophoric account of demonstratives, where demonstratives as a whole lexical category was described as obligatorily being exophoric. Ahn & Davidson (2018) argue that demonstratives are not fundamentally different from pronouns in being exophoric, and that what is different between demonstratives and pronouns is how they compose with an exophoric pointing when it is present.

In the experimental study, native speakers of English were shown a video where the speaker is standing in the middle of the video with two entities – either physically present at a distance from the speaker or as images overlaid in the video, as shown in Figure 4.1. The speaker started by introducing one of the objects with a property that is not detectable from the images alone, such as being friends, as in 260. For inanimate referents, the invisible property was of possession ('One clock is mine.').

(260) One woman is my friend.

The subsequent sentence either had a pronoun or a demonstrative, either with pointing or without. The schema and the sentences are shown below.

(261) *Experiment Schema*

[DEM]	[PER]
[+point] that _→	woman she _→
[-point]	that woman she

- (262)
- a. That_→ woman plays soccer. [that, +point]
 - b. That woman plays soccer. [that, -point]
 - c. She_→ plays soccer. [pronoun, +point]
 - d. she plays soccer. [pronoun, -point]

Note that in this test, animate pronouns *he* and *she* were used. The full set of trial items is provided in Appendix A.

The question prompt then asked the participant to identify the referent of the first sentence ('Aidan's friend') as in 263. Only two choices, the soccer-player and the non-soccer-player, were given. By asking this forced choice question, we investigated whether the anaphoric expressions with and without pointing are interpreted anaphorically. If for example, *she* is interpreted anaphorically, it would be immediately obvious that Aidan's friend is the soccer-player. However, if *she* is not interpreted anaphorically, there is no link between the two sentences in the prompt, and it would not be clear which woman is Aidan's friend.

- (263) Which woman is Aidan's friend?

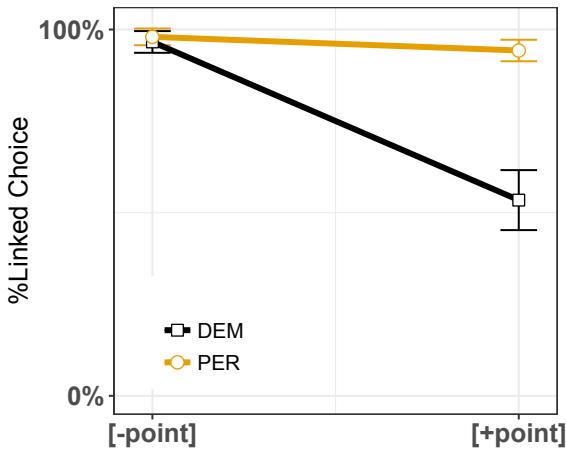


Figure4.2: Average percentage of linked choice.

The graph plotting the average percentage of linked choice (choosing the soccer player) is shown in Figure 4.2.

What we found was that in the absence of pointing, both animate pronouns and demonstratives referred anaphorically to the referent introduced in the previous sentence. When there is pointing, however, animate pronouns and demonstratives diverge. Animate pronouns maintained the anaphoric interpretation, while the demonstrative description broke the anaphoric link. The almost at-ceiling percentage of anaphoric interpretation for pronouns seems to be due to the bias for the anaphoric interpretation that was caused both by the task given in the study as well as discourse coherence. In the study, participants were given a few clues and asked to identify who the friend was. So, participants could have tried to accumulate as much information as possible that could help them in identifying the answer. Only when the pronoun is interpreted anaphorically does this become a helpful clue, and so participants may have been tempted to

analyze the pronoun anaphorically. Discourse coherence alone could have also added to this anaphoric bias. The speaker is uttering two sentences in the video, and in a coherent discourse, participants would expect the two sentences to be related to each other in some way. This is only possible when the anaphoric expression in the second sentence refers to the referent introduced in the first sentence. Thus, in many ways, there was a bias for the anaphoric interpretation.

What is striking is that despite this strong anaphoric bias that forced participants to interpret the animate pronouns fully anaphoric, the demonstrative obligatorily broke the anaphoric link. Participants were not able to maintain the anaphoric interpretation when demonstratives were used with pointing. This supports the prediction that the anaphoric interpretation of a demonstrative is a last-resort option, and that when a pointing information is present, demonstratives must obligatorily combine with it restrictively.

This study reveals that the main difference between pronouns and demonstratives is that while pronouns allow both truly anaphoric uses and demonstrative-like uses, the demonstrative description always requires an *R* position to be filled, and if there is a candidate available, like the exophoric pointing, it fills the *R* position with that property.

Another finding is that adult speakers of English readily accommodate the use of demonstratives even when there is no pointing or relative clause present. Moreover, when accommodating, they take the demonstrative to refer anaphorically, taking the last-resort option. In a subsequent study, I investigated whether children also accommodate this *R*-less use of demonstratives in a collaboration project Ahn & Arunachalam

2019.

4.5.2 CHILDREN DO NOT ACCOMMODATE

In Ahn & Arunachalam 2019, we looked at whether children also interpret demonstratives without pointing to be anaphoric, like adults do (Ahn & Davidson 2018). We created a similar experimental setup, where children were shown a series of videos and asked to answer a question following each video. In the video, the speaker in the middle of the screen continued to look straight at the camera, without turning her head or eyes to either of the objects displayed on each side of the screen. The speaker then started the prompt by saying the following in 264.

- (264) One baby is my friend.

We compared two conditions, the pronoun and the demonstrative condition. In the pronoun condition, the speaker continued with the sentence in (266a). In the demonstrative condition, the demonstrative description was used as in (266b). We ensured that the speaker does not make any gestures with her hands during this part.

(265) *Experiment Schema*

[DEM]	[PER]
[-point]	that BABY she

- (266) a. She is sleeping.
b. That baby is sleeping.



Figure4.3: Sample video screenshot.

The speaker then followed up with the question in 267.

(267) Which baby is my friend?

In order to test specifically the anaphoric uses, we did not have any exophoric pointing involved in the study. This also ensured that every condition has a correct answer, unlike the exophoric condition in the adult study in Ahn & Davidson 2018 where there was no correct answer.

Children between ages 2 and 5 participated in the study. If they are adult-like in interpreting the pronoun and the demonstrative anaphorically when there is no pointing, we would expect them to consistently point to the sleeping baby, the anaphoric choice. What we see in the results is different. The average score, where the correct anaphoric choice is given the score of 1, is plotted in Figure 4.4.

We divided children into two age groups, the younger group consisting of 2-3 year olds, and the older group consisting of 4-5 year olds. What we see is that children

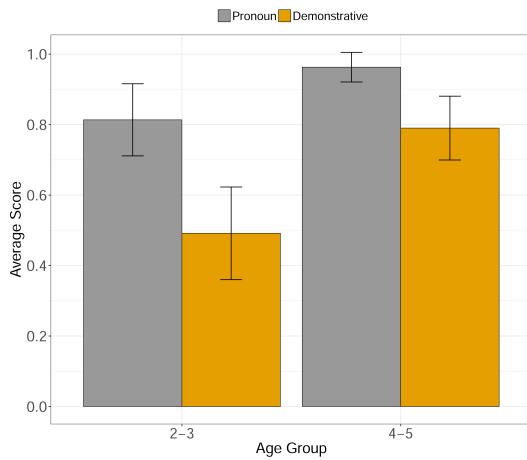


Figure 4.4: Average performance by age group.

are significantly better in the pronoun condition than in the demonstrative condition. In the younger group, the performance for the demonstrative condition is at chance, suggesting that they are having a difficult time interpreting the demonstrative without pointing. The older group shows a significantly better performance, suggesting that the anaphoric interpretation of a demonstrative without pointing is improved over age.

What could explain the difficulty children have in the interpretation of a demonstrative description without the presence of an exophoric pointing gesture? Based on preliminary eyegaze data collected on 35 of the participants suggests that this may be due to children expecting additional information upon hearing the demonstrative.

The plot in Figure 4.5 shows the proportion of looks to target and the speaker after hearing the sentence containing the anaphoric expression, namely at the start of the question ‘Which baby is my friend?’.

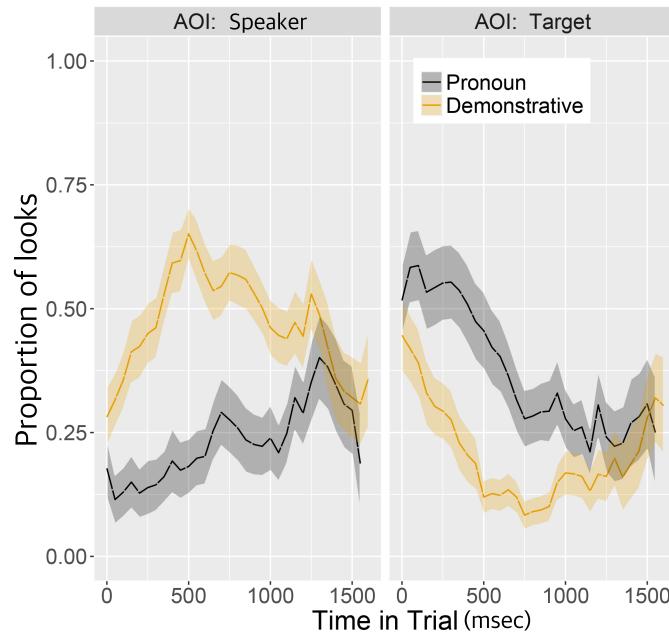


Figure4.5: Average proportion of looks to AOIs.

What we observe is what when the demonstrative description ('that baby' in the baby trial) is used, participants are less likely to look at the target item, the sleeping baby (the anaphoric choice). Instead, participants are looking significantly more at the speaker at this phase, unlike in the pronoun condition.

We argue that this suggests that children are waiting for additional information like pointing or eyegaze to be provided by the speaker when they hear the demonstrative. This could be due to at least two reasons. First, it may be that children may not have learned yet that demonstratives can be used anaphorically. It is likely that the majority of demonstratives used in child-directed speech involves an exophoric pointing rather than an anaphoric interpretation. If this is so, younger children might not have yet

acquired the anaphoric use of demonstratives at all, meaning that they will continue to wait for an additional information and fail to reach an interpretation when no additional information is provided by the speaker. Second, it may be children have a general difficulty in switching between different interpretations of a lexical item. When they hear a demonstrative, they may first assume that there will be pointing accompanying it. If they do not find the pointing information, they may have a delay in switching to the accommodated anaphoric interpretation that results in the wrong choice.

To make a conclusive claim, we will need to verify that demonstratives in child-directed speech are mostly used exophorically. A more fine-grained analysis of the eyegaze data would also shed light on how children interpret demonstratives in the absence of pointing. This will be taken up in future investigation.

4.6 INTERIM SUMMARY

What we have seen so far is the following. First, demonstratives are analyzed as carrying the same denotation as pronouns and definite descriptions, but with an additional property *R*. This additional property places demonstratives at the higher end of the respective scales: the pronominal scale that consists of pronouns and pronominal demonstratives, and the adnominal scale that consists of definite descriptions and adnominal demonstratives. The *R* property takes an exophoric pointing gesture and a relative clause. When neither is present, *R* takes the default anaphoric expression, but because there is always a semantically less complex form (pronoun or definite description) available in the anaphoric use, this use is predicted to be marked and only available as last resort. This was evidenced in an experimental study where demonstratives were

obligatorily analyzed as carrying the pointing information restrictively if pointing was present. I also showed that pronouns can also carry *R* in their denotation, but only when there is no pronominal demonstrative counterpart lexicalized in the language. We saw this when *it* was blocked from exophoric uses and generic relative clauses from competition with *that*, and when *they* was blocked from having the generic relative clause from competition with *those*.

In the next section, I present one possible analysis of the underlying structure of demonstratives. So far, I have simply shown that demonstratives carry an additional property *R* and, given the economy principle, the use of a demonstrative implies that the anaphoric pronoun or the definite description was not sufficient. This resulted in *R* providing an alternative mechanism that bleeds the use of the anaphoric index, giving rise to non-familiar uses involving pointing and relative clauses. In the underlying structure, I suggest that demonstratives might lexicalize a binary supremum operator that takes not just the information in its complement as its argument but also some additional property as its argument. This additional property slot would be taken by *R*.

4.7 POSSIBLE SYNTACTIC ANALYSIS

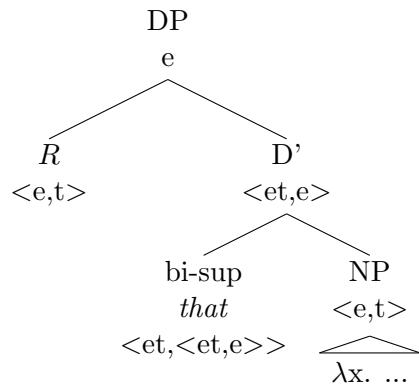
The main intuition I presented in this chapter is that demonstratives carry an additional property *R*. This additional property results in the implicature that the default anaphoric index is not sufficient in resolving the referent. Based on this intuition, I propose that demonstratives lexicalize a binary version of the supremum operator unlike definite descriptions and pronouns. This binary supremum has the denotation as shown

in 268 and takes not only the properties inside the NP but also an external property, R , as its second argument and return the maximal entity that meets all of the properties combined.

$$(268) \quad [\![\text{bi-sup}]\!] = \lambda P \ \lambda R \ \iota x : \forall y [R(y) \wedge P(y) \leftrightarrow y \sqsubseteq x]$$

The structure would be as shown in 269.

$$(269)$$



Note that R replaces the index information that would be added to the spec-DP position by default. The R slot can be occupied by an exophoric pointing gesture, which would have the denotation as in 270. It takes a locational variable A and an individual x and returns true if x is at A .

$$(270) \quad [\![→]\!] = \lambda A \ \lambda x. \ x \text{ is at } A$$

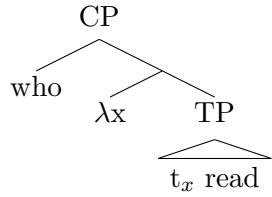
Thus, an exophoric demonstrative *that* would result in the following denotation:

$$(271) \quad [\![\text{that}_A]\!] = \sup [\lambda x. \text{entity}(x) \wedge [\text{inanimate}](x) \wedge \rightarrow(A)(x)]$$

‘The maximal inanimate entity that is at A’

R can also take a relative clause, which would have a denotation as below.

(272)



(273) $\llbracket \text{who read} \rrbracket = \lambda x. x \text{ read}$

The pronominal demonstrative *that* with this relative clause would have the following denotation:

(274) $\llbracket \text{those who read} \rrbracket = \sup [\lambda x. \text{entity}(x) \wedge [\text{plural}](x) \wedge \text{read}(x)]$

‘the maximal plural entity that reads’

If there is neither pointing nor relative clause available, R would take on an anaphoric index as a property rather than a presupposition like in other anaphoric expressions. So, the anaphoric demonstrative differs from other anaphoric expressions in carrying the index information as part of the restriction of the DP.

(275) $\llbracket \text{idx} \rrbracket = \lambda n \lambda x. x \text{ is } g(n)$

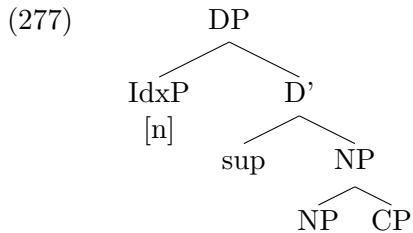
This correctly predicts the relative markedness, because the restriction carries an additional property (the index property) which is not present in the lower expressions in the scale.

One advantage of this analysis is that we can correctly predict a fine-grained difference we observe between pronominal and adnominal demonstratives in their interpretation with relative clauses. Note the following contrast in 276.

- (276) a. Those who read never fail.
 b. Those people who read never fail.

Note that in the pronominal *those* in (276a), the resulting reading is fully generic as discussed before. However, as soon as the demonstrative takes an NP complement as in (276b), the reading is no longer fully generic. Similar to the definite description with relative clauses, (276b) requires that the referent or at least the domain of people be previously established in the context.

This is correctly predicted by the analysis presented here. Note that a relative clause can appear not only in the *R* position as proposed here, but also inside the NP argument, as classic accounts of relative clauses assume. This means that the pronominal and the adnominal demonstratives differ in that the latter has an additional slot for relative clauses. Thus, in the adnominal demonstrative, it is possible to have the relative clause appear in the lower NP argument instead of inside the *R* position as shown in 277.



Note that in 277, the *R* position is not filled, and thus would take the anaphoric

index property. The anaphoric index requires the domain of referents to be familiar, which would result in the interpretation we see in (276b). The fact that adnominal demonstratives seem to resist the fully generic reading of relative clauses suggests that there might be some independent economy principle that requires that the relative clause be hosted by the lower NP whenever possible.

As for the pronominal demonstrative, however, there is no NP position available for the relative clause to be hosted in the lower position. The only place available is the *R* slot, which would take the relative clause information instead of the anaphoric index. This is why only the generic reading is available for pronominal demonstratives when relative clauses are present.

4.8 MORPHOSYNTACTIC REALIZATION OF EXOPHORICITY

So far, we have shown that the expressions that allow *R* in their spec-DP are the ones that allow exophoric uses as well as restrictive relative clauses. In English, the structure containing *R* can be lexicalized as a demonstrative or as a pronoun in contexts where there is no demonstrative available. Because there is a morphological distinction between pronouns and demonstratives, the underlying structure containing *R* has not received much attention in previous literature. What I have shown in this chapter is that pronouns sometimes take on the demonstrative form in English because the demonstrative paradigm in English is not complete.

In this section, I discuss three languages in which the *R*-containing structure is morphosyntactically marked. These languages are Romanian, Korean, and ASL, and the

way they reflect the underlying structure morphosyntactically differ. The overarching property, however, is that in all three of these languages, the presence of the binary supremum operator is systematically reflected in the morphology, where a distinct set of morphemes (the demonstratives in Romanian and Korean, and the use of location in ASL) appear whenever the underlying structure has a binary supremum operator in D. This is different from English, where the morphological divide (between pronouns and demonstratives) does not line up with the presence and absence of *R* due to syncretism.

The data from these three languages provide further support for semantically distinguishing the *R*-containing morphemes. While English doesn't show a distinction, many other languages do make a morphological distinction that aligns with this underlying structure and meaning. I focus on the data reported in Ahn 2017, which investigated the morphosyntactic marking of the exophoric use.

In identifying anaphoric and exophoric uses, Ahn (2017) uses the following set of criteria. For anaphoric uses, she uses bound-variable readings as in 278 following Schwarz 2009. For exophoric uses, she uses both the contrastive context in 279 and the introductory context in 280, inspired by the zoom-in and zoom-out contexts in Wolter 2006.

- (278) Every time I met a boy_{*i*}, I talked to that boy_{*i*}. [BV]

- (279) I like that star_{→*A*}, not that star_{→*B*}. [Contrastive]

- (280) Look at that star_{→*A*}! [Introductory]

Note that in English, the demonstrative *that* can appear in all three contexts. In German, while the strong definite can be used in bound variable reading as well as contrastive contexts, it seemed to be degraded in introductory contexts (Uli Sauerland, Florian Schwarz, pc), though this may be affected by the morphological restriction in evaluating strong definites: because the only way we can identify that the strong definite is being used in German is by looking at the inability to contract with the preposition, prepositional phrases must be used, and they might be conceptually not compatible with truly introductory uses.

4.8.1 KOREAN *ku* VS. *ce*

In Korean, there is a clear contrast between anaphoric and exophoric uses. Korean has a three-way distinction in the demonstrative paradigm (Sohn 1994, a.o.).

Ahn (2017) argues that the demonstrative *ku*, which is traditionally analyzed as referring to entities close to hearer, must be analyzed as a familiarity-denoting, anaphoric element. In contexts like 278, *ku* is obligatory, even though uniqueness denoting contexts allow bare arguments.

- (282) *secem-eyse aylpem-ul pol ttaymata *(ku) aylpem-ul sassta.*
 bookstore-DAT album-ACC see every.time ku album-ACC bought
 ‘Every time I saw an album I bought it.’ [Bound variable; *(ku)]
- (283) *Amsuthulong-un inlyu-sasang choycholo (*ku) tal-ey*
 Armstrong-TOPIC man-history first ku moon-DAT
chaklyukhayss-ta.
 landed
 ‘Armstrong was the first to land on the moon in human history.’ [Globally
 unique; *ku]

In exophoric uses, however, *ku* is completely ruled out. In such contexts, the demonstrative *ce* is used.

- (284) **ku/ce pyel-un yeypu-ko *ku/ce pyel-un an yepputa.*
 *ku/ce star-TOP pretty-CONJ *ku/ce star-TOP NEG pretty-DECL
 ‘That star is pretty, but that star is not pretty.’ [Contrastive; *ku/ce]
- (285) *ce/*ku pyel-ul pwa!*
 ce/*ku star-ACC look.IMP
 ‘Look at that star!’ [Introductory; *ku/ce]

In fact, *ku* is simply incompatible with the exophoric pointing gesture. It is not like pronouns in English that allow pointing in certain contexts for supplementary information. This incompatibility with pointing has been empirically tested in Ahn & Davidson 2018 in their Korean part of the study, where participants rated *ku* with pointing significantly lower than *ku* without pointing. It is also the case that *ce* obligatorily requires pointing. In the same test, Ahn & Davidson (2018) found that *ce* without pointing is also rated significantly low. The measures are shown in the plot in Figure 4.6, where [-point] con-

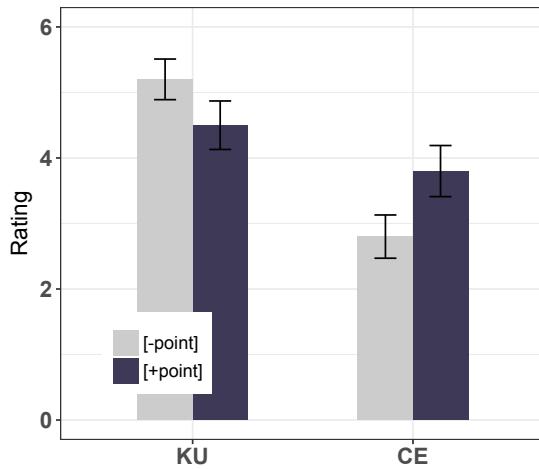
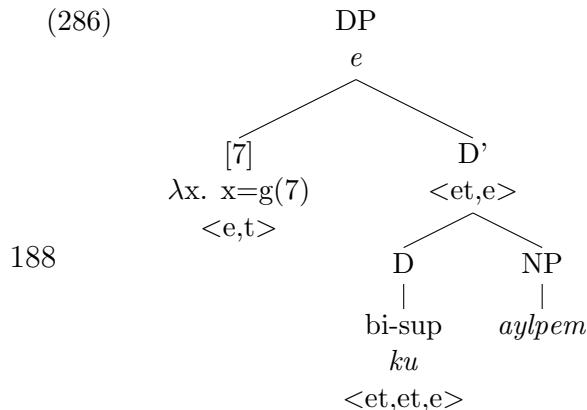


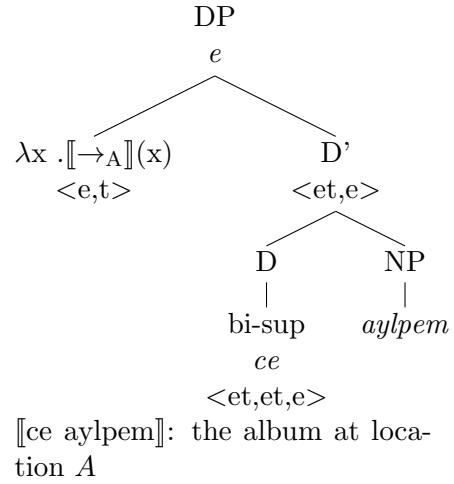
Figure4.6: Average rating of demonstratives with or without pointing (Ahn & Davidson 2018).

dition is significantly higher than the [+point] condition for *ku* and the opposite pattern is shown for *ce*.

I propose that Korean demonstratives always lexicalize the binary supremum operator, with morphological distinction reflecting what information is occupying the *R* position. For example, I argue that the binary supremum operator is lexicalized as *ku* when *R* contains an anaphoric information, while it is lexicalized as *ce* when *R* contains an exophoric information, specifically the distal exophoric information. The proximal exophoric information would lexicalize *i* in the same position. The structures are shown below, with *ku* in 286 and *ce* in 332.

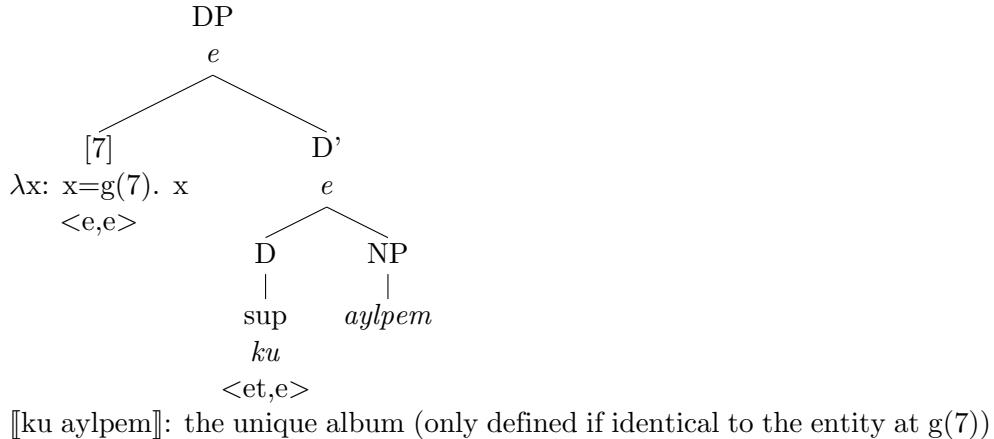


[[ku aylpem]]: the familiar album (287)
identical to the entity at g(7)



Recall that there is an alternative structure available for anaphoric uses. English definite descriptions, for example, do not require this binary supremum or the *R* property because the presuppositional anaphoric index is also available for them. It may be possible that *ku* lexicalizes this regular anaphoric expression that does not carry the *R* property, as shown in 288.

(288)



It is possible that *ku* lexicalizes this regular anaphoric use in 288. Then the difference between *ku* and *ce* is that the former is a unary supremum operator, while *ce* is a binary operator with *R* as its second argument. However, I argue against the structure 288

for *ku* for the following reasons. Unlike English demonstratives that allow anaphoric uses, *ce* in Korean is not compatible with an anaphoric use at all. What this suggests is that while demonstratives in English allow *R* to carry an anaphoric index, *ce* does not. One way to block the anaphoric *R* is to argue that the anaphoric *R* is lexicalized as *ku* instead of *ce*. This analysis where *ku* is also an *R*-carrying demonstrative is more compatible with traditional accounts of *ku* as in Sohn 1994 where *ku* is also analyzed as an exophoric demonstrative that refers to entities closer to hearer. While Ahn (2017) argues against this by showing that familiarity is necessary to license *ku* even for entities physically close to the hearer, it might be that there are speaker variations in which exophoric uses of *ku* is still possible. The exophoric use of *ku* that is decoupled from familiarity has not been attested yet, and the data from Ahn 2017 clearly shows that it is familiarity and not the exophoric distance that licenses *ku*, but a closer investigation might be necessary.

4.8.2 ROMANIAN SHORT VS. LONG DEMONSTRATIVE

Romanian is another language that distinguishes anaphoric and exophoric uses. Recall the two demonstrative constructions (Cornilescu 1993), repeated in 289.

- | | |
|--|---|
| (289) a. <i>acea stea</i>
that star
‘that star’ | b. <i>stea.ua aceea</i>
star.DEF that
‘that star’ |
| [Short form] | [Long form] |

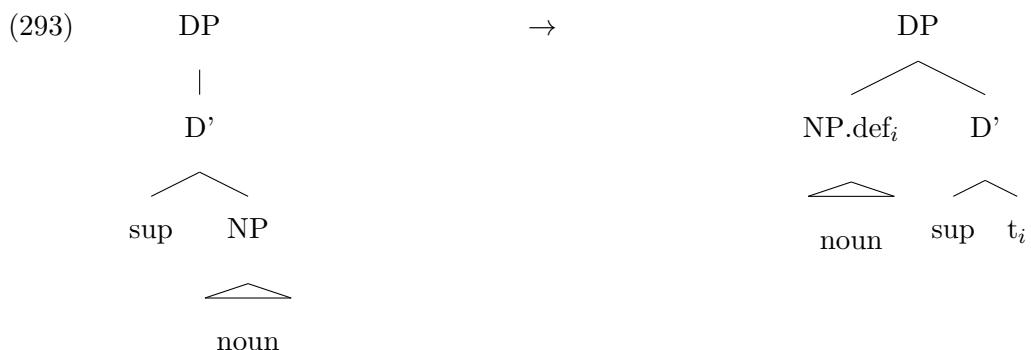
Using the same diagnostic, Ahn (2017) shows that the long form is restricted to exophoric uses, while the short form has anaphoric uses (Dora Mihoc, Andreea Nicolae, pc).

- (290) *In fiecare bibliotec care are vreo carte despre varz, caut în*
 in each library that has some book about cabbage search.1SG in
(acea) *carte dac pot s frig la grtar varza.*
 (that) book if can.1SG SUBJ grill.SUBJ+1SG cabbage.the
 ‘In every library that has a book about cabbage, I look in the book whether I
 can grill cabbage.’
- [Bound variable; short]

- (291) *Îmi place steaua aceea/*acea stea.*
 me.CL please star.the that/that star
 ‘I like that star.’
- [Contrastive; *short/long]

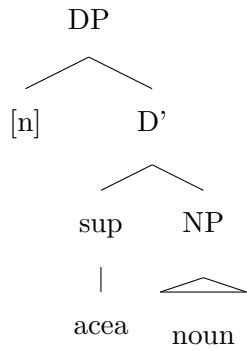
- (292) *uit-te la steaua aceea / *acea stea!*
 Look at star.the that / that star
 ‘Look at that star!’
- [Introductory; *short/long]

I propose the following structure for Romanian. I first start by noting that definiteness marking is reflected by the suffix that appears on the noun in Romanian. Consider the structure in 293. I argue that for definiteness to be licensed, the spec-DP has to be filled. This is done by NP raising to spec-DP position, and is morphologically realized as the suffix on the noun.



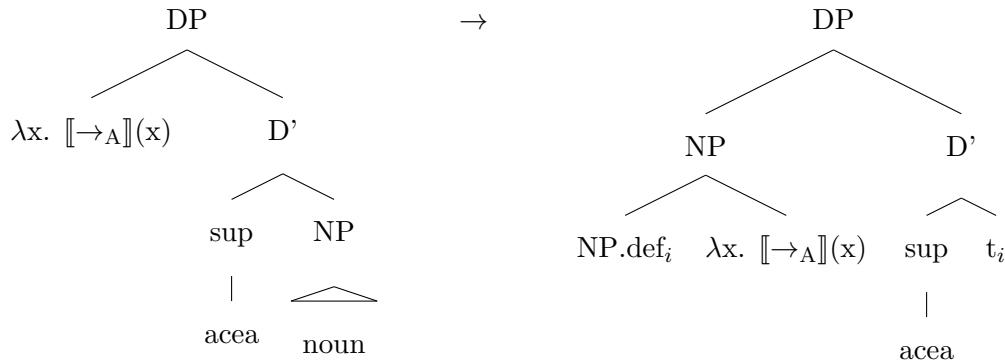
I further argue that the demonstrative in Romanian is realized at the D head as shown in 294. In anaphoric uses, the anaphoric index appears in the spec-DP position, thus bleeding the NP movement. This results in the correct word order where the demonstrative precedes the noun. Also, because there is no NP movement, the noun does not have the definite suffix.

(294)



Finally, in exophoric uses, *R* occupies the spec-DP position in place of the anaphoric index. I argue that the definiteness is not licensed by the pointing gesture that occupies *R* because it is not in the same modality as the rest of the DP. Thus, the presence of *R* in spec-DP is argued to trigger the NP movement again. The raised NP occupies the slot where the pointing property is, licensing definiteness. This results in both the definite-suffixed NP and the order in which the demonstrative follows the NP.

(295)



Romanian also provides support for the existence of two different structures for anaphoric and exophoric reference. The word order change and the definite suffix that only appears on the exophoric use suggest that there is some kind of NP raising happening only for exophoric uses. This would not be predicted by accounts where the exophoric use is equated to anaphoric uses.

The analysis presented here is preliminary and should be investigated further. But what we see is that to account for the distinction found in Romanian, we need at least two underlying structures. Further support for this specific analysis may be found in Romanian. Note that *R* is analyzed as carrying not only the exophoric pointing information but also a relative clause. When a restrictive relative clause appears, the surface form looks like a short demonstrative rather than a long demonstrative (Dora Mihoc, pc), as shown in 296.

- (296) *Acea care citesc nu dau niciodat gre.*
 those who read not give never error
 ‘Those who read never fail.’

This could be due to the fact that the relative clause in *R* is of the same modality as the

rest of the DP, and thus does not trigger NP raising to license definiteness. A remaining puzzle is how the linear ordering of the noun and the CP results from this structure. This is left for future investigation.

4.8.3 ASL: LOCUS AS *R*

ASL is another language that may reflect the presence of *R* morphosyntactically. Specifically, I argue that in ASL, *R* is morphosyntactically reflected as a locus. In ASL, signers can use the pointing handshape (IX) and point to different locations in the signing space or in the actual context to refer to entities. When referents are immediately in the context, IX points directly to the referent present in the context, just like the exophoric uses of pointing in spoken languages. When referents are not present in the context, IX can point to an abstract location and assign the entity there. Later, pointing to that locus can be used to anaphorically refer to that entity.

It has been assumed in many studies that loci in ASL are used for keeping track of anaphoric referents. Some argue that loci are overt instantiations of indices that are used for anaphora (Lillo-Martin & Klima 1990). However, it is not the case that loci are always necessary for anaphoric references in ASL. Building on existing and new data, I argue that loci are morphosyntactic realizations of the *R* property. This is further discussed in Chapter 5.

4.8.4 SUMMARY: MOTIVATING R

Data from Korean, Romanian, and ASL provide support for having two underlying structures, one dedicated for anaphoric uses and the other dedicated for exophoric uses. With these two underlying structures, we are able to account for the cross-linguistic distinction we find between anaphoric and exophoric reference. I summarize the cross-linguistic mapping between the two underlying structures and morphology in the table in 297.

(297) Underlying structures of anaphoric and exophoric reference

	Anaphoric	Exophoric
	DP [7] D' sup NP	DP CP D' $\lambda x \llbracket \rightarrow \rrbracket (A)(x)$ bi-sup NP
English	definite, pronoun	demonstratives, D-pronouns
Korean	<i>ku</i>	<i>ce</i>
Romanian	short demonstrative	long demonstrative
ASL	null, IX	IX to locus

4.9 CONCLUSION

In this chapter, I have presented a novel analysis of demonstratives that builds on the extended definite approach (Elbourne 2008; King 2008; Nowak 2014). Unlike the previous analyses where the additional property present in demonstratives was unspecified, I have proposed that this additional property R must consist of exophoric pointing gesture or a relative clause. Because the competition mechanism predicts demonstrative descriptions to be used only when the additional information it carries (R) is necessary to resolve the reference, it is predicted that R has an effect of bleeding the use of the anaphoric index in pronouns and definite descriptions. It is also predicted that an anaphoric use of a demonstrative would be a last-resort option since there are simpler forms that have an equivalent meaning. I provided experimental evidence showing that adults obligatorily break the anaphoric link when pointing is available with demonstra-

tives, which supports the hypothesis that anaphoric use of demonstratives is last-resort.

It is important to note that the main improvement this proposal has over the extended definite approach is the use of the competition mechanism that allows us to account for various markedness effects of demonstratives. This allows us to correctly predict demonstrative uses of animate pronouns *he* and *she* in English, as well as the more articulated restrictions in German personal pronouns and demonstrative pronouns due to a competition that is more defined.

5

Anaphoric expressions in ASL

This chapter proposes a new analysis of anaphoric expressions in American Sign Language (ASL). ASL makes use of a number of anaphoric expressions, including the null argument, the bare noun, as well as different kinds of indexical pointing (IX). IX can be used to point and refer to actual referents, and can also associate abstract locations in

the signing space (loci) to refer to referents not present in the context. This latter use of IX has received a lot of attention in the formal semantic literature, especially in the variable vs. variable-free semantics debate (cf. Jacobson 1999), as loci were analyzed as overt instantiations of indices (Lillo-Martin & Klima 1990).

In this work, I present data that suggest that IX with a locus is very much restricted in distribution and licensing conditions. This has been observed in a number of reference tracking studies (Czubek 2017; Frederiksen & Mayberry 2016), but have not been discussed much in the formal literature. I present this disconnect and motivate a more fine-grained investigation of IX in ASL. Based on an investigation on different uses of anaphoric expressions in ASL, I propose an alternative analysis of IX, where a) IX to a neutral position and IX to a locus are semantically distinguished, and b) IX to a locus is analyzed as a modifier that triggers a contrast. I show that the proposed semantic analysis and the general competition mechanism allow us to account for the distribution of the anaphoric expressions in ASL more fully.

5.1 INTRODUCTION: DISCONNECT ON STUDIES OF IX

American Sign Language (ASL) has recently received a lot of attention in the formal semantic literature, especially where it is argued to exhibit distinctions that are invisible or at least less clear in spoken languages. In the domain of anaphoric elements, the main focus has been on the pointing gesture (indexical; IX) directed to a location in the signing space (locus) (cf. Koulidobrova & Lillo-Martin 2016; Neidle et al. 2000). Since it has been claimed that loci are overt instantiations of indices that variables carry for pronominal reference (Lillo-Martin & Klima 1990), researchers have focused

quite exclusively on IX and loci in formal studies of ASL anaphora (cf. Koulidobrova & Lillo-Martin 2016; Irani 2016; Kuhn 2015; Schlenker 2011; MacLaughlin 1997; Neidle et al. 2000; Steinbach & Onea 2015).

Less considered in this series of literature is that IX, especially IX to a locus, is neither obligatory nor frequent in anaphora in ASL. Like any other sign or spoken language, ASL makes use of various anaphoric expressions including the null argument, pronominal elements, and full noun phrases, in addition to IX. In fact, when we take a look at narrative production studies like Frederiksen & Mayberry 2016 and Czubek 2017, we can see that IX is actually quite infrequent in natural discourse. Instead, null arguments and other mechanisms such as constructed action (where the signer iconically reproduce the action of the referent) are used much more frequently.

The fact that ASL makes use of other anaphoric mechanisms and that IX is infrequent in production studies provide an empirical challenge for these formal semantic studies. For example, the strongest interpretation of the argument that sign language loci are overt instantiations of indices cannot hold, as loci are not obligatory in all anaphoric references. Indices in formal semantics are assumed to be present whenever anaphora takes place. Thus, if ASL instantiates indices with loci, we would expect loci to be used in all anaphoric expressions. But loci are not overtly present in null arguments, bare nouns, or even in some uses of IX that are used anaphorically. Thus, the argument we can maintain would be that indices *can* be overtly instantiated in ASL even though they are also often covert. It would have to be explained why, in a single language, covert and overt forms of indices are both available, and why the overt form is so infrequent.⁷

⁷Note that this is different from languages allowing covert and overt pronouns. A pronoun is a morphosyntactic element, while indices are formal entities that are assumed to be present in the underlying structure of all anaphoric references. A morphosyntactic element can be covert,

Such discussions have not surfaced yet, due to a large disconnect between formal semantic/syntactic literature and referent tracking studies in ASL. In this chapter, I evaluate the formal semantic claims about ASL IX against the distributional properties observed in referent tracking studies and suggest an alternative formal analysis that could better account for natural production data.

I first present an overview of anaphoric expressions available in ASL, especially focusing on the claims made about ASL IX in the formal literature as well as the distributional properties observed in narrative production studies. Based on the relative frequency of bare nouns, null arguments, and different forms of IX in the narrative production studies (Frederiksen & Mayberry 2016; Czubek 2017), I then present a new hypothesis where **locus in ASL is triggered by contrast with competing referents**. Specifically, I argue that loci are licensed in anaphora only when there is a need to point out the intended referent from the rest of competing referents. This differs from previous accounts of locus in that the main role of loci is to draw contrast rather than to refer anaphorically.

The relative frequency of bare nouns, null arguments, and different IX forms reported in narrative production studies allow us to see some trends that track with contrast with competing referents. However, there are limitations in directly testing the predictions from these data due to two reasons. First, different forms of IX – specifically the neutral IX and the IX to locus – were not distinguished in their counts. Because my hypothesis is that IX with a locus, not IX in general, is used for contrast, we are not able to test this prediction directly. Second, the presence of competing referents was

but in this argument, it would have to be this formal element that can have both covert and overt instantiations, unlike spoken languages.

not coded in their studies. Their focus was on the distinction between maintained and reintroduced anaphora, which code whether the antecedent was introduced in the immediately preceding sentence (maintained) or prior to the immediately preceding sentence (reintroduced), as is common in referent tracking studies. However, the factor that is important for my hypothesis is the presence of other competing referents rather than the distance between the antecedent and the anaphor. It is possible that there is no competing referent even in reintroduced contexts, for example, if the referent is first introduced and then the story continues to talk about that referent for the next several sentences. Because the data are not coded for the presence of competing referents, we are not able to directly test for the role of contrast in analyzing different forms of IX.

Thus, in order to investigate the distribution and meaning of different forms of IX more closely, I present a set of comprehension data in Ahn, Kocab, and Davidson 2019 that involved a series of consultation sessions with three ASL informants. We manipulated the number of referents in the discourse as well as the choice of the anaphoric expression and asked the participants to indicate how felicitous the sentence is, and whether the referents of the anaphoric expressions were clear.

Based on this set of data, I propose an analysis of anaphoric expressions in ASL. First, I show how the basic denotations of each anaphoric expression in ASL allow for a naturally derived scale, as I have done in spoken languages in previous chapters. The scale contains the null argument in the lower end of the scale, and is built with expressions that carry more restrictions occupying higher positions in the scale. Second, I propose that the category of IX must be semantically distinguished between IX to a neutral position (IX_{NEUT}) and IX to a locus (IX_{LOC}). This is a novel claim that differs from syntactic accounts of locus vs. neutral position as in Steinbach & Onea

2015 or Kuhn 2015 where the difference was suggested to be a syntactic, feature-based difference that does not have semantic consequences. This claim is also different from accounts of IX such as in Koulidobrova & Lillo-Martin 2016 where the analysis of IX_{NEUT} was assumed to apply to IX with a locus as well. In my analysis, the two forms of IX are shown to have different distributions as well as different meanings. Under my account, IX_{NEUT} carries a *phi*-information that specifies animacy, while IX_{LOC} is a modifier that contributes the property of being signed at the given locus. After proposing the denotations for the null argument and the bare noun, I show that the competition mechanism proposed in the previous chapters allows us to better account for the distributional properties observed in previous studies.

I focus mainly on null arguments, bare nouns, and forms of IX in ASL in the scope of this work, leaving other mechanisms such as constructed action, classifiers, and clitics for future investigation. At the end of the chapter, I briefly discuss the use of clitics and how they relate to the current work in the analysis of directional verbs in sign languages.

5.2 ANAPHORIC EXPRESSIONS IN ASL

I start with an overview of the three kinds of anaphoric expressions used in ASL that are discussed in this chapter: null arguments, bare nouns, and IX. After discussing any formal analysis available from previous accounts for each expression, I present the frequency data from corpus studies (Frederiksen & Mayberry 2016; Czubek 2017) that tell us how frequent each expression is in naturally occurring anaphoric contexts. The disconnect between formal studies and corpus-based studies surface again in this

overview: the formal investigation of these expressions are disjoint pieces of work that focus on each expression in isolation, and thus often do not take into consideration its distributional properties.

5.2.1 NULL ARGUMENTS

ASL makes use of null arguments very frequently. Corpus and production studies show that null arguments are frequently used in sign languages (cf. Frederiksen & Mayberry 2016; Czubek 2017; Coppola et al. 2013). In the formal semantic literature, there has been a discussion on whether the null argument in ASL is similar to that of Romance languages or to that of Mandarin. Bahan et al. (2000) argue that it should be analyzed as the Romance type, showing that null arguments in ASL have the same licensing restrictions as Romance pro. Lillo-Martin (1986, 1991), on the other hand, argues that ASL is a hybrid language that has both the Romance type and the Mandarin type. The main distinction between the Romance type and the Mandarin type is that the former is only licensed when the verb is inflected to show agreement. In the Mandarin type, such inflection is not visible. Simplifying a bit, the agreement-licensing property results in a syntactic restriction on Romance pro: it is only available in the subject position, while the Mandarin pro does not have such restrictions (but see Liu 2014 for restrictions on Mandarin pro-drop).

- (298) a. *El *(la) vio.*
he her.cl saw
'He saw her.'
- b. *Ta kanjian Ø le.*
he saw asp
- [Spanish]

‘He saw him.’ (Roberts & Holmberg 2010:9)

[Mandarin]

- (299) a. *Qui non *(si) puó fumare*
here not SI can smoke
‘One is not allowed to smoke here.’ (Roberts & Holmberg 2010:12) [Italian]

b. \emptyset *kitsuen deki-masen*
smoke can-neg
‘One cannot smoke here.’ [Japanese] [All examples from Koulidobrova 2012]

Koulidobrova (2012) argues that null arguments in ASL cannot be analyzed in parallel to the Romance type. She shows that ASL null arguments allow generic and indefinite readings. This is not predicted under the Romance pro story because the agreement-licensed pro must be definite.

- (300) \emptyset CAN’T SMOKE HERE

‘One can’t smoke here.’

Koulidobrova (2012) also provides arguments against analyzing ASL null arguments similar to East Asian null arguments. Null arguments in East Asian have often been analyzed as argument ellipsis, and have been shown to occur in non-DP positions such as AP, PP, and CP positions in Japanese. A case of the CP ellipsis is shown below in 301.

- (301) *Taroo-wa zibun-ga tensai da to omotteiru ga Ken-wa \emptyset omotteinai.*
Taroo-TOP self-NOM genius be that think while Ken-TOP think-not

‘Taroo thinks that he is a genius while Ken does not think ().’ [CP ellipsis]

Koulidobrova shows that ASL null arguments are restricted to the nominal domain. For example, CP ellipsis is not possible as in 302.

- (302) MARY FEEL _{neu}POSS TEACHER PREFER BOOK PAPER, PETER NOT
FEEL THAT/*∅.

‘Mary feels that the teacher prefers paper-made books [to kindle], but Peter does not feel that/the same.’

Thus, she argues that ASL null arguments are not like East Asian null arguments. Note, however, that Japanese null arguments are not always analyzed as argument ellipsis. Kurafuji (2018) analyzes null arguments in Japanese as a case of choice function. Also, it is not the case that all East Asian languages allow ellipsis in non-nominal positions. For example, Korean does not allow ellipsis in AP, PP, or CP positions. It only allows null arguments in the nominal domain, similar to ASL. The CP ellipsis example parallel to 301 is shown in 303.

- (303) Jin-un casin-i pwucohata-ko sayngkakha-ciman Namjoon-un
Jin-TOP self-NOM imperfect-that think-but Namjoon-TOP
kulehkey/*∅ sayngkakhaci anhnun-ta.
like-that/∅ think NEG-DECL
‘Jin thinks that he is imperfect, but Namjoon does not think so.’

Note that in 303, the null argument is impossible and instead the anaphoric demonstrative *ku* must appear, much like what we see in 302 from Koulidobrova 2012. Thus, while null arguments in ASL do not seem to have the same restrictions as Romance

pro, there needs to be more research on cross-linguistic variation on argument ellipsis to more conclusively determine how ASL fits into the larger typology.

5.2.2 BARE NOUNS

ASL is a bare nominal language, like Mandarin and Russian: it does not have obligatory definite or indefinite markers, allowing the bare noun to receive definite and indefinite interpretations depending on context. Often overlooked in the literature is that ASL bare nouns allow anaphoric uses.

For example, the second instance of the bare noun PRIEST in 304 from Koulidobrova & Lillo-Martin 2016 is used anaphorically without the use of IX.⁸

(304) TODAY SUNDAY. DO-DO. GO CHURCH, SEE PRIEST. (*IX) PRIEST
NICE

‘Today is Sunday. What to do? I’ll go to church, see the priest. The priest is nice.’

There is no formal discussion on what the denotation of these nouns are, or how they are used anaphorically, as far as the author knows. Note that, as discussed previously in the dissertation, there has been an extensive amount of work done on different interpretations of bare nouns in other spoken languages (Chierchia 1998b; Dayal 2009; Jiang 2012; Jenks 2015, a.o.). Many of the research questions on bare argument languages

⁸Koulidobrova & Lillo-Martin (2016) use this example not to show that bare nouns are possible in anaphora but to argue that IX is not like the strong definite in Schwarz 2009 which allows anaphoric uses.

like Mandarin, Hindi, and Russian would be relevant to ASL as well, and it would be fruitful to closely investigate how ASL fits into the picture of the larger category of bare argument languages.

5.2.3 IX AND LOCI

Across sign languages, a point with the index finger (IX) can be used to point to an abstract locus in the signing space to refer back to an antecedent anaphorically (Friedman 1975, Liddell 2000, Neidle et al. 2000, Koulidobrova & Lillo-Martin 2016 a.o.). There has been a lot of attention given to analyzing IX and loci, in formal syntax and semantics. In the syntactic discussions, IX has been analyzed as a determiner (MacLaughlin 1997; Neidle et al. 2000; Irani 2016), a demonstrative (Koulidobrova & Lillo-Martin 2016), as well as a personal pronoun (MacLaughlin 1997; Schlenker 2011). In the semantic literature, there has been discussions on whether to analyze loci as signed correlates of phi-features (Neidle et al. 2000, Kuhn 2015) or variables in the dynamic semantic framework (Schlenker 2011). IX and loci do not have to cooccur. Due to this, we often see that an analysis of a specific combination of IX and locus is generalized to the whole class of IX or loci. Noting this, Koulidobrova & Lillo-Martin 2016 analyze the use of IX in isolation, without association with loci. However, this also misses an important generalization. It is true that loci are not always necessary on IX, but whether a locus is associated with IX affects distribution as well as interpretation, as will be shown in 5.4.

Thus, I will organize the previous arguments on IX and loci in the following way. I start with the discussions of IX as encoding some kind of anaphoric expression. Un-

like MacLaughlin 1997 and Neidle et al. 2000 who analyze IX as a definite determiner without discussing different uses of definite determiners in English, Irani (2016) specifies that IX corresponds to the anaphoric definite. Kuhn (2015) presents evidence that IX is pronominal rather than reflexive. While his argument that IX is not reflexive is strong, it is unclear whether IX has to be a pronoun rather than other types of anaphoric expressions. We have seen throughout this thesis that definite descriptions and demonstratives are included in the scale of anaphoric expressions. Which type of anaphoric expression IX is, is not specified in Kuhn's analysis. In fact, Koulidobrova & Lillo-Martin (2016) argues that IX should be analyzed as a demonstrative rather than a pronoun, showing examples where IX seems to be more marked than English pronouns. I discuss these studies in turn, establishing that IX encodes anaphoricity.

I then go on to discussions of ASL loci in the formal semantic literature, where they have been analyzed as indices (Lillo-Martin & Klima 1990; Steinbach & Onea 2015) or features (Kuhn 2015) associated with pronoun reference. I will show that there are limitations on both of these analyses due to the fact that a) IX to locus is neither obligatory nor licensed in all anaphoric contexts in ASL, and b) the use of locus seems to track with contrast. These two properties are difficult to explain in either index-based or feature-based analyses.

5.2.3.1 IX

IX has been analyzed as a definite determiner (Neidle et al. 2000; MacLaughlin 1997). However, as discussed in earlier chapters, there are two uses of definite determiners that have been discussed in more recent semantic literature. Schwarz (2009) argues

that the uniqueness-denoting definites should be semantically distinguished from the familiarity-denoting definites. The latter carries an anaphoric index and requires that the referent be familiar to conversation participants, while the former simply requires that the referent be unique in the given context. Cross-linguistic studies show that these two types of definites are morphosyntactically distinguished in a number of languages. Applying this distinction to ASL, Irani (2016) argues that IX should be analyzed as the familiarity-denoting definite (called strong definites following Schwarz 2009), based on examples as in 305. It is shown in 305 that IX to the locus associated with the book (IX_A) is obligatory for the anaphoric use of *the book* in the second sentence.⁹

- (305) JOHN BUY IX_A BOOK, IX_B MAGAZINE. #(IX_A) BOOK EXPENSIVE.

‘John bought a book and a magazine. The book was expensive.’ [Irani 2016]

Koulidobrova & Lillo-Martin (2016) also provide examples against analyzing IX as the uniqueness-denoting (weak) definite, as shown in 306. In 306, what we see is that IX is not licensed just by the fact that the referent (the capital of France) is unique in the given context. IX seems to require the referent to be familiar with conversation participants, which it isn’t in 306.

- (306) FRANCE (*IX) CAPITAL WHAT

‘What is the capital of France?’

In fact, Koulidobrova (2012) argue that IX is not the strong definite either, using

⁹The subscript after IX represents the locus variable. IX without a locus in glosses suggests that the pointing sign is in the neutral position rather than at a specific locus.

examples like 307.

- (307) TODAY SUNDAY. DO-DO. GO CHURCH, SEE PRIEST. (*IX) PRIEST
NICE

‘Today is Sunday. What to do? I’ll go to church, see the priest. The priest is nice.’

The conflicting analyses between Irani 2016 and Koulidobrova & Lillo-Martin 2016 can be resolved when we consider the neutral IX used in 307 separately from IX to locus discussed in Irani 2016. Koulidobrova & Lillo-Martin (2016) purposefully only focuses on IX to the neutral position rather than IX to loci in order to tease apart the effects of loci and the meaning of IX. Instead of generalizing this analysis to IX to loci as well, I restrict the analysis in Koulidobrova & Lillo-Martin 2016 to neutral IX only, and suggest that IX to loci indeed allows anaphoric uses as claimed in Irani 2016. In the present work, the two types of IX will be analyzed as two separate morphemes. In other words, IX to loci is not analyzed as the neutral IX plus a locus. Neutral IX and IX to loci are two separate morphemes that do not have an entailment or a subset relation.

It has been observed that IX behaves like a pronoun rather than a reflexive. For example, it has been observed that IX shows Condition B effects like other pronouns (308; Sandler & Lillo-Martin 2006) as well as crossover effects (Lillo-Martin 1991; Sandler & Lillo-Martin 2006; Schlenker & Mathur 2013).

- (308) Condition B in ASL:

- a. *JOHN_a LIKES IX-a.

b. JOHN_a LIKES SELF-a.

(309) Crossover effect in English:

a. Which boy_i did he think t_i would win?

(Unavailable reading: Which boy x is such that x thought that x would win?)

(310) Crossover effect in ASL:

a. *WHO-CL-a IX-a THINK MARY LOVE NO-MATTER WHAT?

'Who does he think Mary will love no matter what?'

Intended: 'Which person x is such that x thinks that Mary loves x no matter what?' [Schlenker & Mathur 2013]

Kuhn (2015) adds semantic similarities such as covariation with the antecedent as shown in 311.

(311) EACH-TIME LINGUIST_a PSYCHOLOGIST_b THE-THREE-a,b,1 TOGETHER WORK, IX-a HAPPY BUT IX-b HAPPY NOT.

'Whenever I work with a linguist and a psychologist, the linguist is happy but the psychologist is not happy.'

These data points establish that IX is like a pronoun and not like a reflexive. It is crucial to note, however, that the only conclusion we can draw from this set of examples is that IX is not a reflexive. Whether it is necessarily a personal pronoun rather than other types of anaphoric expressions like a strong definite or a demonstrative is not

derived from these examples. This is because a strong definite and a demonstrative also show all of these properties: Condition B in (312a), crossover effects in (312b) and (312c).

- (312) a. John_i likes {him, the boy, that boy}*_i
- b. Which boy_i did {he, the boy, that boy} think t_i would win?
 (Unavailable reading: Which boy x is such that x thought that x would win?)
- c. Whenever I work with a linguist, {he, the linguist, that linguist} is happy.

In fact, Koulidobrova & Lillo-Martin (2016) argue that IX should be analyzed not as a personal pronoun but as a demonstrative. Their argument is based on examples as in 313.

- (313) a. MOTHER_i PERSUADE MARY_j MAKE SANDWICH_k. a-IX_{j,k,*i} GOOD
 ‘My mother persuaded my sister to make a sandwich. {She/it} is good.’
- b. SANDWICH_k MOTHER_i PERSUADE MARY_j MAKE. b-IX_{i,j,?k} GOOD.
 ‘Mother is persuading Mary to make a sandwich. {Mother/Mary} is good.’

There is a descriptive generalization that personal pronouns refer to the most salient referent or the topic, while demonstratives refer to the other referent in English. For example, demonstrative pronouns in German are analyzed as anti-topic or anti-perspective holder in Hinterwimmer & Bosch 2016, 2018. Showing that IX in neutral position is degraded in referring to the subject in (313a) and in referring to the topic in (313b), Koulidobrova & Lillo-Martin argue that IX is not a personal pronoun but a demonstra-

tive.

However, note that there are many factors that may be playing a role in this resolution pattern shown in 313. The first factor is the last-mention bias. For example, pronouns in spoken languages are often observed to refer to the last-mentioned referent (Roberts 2002). This is shown in the example in 314 with the English pronoun *she*.

- (314) A woman entered from stage left. Another woman entered from stage right.
She was carrying a basket of flowers. [Roberts 2002]

If pronouns are likely to refer to last-mentioned elements, then the tendency of a-IX in (313a) and b-IX in (313b) in not referring to the first-mentioned entity (MOTHER and SANDWICH, respectively) follows from an analysis of IX as pronouns.

Another factor is the availability of null arguments in ASL anaphora. This is an important difference between languages like English and ASL because, as discussed in previous chapters, the interpretation of an expression including its markedness is affected by the presence of other expressions in the language. In other words, given two expressions that can refer to the same referent in a given context, the more complex form is marked. This is what we find with overt pronouns and demonstratives in English. In languages that make use of null arguments like Romance, the null argument can compete with the overt pronoun, thus making overt pronouns marked. Since IX to a neutral position is an overt pronominal expression, it may be more marked than the null pro, just like in Romance languages. So, it is predictable that the more marked IX would refer to secondary referents due to a competition with the less marked null argument. With this in consideration, the markedness of IX in examples like 313 remains

compatible with analyses of IX as a pronoun.

What we have seen so far is that while there is a number of examples that suggest that IX encodes anaphoricity, it is unclear which kind of anaphoric expression IX should correspond to. There are two issues that complicate the matter in these works. The first is the heavy focus on the comparison between ASL and English. ASL is a bare argument language that makes use of bare nouns as well as null arguments frequently. This is different from languages like English that does not allow either form in argument positions. Thus, trying to give an English-based label to a morpheme in ASL causes us to miss important generalizations about the distribution and interpretation of IX. Second, IX was assumed to be a single category that has a uniform interpretation across all of its uses. There is no distinction between neutral IX and IX to a locus in Kuhn 2015 or Irani 2016. Koulidobrova & Lillo-Martin (2016) focus on IX to a neutral position, but generalize analysis of IX_{NEUT} to all uses of IX, including IX to locus.

I will show later in the chapter that distinguishing the two uses of IX semantically allows us to better account for their interpretation as well as their distributional properties.

5.2.3.2 LOCUS

We now turn to analyses of loci in formal literature. In formal studies, it has been debated whether loci should be analyzed as indices that pronouns carry in semantics, or whether they should be analyzed as grammatical features that check the uninterpretable features carried by verbs in syntax. I discuss both in turn.

The idea of analyzing ASL loci as indices has received a lot of interest since Lillo-Martin & Klima 1990. The idea is that loci are like pronouns in English that carry indices, and the loci are overt instantiations of those indices, which are not visible in spoken languages. Sign languages are attractive in that they show both the assignment of loci to a specific referent and the later reference by using that loci. Consider 315 for example.

- (315) I SEE DOCTOR IX_A PHILOSOPHER IX_B. IX_B NICE.

‘I saw a doctor_i and a philosopher_j. The philosopher_j was nice.

The locus *a* is assigned with the doctor, and the locus *b* is assigned to the philosopher in the first sentence. Then, later pointing to one of the loci, for example, IX_B picks up the referent previously associated with that locus, so the second sentence is true of the philosopher the signer met is nice.

On the other hand, in more syntactic-based analyses, loci are analyzed as grammatical features that pronouns carry to check the uninterpretable features on verbs. In spoken languages, *phi*-features like gender, number and person on verbs are analyzed to be uninterpretable, and thus must be checked by arguments that carry matching features. For example, the verb *likes* has an uninterpretable singular feature that can be checked by singular NPs like *he*. A parallel analysis is given for ASL by considering different kinds of verbs available in sign languages. ASL, like many other sign languages, make use of what is often called ‘directional’ verbs, where the starting point of the verb matches the locus associated with the subject and the end point matches the locus associated with the object, and is used in contrast to ‘plain’ verbs, which do

not show such matching of location (Padden 1983). Kuhn (2015) argues that these directional verbs are lexically specified two uninterpretable features, one associated with the subject, and the other associated with the object (see also Neidle et al. 2000). IX that points to the loci associated with subjects and objects check these features, thus making the sentence grammatical. He further argues that plain verbs, verbs that do not show this directionality, are underspecified in terms of loci, meaning that a verb could appear with no uninterpretable feature that must be checked by a pronoun in that locus.

Note that the definition of ‘feature’ in this account is a syntactic one, that does not assume any semantic meaning. In semantic analyses of pronouns, many of the *phi*-features are assumed to carry meaningful information, like the feminine feature carrying a presupposition that the referent is female. The argument in Kuhn 2015 is a fully grammatical one, where the only purpose of carrying a feature is to check the matching feature on the verb.

Later in the chapter, I show that neither the index-based account nor the feature-based account can fully explain the optionality of loci in anaphoric expressions in ASL. Loci are not always licensed in all contexts of ASL anaphora, which is problematic if loci are analyzed as overt instantiations of indices that pronouns carry. This is because it is assumed in semantics that all cases of anaphora make use of indices. Thus, this would greatly weaken the claim made in the indexed-based accounts: loci have to be analyzed as overt instantiations of indices even though covert indices are also possible in the language. Also, loci seem to be triggered by the presence of contrast. This is not expected if loci are fully grammatical features, because grammatical agreement or feature-checking does not get affected by saliency of referents or contrast with other

competing referents. After discussing these difficulties, I will propose an alternative analysis of loci.

5.2.4 DISTRIBUTION

Now that we have looked at the three anaphoric expressions in ASL, we go on to look at their distribution in corpus-based referent tracking studies. I look at Frederiksen & Mayberry 2016, where 12 native signers were presented with a simple, 6-panel picture depicting a story and were asked to retell the story. A number of different anaphoric expressions available in ASL such as the null argument, classifiers, and IX were counted in the collected corpus, focusing on the subject position. In order to determine how referent status affects the choice of the anaphoric expression, they adopt the three-way distinction of referent status in the discourse from Gullbert 2006. The categories are as follows.

- (316)
- a. **Introduced:** First mention of a referent, independent of clause position
 - b. **Maintained:** A referent having appeared in any position in the previous clause appearing in the current clause as sentential subject
 - c. **Reintroduced:** A referent appearing as sentential subject in the current clause, subsequent to a clause where the referent was not mentioned

Note that the latter two categories, maintained and reintroduced, focuses on the distance between the antecedent and the anaphor. As discussed earlier, the relative distance between the antecedent and the anaphor is not so crucial to the present work. What is important for this work is the presence of competing referents, which is not coded in this

set of narrative production studies. Thus, I reanalyze their categories and call the category that only contains the maintained referents the ‘narrow anaphora’ and the category that contains both maintained and reintroduced referents the ‘broad anaphora’. I will focus mainly on the broad anaphora category to look at wider ranges of anaphora, with the understanding that the presence of contrast remains unspecified in this category.

With these new categories, the proportion of each expression is listed in 317.

(317) Proportion of expressions in narrow and broad anaphora

Anaphora	Nominal	Pronoun	Null Argument	Classifier	Total
Narrow	0.07 (24)	0.01 (4)	0.71 (219)	0.20 (63)	310
Broad	0.10 (34)	0.01 (4)	0.70 (239)	0.19 (63)	340

First note that the null argument is dominant in both categories of anaphoric reference, with around 70% of all anaphoric expressions being null arguments. Nominals can be used in anaphora as well, especially when the definition of anaphora is broadened to include reference to an entity not immediately after it is introduced. Within the nominal category, the bare noun is most frequently found, as the table reproduced from Frederiksen & Mayberry 2016 (Table 4, p.60) shows.

(318) Proportion within the nominal domain

Anaphora	CL N	Spell	IX N	N	N CL	N IX
Narrow	0.00 (0)	0.04 (1)	0.04 (1)	0.88 (21)	0.00 (0)	0.04 (1)
Broad	0.00 (0)	0.04 (1)	0.04(1)	0.94 (31)	0.00(0)	0.00 (0)

Note that IX rarely appears in this kind of production study. The pre-nominal and

post-nominal use of IX only occur once each in the whole set of data.

5.2.5 SUMMARY AND PREVIEW OF PROPOSAL

What we see from this overview is the following. While the most amount of attention in formal semantics has been given to the use of loci in ASL, the current analyses of loci as features or indices do not take into account the frequency data presented in corpus-based studies. What referent tracking studies like Frederiksen & Mayberry 2016 show is that IX to locus is rarely used in simple narratives. This is problematic for both index-based and feature-based analyses of loci because any formal theory assumes that both indices and features are available for all anaphoric references. Given that loci are not obligatory for all anaphoric expressions in ASL, while indices and features are assumed to be present in all anaphoric reference, the only claim we can really maintain given the distribution is one-way: while loci might be indices or features, it is not the case that these are always instantiated as loci in the language. While it is possible that a language has both overt and covert realizations of a certain semantic concept, the current analysis does not have a story on why there is this divide between overt and covert instantiations, and how this divide is delineated.

Thus, it seems that the relative distribution and licensing condition of IX, as well as how it compares to other expressions available for anaphora in ASL, should be more closely evaluated before we can conclude anything about its counterpart in spoken languages.

In the rest of the chapter, I return to the distributional properties of anaphoric

expressions in ASL, with the focus on how the distributional property can reflect the underlying semantic denotations of these expressions. The first step is to investigate the use of null arguments, bare nouns, and different forms of IX in production studies. In Section 5.3, I discuss the data reported in Frederiksen & Mayberry 2016 and Czubek 2017, which suggest that while null arguments are frequently used, IX is not so frequent in production data. There are also hints of IX being licensed when there are more competing referents. However, because these studies did not specifically look for the presence of contrast in the contexts, and because they did not distinguish the neutral IX and the IX to locus, the conclusions I can draw from these studies is only preliminary.

In order to investigate the effect of contrast on anaphoric expressions in a more fine-grained manner, a series of grammaticality judgment tasks were designed, where ASL signers were asked to evaluate and comment on the felicitousness of sentences for which we manipulated the presence of contrast and the choice of anaphoric expressions. In section 5.4, I present the data from three consultation sessions with ASL signers. I show that the results from this study provides some new insights on IX use in ASL. First, I show that IX to loci is indeed not so frequent, and is only licensed in contrastive contexts. IX to the neutral position, however, appears more readily in contexts without contrast in our elicited data set.

Given these data, I propose that IX to locus and IX to neutral position must be distinguished semantically. Specifically, I analyze IX to neutral position as carrying less information than IX to locus, thus more like a pronoun. IX to locus is analyzed like a demonstrative in Chapter 4. The distributional and licensing difference between IX to locus and IX to neutral position is naturally derived from the competition mechanism proposed in this theory: because IX to locus carries more information, it is only triggered

when the presupposition of IX to neutral is not met, specifically when there is more than one possible antecedent. I will show that this analysis is in line with analyzing the use of space such as lateral shift and role shift as contrastive in ASL (Kimmelman et al. 2016; Joyce 2019). Null arguments and bare nouns also compete in the anaphoric scale, and evidence for that is presented in Section 5.5.

5.3 IX IN PRODUCTION STUDIES

In this section, I discuss the relative frequency of different anaphoric expressions in narrative production studies. I specifically look at Czubek 2017 which replicates and extends the data from Frederiksen & Mayberry 2016 with more complex narratives. What we can conclude from the reference tracking studies is that a) IX is not as common as other mechanisms of anaphora such as null arguments and bare nouns, and that b) IX seems to be licensed when there are more competing referents. Throughout the section, I point out the categorizations of discourse status and expression type that are not straightforwardly translatable to our study, motivating a more fine-grained investigation of IX, which I present in the next section.

The goal of Czubek 2017 is to replicate and extend the investigation of referential expressions in Frederiksen & Mayberry 2016. Frederiksen & Mayberry (2016) report on their narrative production study conducted on 12 native signers of ASL, where the signers were shown a simple 6-panel story involving 2 animate entities and one object. Only the expressions in the subject position were counted in their study. Czubek (2017) makes use of a more complex stimulus, the Balloon Story (Hoffmeister et al 1999, adapted from Karmiloff-Smith 1979), which involves three competing animate entities

and 2 inanimate entities. In addition, Czubek (2017) presents a coding data from three professionally-produced ASL narratives: *Wrong Daughter* by Elinor Kraft, *Deaf Spies of the Civil War* by Ben Bahan, and *Bird of a Different Feather* by Ben Bahan. The table in 320 summarizes the relative proportion of tokens by discourse status and type in Frederiksen & Mayberry's stimulus as well as the four narrative data from Czubek 2017. As briefly discussed in the previous section, both Frederiksen & Mayberry and Czubek make use of the three-way distinction in discourse status from Gullbert 2006: introduced, maintained, and reintroduced. The definition for each discourse status is repeated in 319.

- (319)
- a. **Introduced:** First mention of a referent, independent of clause position
 - b. **Maintained:** A referent having appeared in any position in the previous clause appearing in the current clause as sentential subject
 - c. **Reintroduced:** A referent appearing as sentential subject in the current clause, subsequent to a clause where the referent was not mentioned

The definition of familiarity that I make use of in identifying anaphoric expressions involves referring to an entity that is in the domain of familiar entities. A referent is assumed to enter the domain by previous reference, with details provided in Chapter 3. Whether a referent is uniquely identifiable is crucial in my discussion, as this is what determines the form of the anaphoric expression from the scale. Note that this definition is orthogonal to the distance between the anaphoric expression and the antecedent: it is possible for the referent to be uniquely identifiable even if the antecedent is separated from the anaphoric expression by a few clauses, as long as there is no competing referent. Thus, the difference between ‘maintained’ (which means that the anaphoric expression

appears in the immediately subsequent clause) and ‘reintroduced’ (which means that there is at least one clause between the anaphoric expression and the antecedent) is not as important for our purposes as the presence of competing referents. In the way anaphoric expressions are labeled in these works, it is not possible to know whether there are competing referents. For example, it may be that the expression is labeled ‘maintained’ because the antecedent appears in the immediately previous clause, but has a competing referent in the object position of the previous clause.

Thus, in this section, I provide the counts from Czubek 2017 by combining the two discourse statuses under the category of ‘broad anaphora’. The ‘maintained’ category from Czubek 2017 is maintained under ‘narrow anaphora’ for now, though the counts do not make a difference for us. Because it is not known whether competing referents intervene for any of these instances of anaphoric expressions, both categories remain a rough estimate when translated to this work.

As discussed in the overview on bare nouns, Czubek (2017) does not count the use of bare nouns separately as a category. His category of Definite Descriptions (DD) includes the use of a noun accompanied by IX. Thus, the table in 320 does not indicate the proportion of bare nouns in anaphoric uses, but the proportion of IX with noun vs. IX in isolation. Also note that whether the IX is pointing to a neutral position or to a locus is not reflected from the coding.

(320) Proportion of anaphoric expressions by discourse status and type

Study	Anaphoricity	DD	Null	IX
Czubek 2017	Narrow (306)	28% (85)	2% (2)	7% (6)
Balloon Story	Broad (395)	36% (141)	5% (21)	8% (30)
ASL Narratives	Narrow (123)	4.87% (6)	11.38% (14)	29.26% (36)
	Broad (171)	12% (21)	11% (19)	30% (51)

The categorization of anaphoric expressions was different in Frederiksen & Mayberry 2016. While Frederiksen & Mayberry (2016) counted bare nouns separately from IX, they did not count IX in isolation as a separate category. Thus, Czubek 2017 reorganizes data from Frederiksen & Mayberry 2016 to match his coding and draws the following conclusions.

NULL ARGUMENTS WERE LESS FREQUENT IN CZUBEK 2017. While null arguments were very frequently found in Frederiksen & Mayberry 2016, Czubek (2017) finds less of them, especially in the Balloon Story. Null arguments are more frequent in the professionally-recorded ASL narratives.

IX IN ISOLATION WAS MORE FREQUENT IN CZUBEK 2017. While isolated use of IX was almost nonexistent for Frederiksen & Mayberry 2016, Czubek (2017) found IX to be more frequent in anaphora (8% in the combined category of ‘broad anaphora’). Note that IX was even more frequent, accounting for about 30% of anaphoric uses in professionally-recorded ASL narratives.

DEFINITE DESCRIPTIONS WERE MORE FREQUENT IN CZUBEK 2017. The use of nouns with IX also increased for Czubek 2017. This with the last observation together suggests that the use of IX was overall more frequent in Czubek 2017 than Frederiksen & Mayberry 2016. IX with nouns, however, were not so frequent in ASL narratives, accounting for about 12% of all anaphoric uses.

5.3.1 ACCOUNTING FOR THE DIFFERENCES

In comparing his data with that presented in Frederiksen & Mayberry 2016, Czubek (2017) suggests that the relative simplicity of the story used in Frederiksen & Mayberry 2016 may have affected the different counts of anaphoric expressions. In this section, I expand on this suggestion, forming testable hypotheses. Because the difference in coding in Czubek 2017 hides the important factors for the hypothesis, namely contrast and loci use, I present a new study in the next section that addresses the hypothesis more directly.

First, note that the decrease in the use of the definite descriptions in the professionally-recorded ASL narratives may be due to the highly rehearsed and organized nature of the story. It is likely that the more rehearsed a story is, the simpler it gets as the storyteller can set a point of view from which the story could be told. The increase in the simpler forms, the IX in isolation and the null argument, may also be explained in a parallel way. However, because professionally narrated stories differ from naturally-produced stories, a direct comparison would be difficult.

The decrease in null arguments and the increase in more complex forms IX and IX

with nouns (DDs) may be explained in terms of the relative complexity in the balloon story used in Czubek 2017. See the following table in 321 to compare the number of characters present in the story.

(321) Number of characters in each story

Study	Animate referents	Inanimate referents
Frederiksen & Mayberry 2016	2	1
Czubek 2017	3	2

In addition to the absolute difference in number of characters, the role of the second character in Frederiksen & Mayberry 2016 was much less important in the story than the role of the second character in Czubek 2017. For example, while the second character in Czubek 2017 played a crucial role in the course of the story (popping the balloon that the main character bought), the second character in Frederiksen & Mayberry 2016 was simply someone standing at the table where the main character bought something. This difference might have triggered some contrastive uses comparing the main character with the secondary character in the latter story but not in the former story.

I hypothesize that the use of IX with locus is triggered by contrast. While null arguments are possible for referring to the uniquely identifiable entity, IX to a locus must be used to distinguish between referents when there is more than one competing antecedent.

(322) The use of IX with a locus in ASL is triggered by contrast, which requires the signer to locate competing referents in different loci to distinguish them. This results from the competition mechanism of anaphora, in which the use of IX

to a locus implies that the entity is not uniquely identifiable and requires the information provided by the locus.

While the counts in Czubek 2017, especially the contrast from the simpler story in Frederiksen & Mayberry 2016, provides some initial support for the hypothesis, there are important limitations that need to be addressed. First, note that while the overall number of competing characters suggests that there were more contrastive contexts in the story used in Czubek 2017, it is impossible to test this directly from the way the tokens of anaphoric expressions are coded. As discussed before, the tokens are only categorized based on the distance from the antecedent, rather than whether there are competing antecedents intervening. Thus, it would be important to test contrastive and noncontrastive contexts directly. Second, the category of IX is not further divided in terms of whether it points to a neutral position or to a locus. The hypothesis in 322 relies on the assumption that loci are used to distinguish different referents. In this hypothesis, IX to a neutral position would still predict that the referent is uniquely identifiable. So it is crucial to tease apart these two uses and investigate them separately. In addition, IX in Czubek's study also included uses of first and second-person pronouns, which results in conflating shifted, deictic references with anaphoric references. So a study that only looks at IX to third-person reference in non-shifted contexts would be necessary.

In the next section, I discuss a set of comprehension and production studies that address the hypothesis in 322 that takes into account the distinction between contrastive and noncontrastive contexts as well as the different kinds of IX available in ASL.

5.4 NOVEL DATA: EFFECTS OF CONTRAST IN ASL ANAPHORA

In this section, I report data from Ahn, Kocab, & Davidson 2019 where short, two-sentence discourses were presented to consultants by a deaf, signing member of our research team, one discourse at a time. Consultants provided acceptability judgments immediately after each one, commenting on whether it is clear who the referent is, and whether they would sign the sentence in that way. This approach allowed us to control factors of interest. The three consultants were all deaf, native signers of ASL.

In the first sentence of each test item, which we call the context sentences, we manipulated the presence of contrast in one hand and the choice of the anaphoric expression on the other hand. For example, in contexts with no contrast, we only had one salient entity introduced in the first sentence as in 323.

- (323) BOY ENTER CLUB. MUSIC ON.

‘A boy entered club. Music was on.’

In contexts with a contrast, we added another entity into the context as in 324.

- (324) BOY ENTER CLUB. MUSIC ON. SEE GIRL READ.

‘A boy entered a club. Music was on. He saw a girl reading.’

We also looked at contexts where the second entity is an inanimate entity as in 325.

- (325) GIRL BUY BOOK.

‘A girl bought a book.’

In the sentences following the first, we manipulated the choice of anaphoric expression. Null arguments, bare nouns, as well as neutral IX and IX to locus were tested. For IX to locus, we also changed the context sentences so that each referent is associated with a referent. An example of each item is shown below with 324 as the context sentence and reference to the boy.

- (326) a. BOY ENTER CLUB. MUSIC ON. SEE GIRL READ. DANCE.
 b. BOY ENTER CLUB. MUSIC ON. SEE GIRL READ. BOY DANCE.
 c. BOY ENTER CLUB. MUSIC ON. SEE GIRL READ. IX_{NEUT} DANCE.
 d. BOY IX_A ENTER CLUB. MUSIC ON. SEE GIRL IX_B READ. IX_A DANCE.

Intended: ‘A boy_i entered a club. Music was on. He_i saw a girl_j reading. He_i danced.’

For contexts like 324 and 325 where there were two referents, we also tested the reference to the second referent, the girl and the book respectively. The set of items used for the context sentence in 325 is shown below, with 327 showing reference to the girl, and 328 showing reference to the book.

- (327) a. GIRL BUY BOOK. HAPPY.
 b. GIRL BUY BOOK. GIRL HAPPY.
 c. GIRL BUY BOOK. IX_{NEUT} HAPPY.
 d. GIRL IX_A BUY BOOK IX_B. IX_A HAPPY.

Intended: ‘A girl_i bought a book_j. She_i was happy.’

- (328) a. GIRL BUY BOOK. ABOUT PIRATES.
b. GIRL BUY BOOK. BOOK ABOUT PIRATES.
c. GIRL BUY BOOK. IX_{NEUT} ABOUT PIRATES.
d. GIRL IX_A BUY BOOK IX_B. IX_B ABOUT PIRATES.

Intended: ‘A girl_i bought a book_j. It_j was about pirates.’

5.4.1 SUMMARY OF SENTENCES

Combining all of the factors above, we came up with five different test conditions, which are organized in the table below. The conditions differed on the number of potential referents ('# Ref'; 1 vs. 2), the intended antecedent (whether it is the first or the second-mentioned entity; intended antecedent indicated with bold text in the sentence), and the animacy of the intended referent as well as the competing referent ('Animacy'; + for animate, - for inanimate). For example, condition A only has one potential referent, while conditions B through E have two referents. Conditions B and C differ in the animacy of the competing referent: B has an animate ‘GIRL’ as a competing referent, while C has an inanimate ‘BOOK’. For each condition, an example context sentence is given. The conditions are labeled from A to E for simplicity.

- (329) Sentence types:

Condition	# Ref	Animacy		
		Antec	Competing	
A	1	+	N/A	BOY ENTER CLUB. MUSIC ON.
B	2	+	+	BOY ENTER CLUB. SEE GIRL READ.
C	2	+	-	GIRL BUY BOOK.
D	2	+	+	BOY ENTER CLUB. SEE GIRL READ.
E	2	-	+	GIRL BUY BOOK .

5.4.2 EFFECTS OF CONTRAST

We report the data on the effect of contrast on the choice of anaphoric expressions. Specifically, we compared how the judgment on different anaphoric expressions differ between conditions with one or two referents. First, we compared the conditions A and B, where the only difference between the two was the presence of another referent. In the table below, we show the number of consultants out of three who accepted the anaphoric expression as felicitous and clearly referring to the intended referent, the boy.

Note that in the table, the IX_{LOC} means that the loci were established in the previous sentence.

(330) Conditions A vs. B

Cond.	Sentence	null	IX _{NEUT}	N	IX _{LOC}
A	BOY _i ENTER CLUB. MUSIC ON. [DP] _j DANCE.	3	3	3	3
B	BOY _i ENTER CLUB. SEE GIRL _j READ. [DP] _i DANCE.	1	1	3	3

What we see is that in condition A, where there is only one salient entity introduced in the context sentence, all four anaphoric expressions are accepted by the consultants unanimously. The null argument, the neutral IX, the bare noun, as well as IX to locus (with loci established in the context sentence) unambiguously refer to the boy.

On the other hand, in condition B, the null argument and the neutral IX are not accepted by two out of three consultants. This differs from the bare noun and IX to locus both of which were fully accepted by all three of the consultants. The null argument and the neutral IX were reported to be possible by the third consultant, but what we found from further discussing these sentences was that the consultant was interpreting the story as being told from the perspective of the boy. Thus, what we see is that the use of the null argument and the neutral IX can only refer to the boy if the story is told from the perspective of the boy, so that he is the topic of the narrative.

Thus, in general, we see that the null argument and the neutral IX are only licensed felicitously when there is a unique salient referent. When there is a competing referent in the context, either the noun that teases apart the two referents (BOY vs. GIRL in this context) or the locus information (A vs. B) is necessary.

When asked which sentence they would prefer in Condition A, signers chose neutral IX over IX to locus, suggesting that IX to locus is marked when used without a clear competing referent. The use of a marked form may require signers to accommodate by creating a contrastive setting and thus result in lower felicitousness.

We also compared the conditions B and C, both of which have two referents, but differ in the animacy of the competing referent. In B, the competing referent is animate (GIRL), while in C, the competing referent is inanimate (BOOK). The results are

shown below.

(331) Conditions B vs. C

Cond.	Sentence	null	IX_{NEUT}	N	IX_{LOC}
B	BOY_i ENTER CLUB. SEE GIRL _j				
	READ. [DP] _i DANCE.	1	1	3	3
C	GIRL_i BUY BOOK _j .				
	[DP] _i HAPPY.	2	3	3	3

What we see is that unlike condition B where there was a difference in felicitousness between null arguments and neutral IX on one hand and the bare noun and IX to locus on the other, condition C did not show such effects. Both the null argument and the neutral IX were clear and felicitous to both consultants. The difference may be due to selectional restrictions of the predicate. Because the predicate 'happy' cannot take the book as its argument, the book is not a possible antecedent. Thus, the context only has one referent that would meet the presuppositions of the predicate, thus allowing the null argument and the neutral IX. We tested this possibility with condition E, where the same context sentence 'GIRL BUY BOOK' was provided but was followed by a sentence that had a predicate that could only apply to the book, and not to the girl. The predicate was 'ABOUT PIRATES'. In condition E, both the null argument and the neutral IX felicitously referred to the book. This suggests that selectional restriction is also an important predictor in reference resolution and the choice of anaphoric expressions: even if there are more than one referents available, if only one of them can be selected by the predicate and thus be a plausible referent, the simpler forms such as the null argument or the neutral IX are licensed.

5.4.3 EFFECTS OF SECONDARY ANTECEDENT

The table in 332 compares conditions C and E, where the test sentence was identical but the intended referent was the girl in the former and the book in the latter.

(332) Conditions C vs. E

	Cond.	Sentence	null	IX _{NEUT}	N	IX _{LOC}
C	GIRL_i BUY BOOK_j .					
	[DP] _i HAPPY.		2	3	3	3
E	GIRL_i BUY BOOK_j .					
	[DP] _j ABOUT PIRATES.		2	3	2	0

What we see is that when the intended referent is the girl, all four anaphoric expressions are equally possible. However, when the referent is a book, the null argument and the neutral IX are okay, but the bare noun and IX to locus are not accepted by both signers. The signers commented that creating a separate locus for the book in the test sentence is already degraded because the book is inanimate and it is possessed by the girl. Note that this degradedness of creating locus for the book in a parallel way to the girl poses a challenge for both index-based and feature-based accounts of loci. In formal semantics, indices are assigned to any NP regardless of its animacy. Also, in feature matching, subjects and objects equally carry features that can check matching features in the verb. Neither account predicts the girl and the book to behave differently in the assignment of loci. A contrast-based account that I am proposing in this work, on the other hand, does predict this difference. I am arguing that loci are triggered by contrast. In condition E, however, there is no reason to contrast the girl and the book. This crucially differs from

conditions with animate referents like B or D because in those contexts, it is important to draw a contrast between the girl and the boy to determine who out of the two danced. Thus, the difficulty in assigning and using loci for Condition E is explained in terms of the lack of contrast drawn between the girl and her possession.

This would lead us to predict that, if we have two inanimate referents that need to be contrasted, IX to locus would be licensed even for an inanimate referent. We have not tested this, but data from Irani 2016 supports this prediction, where IX to a locus assigned for a magazine is licensed when it is contrasted with a book.

- (333) JOHN BUY IX_A BOOK, IX_B MAGAZINE. #(IX_A) BOOK EXPENSIVE.

‘John bought a book and a magazine. The book was expensive.’ [Irani 2016]

Moving onto the bare noun in referring to the book in condition E, one of the two consultants responded that repeating the word book is repetitive and non-native-sounding. This is in line with the fact that both of the simpler expressions (the null argument and the neutral IX) were accepted by both signers, and again suggests that the consultants are not drawing a contrast between the girl and the book. The property of being a book is not necessary to resolve the referent, and thus repeating the noun is taken to be redundant. Note that this is what we find commonly in spoken languages too: when the information carried by the noun is redundant, simpler forms of anaphoric expressions are preferred. This is in line with what we found with bare argument languages as well as languages like English in previous chapters.

We also compared conditions D and E, which both referred to the second-mentioned, but differed in the animacy of that referent. The counts are given in 334.

(334) Conditions D vs. E

Cond.	Sentence	null	IX _{NEUT}	N	IX _{LOC}
D	BOY _i ENTER CLUB. SEE GIRL _j				
	READ. [DP] _j DANCE.	0	0	1	3
E	GIRL _i BUY BOOK _j .				
	[DP] _j ABOUT PIRATES.	2	3	2	0

The difference we see between the felicitousness of the null argument and the neutral IX is due to selectional restrictions of the predicate again. It is equally possible for both the boy and the girl in condition D to be the agent of the predicate ‘READ’, while it is only possible for the book in condition E to be ‘ABOUT PIRATES’. Thus, in condition D, there are two competing referents, and the simpler expressions cannot disambiguate between the two. The use of loci for the boy and the girl in condition D is fully acceptable, unlike the use of loci for the book in condition E, as we saw earlier. The reason could be that the two referents in condition D are contrasted, while the girl and the book are not in condition E. Lastly, the bare noun was not accepted by two out of three consultants in condition D. It was later revealed, however, that the low acceptability was caused by pragmatic plausibility, where a girl who was just reading was not expected to be dancing in the next sentence. In other words, if we add an additional sentence to highlight that the two events are not happening at the same time, we expect all consultants to accept the anaphoric use of the bare noun. We have only followed up on this with one of the two consultants who rejected this sentence and confirmed this.



Figure 5.1: Forward pointing (on the left) and downward/index pointing (on the right).

5.4.4 EFFECTS OF ANIMACY

We now look closely at the use of the neutral IX for inanimate referents. In an earlier elicitation session separate from this current study, we noticed that two native signers of ASL distinguish between animate and inanimate referents when they refer to them with the neutral IX. For referring to animate entities, signers used what we call the ‘forward’ pointing, where the index finger is parallel to the ground, as shown on the left in Figure 5.1. For inanimate entities, signers used what we call the ‘downward’ pointing, where the tip of the index finger is pointed downward, either with or without the non-dominant index finger as the target of pointing. The picture on the right in Figure 5.1 shows a downward pointing to the non-dominant index finger.

In consultation, one of the consultants rejected a test sentence where the book was referred to with a forward IX by overtly mentioning that ‘[the experimenter] was pointing to the wrong place’ and accepted the downward IX for the same test condition.

Thus, the preliminary data on neutral IX suggests that neutral IX may specify the animacy feature of the antecedent. This would not be surprising given that many languages including English mark animacy in their pronouns. While English marks animacy in addition to gender and number, Thai pronouns only mark animacy, just like ASL neutral IX.

5.4.5 SUMMARY OF DATA

By manipulating the number of referents, animacy, and plausibility, we were able to confirm some hypotheses formed from looking at referent tracking studies. The findings are summarized in this section.

First, we confirmed that **null arguments and bare nouns readily allow anaphoric uses in ASL**. While it was already clear from referent tracking studies that null arguments are very frequent, we were able to further show that bare nouns are as readily available. That bare nouns are as readily available is not something that can be directly tested in natural production studies, because, as discussed throughout this work, the choice of anaphoric expressions is affected by economy-based principles that choose the least redundant in a given context. Thus, unless there was a reason to use the bare noun over simpler forms like the null argument, the bare noun would not appear in natural production as easily. By explicitly using them anaphorically in test sentences and receiving feedback from consultants, we were able to verify that anaphoric uses of bare nouns is readily possible in ASL.

Second, we showed that **neutral IX and IX to locus have different distributions**.

tions and licensing conditions. While neutral IX is only licensed when there is a clear, unique referent available in the context, IX to locus was possible even in contexts with competing referents. This motivates semantically distinguishing the two uses of IX rather than analyzing the two uses with a single denotation. In natural production data from referent tracking studies (Frederiksen & Mayberry 2016; Czubek 2017), we saw that IX was not as frequently used in comparison to null arguments or bare nouns. We suggested that the lack of contrasting contexts may be a reason behind the low frequency of IX. However, it was unclear from these studies which form of IX was counted, and whether competing referents were present in the contexts that triggered the use of IX. What we have shown in the current study is that neutral IX is not licensed in contexts with a competing referent, while IX with locus is. IX with locus is not the preferred choice when there is no competing referent, suggesting that IX with locus does carry markedness properties.

Third, we have shown that **neutral IX specifies animacy by its pointing direction.** Forward pointing indicates an animate referent, while downward pointing indicates an inanimate referent. This is what I argue is the difference between null arguments and neutral IX. While null arguments do not carry any restriction on the referent, neutral IX does specify whether the referent is animate or not. This would explain why neutral IX (specifically forward pointing) was not licensed when there were two animate referents available, but licensed when there was only one animate referent with a competing inanimate referent. We would need to further test whether neutral IX is licensed when there are two inanimate referents. The prediction we can make based on our analysis is that neutral IX would not be licensed in contexts with two inanimate referents because the animacy specification would not help in resolving the referent if

both potential referents are inanimate.

Finally, we have shown that **analyzing loci as indicating contrast better accounts for its low frequency in natural production and the data collected in the current work.** What we saw in natural production data and confirmed in the current study is that many other anaphoric expressions are possible in ASL and that IX to locus does not often appear in natural production. This already is a challenge for the strong version of index-based analyses where loci are analyzed as overt instantiations of indices. Moreover, we presented the incompatibility between the inanimate book and the assignment of a locus from our consultation data. Recall that in sentences like ‘GIRL BUY BOOK’ it is deemed odd to create two different loci, one for the girl and another for the book. The animacy difference should not affect the assignment of an index to an NP, or the grammatical feature that is carried by the pronouns. This again suggests that while it’s possible that a locus is an overt instantiation of indices in ASL, it’s not the case that indices are implemented as loci in ASL. The effect of animacy and contrast on loci suggest that IX to locus is more related to contrastive topic or topic-hood in general. If we assume that loci are used for drawing contrasts between potential referents, we can readily explain why it would be odd to create separate loci for the girl and the book. There is no reason to draw a contrast between the two referents, unlike in contexts where there are two competing animate referents.

Given these data points, I propose an analysis of anaphoric expressions in ASL. I argue that the expressions in ASL are organized into a scale, just like other languages that have been looked at in this work. I will specifically argue that the locus information is similar to the contrastive *R* property carried by demonstratives in English. This analysis allows us to derive the distributional properties we saw in natural production

data as well as the licensing conditions we identified in the consultation data.

5.5 ANALYSIS: ANAPHORIC EXPRESSIONS IN ASL

Before discussing the specific denotations proposed for the anaphoric expressions, I go over the main ideas of the competition mechanism presented in earlier chapters. I have proposed that anaphoric expressions carry in their underlying structures an anaphoric index that links to the intended antecedent, and a set of restrictions (such as *phi*-features or the NP property) that uniquely identify the referent. For instance, the anaphoric expressions *she*₇ and *the linguist*₇ refer to the maximal female entity ($\sup [\lambda x. \text{entity}(x) \wedge \text{female}(x)]$) and the maximal linguist ($\sup [\lambda x. \text{entity}(x) \wedge \text{linguist}(x)]$), respectively. The index information is part of the presupposed material, such that *she*₇ and *the linguist*₇ are undefined if the maximal female entity or the maximal linguist in the given context is not identical to the discourse referent assigned at the seventh coordinate of an assignment function.

Given these structures, I argue that given multiple anaphoric expressions that can successfully refer to the intended antecedent, an economy principle requires that the least complex form is used. In other words, because *she* only carries *phi*-features while *the linguist* additional carries an NP property, *she* is used in a context where there is only one female referent who is a linguist. The use of the more complex form *the linguist* suggests to the addressee that the simpler form *she* could not successfully resolve the referent, i.e. there are two or more female possible referents in the context. A use of a more complex form thus requires an accommodation process where alternatives to the intended referent are triggered.

I propose the following denotations for anaphoric expressions in ASL. For all of these denotations I am assuming that there is a presuppositional anaphoric index n that checks whether the returned individual is identical to the individual at $G(n)$. In this section, I only show the denotation consisting of the maximality operator that takes a set of restrictions and return an individual that meets all of the restrictions. I argue that the null argument in ASL is analyzed as in 335. It does not carry any additional restriction for the referent and thus returns the maximal entity in the given context.

$$(335) \quad [\![\text{null}]\!] = \sup [\lambda x. \text{entity}(x)]$$

The neutral IX carries one additional restriction than the null argument, which is the animacy restriction. Indicated by $\phi(x)$ as in 336, the neutral IX morphologically distinguishes between animate and inanimate referents and returns the maximal animate or inanimate entity in the given context.

$$(336) \quad [\![\text{IX}_{\text{NEUT}}]\!] = \sup [\lambda x \text{ entity}(x) \wedge \phi(x)]$$

The bare noun in ASL is analyzed in parallel to other anaphoric bare nouns in bare argument languages, where it carries the property denoted by the NP, and returns the maximal entity that satisfies the property of being that NP.

$$(337) \quad [\![\text{NP}]\!] = \sup [\lambda x. \text{entity}(x) \wedge \text{NP}(x)]$$

We now move on to the analysis of IX to locus. I will argue that IX to locus as a whole carries the the R property like demonstratives in English as in 338.

$$(338) \quad [\![\text{IX}_{\text{LOC}}]\!] = \sup [\lambda x \text{ entity}(x) \wedge R(x)]$$

However, I propose that **the anaphoric function in IX_{LOC} is contributed fully by the null argument that is not overtly visible.** What we see overtly, namely the pointing to a locus, is a modifier that further modifies this null anaphor with an additional locative property.

Recall that the R property is the additional property that was proposed for adnominal and pronominal demonstratives in English. The main role of R is to provide an additional restriction that helps in identifying the referent. For spoken languages, this could be an exophoric gesture that indicates the location of the referent, or a relative clause that defines who that referent is with a property. What I am arguing is that IX to a locus is exactly this exophoric pointing gesture. IX to a location a returns the same meaning as the exophoric pointing gesture to a location a as shown in 339.

$$(339) \quad [\![\text{IX}_a]\!] = [\![\rightarrow a]\!] = \lambda x. x \text{ is at } a$$

Thus, in my analysis, IX to a locus is not on its own an anaphoric expression. It is simply a modifier that adds some information about the referent's location. This location can be both physical and abstract. If IX carries information about the physical location of the referent, then it would be identical to an exophoric use of demonstratives in spoken languages. This is what we see with exophoric IX in ASL, where the signer can directly point to an actual entity present in the context. For example, IX to a boy at a location c in ASL is identical to the exophoric pointing to c in spoken languages as in 340.

(340) BOY IX_C HAPPY.

‘That_{→C} boy is happy.’

[ASL]

IX can also carry an abstract location. In anaphoric uses of loci, the locus does not refer to an actual location in the given context but an abstract one that the signer establishes.

The main reason for analyzing IX to a locus as a modifier rather than an anaphoric expression comes from the difference between neutral IX and IX to locus. The crucial difference between the two is that while neutral IX is used out of the blue to refer anaphorically to a salient entity, IX to locus requires that locus to be established prior to the anaphoric use. For example, in 341 for IX_A to refer to the boy assigned at locus A, it is crucial to assign that boy to that locus prior to using IX_A anaphorically.

(341) BOY IX_A ENTER CLUB. MUSIC ON. IX_A DANCE.

By definition, anaphoric expressions require the referent to be familiar to conversation participants. This holds for the second use of IX_A in 341 because it refers to the familiar boy introduced in the first sentence. However, in the first use of IX_A, there is nothing familiar about the boy that was just introduced. This is why IX_A itself should not be analyzed as something that requires familiarity. Instead, I argue that IX_A is a modifier that can apply to newly introduced and familiar referents equally.

In the introductory use, IX_{LOC} is used as an appositive relative clause that does not restrict the reference. For example, JOHN IX_A in an introductory use would mean ‘John, who I will sign at A’. In the anaphoric use, the relative clause composes with the null anaphor restrictively, just like the relative clauses used with demonstratives in

English. Recall that the relative clause ‘who read’ in 342 defines the referent with the property of reading.

- (342) Those who read never fail.

Just like the relative clause, IX to locus defines the referent as someone who is signed at that locus. Thus, the null anaphor carrying the property of being signed at *a*, would be translated as ‘the entity that I sign(ed) at *a*.’

The fact that the IX_{LOC} is used appositively in the introductory use but restrictively in the anaphoric use is not surprising. We find that some relative clauses in English are ambiguous between appositive and restrictive uses (Sauerland 2000). Also, a relative clause with a null head noun is available in languages that allow null anaphors like Mandarin. Examples are shown in 343 and 344.

- (343) *Mai-cai-de* \emptyset *hen nianqing*.
sell-vegetable-RC \emptyset very young
‘The vegetable seller is very young.’ [Yuyin He, p.c.]

- (344) *Wo mai-de dongxi he ni mai-de dongxi zai zher. Wo mai-de* \emptyset *hen*
I buy-RC stuff and you buy-RC stuff exist here. I buy-RC \emptyset very
gui.
expensive
‘The things I bought and the things you bought are here. The ones I bought
are expensive.’

My argument is to draw a parallel between the relative clauses ‘that sell vegetables’ in 343 and ‘that I bought’ in 344 with IX to locus in ASL. IX to locus is a more

grammaticalized set of relative clauses that describe the referents in terms of where they are located in the abstract space. Another similar correlate we find in spoken languages is when we use letters to keep track of multiple referents in English. Consider the example in 345.

- (345) Let me tell you about all the boys in that group. Boy A is modest and very hard-working. Boy B is reserved but enthusiastic. Boy C is the leader of the group. While C is younger than A and B, C is the one that resolves conflicts when they arise.

Note that the letters A, B, and C were used to label the different boys and were subsequently used to refer back to respective referents. IX to locus in ASL has the abstract-ness of using letters to keep track of referents as in 345 and the structure of using relative clauses with null anaphora as in 343 and 344.

5.5.1 COMPETITION

I have argued in this section that IX_{LOC} is a modifier that further restricts the anaphoric reference of a null anaphor. How would this fit into the anaphoric scale and the competition mechanism?

Let's consider the denotations proposed and repeated below. These denotations can be organized into scales based on meaning.

- (346) a. $[\text{null}] = \sup [\lambda x. \text{entity}(x)]$

- b. $\llbracket \text{IX}_{\text{NEUT}} \rrbracket = \sup [\lambda x \text{ entity}(x) \wedge \phi(x)]$
- c. $\llbracket \text{NP} \rrbracket = \sup [\lambda x. \text{ entity}(x) \wedge \text{NP}(x)]$
- d. $\llbracket \text{IX}_{\text{LOC}} \rrbracket = \sup [\lambda x \text{ entity}(x) \wedge R(x)]$

Note that IX can appear with or without a noun. This means that based on the presence of the noun, IX will either carry or not carry the restriction $\text{NP}(x)$. These denotations derive two scales, one that involves the pronominal forms, and the other that involves the adnominal forms.

In the pronominal scale, IX_{LOC} competes with the IX_{NEUT} .

- (347) Pronominal scale: { IX_{NEUT} , IX_{LOC} }

In the adnominal scale, we IX_{LOC} competes with the bare noun.

- (348) Adnominal scale: { NOUN, IX_{LOC} NOUN }

Because the economy principle requires that the lowest element compatible with the context be used, the use of the additional locational property in IX_{LOC} suggests that that locational information was necessary to successfully resolve the referent. This would mean that the pronominal IX_{LOC} would suggest that the animacy information of IX_{NEUT} was not sufficient, and that the adnominal IX_{LOC} would suggest that the property denoted by the noun was not sufficient.

Let's consider the pronominal context first. If there are two referents in a given context that differ in their animacy, IX_{NEUT} with forward or downward pointing would

successfully identify the unique referent. IX to locus then suggests that there are at least more than one animate or more than one inanimate referents in the context. The fact that in our consultation data, IX to locus was degraded for the context where there was only a girl and a book is compatible with this prediction. In this context, IX_{NEUT} would have been sufficient. The use of loci in this context would suggest that there were more potential antecedents, which is misleading.

In the adnominal context, the bare noun would successfully resolve the referent as long as there is only one entity that matches the denotation of the noun. Thus, the use of the adnominal IX_{LOC} would suggest that there are more than one entities that match the NP property. This might explain why adnominal IX was more frequent in the retold stories in Czubek 2017 than in Frederiksen & Mayberry 2016. In Czubek 2017, the story contained a boy as the main character, a balloon-seller, and another boy. This differs from the story in Frederiksen & Mayberry 2016, where there was a girl as the main character and a juice-seller. In the latter story, it is sufficient to use nouns such as ‘GIRL’ and ‘SELLER’ to refer to each entity, but in the balloon story in Czubek 2017, the noun ‘BOY’ was not sufficient to tease apart the two boy referents.

5.6 CONCLUSION

In this chapter, I have presented a close investigation of anaphoric expressions in ASL. Because there has been a large disconnect between formal studies of each expression in isolation and referent tracking studies that looked at relative frequencies of these expressions, there was no analysis that allowed us to link the two fields. By looking at both natural production data and felicity judgments, I have made the following claims

that diverge from previous analyses. First, I argue that the category of IX should be semantically distinguished between neutral IX and IX to locus. While neutral IX is like a pronoun, IX to locus is analyzed as a modifier that can be used in both introducing and anaphorically referring to an entity. This semantic distinction allows us to account for the distributional differences between the two expressions as well as the fact that only IX to locus must be previously established. Second, I present a new set of data that suggest that neutral IX marks animacy by the direction of its pointing. Forward pointing refers to animate entities while downward pointing refers to inanimate entities. Third, I propose that the anaphoric expressions in ASL are organized in a scale with respect to the amount of information they carry, and that the competition mechanism correctly derives both the licensing conditions and predicts the patterns we find in natural production studies.

I conclude this chapter with a traditional discussion of ASL pronouns in Lillo-Martin & Klima 1990. In Lillo-Martin & Klima 1990, IX is analyzed as a pronoun. Given this analysis, three non-canonical aspects of ASL pronominal systems were pointed out in Lillo-Martin & Klima 1990. The first is the ‘infinite pronominal forms’ given that there is an infinite number of loci that can be pointed to by IX. The second is that the pronoun is unambiguous in that it points to the specific locus associated with an individual, rather than just giving some features like male or singular. The third is the potential for shift.

Given our new data and analysis, we focus on the first two aspects. First, if IX to some locus is a modifier similar to the exophoric gesture in spoken languages, the infinite number of loci is no longer surprising. Exophoric demonstratives in spoken languages can also make use of the infinite range of spatial locations to point and refer.

The abstract use of space for anaphoric reference in ASL also has a spoken language correlate, as I showed previously, where English speakers can use letters to keep track of multiple referents at a time.

If neutral IX is analyzed as a pronoun as proposed in this work, then the second aspect is no longer relevant. Note that the fact that IX to locus unambiguously refers to one specific referent is not surprising because exophoric demonstratives also unambiguously refer to the specific referent in that location. Neutral IX, on the other hand, does not in fact have this property. As I showed in Section 5.5, neutral IX may at most specify animacy as a feature. Thus, if we analyze neutral IX and not IX to locus as parallel to English pronouns, they start to look much more similar, and there is nothing non-canonical about ASL pronouns. The third non-canonical property, which is the potential for shift, is not something I discuss directly in this chapter, but I do point out that many languages do in fact allow a perspective-shift for their pronouns. Thus, given the new analysis presented in this work, we are able to resolve many puzzles that have been associated with pronouns in ASL.

6

Conclusion

To conclude this dissertation, I discuss some directions for future research and summarize the main theoretical and empirical advantages of the competition mechanism proposed.

6.1 DIRECTIONS FOR FUTURE RESEARCH

6.1.1 ROLE OF INDEX

I have separated the role of the anaphoric index from the rest of the anaphoric DP to ensure that the anaphoric expressions enter the competition without the index information as part of the restriction of the supremum operator. While I have presented the work in a dynamic framework, the competition mechanism itself is quite modular and can be couched in other frameworks such as situation semantics. The index argument will change to situational indices, and the anaphoric DP would simply return the maximal entity that meets all of the restrictions in that situation.

6.1.2 REFLEXIVES

In analyzing PRO, I have argued that PRO does not carry any additional restriction than being an entity. This resulted in PRO allowing resolution via reflexivization, where the object of the verb is identified to be the same as the subject of the verb. This makes use of the self-operator that would simply equate the two arguments of the verb.

A natural connection to this is the reflexives that require local antecedents. There have been a number of competition-based accounts of reflexives and pronouns (cf. Hornstein 2007) where it is argued that pronouns appear only when reflexives cannot.

Because PRO already has the reflexive flavor, it might be possible to apply the competition mechanism proposed in this dissertation to reflexives as well.

6.1.3 NULL ARGUMENTS

I have taken null arguments out of the picture when discussing bare argument languages. A closer investigation of the distribution and interpretation of null arguments across these languages would be required before I can conclusively argue whether they participate in the competition with other anaphoric expressions. A closer look at Slavic null arguments, and the reported difference in distribution between Russian and Polish null arguments would also be important, as the availability of anaphoric bare nouns might track with the absence of null arguments.

6.1.4 DIACHRONIC CHANGES IN DEMONSTATIVES

What we have seen is that while all languages make use of demonstratives, not all languages carry lexically distinct pronouns. Some languages seem to be in the middle, where demonstratives can be used quite freely as a pronominal element (like Hindi), though there is no separate set of morphemes for pronouns. In Dahl 2004, there is a discussion of cross-linguistic patterns in definite marking. He argues that definite marking across languages is more frequent with modified nouns. He suggests that this is because adjectives usually point out a subset that makes them unique. What I would like to point out is that while pronouns often refer to the uniquely salient entity in the context, demonstratives point out a referent out of competing referents. It could be that out of different definite (or more specifically, anaphoric) marking, the ones that are crucial are the demonstratives because these specify that there is a property that pinpoints the intended referent. This might explain why across languages, we never see

a lack of demonstratives but we do see the lack of marking definiteness. If something is unique in a context, it might not be necessary to overtly mark that it is the intended referent.

6.2 SUMMARY

In summary, I have proposed in this dissertation a competition mechanism for anaphoric expressions. A single mechanism that builds denotations out of semantically primitive properties and makes use of an economy principle that chooses the least informative in a given context was shown to apply to a wide range of overt and covert expressions, including bare nouns, covert PRO and pro, anaphoric definite descriptions, demonstratives, and ASL loci.

In order to analyze each expression with the right set of properties, the distribution and the resulting expressions were closely investigated. This resulted in modifying many of the labels that have been proposed and assumed in previous literature. For example, I have shown in Chapter 4 that the term ‘demonstrative’ is not a category that maps only to expressions that contain *that*, but also to some animate pronouns. The IX to locus was also reanalyzed as a modifier rather than an anaphoric expression, by looking closely at the licensing condition of IX to locus, the introductory use, and the use of null anaphors and bare nouns in the language. This was possible because the starting point of the research was the denotations that make up the semantic space of anaphoric reference, rather than terms such as ‘demonstrative’ and ‘pronoun’ that focus only on the morphological distinction specific to a language. By looking at the range of denotations possible in the semantics and then investigating how these different meanings map onto

the morphosyntax of various languages, the theory allows us to make predictions on any given language without restricting ourselves to a specific set of phenomena expected from a morphological category that may not be relevant for the target language.

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