Psycholinguistic Investigations in the Theory of Reference

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Abstract

The correct use of pronominals requires knowledge of both syntactic and discourse-related principles. Normal adult speakers, in most cases, are able to fluently use and immediately understand pronominals, although the interpretation of these elements is different from one use to another. The pronoun *she*, for example, can be used to talk about an infinite number of singular female individuals, yet speakers (in most cases) are able to interpret it as designating one particular person. Establishing a unique reference for a pronoun depends on taking into account both syntactic and discourse information. Thus, the integration of the knowledge of syntactic and discourse-related principles appears to be a natural capacity of normal adult speakers.

Part I of this thesis presents a model of the syntax-discourse interface that shows how the syntactic and discourse-related information is coordinated in order to establish reference for definite noun phrases, pronouns in particular. It is argued that the integration of two types of knowledge is required: *the speaker-internal knowledge* and *the conversation-internal knowledge*. The proposed model explains certain errors in pronominal interpretation observed in young children. Children have difficulties implementing conversation-internal knowledge because it requires making inferences about other speakers' representations of the discourse. Based on the results reported in the literature, it is argued that children's inferential capacity is limited. It is proposed that these limitations lead to specific errors in children's interpretation of pronouns. It is further suggested that the same types of limitations explain similar errors observed in Broca's aphasics.

Part II presents theoretical and experimental projects that investigated children's knowledge of pronoun distribution in various constructions (Russian possessives, English plural pronouns, pronouns in Russian subjunctive clauses). Consistently with previous findings, in those constructions where the correct interpretation of pronominals requires only the speaker-internal knowledge (i.e. syntactic principles), children's performance is almost no different form that of normal adults. In cases where the correct interpretation requires additional inferential resources, children's performance deteriorates significantly.

Overall, the theory and experiments presented in this thesis argue for a modular account of linguistic development and breakdown. It is argued that the relevant linguistic knowledge is available to young children and intact in Broca's aphasics, while their capacity to implement (at least part of) this knowledge is limited.

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My work consists of two parts:
The one presented here, plus all
that I haven't written. And it is
precisely the second part that is
the important one.

Ludwig Wittgenstein

Briffe ·um Ludwig von Ficker,
G.H. von Wright (ed.) (1969)
Brenner Studien, vol. 1
Salzburg: Otto Miller, p. 35

Introduction

All natural languages contain certain elements whose interpretation depends on their linguistic (and, sometimes, non-linguistic) environment. These elements are pronominals: pronouns and reflexives. The information associated with the lexical entry for, say, pronoun *she* or reflexive *himself*, is limited and is never sufficient to provide a unique interpretation for these elements. The environment where these elements appear functions as a source of information for establishing reference.

The interpretation of pronominals depends both on syntactic, and contextual factors. To correctly interpret pronoun *she*, which (potentially) can be used to talk about an infinite number of singular female individuals, speakers have to integrate their knowledge of syntactic and discourse-related principles. An important difference between these two kinds of knowledge is that the knowledge of syntactic principles is *speaker-internal*: it represents their internalized knowledge of language. The knowledge of discourse-related principles, by contrast, is *conversation-internal*: it relies (in its implementation) on taking into account other speakers' representation of a given conversation. Given that speakers fluently and effortlessly use pronominals in their conversations, one may conclude that coordination of these two types of knowledge is a natural capacity of normal adult speakers.

This thesis has several goals. First, I develop a model of the syntax-discourse interface that shows how speakers' syntactic knowledge is coordinated with their knowledge of discourse principles. As the basis for this model, I take two existing theories. From the syntactic side, it is the Binding Theory (Chomsky 1986a), and from the discourse side, it is File

Change Semantics (Heim 1982). These two levels are separate independent levels of representation, each of which is characterized by its own principles. The model I propose aims at explaining how these principles interact with each other. More specifically, it relies on indexation of noun phrases and interpretation of this indexation as a mechanism for integrating syntactic and contextual information. I show how syntactic indices are interpreted at the level of discourse to establish reference for noun phrases, in particular pronominals.

Second, I further develop the existing model of discourse to incorporate the deictic use of definite NPs. The idea behind this enterprise is to make a non-linguistic source of reference (deixis) compatible with linguistic sources (e.g. NPs previously mentioned in the discourse). This will be shown to have important consequences for analyses of children's and aphasics' errors in pronominal interpretation.

Third, I show how the proposed model explains results of experiments with children and Broca's aphasics. In many studies, these two populations have been shown to assign a wrong reference to pronouns in certain constructions. Although, on the face of it, they behave as if they lack the knowledge of some linguistic principles, I argue that this is not the case. As mentioned above, establishing reference for a pronoun requires the use of both speaker-internal and conversation-internal knowledge. Further developing an idea proposed in Wexler and Chien (1985) and Chien and Wexler (1990), I argue that children and Broca's aphasics have difficulties implementing the second type of knowledge because it requires making certain inferences about other speakers' representations of the discourse. I

show how limitation on computational (more precisely, inferential) resources that these two populations exhibit results in a wrong interpretation of indices, in particular in an incorrect use of deixis. Thus, the account I offer claims that children's and aphasics' knowledge of relevant principles is no different from that of normal adults, although their inferential capacity is more limited.

In Part II of the thesis, I present results of theoretical and experimental projects. First, I develop a linguistic theory of Russian possessive pronominals and Russian subjunctive clauses. Second, I present results of acquisition experiments with Russian-speaking children. Their responses show that children between ages of 4 and 6 possess subtle linguistic knowledge necessary for correct interpretation of possessive pronominals and pronouns in subjunctive clauses. Similarly to previous experiments, however, in those conditions where children had to make inferences about other speakers' representation of discourse, their performance was once again poor.

Overall, the theory and experiments presented in this thesis argue for a modular account of linguistic development and breakdown. I argue that the relevant linguistic knowledge is available to young children and intact in Broca's aphasics, while their capacity to implement (at least part of) this knowledge is limited. With respect to the development, no learnability question arises on this account. Children will perform like normal adults when their computational (inferential) capacity has matured. Before that, their responses to experimental conditions may be misinterpreted as a manifestation of a lack of knowledge.

Part I
Establishing Reference

Chapter 1
Pronominals in Adult and Child Speech

1. Pronominals in Natural Languages.

As far as we know, all languages have pronominal elements. All languages give their speakers an opportunity to avoid unnecessary repetition of names and other referring expressions by making use of the pronominal system. This system presents a very special interest for linguists and psycholinguists because these elements do not have their own interpretation, and their interpretation depends on the linguistic environment. Speakers, clearly, use and understand pronominals fluently, and, in most cases, interpret them correctly. Thus, from the computational point of view, speakers are able to solve what appears to be a complicated task: to find an appropriate interpretation for an element that every time has a different interpretation depending upon where it appears in the input. Remarkably, as will be discussed in following chapters, such mastery is evident even in young children.

Pronominals have drawn linguists' attention because their interpretation depends on the syntactic environment and reflects, to a certain extent, the structure of a sentence. A simple example illustrates the point. The interpretation of NP *an apple* is the same in (1a) as in (1b), that is it does not depend on the structure of the sentence. By contrast, the interpretation of pronoun *her* in (2a) is different from the interpretation of the same pronoun in (2b).

(1) a. Mary thinks that Jane ate an apple.

b. Mary thinks that Jane's mother ate an apple.

(2) a. Mary thinks that Jane likes her.

b. Mary thinks that Jane's mother likes her.

In (2a), speakers interpret the pronoun as referring to Mary, and in (2b), it can be either Mary or Jane. Intuitively, the difference between NP *an apple* and NP *her* is that the former carries some independent information used for its interpretation, while the latter carries no such information. All relevant information is encoded syntactically in the form of features +singular, +feminine, which may be used to talk about an infinite number of objects. The linguistic environment supplies some additional information, thus making it clear which object is being discussed.

As we can see from (2), however, this information is supplied in a restricted way. That is, the structure of a sentence where a pronoun appears plays a certain role in how it can be interpreted. The same is obviously true about another type of pronominals, e.g. reflexives:

(3) a. Mary thinks that Jane likes herself.

b. Mary thinks that Jane's mother likes herself.

Once again, the interpretation of the reflexive depends on the structure of the sentence. To be more precise, two linguistic factors play a role in restricting the range of possible interpretations: c-command and locality. In (2a), *Jane* locally c-commands *her*. Thus, it cannot be used as a source of information necessary for interpreting the pronoun. A non-local name (*Mary*), on the other hand, can supply the relevant information, as well as a non-c-

commanding name (*Jane* in (2b)). The same factors are relevant for reflexives, although in the opposite way: only locally c-commanding NPs can be used for interpreting a reflexive. These two factors -- c-command and locality -- have been incorporated in the so-called Binding Principles (Chomsky 1981). Somewhat simplifying the original formulation and focusing only on pronouns and reflexives, these principles can be stated as in (4).

(4) Principle A: Reflexives must be locally bound.

Principle B: Pronouns must be locally free.

An element is said to be bound if it is coindexed with another element that c-commands it. The question of what coindexation represents will be extensively discussed in Chapter 2.

Principles A and B are syntactic principles that regulate which NPs *in a given sentence* can potentially be a source of pronominal interpretation. It is clear, however, that pronouns (and even reflexives sometimes) can be interpreted even in the absence of any intra-sentential antecedent:

(5) a. I like her. She is smart.

b. I want to talk to HIM, not to HIM (while pointing to someone).

c. John was walking down the street when he met Bill. They talked for a while, and then he suggested they have a drink.

The pronoun *her* in (5a) is interpretable if all speakers know that there is some female individual presupposed as a topic of their conversation. It is also interpretable in (5b) if the listener sees who the speaker is pointing to. In (5c), speakers tend to interpret the pronoun as referring to John, although it

does not appear in the same sentence, and there is another masculine NP around.[1] The point of these examples is to show that more than syntax alone is involved in interpreting pronominals. It involves both syntactic and discourse information. In this sense, pronominals occupy a very special place in natural languages because their interpretation requires sometimes that speakers carry out both syntactic, and discourse-related computations. Moreover, syntactic knowledge is "speaker-internal": it is a reflection of speakers' knowledge of language. The knowledge of discourse rules, by contrast, requires making certain inferences about other participants in the conversation. In (5a), for example, the speaker must make sure that the female individual under discussion is the same for all other speakers. No such inferences are required to know that, in (2a), *her* can (potentially) be Mary, but it can never be Jane. Let us briefly discuss the syntactic conditions on the choice of an antecedent. I defer the discussion of discourse-related factors until Chapter 2.

The restrictions on what can be a possible antecedent for a pronoun apparently exist in all languages. Languages may differ, however, with respect to the locality requirement, that is "how far away" from the pronominal its antecedent is allowed to be. For example, in Russian, a reflexive can be bound outside of its clause but only if this clause is infinitival. In Icelandic, a reflexive can also be bound outside of a subjunctive clause. None of these are allowed in English:

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[1]Somewhat similar examples can be constructed with logophoric reflexives, but I put this issue aside.

(6) a. Ivan ugovoril Petra sfotografirovat' sebja.

Ivan convinced Peter to photograph himself (Ivan or Peter)

b. Jon vildi ad Petur rakadi sig.

John wants that Peter shaved self (John or Peter).

Both NPs can be interpreted as an antecedent for the reflexive in (6a,b). Russian possessive pronouns, on the other hand, have less freedom than English possessives:

(7) Ivan pokazal Petru ego komnatu.

Ivan showed (to) Peter his room

In English, the possessive pronoun *his* can be interpreted as either Ivan or Peter, while in Russian *ego* 'his' can only be Peter. Other languages, for example Chinese and Japanese, impose other locality restrictions on what can be a possible antecedent.

This cross-linguistic variation presents an interesting learnability problem. A child does not know at birth what language it is going to acquire, more specifically, what are the locality restrictions imposed on the choice of an antecedent. The child, presumably, can figure out what is a pronoun, and what is a reflexive, but this knowledge alone is not sufficient to demonstrate an adult-like behavior. As mentioned above, to be interpretable, pronominals need to receive some additional information from their environment, and the child has to figure out where this information can be received from, for example, whether it can be an NP in the same clause.

There have been several proposals in the literature regarding how the child learns what is a local domain in his/her language. Wexler and

Manzini (1987), for example, suggest that the locality requirement can be parametrized in such a way that grammatical sentences of one language will form a subset of grammatical sentences of another one. Their theory is based on the Subset Principle (Berwick 1985) whereby children will move from the smaller language to a bigger one when they hear certain constructions in their target language. All children begin with the parameter setting that gives them the most restrictive type of grammar. For example, both English and Russian children begin with a hypothesis that the local domain for a reflexive is the clause. Thus, (6a) in Russian is initially outside of child's grammar on the reading where the reflexive is bound by the matrix subject. When Russian-speaking children hear sentences like (6a), they reset their parameter to such a value that allows binding of reflexives outside of an infinitival clause. English-speaking children, on the other hand, never receive this input (because adults never produce such sentences in English), and, therefore, their initial setting of the relevant parameter is, actually, the final one. Thus, this theory provides a model of acquisition of the locality constraint from positive data only. Although this theory has been shown to make wrong predictions with respect to some languages (e.g. Sigurjonsdottir and Hyams 1992 for Icelandic, Baylin 1992 for Russian), it provides an interesting model of acquisition of linguistic knowledge. It is possible that the parameters involved in the formulation of such a theory should be based not on the structural properties of a sentence, but on morphological (X-bar) properties of pronominal elements (whether it is a head or a maximal projection, whether it is a monomorphemic, or a polimorphemic element), but I will not discuss this issue here. Analyses along these lines can be found

in Pica 1987, Hestvik 1992, Baylin 1992, among others. In any case, the child has to figure out from positive data only the correct setting of certain parameters to become a competent speaker of his or her language.

It is interesting that theories that concern themselves with acquisition of constraints on pronominal interpretation provide, in most cases, purely syntactic models. The child, for example, may have to figure out the relevant structural characteristics of the binding domain, or the relevant morphosyntactic property of the element itself. At the same time, as discussed at the beginning of this section, the interpretation of a pronominal element (a pronoun, in particular) depends both on syntactic, and discourse-related factors. It is clear, therefore, that a comprehensive learning model must include both components. It has to specify what syntactic constraints the child has to know, as well as what the child has to know about the discourse a given sentence is a part of. Recently, researchers have begun to attempt to look at the development of pronominal interpretation from both syntactic, and pragmatic (discourse-related) points of view (for the most recent proposal based on Sperber and Wilson's (1986) Theory of Relevance see Foster-Cohen 1994). In the following section, I briefly discuss previous acquisition results and theories proposed to account for these results. I suggest that a more detailed theory is needed to account for cross-linguistic acquisition data in a coherent way. Such a theory will be presented in Chapters 2 and 3.

2. Previous Acquisition Results.

Acquisition of pronominal system represents a very active direction of research in the field of developmental linguistics. During the last decade, quite a few studies have attempted to investigate children's mastery of pronominals, both in English, and in other languages. A very detailed and careful discussion of previous data (as well as corresponding references) is presented in Koster (1993). I will not repeat here results of all of the experiments, but rather summarize the cross-linguistic data, and present a pattern that emerges from analyses of these data.

Jakubowitz (1984) first noticed that children's performance is significantly better on sentences with reflexives than on sentences with pronouns. Thus, in a situation where Father Bear washes himself, children almost always correctly accept (8). If Father Bear does not wash himself, but washes somebody else, they correctly reject (8).

8) Father Bear washed himself. (Good performance: almost 100% acceptance)

At the same time, children sometimes incorrectly allow (9) as a true description of situation where Father Bear washes himself:

9) Father Bear washed him . (Poor performance: about 50% acceptance)

Jakubowitz suggested that children at this age (4-6 years old) incorrectly interpret pronouns as reflexive elements. In English, it could be so because pronouns and reflexives are morphologically similar. This explanation, however, does not hold. First, Avrutin and Wexler (1992) show that Russian speaking children show exactly the same pattern, although Russian pronouns

and reflexives are not morphologically similar (for example, Russian *him* is *ego*, and Russian *himself* is *sebja*). Second, if children confused pronouns and reflexives, we might expect them to always accept (9), to be more precise, to accept (9) as often as they accept (8). This, however, does not happen: children demonstrate an almost perfect performance on reflexive conditions, and around chance performance on pronoun conditions. In other words, children are sensitive to the difference between pronouns and reflexives.

Even before the Russian experiment, however, Wexler and Chien (1985) questioned Jakubowitz's claim. They argue that children possess all relevant syntactic knowledge (e.g. Principles A and B) and know the difference between pronouns and reflexives. An important inside first offered in this article was that children are different from adults in their treatment of indexation. Wexler and Chien suggest that children's representation of (9) is different from adults' in that *Father Bear* and *him* are allowed to have different indices but be coreferential. I return to this proposal, which was the basis for the "Principle P account", later in this chapter. In this article, Wexler and Chien suggest that children's performance on sentences with quantified antecedents should be good because of the necessary coindexation. This experiment was carried out and is reported in Chien and Wexler (1991). Indeed, children's performance improves significantly when the antecedent for a pronoun is a quantified NP, as in (10).

(10) Every bear washed him.

In contrast to (9), children correctly reject this sentence as a description of a situation where every bear washed himself. If children had difficulties with

distinguishing pronouns and reflexives, we should not expect any difference in their responses to (9) and (10). Thus, as Chien and Wexler point out, children are sensitive to the nature of the antecedent, which (as will be discussed below) determines the character of the pronoun (whether it is a referring element, as in (9), or a bound variable, as in (10)).

It is also interesting that when children are presented with a situation where Father Bear washes somebody else, and hear sentence (9), they correctly accept this sentence as a true description of the situation. As Grimshaw and Rosen (1990) argue children distinguish between grammatical and ungrammatical structures, which shows their knowledge of the relevant linguistic principles (Principle B in this case). According to Grimshaw and Rosen, children possess the relevant knowledge, but (sometimes) do not obey it. This failure of obedience is, presumably, due to some problems with experimental designs, and other extralinguistic factors. A detailed discussion of Grimshaw and Rosen's approach can be found in Avrutin and Wexler 1992, and, especially, in Grodzinsky and Reinhart 1993. Here, I want to mention just two questions that are relevant for the current discussion. First, why do children show both knowledge and obedience in reflexive conditions, and second, why does their performance improve in quantificational constructions? Let me now turn to two explanations that specifically address these two questions.

Grodzinsky and Reinhart (1993) offer a "processing" account of the observed deficit based on the theoretical work of Reinhart (1983, 1986). The central point of Reinhart's approach is that even those pronominals that have an R-expression antecedent can be interpreted as bound variables. The

difference between quantificational and non- quantificational constructions is that, in the former case, the interpretation of a pronoun is unambiguously a bound variable, while in the latter case, the pronoun can be either bound variable or a referring element. The idea (originally due to Sag 1977 and Williams 1977) is that R-expressions can function as quantifiers (the so-called generalized quantifiers). Unlike "real" quantifiers, however, R-expressions function as quantifiers only optionally. In terms of derivations, it amounts to saying that, at LF, "real" quantifiers undergo obligatory raising, while R-expressions do so optionally. (11) and (12) illustrate the point.

(11) Every girl walked her dog. (S-structure)

Every girl t walked her dog (LF)

$\forall x$ (girl(x) ---> x walked x's dog) (Interpretation)

(12) Mary walked her dog. (S-structure)

a. Mary t walked her dog (LF; *Mary* functions as a generalized quantifier)

Mary $\lambda_i(x)$ (x_i walked x_i's dog) (Interpretation; λ is a functional abstractor)

b. Mary walked her dog (LF; *Mary* is a regular R-expression)

Mary walked her dog (Interpretation: *her* refers to a singular female individual who happens to be Mary).

Grodzinsky and Reinhart propose Rule I which is meant to specify when speakers can use (12a) and (12b). A detailed discussion of Rule I can be found in Heim 1992 and Avrutin 1994. Suffice it to say here that Rule I allows reading (12b) (coreference) only if it yields a meaning different from that obtained by a bound variable interpretation (12a). Thus, in this approach, the bound variable anaphora is the center of the dependency relation, while

coreference is a marginal case. Principle B of the binding theory applies only to bound variables and rules out sentences where pronouns are locally bound by a coindexed antecedent. The coreference, which in Reinhart's system does not involve coindexation, is ruled out by Rule I. Thus, normal speakers reject (13) because both of its possible representations (bound variable and coreference) are ruled out: the first one by Principle B, and the second one by Rule I.

(13) Father Bear washed him.

Notice that to correctly use Rule I speakers have to figure out whether coreference gives an interpretation different from the bound variable. In order to do that, speakers have to compare the resulting representations to the context, which, according to Grodzinsky and Reinhart, requires additional processing resources. They suggest that children and Broca's aphasics are unable to maintain the two representations (coreferential and bound variable), which results in their being lost. In other words, children and aphasics accept (13) not because of some problems with Principle B, but because of their failure to implement Rule I. This approach correctly predicts that when Rule I does not apply (quantificational constructions, sentences with reflexives), children and aphasics should not have any problems.

A good part of this analyses, I believe, is that it attempts to provide a unified explanation for the similarities found in children and Broca's aphasics. There are several problems with this approach, however. First of all, it is not detailed in the sense that there is no proposal of what exactly is missing in these two populations. Clearly, neither children nor aphasics get

lost every time they hear a potentially ambiguous structure or word. The question is why they are so sensitive to the bound variable/coreference ambiguity. Moreover, the evidence that Grodzinsky and Reinhart advance to support their processing view is based on a very specific interpretation of Swinney et al's priming experiment (Swinney, Nicol and Zurif 1989, Swinney and Prather 1989). It was shown that children and aphasics show priming only for the most frequent meaning of an ambiguous word, while normal subjects show priming for both meanings. I return to the discussin of this experiment in Chapter 4. Grodzinsky and Reinhart interpret this result as evidence that these populations can not processes two representations simultaneously. This view, however, is different from the traditional interpretation of these results, which suggests that the most frequent meaning is accessed first, and that the mechanism responsible for this access is slowed down (at least in aphasia).

But, more importantly, there is empirical evidence that the Rule I approach is not correct. This evidence comes from Russian subjunctive clauses, which I discuss in Part II. Briefly, the pronoun in the subject position of a subjunctive clause in Russian cannot be coindexed with the matrix subject. At the same time, reflexive in this position is also ungrammatical, as shown in (14).

(14) *Ivan xočet ctoby on/sebja prygnul.

Ivan wants that he/himself jumped

Thus, there is no way to use a bound variable representation in this case, which means that children (and aphasics) should not have any problem. In

the experiment I report, however, Russian speaking children exhibited exactly the same pattern of responses as in other, traditional constructions. Such a result is not predicted in Grodzinsky and Reinhart's theory because, in their view, the problem arises only when there are two competing representations, and subjects are lost while trying to figure out whether one of them is allowed. When there is no ambiguity (as in case of subjunctive constructions), there should be no deficit.

As mentioned above, a different explanation was proposed by Chien and Wexler (1991). A detailed explanation of their theory is presented in Avrutin and Wexler (1992). The central idea is that children lack certain knowledge that is responsible for the connection between reference and indexation. Chien and Wexler formulate pragmatic Principle P that states that two coreferential NPs are coindexed (unless context specifies otherwise). Thus, for normal adults, if *Father Bear* and *him* in (13) have different indices, they necessarily designate different individuals. This sentence is rejected by normal adults as description of a situation where Father Bear washed himself because Principle P requires a coindexation, and Principle B rules it out. Children, however, are claimed to lack the knowledge of Principle P, and, therefore, they allow the two NPs in (14) to have different indices, and yet to corefer. Chien and Wexler argue for a highly modular character of the development: the syntactic part of the dependency relation is innate (Principles A and B), while the pragmatic part (Principle P) is acquired around the age of 6. Presence of the syntactic knowledge is manifested in children's correct responses to reflexive conditions and sentences with quantified

antecedents (in this case Principle P is irrelevant because the only way to link a pronoun with a quantifier is by coindexation).

This theory provides an important inside on the relationship between indexation and reference, and on the development of this relation. It is interesting, however, that Broca's aphasics demonstrate a similar pattern of responses. Although it is logically possible that these people lose (as a result of brain damage) some relevant knowledge, it seems to me more plausible that the similarities between children and aphasics have a common explanation in terms of some limitations on computational resources.

Although, the indices/reference approach appears to be on the right track, several questions remain unanswered. Given that the problem lies in the interpretation of indices and its relation to reference, the following questions arise:

- What is indexation?
- What is its relation to reference?
- Assuming that children's and aphasics' inferential resources are limited, how does this limitation show up in the interpretation of indices, i.e. in their relations to reference?

Thus, to briefly summarize, the goal of Part I of this thesis is to develop a model that shows how limitations on computational resources may result in an incorrect interpretation of indices. In order to do that, we first need a theory of indexation and interpretation of indices, a theory that would explain the role indices play in the syntax-discourse interface.

Chapter 2
Syntax, Discourse and Interpretation of Pronominals

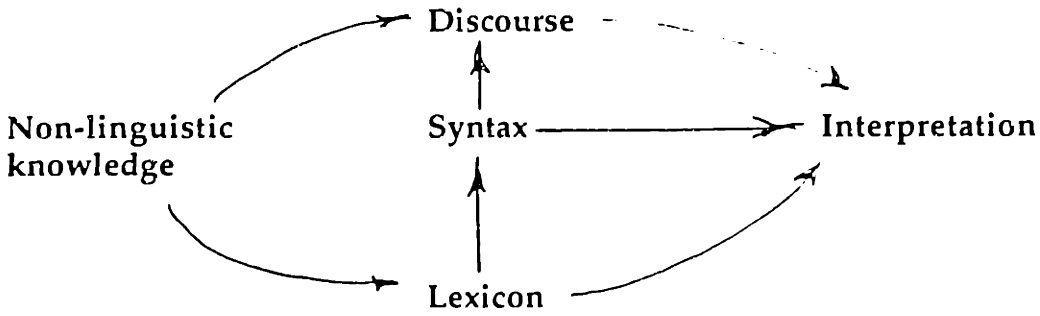
In this chapter, I present a model of the syntax-discourse interface. First, I discuss the role indices play in establishing a relevant interpretation of NPs. I show that coindexation of two NPs can either represent variable binding, or *identity of senses for a given referent*. Although these two interpretations are different with respect to the character of elements they apply to, they both establish a dependency relation. In the first case, it is a syntactic dependency, in the second, it is a discourse-related dependency.

I also discuss various ways of introducing an NP into discourse. First, I present a model known as File Change Semantics (Heim 1982). I discuss three mechanisms: Incorporation, Accommodation and Deictic use of an NP. I further develop the existing discourse model and argue that the deictic use of a definite NP is just another case of Accommodation. This proposal will be shown to have important consequences with respect to analyses of children's and aphasics' interpretation of pronouns.

1. General Model.

When speakers take part in a conversation, they use various aspects of their knowledge. Speakers, clearly, have to know words of their language (i.e. to possess lexical knowledge). They must be able to combine words into grammatical strings (i.e. to possess syntactic competence), and to combine these strings (sentences) into a coherent text (i.e. to possess knowledge of some discourse principles and strategies). To make a conversation mutually understandable and informative, speakers must also share some world knowledge, roughly speaking, they must know what they are talking about.

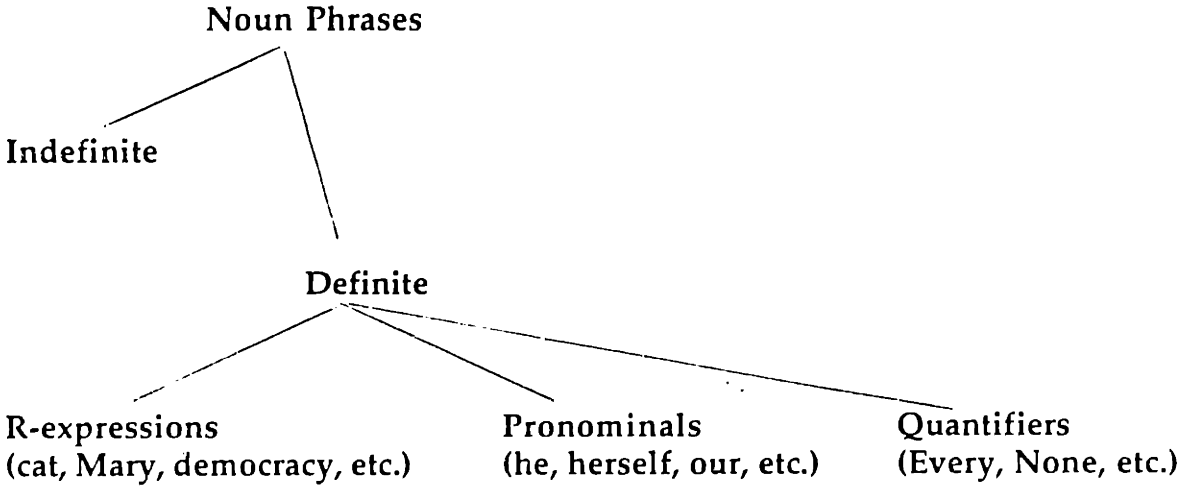
The following simplified model illustrates relationship between these domains of knowledge.



To be able to correctly interpret sentences, speakers must be able to combine the lexical, syntactic and discourse-related knowledge. They, clearly, must know the meaning of the words. They must be able to represent the syntactic structure of the sentence, for example to know who did what to whom in a sentence "Mary showed John Bill". They also must know some rules of the discourse to correctly interpret *he* as *John* in "John came home late after drinking with Bill. He was tired". Thus, interpretation of sentences requires an integration of different types of knowledge.

Consider, for example, a noun *dog*. Suppose a speaker wants to say something about a dog. He or she pulls out of the lexicon the lexical item *dog*, which is inserted into the syntactic tree. In the output of syntax, we have a phrase that carries some lexical and syntactic information: [NP a dog], or [NP the dog]. This NP is presented to the discourse and it is subject to some new, discourse related mechanisms. The questions now are: what are these mechanisms, and what is the discourse representation of NPs? The second question is of particular interest because it is directly relevant to the question of how NPs are interpreted. The discourse representation of an NP, in turn, depends on what kind of NP it is. Syntactically, NPs can be either definite, or

indefinite, and definite NPs can be either 'names' (or, rather, 'R-expressions' as in Chomsky 1986a), pronominals (pronouns, reflexives), or quantifiers:



I begin with a brief summary of the syntactic conditions that are commonly accepted to be responsible for the distribution of pronouns and reflexives. Then, I show that in those cases where pronominals (specifically pronouns) are interpreted through discourse, their distribution can be best analyzed if we abstract away (at least in part) from their pronominal nature, and focus on the fact that they are definite NPs. Let us begin with the following questions about pronouns: how are these elements interpreted, and what kind of syntactic and non-syntactic principles are involved in their interpretation?

2. Syntactic Constraints and Interpretations of Indices.

From the traditional syntactic point of view, the principles regulating distribution of pronouns and reflexives appear to be straightforward. These principles are known in the literature as Principles A and B of the Binding Theory. Stated somewhat informally, these principles are repeated below (for a more detailed formulation see, for example, Chomsky 1986a):

Principle A: Reflexives must be locally bound.

Principle B: Pronouns must be locally free.

Locality in these conditions is defined in structural terms (for example, a clause), and binding is defined as c-commanding in the presence of coindexation. Thus, only (1) below violates Principle B:

(1) *Mary$_i$ likes her$_i$.

(2) Mary's$_i$ father likes her$_i$.

(3) [Mary$_i$ thinks [John likes her$_i$]].

The pronoun *her* in (1) is in local c-commanding relation with its antecedent, thus the sentence is ruled out. In (2), although the pronoun is, in some sense, local to its antecedent, there is no c-commanding relation between them, hence no binding. And in (3), although *Mary* does c-command *her*, the pronoun is sufficiently far away from its antecedent, therefore *her* can be interpreted as *Mary*.

While the notions of c-command and locality are unproblematic in that they can be defined in structural terms, the notion of coindexation is less transparent. The first, intuitive, view on coindexation is that it represents coreference. That is, in (3) *Mary* refers to a certain person named *Mary* (or, rather, to the speaker's mental representation of this person), and *her* also refers to this person. Thus, the two NPs are coreferential, and, therefore, coindexed.

There are two problems with equating coindexation and coreference. First, in sentences with quantified antecedents, it is meaningless to talk about

coreference simply because pronouns (and their antecedents) have no reference:

(4) [Every boy]$_i$ thinks he$_i$ is smart.

Since quantifiers do not refer, the pronoun *he* in (4) cannot be said to be coreferential with its antecedent. Rather, it is interpreted in this case as a variable bound by an operator, that is its value is determined by the value picked by the universal quantifier *every* from a pre-established set of boys. Thus, although *every boy* and *he* are coindexed, this coindexation clearly does not represent coreference.

The second problem arises if we consider some 'marginal' cases, that is sentences which should be ruled out by (the orthodox version of) Principle B. These sentences, exemplified below, have attracted significant attention from both linguists and philosophers of language (e.g. Higginbotham 1985, Reinhart 1983, Heim 1992, among others). The acquisition results presented in Chien and Wexler (1990) have once again stirred up this interest. The most recent analyses of pronominal interpretation in these constructions are provided in Heim 1992, which I discuss shortly.[2]

(5) Who is this speaker? It must be Zelda. She praises her to the sky. No other candidate would do it.

(6) Everybody hates Lucifer. Only he himself pities him.

(7) You know what Mary, Sue and John have in common? Mary admires John, Sue admires him, and John admires him, too.

(8) That must be John. At least, he looks like him.
(from Chien and Wexler 1990)

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[2]Examples (5) - (7) are also from Heim 1992.

Consider, for example, (5), specifically the sentence 'She praises her to the sky'. Both *she* and *her* refer to the same individual named Zelda, in fact there is only one individual around, or, at least under, consideration. Thus, *she* and *her* are coreferential in the sense that they have a common referent. But if coreference implies coindexation, *she* and *her* in this sentence should be coindexed, and the sentence should be ruled out as a violation of Principle B. Still, (5) is perfectly acceptable. The same holds for examples (6) - (8).

A conclusion that we can draw from these examples (and from quantificational constructions) is that coindexation does not, in fact, represent coreference, but has some other interpretation. To see what could be said more plausibly about coindexation, let us recall the distinction between *Sense* and *Reference* proposed first by Goettlibe Frege (Frege 1892). Frege suggested that two different terms, for example *Morning Star* and *Evening Star*, may have the same reference but different senses. In the morning, or in the evening, when speakers talk about some bright star in the sky, they actually talk about Planet Venus, which is the same in the morning, and in the evening. Thus, in Fregian terms, both Morning Star and Evening Star have the same reference. In the context of their conversation, however, Planet Venus discussed in the morning is represented differently from Planet Venus discussed in the evening. The two terms, thus, have different senses, where sense is a context-dependent notion for some referent. Crucially, one and the same referent may have different senses, provided there are appropriate contextual conditions that introduce these different senses for the same referent. In the absence of such conditions, one and the same referent appears in discourse as having one and the same sense. For example, astronomers

observing Venus in the telescope and discussing its motion, represent it in their conversation as one and the same object observable in different times of the day. In their conversation, the thing they observe in the morning has the same sense and reference as the thing they observe in the evening.

What do these Fregian ideas have to do with indices? Let us look again at the sentences above, for example (5). Notice that when the middle sentence appears in isolation, with no surrounding context as in (9), this sentence is actually ruled out:

(9) *She$_i$ praises her$_i$.

As Heim (1992) points out, the difference between the two cases is that in (5), one and the same person (referent) Zelda appears under two different guises. One guise is provided through the speaker's visual context (pointing to the speaker), and the other is something like our memory entry regarding Zelda. Of course, some special contextual conditions are necessary, which are provided through discourse. Indeed, when the discourse is not there, as in (9), there is no evidence that one person (one referent) has two different guises (senses). In (9), the sense and reference of Zelda coincide, while in (5) the context disambiguates between them. And it is not a coincidence that only (5), but not (9) is grammatical. Following Heim's proposal[3], we say that in (5), *she* and *her* are not, actually, coindexed, while they are in (9). They bear different indices in (5) because the context here provides different guises for the same referent. In other words, the index denotes the guise, not the referent of the NP, that is it denotes the way a particular object is introduced

[3]See also Higginbotham 1985, Reinhart 1983 and Montalbetti and Wexler 1988 for earlier versions of the same idea.

in the discourse. Coindexation, therefore, represents the identity of guises, not the identity of referents.

(10) Who is this speaker? It must be Zelda. She$_i$ praises her$_j$ to the sky. No other candidate would do it.

In the absence of context, as in (9), there is no evidence that one and the same referent appears under two different guises, therefore *she* and *her* are coindexed. The point is that the distinction between *sense* and *reference* noticed by philosophers is reflected in natural languages by means of the indexation mechanism.

Let us now return to quantificational constructions:

(11) [Every boy]$_i$ thinks he$_i$ is smart.

Given that quantifiers (and bound variables) do not have reference, and therefore cannot denote guises of their referents, we have to say something about what coindexing represents in (11).

It has been argued in the literature (most notably in Reinhart 1983, 1986) that the coindexation exemplified in (11) is the only meaningful type of coindexation. Reinhart argues that the only interpretation of coindexation is variable binding familiar from formal logic. Thus, (11) receives the following interpretation:

(12) $\forall x$ (boy(x) ---> x thinks that x is smart).

Referring expressions in this theory do not have any index, and their interpretation is achieved by some discourse mechanisms, which indexation

has nothing to do with. For example, in (13) neither *John*, nor *he* has any index:[4]

(13) John's mother thinks that he is smart.

John is interpreted as referring to some person John mentioned in the previous discourse, and *he* is interpreted as a single male individual referring to some entity also introduced in the discourse, and which also happens to be John. In other words, indexation is a purely syntactic mechanism that has nothing to do with discourse, or, for that matter, reference.

Notice, however, that both bound variable anaphora (as in (11)), and discourse anaphora (as in (13)) are types of dependency relation. They are different in nature, of course, but the difference lies in *the level* of application, rather than in the character of the relation. Variable binding is a dependency relation established *at the level of syntax*, while the other type of dependency is established *at the discourse level.*

I suggest that we can use one mechanism (indexation) to express both types of dependency, and that the difference between the types lies in the interpretation of indices.[5] Before making this proposal, however, we need to

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[4]In fact, this is a simplification of Reinhart's prposal. As discussed in Chapter 1, R-expressions can also function as generalized quantifiers. In this case, this expression and the pronoun do receive indices. Thus, in Reinhart's system, assignment of indices is an optional procedure that takes place at LF depending on the interpretation of the NP. My approach is different in that I argue that NPs always bear indices, but their interpretation may be different. See discussion below.

[5]The idea of using indices to express both types of relations is originally due to Heim (1992). Heim's proposal is different from mine in that she argues for the presence of two indices on each NP. The first index (by stipulation) comes from the lexicon, and the second is (optionally) assigned at LF in those cases where NP undergoes QR. The first ("inner") index in this system corresponds to what the NP can be bound by, and the second ("outer") index corresponds to what it can bind. This, rather complicated mechanism, is introduced in order to account for some non-trivial cases of VP-ellipsis.

have a model of discourse. Then, we will be able to ask the question of what role indices (and coindexation) play in this model, that is how coindexation is represented at the level of discourse, and whether it is possible to use one and the same mechanism (indices) to represent two different types of dependencies. In the following section I present one of the existing models of discourse, which is known as File Change Semantics, and then I make a specific proposal regarding interpretation of indices.

3. File Change Semantics.

File Change Semantics is a discourse model originally proposed in Heim 1982. The intuitive idea behind this model is that the goal of a conversation is to convey some information from one participant to the other. The second participant (the listener) keeps track of this information by creating file cards and updating information on them, similar to record keeping in a library's file catalog. Consider, for example, the following conversation (from Heim 1982). There are two participants in the conversation: A and B. A utters sentences (14), and B extracts the information, and keeps a record of it.

(14) a)A woman was bitten by a dog.

b) She hit him with a paddle.

c) It broke in half.

d) The dog ran away.

The file change proceeds in the following way. After sentence (a), B takes two new cards and gives each a number (1 and 2). On card 1, B writes:

1: "is a woman"; "was bitten by 2"

On card 2, B writes:

2: "is a dog"; "bit 1"

After sentence (b), B takes a new card, gives it a number (3), and writes:

3: "is a paddle; was used by 1 to hit 2"

Speaker B at this moment also updates the information on card 1, that is two new entries are added: "hit 2 with 3" (on card 1) and "was hit by 1 with 3" (on card 2).

After (c), speaker B updates card (3):

3: "broke in half"

Finally, after hearing sentence (d), the speaker updates card (2):

2: "ran away"

What is important for us in this model is the following two things. First, each indefinite NP that appears in discourse requires introduction of a new file card, that is a card with a new number. Definite NPs do not introduce new cards, rather information on an existing card is updated. Second, different file cards do not necessarily correspond to different referents. Two different cards can, in fact, have one and the same referent. *File cards correspond to the way this referent is presented in the discourse*, or, using Heim's terminology, they introduce *guises*. Thus, as discussed above, in example (10), *she* and *her* represent different guises of the same referent (Zelda). A different guise is associated with a different file card, and a different file card is associated with a different number in the file catalog. Let us now return to the original question of interpretation of indices on

referring and non-referring elements, more specifically to the relation between NPs, their indices, file cards and their numbers.

4. Interpretation of Indices in Syntax and Discourse.

As I suggested at the end of Section 3, we can use one mechanism (indexation) to express both types of dependency, and that the difference between the types lies in the interpretation of indices. Specifically, I propose the following mechanism of generation and interpretation of indices.

Contrary to Reinhart (1983, 1986) who claims that indices are optionally assigned to NPs, I would like to make the following proposal:

All nominal elements (N, AgrS, AgrO) come from the lexicon with an index.

This is, of course, similar to Heim's (1992) proposal who stipulates that all pronouns come from the lexicon with an index. I suggest that this is not a stipulation. What comes from the lexicon is a head (let's say *dog*) that has syntactic property +N and is inserted into syntactic structure where it projects NP. Notice that the noun *dog* does not denote any particular individual, rather it denotes a set of all possible dogs. Thus, we can say that dog is a variable whose value ranges over all possible dogs. *Dog*, however, is just a lexical item, so it is better to say that this item has a variable index whose value ranges over all possible individuals of the set denoted by the noun dog. The index of *dog* ranges over all possible dogs and the index of *table* ranges over all possible tables. Having a variable index, therefore, is an inherent property of elements that denote sets, nouns in particular[6].

[6]For the time being, I put the issue of AgrS and AgrO aside. Intuitively, the set denoted by Agr is fully determined by its features. If Agr is +sing, +masculine, it denotes the set of all

Following traditional assumptions, we can say that the index of an NP is the same as the index of its head. This can be described as an index percolation, or it may follow from the X-bar theory. What is important is that the index of an NP, therefore, is also a variable. And this is somewhat counterintuitive. Indeed, while it is intuitively plausible that dog does not denote any particular individual, NP *the dog*, or *a dog* is interpreted by speakers as denoting a single representative of the set of dogs. Such an interpretation would not be surprising if the index of NP was a constant (say, a number), not a variable index. The question is why we are able to use NPs to talk about individuals, although the indices on NPs are variables.

A straightforward answer to this question is that by the time an NP gets interpreted, its index is no longer a variable, but a constant. Recall now the we deal with constants at the level of discourse representation as well: file cards that represent NPs have numbers, and numbers are certainly constants. I propose that we interpret NPs as denoting individuals because the syntax-discourse connection can be characterized as nothing but **instantiation of a variable (index) with a constant (number of a file card)**. The set of rules is presented below.

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possible singular masculine individuals. An interesting question (which I do not discuss here) is in what respect (if in any) Agr is different from pronouns, in particular a non-pronominal Agr.

Rules of NP Representation in Discourse

1. Instantiate the variable index of an Indefinite NP with a number of a new file card.

2. Instantiate the index of a definite NP with a number of an old file card.

3. Instantiate two identical variable indices with the same number, and two different indices with different numbers.

The first two rules correspond to what was proposed in Heim (1982): an Indefinite NP introduces a new file card, a definite NP does not. The third rule says that NP_i and NP_i will be represented by the same file card (the same index will be instantiated with the same number), and NP_i and NP_j will be represented by two different cards (two different instantiating numbers).

In syntax, NP *a/the dog* has a variable index. By Rule 1 or 2, this index is instantiated by the number of a new card, or an old one (say, card #7). Thus, speakers interpret *a/the dog* as denoting an individual because the representation that is actually interpreted is something like DOG #7, not $[_{NP}$ the dog$]_i$. The latter is its syntactic representation, but interpretation of NPs operates on their discourse representation. Why can't we say that the syntactic representation of an NP can be an input to its interpretation? After all, as I mentioned at the beginning of this Chapter, syntax directly contributes to the interpretation of a sentence. First, as discussed in Section 3, discourse plays a crucial role in establishing reference for NPs, pronouns in particular. Sentences of type (10) illustrate the point. A different indexation for *she* and *her* is possible only because the discourse supplies different guises for one and the same referent, thus making the sentence grammatical with respect to

Principle B. Second, following Heim (1992), I assume the following constraint on interpretation:

Sentences with free (unbound) variables are not interpretable.

It follows then that (in the absence of any operator that binds the variables in syntax), variable indices must be instantiated. In other words, indices of NPs (variables) must be translated into numbers of file cards (constants). Thus, only the discourse representation of NP *a/the dog* can function as an input to interpretation, and only in this case this NP will be interpreted as denoting an individual dog.

It also follows, however, that the syntactic representation of an NP with a bound index can be interpreted. This is the case of quantifiers and bound variables. Consider, for example, (15).

(15) Every boy thinks he is smart.

The nouns *boy* and *he* come from the lexicon with an index. Let us suppose they have the same indices. These indices are bound in syntax (at LF) by the universal quantifier *every*. Thus, the sentence contains no free variables, and it can be interpreted as in (16).

(16) ∀x (boy(x) --->x thinks x is smart)

As expected, quantifiers and bound variables do not denote individuals, but rather sets. This is predicted because their indices are variables, not constants. In other words, the constraint on interpretability stated above is satisfied in this case by binding variables, not by instantiating them. Moreover, this is the

only possible way of satisfying this constraint. If we were to instantiate the variable index on a quantifier or a pronoun syntactically bound by a quantifier, we would have to follow Rules 1 and 3 above and instantiate their index with the number of some previously existing card, say #4. The sentence would receive the following representation.

(17) [Every boy]#4 thinks that he#4 is smart.

But this is an uninterpretable representation, in fact it is meaningless: there is an operator but no variable. It follows then that quantifiers and bound variables are not represented by file cards. For definite and indefinite NPs it is their discourse representation that is interpreted, while for quantifiers, it is their syntactic representation.

Recall now sentence (5) repeated below as (17).

(17) Who is this speaker? It must be Zelda. She praises her to the sky. No other candidate would do it.

As argued above, *she* and *her* have different indices because the discourse provides different guises for the same referent, that is the discourse allows introduction of two different cards for *she* and *her* . But if quantifiers are not represented by file cards, we predict that a quantificational construction corresponding to (17) is ungrammatical. This is the case, as (18) demonstrates.

(18) Who are these speakers? It must be Zelda, Mary and Jane. *Each of them praises her to the sky. None of other candidates would do it.

The coindexation of *each of them* and *her* is prohibited by Principle B. And since quantifiers are not represented by file cards, they cannot represent any

guise of some referent, which was possible in (17). Thus, (18) is ungrammatical.

Consider now (19).

(19) The speaker praised her.

The speaker, as a definite NP, has a variable index *i*, which is instantiated with some file card number, say 9. The pronoun *her* cannot be generated with the same index due to Principle B. But, as a definite NP, it must have some index, so it receives a different index, say *j*. According to Rule 3, this index is instantiated with a different number, say 5. The only interpretation of this representation is such that NP *the speaker* represents a guise of some individual introduced in the discourse by file card #9 and *her* represents a guise of some female individual represented by file card #5. In the absence of any discourse, this means that the speaker praised some other female person. If the appropriate discourse is present, however, this can also mean that one the same person presented under two different guises praises herself. This is the case of (10) discussed above.

Notice that there is an implicit "markedness" assumption regarding the relationship of a referent an a guise. The idea is that the default, unmarked case for a discourse representation of a referent is that different guises represent different referents. It is only when the context provides some additional, marked conditions that one and the same referent is allowed to be represented by different guises (file cards). This assumption was already evident in the Chien and Wexler's (1990) proposal regarding the relationship between reference and indexation, which they formulated as Principle P (see also Avrutin and Wexler 1992).

Principle P: Two coreferential elements are coindexed unless the context specifies otherwise.

In the proposed framework, such an assumption seems to be quite plausible and based on economy considerations. Indeed, the smaller the file (that is, the fewer cards it contains), the easier it is to maintain it (that is, to keep record). It is plausible, therefore, that the economy (information-processing) considerations result in the following constraint on file change:

Avoid introduction of new file cards, unless it is required by the discourse.

This is, essentially, a reformulation of Chien and Wexler's proposal, but with more Psycholinguistic flavor. And, returning now to our example (19), we can see why *the speaker* and *her* have different references: they are represented by two different file cards, which (as follows from the constraint on file change introduced above) is a way of representing two, not one, referents.

As stated in Rule 2, indices on definite NPs are instantiated by numbers of previously existing cards. In other words, a definite NP can, apparently, be used only if there was a previous mention of this NP (either in its definite or indefinite form: all that is required is that there would be a previously established file card). In the following section, I show that this does not have always to be the case. There are cases where speakers (apparently) violate this rule. I argue that there is, in fact, no violation, but a modification of this rule is in order.

5. Various Uses of Definite NPs.

The question of how and when speakers use definite NPs is one of the most widely discussed questions in the philosophical, psychological and psycho linguistic literature.[7] The reason for this interest is that definites are extensively used by speakers in a variety of contexts, but a more or less precise characteristic of these uses is extremely difficult to achieve.

On the face of it, the situation appears to be quite simple. When an NP is used in a conversation for the first time, this NP has to be indefinite. Afterwards, a corresponding definite NP can be used to refer to the previously established referent (that is, the referent established by the use of the indefinite NP). This simple case is exemplified in (20).

(21) I saw a cat. The cat/ he was hungry.

It is infelicitous to use a definite NP without establishing an appropriate reference:

(22) #The cat/he was hungry.

The situation, however, is much more complex. In a large number of cases, speakers introduce a definite NP without ever mentioning any antecedent, but the sentence still sounds perfectly normal. Here are several examples taken from Heim 1982 and Hawkins 1978. As I am walking up a driveway, someone says to me:

(23) Watch out, the dog will bite you!

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[7]See, for example, Hawkins 1978 and Ariel 1990 for extensive discussions and references.

There was no previous mention of a dog, and there is no reason to assume that I know which dog we are talking about, or, for that matter, that this dog exists. Still, this, so-called Immediate Situation Use of a definite NP is perfectly natural. Another example (a so-called Larger Situation Use):

(24) The sun is shining.

Speakers do not have to say: "There is a sun. The Sun is shining". This first mention of the definite NP *the Sun* is natural, as well as in (25) below:

(25) I wonder where the City Hall is.

Although there was no mention of a city hall before, this is a pragmatically normal question in a new town. Interestingly, this use depends on some shared knowledge, or at least on the assumption that some relevant knowledge is shared both by the speaker, and the listener. More specifically, it is assumed that this knowledge is shared by members of a certain community, and the size of this community may vary. In (24), the community is the population of the planet Earth, which has only one sun. Thus, for this population, the first mention of the definite NP *the Sun* uniquely identifies the referent. In (25), the shared knowledge is some knowledge about the political system in the US, thus this sentence is felicitous for members of the American community. And the correct identification of the referent in (26) is possible for an even smaller group of people all of whom possess certain knowledge about who is the boss:

(26) You know, Mary met the boss yesterday in a local pub.

One of the most interesting examples of the "first mention use" of a definite NP is the so-called 'associative anaphoric use', as in (27).

(27) John read a book about Dali and wrote to the author.

No author has ever been mentioned in the previous discourse, but the definite NP is quite appropriate. Moreover, it is necessarily interpreted as referring to the author of the book mentioned in the previous clause. This use is very interesting because it requires making certain inferences on the basis of non-linguistic knowledge. That is, we have to know that books, normally, have authors. Other examples require some knowledge of the physical world, for example:

(28) I bought a couch recently that wouldn't fit into the elevator. The length was too big. The color really pleased me, however, but the weight displeased Kevin and Danny.

In (29), the use of a definite NP appears to be possible on a basis of our knowledge of some social conventions:

(29) I attended a wedding recently. The bride was wearing a white dress.

Intuitively, what is happening here is that the first (indefinite) NP serves as a trigger for some associations, for example:[8]

wedding: bride, music, cake, etc.

couch: length, weight, color, etc.

It is not case, of course, that this kind of connection between NPs in discourse (based on the triggering) is always possible. Clearly, certain conditions have to

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[8]For more examples of triggering see Hawkins 1978, Clark and Haviland 1977

be satisfied that would account for the fact that (30) sounds more coherent that (31).

(30)The man drove past our house in a car. The dog was barking furiously.
(31)The man drove past our house in a car. The exhaust fumes were terrible.

It appears that *car* can trigger *the exhaust fumes* more naturally than it can trigger *the dog*. The possibility of triggering is interesting because it tells us something about how our knowledge is organized.

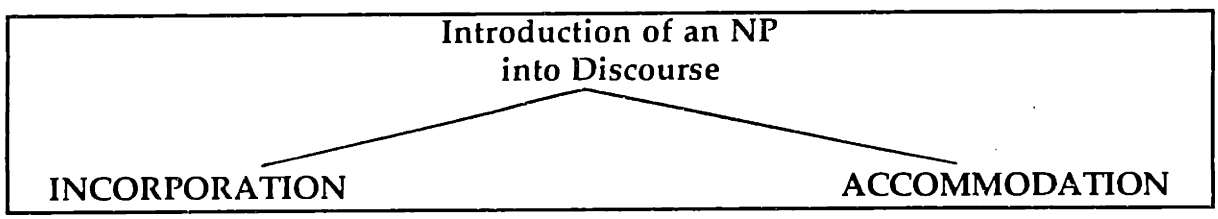
There are many more examples, of course, but these sentences illustrate the point I want to make. It is not necessary to have a linguistically mentioned antecedent to use a definite NP. At the same time, it is not the case, of course, that speakers can use definite NPs whenever they want. There are some restrictions, that is there exist some conditions that license the use of a definite NP without any previous mention of its antecedent. And the associative anaphoric use is not always possible, at least in many cases it requires some additional effort, as the difference between (32) and (33) illustrates.

(32) ?I bought a book. The little girl was happy.
(33) I bought a book. The author was well-known to me.

In terms of file change semantics, these examples show that under certain circumstances a definite NP can introduce a new file card, that is it can receive a new index. This observation is particularly important for analyses of pronouns. This is so because pronouns cannot be c-commanded by another (local) NP *only if it has the same index.* Now, if definite NPs (including

pronouns) can, in some cases, be represented in discourse by a new file card, which means that they can, in some cases, receive a new index, we want to know the mechanisms of introducing new file cards for definite NPs, and conditions when such an introduction becomes possible.

To summarize, NPs are represented in discourse by file cards. A file card can be either already existing, or a new one. What are the ways of associating an NP with a file card? According to Heim 1982, there are two possibilities: Incorporation and Accommodation.



Incorporation is a procedure of updating information on an already existing file card, that is adding some new entries. Accommodation is a procedure that is carried by so-called Inferential Bridging (Clark 1977, Clark and Marshall 1981). Let us consider these two mechanisms in some detail.

6. Incorporation and Accommodation.

Consider first some examples of Incorporation.

(34) I saw a cat. The cat was hungry.

A cat is an indefinite NP. Therefore, its index is instantiated with the number of a new file card, say #1. *The cat*, on the other hand, is a definite NP, it has an index that has to be instantiated with a number of some existing file card. In order to do this, this NP looks for a file card that has an entry IS A CAT. This card gets updated, that is it receives an additional entry: IS HUNGRY. As

a result of this operation, at the level of discourse representation, there is one card with two entries:

1:	IS A CAT IS HUNGRY

Consider another example, this time with a pronoun:

(35) I met a boy named Bill, and I met a girl named Mary. I introduced Bill to Mary. He was very happy.

By the end of the second sentence, we have two different cards:

4: IS A BOY, IS NAMED BILL

5: IS A GIRL, IS NAMED MARY

Now, *he* has an index that has to be instantiated. It looks for a card that matches its description, that is a card that has the following entry: IS A SINGLE MALE INDIVIDUAL. It cannot be associated with *Mary*, in fact, in this file there is only one candidate, *Bill*. So the index of the pronoun is instantiated with #4 and the card gets updated:

HE: IS A SINGLE MALE INDIVIDUAL.

4: IS A BOY, IS NAMED BILL, IS HAPPY

Notice that the operation of incorporation, as shown here, is, in a sense, automatic. We just look for relevant entries on the file cards, which are, in turn, part of lexical meaning. No inferences are necessary for this operation.

What happens in cases like (35)?

(35) I attended a wedding recently. The bride was wearing a white dress.

NP *a wedding* is represented by a new card (because it is indefinite), e.g. #8:

8: IS A WEDDING

What about *the bride*? Although there is no syntactic prohibition, this NP cannot have the same index as *a wedding*. This is so because, according to Rule 3, its index would have to be instantiated by the card number representing *a wedding*, and the information on this card would have to be updated in the following way:

8: IS A WEDDING IS WEARING A WHITE DRESS

This is, of course, a nonsense card. Roughly speaking, incorporation leads to identity, which is not the case here. Thus, *the bride* cannot have the same index as *a wedding*. At the same time, according to Rule 2, its index has to be instantiated by the number of some previously existing card. Thus, Rule 2 has to be modified in a certain way to allow for the so-called *accommodation by bridging*.

What it means is that a definite NP can (under certain conditions) introduce a new file card, but this card has to be 'bridged' with a previously existing one. There can be no accommodation without bridging. The index of NP *the bride* is instantiated by some new number, say 10, and it is represented in discourse as:

10: IS A BRIDE of (8)

Thus, the representation of definite NPs that are accommodated is different from the representation of incorporated definite NPs in that accommodated NPs are represented by a new file card with a new number.

As mentioned above, bridging is an operation that requires some inferences, and these inferences are based on our world knowledge that we share with other speakers. For example, our knowledge tells us that a wedding implies the presence of a bride, therefore we can build an inferential bridge between the two cards with different numbers. In this case, it is our cultural knowledge. In other cases, bridging becomes possible due to some very specific knowledge shared by a small group of people, as in (36):

(36) I went to a student's presentation last Tuesday. The food was good.

Only for some small group of people is bridging possible because they share some knowledge about free lunch served at these presentations.

These examples show that another rule has to be added to the three rules listed in Section 4, a rule that would allow for the cases of accommodation. The four rules are listed below.

Rules of NP Representation in Discourse

1. Instantiate the variable index of an Indefinite NP with a number of a new file card.

2. Instantiate the variable index of a definite NP with a number of an old file card.

3. Instantiate two identical variable indices with the same number, and two different indices with different numbers:

4. Instantiate the variable index of a definite NP with a number of a new file card only if this card can be bridged to another one.

Now let us return for a moment to the claim that quantifiers are bound variables are not represented by file cards. Interestingly, bridging provides additional evidence for this claim. As discussed above, bridging is an operation that takes place at the level of discourse, that is at the level of file cards. Thus, the prediction is that if an NP is not represented by a file card, no bridging will be possible. Examples below show that this is the case.

(37) a. John read a book and wrote to the author.

b. *John read every book and wrote the author.

In (37a), speakers can use a definite NP *the author* because the file card that represents this NP can be bridged to the card representing *a book*. But in (37b), this becomes impossible: quantifiers are not represented by any file cards, and, therefore, no bridging is possible. Another example is based on Heim's (1982) analyses of indefinite NPs in the so-called "donkey-anaphora" sentences. Heim argues that the indefinite NP *a donkey* in (38) is interpreted as a variable.

(38) Every farmer who owns a donkey beats it.

A detailed analyses of these sentences can be found in Heim (1982). Suffice it to say that *a donkey* is interpreted as a variable which is bound in syntax by a (phonologically empty) operator. For the current discussion it is important that this NP is not represented by a file card because it is interpreted as a bound variable. By contrast, in (39), *a donkey* is not a variable and, therefore, has a corresponding file card.

(39) John, who owns a donkey, beats it.

The prediction, thus, is that the bridging with an indefinite NP should be possible in (39), but not in (38). This prediction is borne out, as parallel examples (40a,b) demonstrate.

(40) a. John, who has recently read a book, burnt it. The author was mad.

b. *Every student who has recently read a book burned it. The author was mad.

Only in (40a) is the bridging possible because only in this case does the indefinite NP have corresponding file card, which the card representing the definite NP could be bridged to.

Let us return now to our discussion of accommodation. As mentioned above, there is no accommodation without bridging. This means that a definite NP cannot introduce a new file card (and, therefore, receive a new index) if it cannot be bridged to some previously existing card. But what happens in cases of no linguistic antecedent, for example (41a,b,c)?

(41) a. I wonder where the city hall is (in a new town).

b. The sun is shining.

c. I like this cat (pointing).

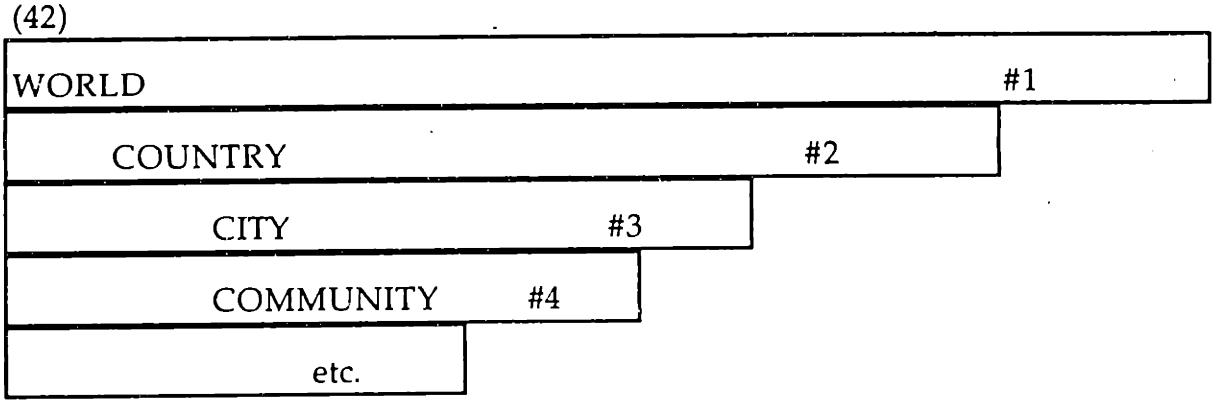
(41a) is an example of the so-called "Immediate Situation Use", (41b) is an example of the "Larger Situation Use", and (41c) is an example of a deictic use of a definite NP.

There are several questions regarding these uses of definite NPs. First, as suggested above, new file cards that introduce definite NPs must be bridged to some existing cards. The question is what the cards introduced in (41a,b,c)

are bridged to. The second question is whether these three uses are really different with respect to the discourse representation of the definite NPs. Somewhat developing ideas of Hawkins (1978) and Heim (1982), I suggest that all the three uses of a definite NP are essentially the same. They are the same because in all cases a definite NP is bridged to the so-called Situation Card.

The idea is that speakers never begin a conversation with a completely empty file. There is always some common knowledge regarding the place and time of the conversation, as well as some Encyclopedic knowledge about the world (Ariel 1990). In terms of file change semantics, we can say that there is an initial file card that contains at least some of the relevant information. For convenience, let us assume that this initial card contains several "smaller" cards, each of which corresponds to some situation: for example, the country, the town, the university, etc. So this card looks something like this:

(42)

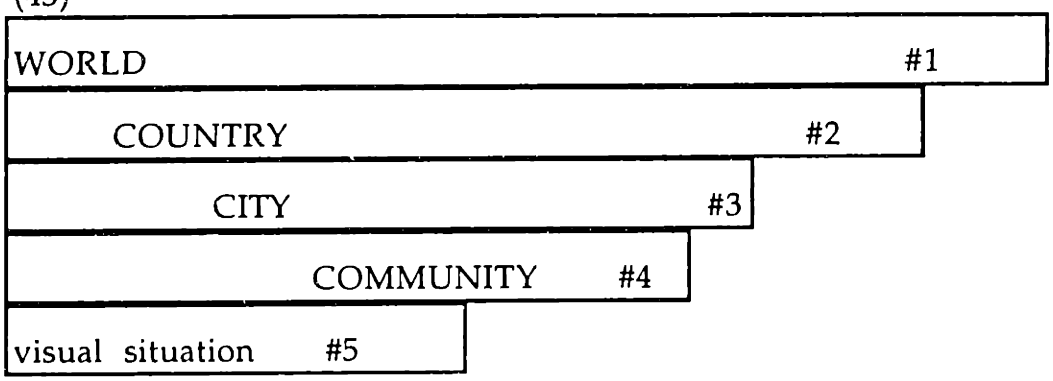


Now, I also assume that each of these cards has its own number (index). This assumption is not crucial, although it will make the story easier. We can now see what happens in (41a) and (41b). The NPs *the town hall* and *the Sun* introduce new file cards which are bridged to the corresponding Situation Cards. *The Sun* is bridged to card #1 (corresponding to the world), and *the*

town hall is bridged to card #3 (corresponding to the city where the conversation is taking place). In this sense, this bridging is no different from the bridging of *the bride* to *a wedding*. In all cases, the interpretation is that the new card is related to the old one (the bride of this particular wedding; the town hall of this particular city, etc.).

The question, however, remains regarding the discourse representation of a deictic NP. I propose that this representation is also essentially the same. The idea is that, in the course of a conversation, speakers may introduce an additional card inside of the Situation Card, which I call the Visual Situation Card.

(43)



The visual situation surrounding speakers is not something invariable, in fact, it constantly changes. Thus, this situation cannot be represented in the initial setting of the file because the content of the initial situation card reflects some stable knowledge shared by the speakers. But, in principle, it is as legitimate for speakers to make use of their knowledge of what they see NOW, as of their knowledge of what they know ALWAYS. For example, my knowledge that there are food trucks at MIT allows me to utter sentences like: "I'm going to the trucks". But for someone who is not aware of these trucks, it is still possible to point to these trucks, and say the same sentence. The only

difference between me and the other speaker is that I do not introduce any new situation cards when I utter this sentence, while the other speaker does. His or her file is changed not only by introducing a new card for *the trucks*, but also by introducing a new Visual Situation Card bridged to the card representing NP *the trucks*. The interpretation of a deictic NP, then, is something like: "The trucks of the visual scene", or, when pointing to a cat, "The cat of the visual scene", etc. Such an interpretation is no different from the ones I discussed for Immediate and Larger Situation Uses, and for the Associative Use. Speakers can talk about the bride (of a wedding), the town hall (of the city), the Sun (of the world). In all cases, there is a bridging between a new card and an old one, the only difference is whether the old one is a permanently present card reflecting some constant knowledge, or it is a new card introduced for a particular visual situation.[9]

There is an important difference, of course. The deictic use of a definite NP must be accompanied by pointing. In the next section, I show why it is necessary.

7. Constraints on Bridging.

To be able to participate in a conversation, a speaker must know words of the language, syntactic principles, and some rules of conducting a conversation. In the adopted terminology, the rules of conversation can be labeled "Rules of File Keeping". There is an important difference between the knowledge of

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[9]In fact, it does not have to be a *visual* situation. If I am talking to a blind person, for example, I can take his or her hand, place it on a cat and say: "This cat is sleeping". It does not matter that for the listener the situation is not literally visual, he or she just has to know which part of the surrounding situation I am talking about to introduce a corresponding file card. For simplicity, I will refer to it as a visual situation.

the lexicon and syntax, on the one hand, and the knowledge of conversational rules, on the other. The former type of knowledge is *speaker-internal*, in the sense that speakers do not have to take into account other speakers' knowledge. Speakers use terms like 'a cat', 'democracy', 'London' to talk about their concepts of the corresponding terms. A conversation is, by and large, mutually understandable because, although each speaker talks about his or her individual concepts, these concepts are, in most cases, similar to those of other speakers. The same is true about the syntactic knowledge. Speakers know that 'Mary likes John' is a good English sentence while "Mary John likes' is not because of their internalized knowledge of some syntactic constraints, which is independent of other speakers' knowledge of these constraints.

By contrast, knowledge of the rules of conversation is different in that its implementation relies on speakers' capacity to make inferences about other speakers' representations of the conversation. Although the rules themselves are speaker-internal, this knowledge can be better labeled "conversation-internal": it implicates speakers capacity to go beyond their own internal representations and take into account representations of other participants in the conversation. No such requirements exist for the implementation of the syntactic knowledge. The use of definite NPs discussed in this chapter, illustrates the point. A speaker can felicitously utter sentences in (35), only if he or she makes sure that other participants in the conversation can build the same bridge between the two file cards as he or she does.

(44) a. I went to a wedding. The bride was wearing a blue dress.

b. I read a book and wrote to the bus driver.

c. I want to discuss the paper with HER (pointing).

To utter (44a), the speaker must be sure that the listener also possesses the relevant cultural knowledge that informs him or her about the intrinsic relation between a wedding and a bride. To utter (44b), the speaker must be sure that the listener is also aware that the book under consideration was recommended to me by a local bus driver. And to utter (44c), the speaker must be sure that his or her pointing to some female individual can be seen by other speakers. In all of these cases, speakers' individual knowledge is not sufficient. It is not sufficient for me to know that I know who I am talking about in (44c), or that I know who recommended the book in (44b). The relevant knowledge is *conversation-internal* in the sense that I have to make sure that other participants in the conversation share it with me.

Clearly, speakers cannot directly access other speakers' minds to check whether they share the relevant knowledge. The only possibility is to use our *inferential capacity* to infer whether other participants do, or do not have the relevant knowledge. In other words, speakers cannot felicitously use definite NPs in (44) without making certain inferences about other speakers' knowledge. Thus, the two types of knowledge involved reflect the well-known distinction between necessary and probabilistic knowledge, that is something that is necessarily true (I know that bachelors are not married), and something that is, probably, true, but does not have to be (I know, and I believe other speakers know, that books have authors, so I can say "I read a book and wrote to the author", although, in principle, it does not have to be

true). As discussed above, the second type of knowledge is implicated when a speaker constructs a bridge between two file cards in his representation of the discourse. Thus, we can formulate the following constraint on bridging (see also Hawkins 1978):

(45). When bridging two file cards, make sure that other participants in the conversation will be able to build the same bridge.

This constraint can be satisfied on the basis of some inferences that, in turn, can be based on our world knowledge if we can assume (or infer) that other participants share with us this knowledge. The relevant shared knowledge can be Encyclopedic (there is one Sun, I can say "the Sun"), or local ("the city hall", etc.). This constraint can also be satisfied if a speaker introduces a new Visual Situation Card by pointing to something. In this case, the speaker can infer that the listener sees the pointing and interprets it in the same way: Introduce a new card corresponding to the situation the speaker is pointing to. That is why pointing is necessary in the case of the deictic use of a definite NP. Without pointing, the constraint on file change stated in (45) is not satisfied. Even if a speaker introduces in his or her personal file a new Visual Situation Card, he or she cannot infer that other speakers will do the same. This inference becomes possible if the speaker informs other speakers about the relevant change in his individual file. The speaker can make the following inference: "I changed my file by adding a new card. I informed other speakers about this change by my use of pointing. Other speakers saw my pointing. They know what it means. They change their files accordingly, that is they introduce a new file card. Therefore, (45) is satisfied and the

deictic use is allowed". If there is no pointing, speakers can make the following inference: "I changed my file by adding a new card. I did not inform other speakers. I know that they cannot know what is happening in my mind. Thus, I know that they are not aware of any changes in my file. They won't be able to make corresponding changes in their files. (45) is not satisfied. I cannot use a deictic NP".[10]

To summarize, the difference between our syntactic and discourse-related knowledge is that only the latter implicates our capacity to make inferences. These inferences are required in order to satisfy the constraint bridging presented in (45). If speakers are somehow unable to make appropriate inferences, we might expect them to demonstrate certain problems in trying to follow the constraint on bridging. By contrast, no problems are expected with respect to their syntactic knowledge because the inferential capacity is not implicated in this case. I return now to the analyses of errors that children and Broca's aphasics make in their comprehension of pronouns. I argue that these errors are a manifestation of a deficit of their inferential capacity.

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[10]This is, of course, a very rough description of what an inference might look like. The question of how inferential mechanism works is complicated and depends to a large extent on the question of knowledge representation. For example, if we assume that various concepts are represented as collections of features, inferences could be said to be based on finding features common for two representations. If we assume that the notion of a concept becomes meaningful only if it is embedded into a theory, inferences could be said to be based on some causal relations between concepts within a particular theory. Some current work in Artificial Intelligence attempts to provide computational analyses of inference (see, for example, Jantke (1986), Winston (1991), and references cited therein).

Chapter 3
Children's and Aphasics' Results Revisited

In this chapter, I return to the results of acquisition experiments, and experiments with Broca's aphasics. I show how the proposed model accounts for these results. The deficit observed in these two populations, I suggest, is due to certain limitations on resources needed for making inferences required for the correct deictic use of a definite NP. This explanation is close in spirit to the Principle P explanation proposed by Chien and Wexler (1990). Chien and Wexler's central idea is that the problem that children have with Principle B constructions is a result of a pragmatic, not a syntactic deficit. An important insight that I take from this approach is that there is a specific relation between reference and indexation, and that children's problem is closely related to this relationship.

1. Principle A and Principle B Constructions.

As mentioned in Chapter 1, children and aphasics demonstrate almost perfect performance on sentences with reflexives. They correctly accept sentences of type (1) when, in the experimental story, Father Bear washes himself, and correctly reject them when Father Bear washes somebody else.

(1) Father Bear washed himself.

This good performance is predicted on the proposed account because, in this case, no discourse-related inferences are called for. In a typical experimental situation, a subject sees a picture, or a story with toys. There are two characters: Father Bear and somebody else, say, Clown. When the subject hears the story, he or she creates a file where these two characters are

represented by two different cards with two different numbers. Suppose Father Bear is washing himself. The subject hears sentence (1) and is required to judge whether there is any grammatical representation he or she can assign to this sentence in such a way that it would be a true description of the situation. Now, in syntax, NP *Father Bear* has an index. The only grammatical representation of this sentence is the one where *himself* receives the same index as its antecedent. In this case, the two NPs are coindexed, which means that in the discourse they must be represented by the same file card. In other words, the file card corresponding to the NP *Father Bear* contains information that he washed somebody represented in discourse by the same file card. This state of the file corresponds to the situation where Father Bear washed himself, and subjects correctly accept sentence (1) as a true description of this situation.

Suppose now Father Bear washed Clown. A file corresponding to this situation should contain two cards, with a number and an entry for each of the two cards:

(2) 1: IS FATHER BEAR & WASHED 2

2: IS CLOWN & WAS WASHED BY 1

As mentioned above, when subjects hear sentence (1), the only grammatical representation they can assign to this sentence is the one where the reflexive is coindexed with *Father Bear*. This means that *Father Bear* and *himself* are represented in discourse by the same file card. Such a file, however, has to contain a card with the following entries:

(3) 1: IS FATHER BEAR & WASHED HIMSELF (or: WASHED 1)

Because there is no such card in the subjects' file, they reject (1) as a possible representation of this situation.

Notice that the correct assignment of indices and, therefore, correct interpretation of (1), depends only on the knowledge of the relevant syntactic constraint, namely Principle A, and on the knowledge of how indices are interpreted in discourse. No inferences about other speakers' representation of the discourse is necessary because the only possible way of indexation is forced by syntactic principles. And this is the case independently of whether the antecedent is a referring expression as in (1), or a quantifier *Every Bear* (as in 'Every Bear washed himself'). Children and aphasics know that the reflexive must be coindexed with its antecedent, which prohibits acceptance of any situation where the washer and the person washed are different individuals. This knowledge, again, is syntax-internal and does not require any inferences.

How are pronouns different? Why do children and aphasics make significantly more errors in sentences of type (4)?

(4) Father Bear washed him.

Suppose subjects see a situation where Father Bear is washing himself while he is not washing the clown. This situation can be correctly described by the following file:

(5) 1: IS FATHER BEAR & WASHED HIMSELF (or: WASHED 1)

2: IS A CLOWN

Now, when subjects hear sentence (4), they assign the two NPs in this sentence two different indices (because of Principle B). This means that, in the corresponding file, NPs *Father Bear* and *him* are represented by two different cards because different syntactic indexation corresponds to the existence of two different file cards (different indices are instantiated by different file card numbers). NP *Father Bear* is represented by, say, card #1. What about the pronoun? Pronouns are definite NPs, and, normally, they do not introduce new cards. Thus, *him* can be represented in discourse by incorporation into another existing card, the card that represents the clown. The resulting file in this case would look like this:

(6) 1: IS FATHER BEAR & WASHED 2

2: IS CLOWN & WAS WASHED BY 1

This file, however, is different from the true file given in (5), and the sentence should be rejected (and is rejected by normal adults) as a possible description of the situation.

Recall, however, from the discussion in previous chapters that, in some cases, a definite NP can introduce a new file card with a new index. It happens when a newly introduced card can be bridged to an old one. A card representing NP *the bride* can be bridged to the card representing NP *a wedding*. A card representing NP *the President* can be bridged to the Country Card inside of the Situation Card. And a card representing deictic *her* can be bridged to the Visual Situation Card created by pointing to some female individual in the visual scene. In all of these cases, the new card has a new number that corresponds to a new index of the represented NP. Why can't

speakers introduce a new card for the pronoun in (4), thus rescuing the sentence from a Principle B violation?

In Chapter 2, I suggested that a change accomodation of a new file card by bridging it to an old one is allowed only if the speaker makes sure that other participants in the conversation can build the same bridge. The relevant information can be based on some world knowldge (e.g. books have authors), or by some extra-linguistic means, for example by pointing. In this case the bridge is constructed between the newly introduced visual situation card and the card representing the deictic NP. The speaker, however, has to infer that corresponding changes have been made in other speakers' files. Given that speakers cannot directly access other peoples' minds, the only way to do that is by way of inferences. Pointing allows speakers to make such inferences. If a speaker introduces a new file card (which will function as the basis for the bridge) by pointing to some visual scene, he or she can infer that other speakers see this pointing and interpret it as a signal to also introduce a new card and build a bridge. If no pointing takes place, the speaker can infer that other participants in the conversation will not change their files because they have not been provided with the necessary information.

Thus, the pronoun in (4) cannot introduce a new file card because conditions for building a bridge are not met. The pronoun is a definite NP, but the card it introduces is not bridged to any other card in the discourse. In fact, it could only be bridged to the Visual Situation Card, if there were one. In other words, the pronoun could only be used deictically. However, pointing is required in this case. If there is no pointing, there is nothing for

the pronoun to be bridged to, and it cannot be represented by a new file card with a new index.

To summarize, the pronoun in (4) cannot have the same index because of Principle B, and if it has a different index, it can only be the index of the card representing the clown. Any other index would require bridging, which is not possible here because of the constraints on bridging.

Notice that, unlike sentence (2) with a reflexive, the correct assignment of indices in (4) requires more than knowledge of syntactic principles (Principle B, in this case). It also requires that the speaker be aware of, and be able to implement, the constraint on bridging. This knowledge and ability are crucially dependent on the ability to make inferences about other speakers' representation of the discourse. I suggest that the problem that children and aphasics demonstrate with these sentences is directly related to this requirement. Specifically, I suggest that a limitation on inferential resources that these two populations exhibit may result in their incorrect introduction of new file cards. Here is what happens.

When children or aphasics see a situation where Father Bear is washing himself, but is not washing the clown, they create a file no different from that of normal adults. This file is shown in (5). And, like normal adults, when they hear sentence (4), they assign it a representation where the pronoun and the subject have different indices. This is so because, as I argued, these people know Principle B. Thus, NPs *Father Bear* and *him* are represented in the discourse by two different file cards. Clearly, subjects can incorporate the pronoun into card #2. This, however, will result in a file that

looks like (6), which is different from the true file (5). Subjects, thus, should reject the sentence.

Recall, however, that the idea behind all these experiments is to see whether there is *any* grammatical representation that would allow subjects to accept the sentence as a correct description of the situation. For normal adults, it is impossible because there is no legitimate way to introduce a new card for the pronoun and avoid a Principle B violation.

Suppose now that, although subjects know all relevant rules and principles of syntax and discourse, their capacity to make inferences with respect to other speakers' representations is limited. In fact, there is evidence (which I discuss in the following chapters) that computational resources required for making inferences are, in general, limited in children and aphasics. In this case, speakers will have difficulties evaluating whether the constraint on bridging is satisfied because, as discussed above, this evaluation crucially relies on the ability to make inferences. In particular, speakers have to make inferences about other participants' representations of the discourse. For example, a normal adult speaker can infer that if he or she introduces the Visual Situation Card into the file to bridge it with another card, but does not point to anything, other speakers will be unable to build corresponding bridges in their files. Thus, normal adult speakers will not use a definite NP deictically without pointing.

I suggest that children and aphasics fail to make appropriate inferences about other speakers' representations of discourse and allow the deictic use of definite NPs without pointing. When they hear sentences of type (4), they attempt to find a representation that would be both grammatical, and true of

the situation (as mentioned above, the idea behind all these exp is to see whether there is any grammatical representation that v .llow subjects to accept the sentence as a correct description of the situat· ı. See Crain and McKee (1985) and Crain (1992) for more discussion). This can be achieved if they introduce the Visual Situation Card and bridge it with the card representing the pronoun. Now that they have made these changes in their individual files, they have to make sure that the constraint on bridging is satisfied. They have to compute whether other participants in the conversation are able to build corresponding bridges. And that is what they fail to do correctly. They fail to make correct inferences, and they may conclude that this constraint is satisfied. In this case, they accept the sentence because it does not violate any conditions, neither syntactic, nor discourse-related. They may also conclude that the constraints are not satisfied, and the new card cannot be introduced. In this case, they will reject the sentence because it violates the constraint on bridging. In other words, children and Broca's aphasics will sometimes accept these sentences, and sometimes reject them -- exactly what was found in the relevant experiments.

2. Good Performance with Pronouns.

In Section 1, I provided an explanation for the good performance on sentences with reflexives and poor performance on sentences with pronouns. There are, however, constructions where children and aphasics demonstrate significantly better performance with pronouns as well. First, recall Grimshaw and Rosen' experiment where they compared children's

performance on grammatical and ungrammatical sentences. Children were presented with the same type of sentences (repeated below as (7)).

(7) Father Bear washed him.

When in the story Father Bear washed the clown (the second character), children correctly accepted the sentence 83% of the time, significantly more often than when Father Bear washed himself. The correct conclusion that G&R drew was that children do know Principle B of the binding theory. Although I agree with this conclusion, I disagree with their claim that children are not different from normal adults in any relevant respect at all. As discussed above, in my account, children (and aphasics) are different in that their inferential capacity is limited.

How does the proposed theory account for the difference between the grammatical and ungrammatical version of (7)? The explanation is, actually, straightforward. When the child sees the situation where Father Bear washes the clown, he or she creates the file given in (8).

(8) 1: IS FATHER BEAR & WASHED 2

2: IS CLOWN & WAS WASHED BY 1

When the child hears (7), he or she assigns the pronoun and the subject two different indices. This corresponds to a file where *Father Bear* and *him* are represented by two different file cards. As a definite NP, the pronoun does not normally introduce a new card. It cannot be incorporated into card 1, however, because different indices are instantiated by different card numbers. But it can incorporate into card #2, in other words, its index can be

instantiated with the number of card 2. This will result in exactly the same file as shown in (8), which is a true file of the experimental situation. Children, therefore, will accept the sentence as a grammatical and true description of the situation. Crucially, no inferences are necessary in this case to come up with such a representation. The deficit concerning inferential capacity proposed in the previous section is simply irrelevant. Thus, the relevant difference between the grammatical and ungrammatical conditions is that the inferential resources are called for only in the ungrammatical case.

Individual subject analyses support this approach. In the "ungrammatical case", some children, probably, are able to carry out the necessary inferential computations, and, therefore, will reject the sentence. Other children will (at least sometimes) fail to make the relevant computations and will accept the sentence (or, at least, will sometimes accept it). The overall result, therefore, is around 50%. But in the "grammatical case", all children will always accept the sentence (because no inferential capacity is implicated here, only syntax, which is something not different from child to child). Therefore, the overall result is almost perfect (*modulo* noise).

Children's and aphasics' performance on sentences with quantified antecedents is also significantly better than on sentences with R-expression antecedents. Thus, subjects correctly reject (9).

(9) Every bear washed him.

This improvement is also predicted. Recall that children's and aphasics' performance on sentences of type (4) was explained by their incorrect deictic

use of the pronoun. The interpretation of the sentence was something like: "Father Bear washed the individual I am looking at". In (9), however, such an interpretation is not possible. NP *every bear* is a quantificational construction, and it does not denote any specific individual to point to. Thus, the deictic use is impossible in principle. Assuming that children and aphasics know the meaning of *every bear*, we can explain why their performance is correct. The pronoun cannot be coindexed with the subject because of Principle B. But its index has to be instantiated, that is, the NP has to be represented in discourse by some file card. In the absence of the possibility of deixis, this is only possible if the pronoun is incorporated into an existing card. Given that *every bear*, as a quantifier, does not introduce any card (see discussion in Chapter 3), the only possibility is to incorporate it into the card representing some other character in the story, for example the clown. This corresponds to a situation where every bear is washing the clown, which is not true of the story (only one of them washed the clown). Subjects, therefore, correctly reject the sentence, which, although grammatical, does not correctly describe the situation. Once again, no inferential capacity is required in this case because the deictic use is not an option at all.[11]

To recapitulate, a correct interpretation of sentences with R-expression antecedents requires both knowledge of Principle B, and the ability to make inferences about other speakers' representations. Sentences with quantified

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[11]Note that the fact that children reject (9) shows that it is not jus a tendency to say "YES" that makes (4) often good for them. Sentences are good for children if the computations they carry out allow these sentences. In other words, children behave *rationally*: their behavior corresponds to their computations. For a recent discussion of this issue see Crain and Wexler (1994).

antecedents, by contrast, only require knowledge of Principle B. Thus, these two types of sentences constitute a minimal pair. The difference in subjects' performance can, therefore, be interpreted as evidence for their knowledge of Principle B: a conclusion first drawn on the basis of this evidence in Chien and Wexler 1990.

Finally, a brief note on production versus comprehension. It has been noticed that the errors children make on sentences of type (7) are observed much more often in comprehension experiments than in natural production. Children never (or, almost never) produce these sentences. A more detailed discussion of the difference between production and comprehension patterns can be found in Bloom et al (1994).[12]

Such a discrepancy is not surprising, of course. To be precise, it would be surprising for an account that argues that children do not know Principle B, an account that does not exist in the literature. I have argued that children's errors in comprehension is a result of their attempt to find a grammatical and true representation of the sentence by interpreting the pronoun deictically. The deictic use, in turn, requires accommodation of a new card by bridging it to another, newly established card. As I suggested in Chapter 2, and as I will further discuss in Chapter 4, bridging requires additional resources. It is quite natural, therefore, that children will attempt to use such a mechanism only if there is no other, less expensive way. In comprehension experiments, this is the only way to derive a grammatical

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[12]There are a couple of differences between the production results reported in Bloom et al and comprehesion results. First, in production, Bloom et al analyze only the first person pronouns, while experiments were carried out with thrird person pronouns. Second, even in comprehension experiments it is not the case that all chidlren make errors with pronouns. Thus, it is important to compare production and comprehension of individual chidlren, but this, of course, is impossible for in the case of database analyses reported in Bloom et al.

representation that would give them a true description of the situation. In production, however, there is a much less expensive way. If the child wants to describe a situation where Father Bear is washing himself, there is no reason why she should avoid the easiest way of describing such a scene by saying that Father Bear washed himself (using the reflexive). Notice that in this case nothing beyond syntactic knowledge has to be used (Principle A), that is, the child does not have to use any discourse-related rules and make inferences about other speakers. The child does not need to introduce a new file card and bridge it to another one. The relevant syntactic knowledge is automatic and cost-free, and, everything else being equal, the child takes the easiest grammatical route. Children, therefore, correctly and fluently produce sentences with reflexives.

3. Weak Pronouns.

As suggested in the previous section, children make errors in those cases where pronouns are interpreted deictically, that is as referentially independent element. It is interesting, therefore, to look at those pronouns that can only be interpreted as dependent elements. These are the so-called 'weak' pronouns . They are labeled so precisely because they can never be interpreted independently, or deictically. They can never be stressed, and in some cases they require phonological support. A typical example are Romance clitics and English pronoun *it*. In English, for instance, strong pronouns (*him, her*) can be used deictically (as in (10)), but *it* cannot, as in (11):

(10) Pointing: I like him, her, and her.

(11) Pointing: *I like it, it and it.

Similarly, Italian clitics cannot be used deictically, as (c) demonstrates:

(12) Pointing: *l'amo
him like
'I like him'

Another English example is clitic *'em*. This element is similar to Italian clitic pronouns in that it is necessarily referentially dependent. One can say:

(13) As for Bill, I really like'em.

Suppose now A asks B: "Who do you like?". B can point to C and respond with (14), but not with (15):

(14) I like him.

(15) *I like'em.

Thus, referentially dependent elements cannot be used deictically. In terms of file change semantics, we can say that the weak pronouns can never be represented in discourse by an independent file card and receive their own index. They do not introduce a new file card and can be interpreted only through incorporation. In other words, they are necessarily coindexed with their antecedent (which does not have to appear in the same sentence, see Higginbotham 1985).

Regarding the acquisition of these elements, we predict that children should not make errors with weak pronouns of the kind they make with strong pronouns. Indeed, on the proposed account, errors occur as a result of

the deictic use of a pronoun and introduction of a new file card. When this is not an option at all, as in the case of week pronouns, no errors should be expected. Analyses along these lines were also presented in Avrutin and Wexler (1992).

Indeed, there is evidence that this prediction is true. McKee (1991) reports results of an acquisition experiment with Italian-speaking children. Children were presented with sentences of type (16).

(16) Il Cavallo lo spoglia

'the horse him undressed'

In contrast to English-speaking children (who McKee tested in a parallel experiment), Italian children demonstrated almost an adult pattern of responses. That is, in cases where the horse undresses himself, children rejected (16) as a description of this situation. In other words, they overwhelmingly rejected the interpretation of *lo* as *Il Cavallo*. Rozalind Thornton, in a pilot experiment, presented English-speaking children with sentences of type (17).

(17) The robot lassoed it.

In the situation, Robot tried to lasso some inanimate object but ended up with the lasso on itself. Thornton tested exactly those children who (in a different experiment) allowed the pronoun to refer to the subject in sentences of type (18):

(18) The Indian Man lassoed him.

Although the number of children was small, and it was just a pilot experiment, the results are suggestive. The same children who accepted (18) rejected (17).

In summary, these results support the approach proposed in this thesis. Only in those cases where children attempt to interpret pronouns independently, they make errors. When this is not an option, as in the case of weak pronouns, children's performance is significantly better.

An indirect result of these studies is that children at this age can use the syntactic information to distinguish weak and strong pronouns. It is not a trivial question how to figure out which pronominals are weak, and which are strong. Indeed, the fact that clitics appear in discourse only with a possible antecedent somewhere around does not tell the learner that it must be the case. In other words, the learner does not know from this positive input that an alternative would be wrong. A possible way of distinguishing the two types of pronouns is realization of differences in their X-bar properties (weak and strong pronouns may differ in whether they are heads or maximal projections). Although I do not discuss this issue here, the presented results suggest that children at this age have already figured out the relevant differences and can use them to distinguish between dependent and independent interpretations.

4. Principle C constructions.

Crain and McKee (1985) report that children correctly reject sentences of type (19). Similar results are reported by McDaniel, Cairns and Hsu (1990), Lust, Eisele and Mazuka (1992).[13]

(19) He washed Father Bear.

How can we explain the difference between children's performance on Principle B and Principle C constructions? Consider again (19). Let us apply to this sentence the mechanism of index assignment and interpretation discussed in previous chapters. When a speaker hears (19), he or she assigns it a syntactic representation. *He*, as an NP, must have an index. Suppose there are two characters in the story: Father Bear and Clown, both of whom have already been mentioned in discourse and are represented by two file cards (1 and 2).[14] The pronoun gets incorporated into one of these cards (depending on how the listener interprets it). Suppose it is #1 (Father Bear). When NP *Father Bear* is encountered, it must also receive an index, however, this index cannot be 1 because of Principle C. Thus, this NP can only receive a different index, for example #3. This means that *he* and *Father Bear* must be represented by different file cards. In the absence of any specific contextual conditions discussed in Chapter 2, such a file corresponds to a situation where there are two different Father Bears, and one of them washed

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[13]Crain and McKee use these data to argue against the view proposed by Tavokalian (1978) and Solan (1983) that children first hypothesize a purely linear prohibition against backwards anaphora. Crain and McKee argue that children a re sensitive to the structural resptrictions, for example locality and c-command.

[14]A typical story goes like this: "Here is Father Bear, here is Rabbit", etc.

the other.[15] This, of course, is not the experimental situation simply because there is only one Father Bear in the story, and he does not wash anybody else except himself. Children therefore correctly reject this sentence. And, similarly to previous examples, if they interpret the pronoun as corresponding to another character in the story, for example Clown, they also reject the sentence because the obtained file represents a situation where Clown washes Father Bear, which is not the case here.[16]

The difference between Principle B and Principle C conditions, therefore, lies in what has to introduce a new card to avoid coindexation with the antecedent (see also Thornton and Wexler (in press) for a similar proposal). In Principle C experiments, it is an R-expression, and in Principle B experiments, it is a pronoun. If an R-expressions introduces a new card, it is necessarily interpreted as representing a new guise, which means, in the absence of some specific discourse conditions, a new individual. If a pronoun introduces a new file card, it may end up representing the same individual --

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[15]Recall that the context may provide some information that would allow such a file to represent one individual under two different guises. No such context is available here. Moreover, proper names (in English, at least) cannot be used deictically (this is probably related to the fact that proper names in English cannot be used with determiners: in some German dialects, where names can be used with determiners, their deictic use appears to be possible, too).

[16]The question arises why children cannot 'go back' and introduce a new card for the pronoun, that is to interpret it deictically. I assume that once a pronoun is incorporated, it no longer exists as a discourse entity and, therefore, there is nothing 'to go back' to. Or, it is possible that it is to expensive to "re-do" the incorporation followed by accomodation involved inthe deictic use. In any case, this assumption is supported by experimental results with sentences of type (i).

(i) I know who washed him. Father Bear.
Thornton (1990) reports that chidlren's performance in this case is almost no different form adults'. Notice that this construction is similar to Principle C constructions in that the pronoun here also preceedes the R-expression. Since *who* and *him* cannot be coindexed, and since *Father Bear* is coindexed with *who*, it follows that *Father Bear* and *him* are not coindexed. And, as in Principle C constructions, the only grammatical interpretation of this sentence is such that Father Bear wahses another Father Bear, which is not the case. Children also correctly reject (i).

provided the speaker introduces a corresponding Visual Situation Card by pointing to some visual scene.

Clearly, if the coindexation of *he* and *Father Bear* is allowed in syntax (as in backward anaphora cases), children will allow coreference of these two NPs as well. For example, Crain and McKee (1985) report that children allow *he* to be *Grover* in about 75% of the time in sentences of type (20).

(21) After he jumped over fence, Grover drank some water.

He and *Grover* can be assigned the same index. Thus, when these indices are intstantiated, these two NPs will be represented by the same file card. Children, therefore, are predicted to allow *he* and *Grover* to be the same person, which agrees with the reported results. 25% of the time, however, children chose another, extra-sentential antecedent (which was also correct). Children's tendency to accept a sentence if there is some grammatical representation for this sentence explains the 75% of acceptance reported by Crain and McKee.

Chapter 4
Experimental Evidence Reported in the Literature

1. Experimental Evidence for the Existence of two Different Mechanisms: Incorporation and Accommodation.

As was discussed in one of the previous sections, there are two possible mechanisms of introducing an NP into discourse. The first, Incorporation, requires minimum amount of inferences, and can be expected to be very fast and automatic. NPs in this case are not represented by a new file card in discourse, and they do not receive a new index. The second mechanism, Accommodation, requires a certain amount of inferences (to build a bridge between two file cards), which may be expected to take more time. In this section I discuss an experiment reported by Acker and Boland (1992) that bears on this issue.

In a priming experiment, subjects were presented with sentences of type (1) which appeared on a computer screen. In half of the trials the recognition probe (*famous*) appeared in position marked as *1, and in half trials it appeared in the *2 position. Subjects were to push a YES button if they thought the probe is a familiar word (that is, if it had appeared on the screen before). Moreover, in half of each of these conditions the subject of the second clause was a pronoun *she*, and in half it was a nominal anaphor *the star*. The response time was measured in each trial.

(1) The famous actress was interviewed by the white anchorman, but (she/the star)*1 was not cooperative*2.

The idea behind this design, which is relevant for the current discussion, is to see whether it takes subjects less time to establish reference for a pronominal

than for a nominal anaphor, and whether this difference disappears at the end of the sentence. Presumably, the recognition of the probe will be faster when the referent NP (*the famous actress*) is accessed faster.

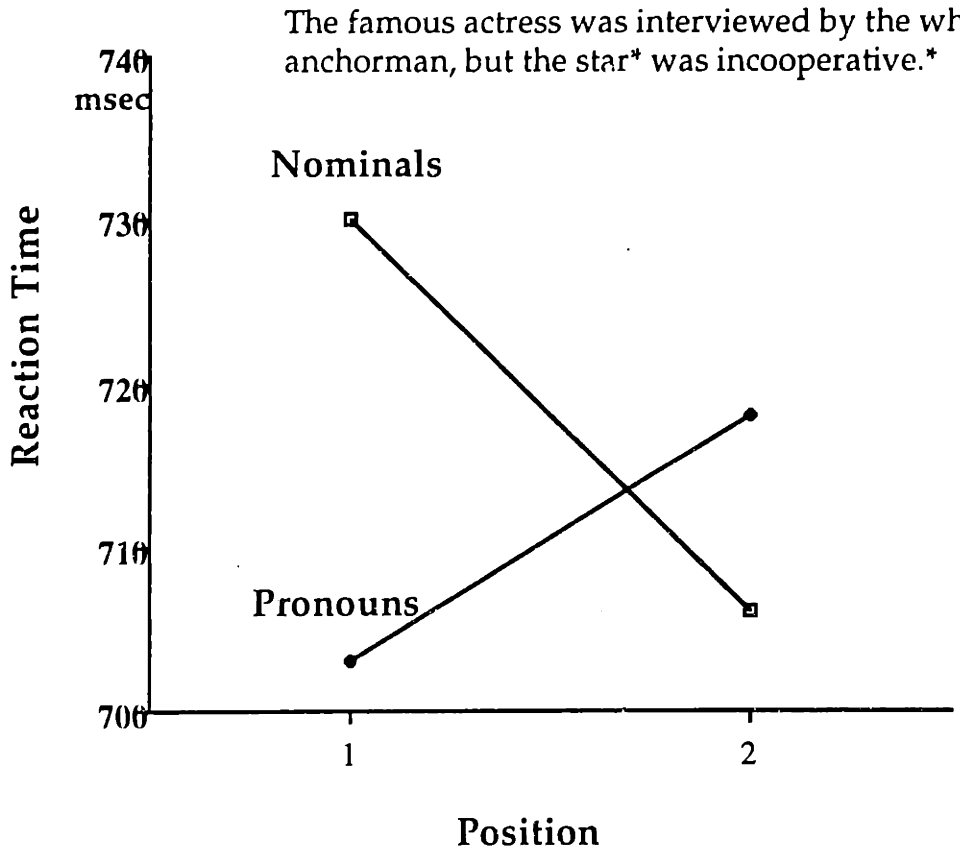
The results are summarized in Table 1 and Figure 1.

Table 1

Mean Response Time

	Position 1 (msec)	Position 2 (msec)
Nominals	730	706
Pronouns	703	718

Figure 1



The difference between pronouns and nominals in Position 1 was statistically significant. The difference was also statistically significant between pronouns in Position 1 and Position 2, and between nominal in Position 1 and Position 2. The difference between pronouns and nominal was not statistically signif.cant, although it was in the direction of significance.

How can we interpret these results in terms of introduction of file cards? Consider first Position 1. Pronoun *she* does not introduce a new card. It is represented in discourse by incorporating into a previously existing card, namely the card representing *the famous actress. The star,* on the other hand, cannot be incorporated because (as in the case of *wedding: bride* discussed above) incorporation leads to identity, which is not the case here. Thus, it can only be accommodated by introducing a new file card and bridging it to the card representing *the famous actress.* This process is computationally more complex, which accounts for the difference between pronouns and nominal in Position 1.

Consider now Position 2. Since pronouns do not introduce new cards, the recognition of the probe now takes longer simply because the distance to the referent has increased. For nominals, however, the situation is reversed. The relevant file card for NP *the star* has already been introduced, and the bridge has been established. Thus, the process of reaching the antecedent is no longer impeded by the necessity to bridge two cards, and subjects take approximately the same amount of time to access the referent as they take for pronouns.[17]

To summarize, the results discussed in this section show that the proposed difference between computational complexity of Incorporation and Accomodation finds an empirical support from the real-time processing of pronominal and nominal anaphors.

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[17]A somewhat marginal difference between pronouns and nominals here can be explained if we assume that the introduced card actually facilitates the access to the referent.

2. Deictic Use of Definite NPs in Children's Discourse.

So far we have considered certain cases where I argued that children interpret pronouns deictically. But what happens in production? Are children different in any way from adults in their use of definite NPs, pronouns in particular, in discourse? In this section I present several studies that show that children's use of definite NPs is different from adults'. In particular, children appear to allow the deictic use of definite NPs (both R-expressions, and pronouns) in cases where adults such a use is unacceptable by adults.

2.1 Pronominalization in Children's Discourse.

Karmiloff-Smith (1981) reports the results of the following experiment with English and French-speaking children. Three hundre fifty children (!!) between ages of 4 and 9 were shown a bound book of six pictures. They were asked to tell what is happening in this book. The pictures in the book were as follows:

1. A little boy is walking along the road.
2. The boy sees a balloon-man.
3. The balloon man gives the boy a green balloon.
4. The boy walks off with the balloon.
5. The balloon flies off into the sky.
6. The boy starts to cry.

Karmiloff-Smith reports that there is a change around the age of 6 in the way how the children use pronouns. Here is a typical story told by English and French kids (age 4-6). *B* here stands for the boy, *M* for the balloon-man, and *GB* for the Green Balloon.

> "He's (B) walking along ... and he (B) sees a balloon man... and he (M) gives him (B) a green one... and he (B) walks off home... and it (GB) flies away into the sky. So he (B) cries."

French-speaking children:

> "Là il(B) se promene. Là il(B) voit un bonhomme avec des ballons. Là il (M) lui donne un ballonn.. un vert. Là il (B) part chez lui ou a l'ecole. Là il (GB) s'envole loin, très loin. Ben, là il(B) pleure."[18]

As Karmiloff-Smith puts it, children "...treat each utterance as a separate unit and attempts to make no intralinguistic cohesion across pronouns in the different utterances" (p. 241). Interestingly, this pattern of pronominalization occurs in the same age when children make errors in sentences like *Cinderella is pointing to her* (that is, when they allow *her* to be *Cinderella*). But this is exactly what is predicted if the incorrect interpretation of *her* in such sentences is due to its deictic use. Thus, the problem with deixis finds its reflection both in comprehension, and production.

2.2 Children's Use of R-expressions.

In the previous section we saw that children appear to use one type of definite NPs (pronouns) deictically even in those cases where adults do not allow this use. How do children use definite NPs that are R-expressions (names)?

It has been noticed by many researchers (e.g. Maratsos 1974, Warden 1976, De Villiers 1978, among others) that children sometimes use definite NPs without making sure that the other party in the conversation knows what they are talking about. The following two examples from the Childese database (McWinney and Snow 1985) illustrate the point.

(a) Sarah: The cat's dead.
Mother: What cat?

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[18] Interestingly, French children used *il* even to refer to the balloon without establishing reference (*ballon* is masculine in French).

(b) Adam: Put it up, the man says.
Mother: Who's the man?

This (inappropriate) use of definite NPs has been also investigated experimentally. Warden 1976, for example, reports the following experiment. Children were presented with a story in cartoon form and had to tell the story to another child who could not see the pictures because of a screen. Each story involved four characters, for example:

Picture 1: A dog is chasing a hen.
Picture 2: A cow stops the dog, and the hen is hiding behind the cow.
Picture 3: The hen has laid an egg.

Warden tested children aged three, five, seven and 9 years old, as well as a group of adults. The results are summarized in Table 2.

Table 2
Definite and Indefinite NPs

	First Mention (percent)	
	Definite NP	Indefinite NP
Adults	0	100
9 years	18	82
7 years	39	61
5 years	38	62
3 years	54	46

As Table 2 shows, adults always used an indefinite article to introduce an NP or the first time. This was not the case for children. Children before the age of seven, allowed both definite and indefinite NP to introduce a new referent. Notice that this is (approximately) the same age when children make errors

with the deictic use of pronouns both in Karmiloff-Smith's experiment, and in Principle B experiments. These data are consistent with the proposal that children allow the deictic use of NPs in those situations where adults don't.

Maratsos 1976 reports results of another experiment with four-year old children. The expeimenter and the children played several games, one of which ('Down the Hill') is described below.

"Down the Hill was played with a wooden hill, a car, and Fisher-Price toy boys and girls which fit conveniently into the cars. The child sat across from the experimenter at a round table. The hill, the car on top of the hill, and the toys were placed on the experimenter's side of the table out of child's reach. The child was told that the experimenter would send the car shown with a toy child in the car, and the child was to select a toy, one at a time, to be placed in the car. After the child had selected a toy doll for the car, it was rolled down the hill..." (Maratsos 1976, pp.80-81).

There were four conditions in this game. In one condition ('visible'), the child could see the toy boys and girls. In the second ('invisible'), there was a screen between the child and the toys so that the could not see them. Moreover, in half of the 'visible' situations, and in half of the 'invisible' situations, there was only one boy and one girl ('singular'). In the other half of these conditions, there were several boys and several girls. The experimenter first named the toys (e.g. 'Here are a boy and a girl we can use'). Then, the child was asked: "Who shall we give a ride to now?". The number of definite and indefinite NPs used in each condition was recorded, and is summarized in Table 3.

Table 3

Percentage of Correct Use of Definite and Indefinite NPs

	Accuracy (percent)	
	Singular	Plural
Visible	75% (*the*)	54% (*a*)
Invisible	77% (*the*)	89% (*a*)

Notice that in the 'singular' condition children have some preference for definite NPs (which is also appropriate for adults) in both 'visible', and 'invisible' condition. The situation is different, however, in the 'plural' condition. In the 'visible' part of this condition, children correctly use an indefinite article to introduce a new referent only 54% of the time. IN other words, in 46% of the time they use a definite NP without making sure that the listener knows what they are talking about. This deictic use of a definite NP becomes much less frequent in the 'invisible' condition. Presumably, the invisibility of the referent inhibits child's use of deixis, which is quite understandable. Deixis means pointing, but if the objects are not visible, the only way use deixis is by some sort of 'mental pointing', which may be argued to be more complex.

Notice also that children at this age (in both experiments) do not *always* use a definite NP to introduce a new referent, rather they allow either (correct) indefinite articles, or (incorrect) definite articles. These data do not

seem consistent with a strong 'egocentricity' hypothesis that claims that children use NPs deictically because they do not care of what other speakers know. If it were the case, one might expect children to always use a definite NP because children always know what they are talking about. In fact, in Maratsos' experiment, children have some preference for a definite NP in the singular condition, which is appropriate for adults, too. Still, in the plural visible condition, they are at chance; that is their preference for the deictic use disappears when such a use requires making certain computations in order to figure out if it is legitimate. This, however, does not happen, which, I suggest, favors the "resource limitaion" account. Children, as I suggested above, incorrectly use definite NPs deictically in some cases because they cannot compute whether such a use is legitimate. Failure to carry out the necessary computations leads them to make assumptions regarding the appropriateness of the deictic use. Sometimes children assume that it is appropriate, sometime they assume that it is not, which results in their 40-60% use of definite NPs in an inappropriate situation.[19]

3. Children's and Aphasics' Inferential Capacity: More Experimental Evidence. One of the mechanisms that normal adult speakers use to indicate the deictic use of a pronoun is emphatic stress. In (2a), for example, the unstressed pronoun is interpreted as *Bill*. This is, presumably, due to speakers tendency for parallel interpretation of clauses: the pronoun is in the object position, so

[19]Analogous results were obtained by Uller 1992 for Brasilian Portugese. In an experiment similar to that of Karmiloff-Smith, Uller shows that children incorrectly use pronouns to switch reference (which is not an option for adults). This, however happens only in 30 cases out 118 (Karmiloff-Smith does not provide statistics). This is consistent with the proposal that children sometimes make errors when trying to calculate whether pronouns are possible.

it is interpreted as referring to the object of the higher clause (Grober, Beardsly and Caramazza 1978). To signal to other participants in the conversation that a different interpretation of the pronoun is intended, the speaker may use stress, as in (2b).

(2) a. John hit Bill and then Sarah hit him.

b. John hit Bill and then Sarah hit HIM.

To correctly interpret stress, listeners must be able to make relevant inferences about the speaker's representations, that is to infer that the speaker intended a non-parallel, deictic use of the pronoun.

It is, therefore, interesting that children have been shown to be "insensitive" to stress. Maratsos (1973) reports that 5 year old children sometimes interpret the stressed pronoun in (2b) as referring to Bill, that is in the same way as in (2a). This is consistent with the account proposed in previous chapters. Due to their limitations on inferential resources, children fail to make correct inferences with respect to other speakers' intentional use of contrastive stress. Even more interestingly, Maxfield and McDaniel have recently shown that there is a statistically significant correlation between children's understanding of contrastive stress and interpretation of pronouns. These researchers demonstrate that children who are sensitive to contrastive stress in sentences of type (2b) are less likely to accept sentences of type 'Father Bear washed him' on the interpretation where Father Bear washes himself. This result suggests that one and the same deficit is responsible for children's errors in Principle B conditions and conditions with stressed pronouns, exactly as argued in my account of the observed errors.

The inferential capacity is implicated not only in the interpretation of deictic pronouns. In cases where there is more than one potential antecedent for a pronoun, speakers have to make inferences about its appropriate interpretation based, for example, on the meaning of preceding sentences. For instance, in (3a), speakers can infer that if somebody finds someone's pencil, it is this pencil who gives it to the other one. By contrast, if somebody wants someone's pencil, it is the second person who gives it to the first one. Thus, the interpretation of pronouns in (3b) is different from that in (3a).

(3) a. Jane found Susan's pencil. She gave it to her.

b. Jane wanted Susan's pencil. She gave it to her.

Wykes (1981), however, reports that children around the age of 5 make significantly more errors in acting out (3b) than (3a). Similar to the contrastive stress experiment, children fail to make relevant inferences: they (sometimes) interpret *she* in (3b) as referring to *Jane*. In another experiment, Wyke asked children to act out sentences of type (4).

(4) Jane found Susan's pencil. The pencil was red. She gave it to her.

In half of the trials, there was one pencil, one car and one book (which made the second sentence --"the filler" -- irrelevant: it supplied no information relevant for the interpretation). In the other half of the trials, there were three different pencils: red, yellow, blue (which made the filler relevant: it carried certain information that had to be taken into account). Children were shown to make significantly more errors in interpreting pronouns in the "relevant filler" condition than in the "irrelevant filler". Wyke argues that

the increase in the amount of computations that children have to carry out overloads their inferential capacity, which results in an incorrect assignment of reference to the pronouns. And, consistently with my claim, children, unlike normal adults, make errors in these conditions precisely because their inferential capacity is limited.[20] Converging results regarding children's inferential capacity are reported in Paris and Lindauer 1976 who argue that, around the age of 7, there is a change in children's ability to use inference for sentence recall.

Another experiment that is relevant for the current discussion was carried out both with children, and Broca's aphasics. These experiments were based on Swinney's (1979) priming experiment. Swinney showed that, in normal adult speakers, both meanings of an ambiguous word are accessed. Thus, independently of the context speakers showed priming for both ANT and SPY in (5) when these probes were presented after the ambiguous word BUG.

(5) The FBI agent/The Landlord found bugs [PROBE] in the corner of the room.

Swinney, Nicol and Zurif (1989) and Swinney and Prather (1989) showed that Broca's aphasics and children demonstrate a different pattern. Namely, these populations show priming only for the most frequent meaning of the word, in this case for ANT independently of the context. The explanation that these

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[20] I am currently preparing a similar experiment with Broca's aphasics. The prediction is that these subjects will also show a decrease in the percentage of correct interpretation of pronouns in sentences of type (4) in the relevant filler condition as compared to the irrelevant filler one. This is so because, as I argued above, their computational capacity is also limited.

researchers offered was that the lexical access is slowed down (at least in aphasics), thus only the most frequent meaning of an ambiguous word is activated by the time the probe is presented.

I would like to somewhat reinterpret these findings. The presented analysis is based on the view that what is crucially involved in priming is activation of some semantic net. Let us suppose, however, that priming actually is a manifestation of subjects' inferential mechanism at work. Thus, the word NURSE is activated faster than CHAIR if it is presented after DOCTOR because the chain of inferences from *Nurse* to *Doctor* is shorter (faster, easier) than from *Chair* to *Doctor*. Suppose now (as proposed in this thesis) that children's and aphasics' inferential capacity is less than that of normal adults. This deficit will manifest itself not only in making incorrect inferences (as in the case of pronouns), but also in a general slow down of the inferential process. This slow down will result in what appears to be "priming for the most frequent meaning only." In fact, subjects whose inferential capacity is limited will be fast to establish to only the easiest, shortest inferential link, that is the link between the probe and the most frequent meaning of an ambiguous word.[21]

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[21]Also these results are, at best, suggestive with respect to the limitations on inferential resources, I wanted to mention them here because they represent one of few experiments carried out both with children and aphasics. A more detailed theory of the underlying mechanism of priming and inferencing is needed to make more specific claims, in particular that the mechanism involved in the recognition of a probe is essentially th esame as the mechainsm involved in allowing the use of a definite NP (say, *the bride*) after another NP (e.g. *awedding*).

PART II

Theoretical and Experimental Projects

In Part II, I present results of three experiments that I have carried out (in collaboration with other people) with Russian and English-speaking children. Presentation of each experimental project begins with theoretical discussion of relevant linguistic phenomena that were put to test with respect to child grammar.

In Chapter 5, I present theoretical analyses of Russian possessive pronouns and reflexives, and I discuss the experiment with Russian-speaking children in which we focused on their knowledge of the distribution of these elements. The full version of this experiment can be found in Avrutin and Wexler (1992). The theoretical part is presented in Avrutin (1994).

In Chapter 6, I discuss children's knowledge of plural pronouns. The experiment was carried out in collaboration with Rozalind Thornton, and is presented in Avrutin and Thornton (1994).

In Chapter 7, I discuss the distribution of prorouns in Russian subjunctive clauses and present results of an acquisition experiment with a group of Russian-speaking children. The theoretical part can also be found in Avrutin and Babyonyshev (1994). The experiment was designed and carried out in collaboration with Ken Wexler and Russian colleagues from the St. Petersburg Pedagogical University in the summer of 1993.

Chapter 5
Possessive Pronouns and Reflexives in Russian

1. Overview of Russian Possessives.

In Avrutin (1994), I provide analyses of Russian possessive pronouns and reflexives based on the distinction between bound variables and referring elements. I argue that pronominals that are interpreted as bound variables must appear in a functional projection. No such requirement is imposed on referring elements. These analyses crucially rely on the possibility of interpreting definite NPs as generalized quantifiers that undergo Quantifier Raising (QR).

In this chapter, I present a somewhat different version of this approach. In the framework adopted on this thesis, only pronouns coindexed with c-commanding quantifiers are interpreted as bound variables. Coindexation of a pronoun with a definite NP is interpreted as identity of file cards in discourse, that is as the pronoun being incorporated into the file card introduced by its antecedent (see Chapter 2). What these two interpretations have in common is that the pronoun in both cases is *referentially dependent*. Bound variables are dependent elements *par excellence*: they simply have no independent interpretation. Incorporated pronouns are dependent because, in discourse, they are not represented independently: they do not introduce any new file card. Thus, incorporated pronouns pattern with bound variables, and coindexation receives a unified interpretation:

Coindexation represents dependency. Dependency can be established in syntax (bound variables), or in discourse (the case of incorporation).

Pronouns that are not coindexed with any other NP are independent. They introduce a new file card which (as discussed in Chapter 2) must be bridged to a previously existing card.

Let us turn now to the analyses of Russian possessive pronouns. I will show how the distribution of Russian possessive pronouns and reflexives supports the theory outlined above. In the second part of this section, I discuss to what extent children know the relevant principles regulating this distribution.

It has been proposed by Lebeaux (1983), Chomsky (1986a), Pica (1987), Cole, Hermon and Sung (1990) (among others) that reflexives and reciprocals undergo LF raising. Hestvik (1990, 1992) has proposed a "Generalized LF Movement Theory" in which pronouns as well as reflexives move at LF. In this article I present a different proposal regarding LF movement of pronominals. Based on data from Russian, I argue that only those elements which are referentially dependent undergo LF movement. I suggest that this movement is required because, at LF, referentially dependent elements in Russian must adjoin to a functional head. This requirement, together with familiar Principle B of the Binding Theory accounts for a number of phenomena in Russian (including the difference between the distribution of singular and plural pronouns). It also provides further support for the view that both Principle A and Principle B of the Binding Theory apply at LF.

2. Distributive and Collective Readings of Plural Pronouns.

Consider (1).

(1) [Amerikanskie turisty]$_j$ opisali [ix$_j$/svoi$_j$ goroda].

American tourists described their/REFL cities

Either the third person plural possessive pronoun *ix*, or the possessive reflexive *svoi* can be used to refer to the subject.[22] However, when the pronoun is used, (1) can only have a collective interpretation. The distributive interpretation can only be expressed by the reflexive possessive *svoi*. Thus, when the pronoun is used, the sentence has the meaning: "American tourists described cities in the United States (in general)". If, on the other hand, tourists John (from Boston), Bob (from New York) and Mary (from Dallas), want to describe their respective places of residence, the only possibility is to use the possessive reflexive *svoi*. Another way to describe the same phenomenon is to say that a bound variable interpretation in constructions like (1) has to be expressed by a reflexive possessive. When a pronoun and its antecedent are in different clauses, however, the pronoun can be used to express a bound variable reading, as (2) shows.

(2) [Amerikanskie turisty]$_j$ skazali [čto Ivan posetil [ix$_j$/*svoi$_j$ goroda]]].

American tourists said that Ivan visited their/*REFL cities

(2) has both the collective and the distributive interpretation. It can either mean that the tourists said that Ivan visited some cities in the US, or that Ivan visited their respective cities (e.g. Boston, New York, Dallas).

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[22]Russian reflexive possessives agree in gender and number with the head noun:

(i) Ivan l'jubit svoju mat'.
Ivan [MASC] loves REFL [FEM] mother

(II) Maria l'ubit svoego otca.
Maria[FEM] loves REFL[MASC] father

(iii) Ivan l'jubit svoix detej
Ivan loves REFL[PL] children

(iv) Oni l'jubjat svoju mat'.
they love REFL[SING] mother

Comparison of (1) and (2) suggests that the possibility of using a pronoun as a bound variable depends on the structural position of the pronoun. The distribution of reflexives and pronouns is often captured by Principles A and B of the binding theory (e.g. Chomsky 1986a), which are repeated below:

(3) Principle A: An anaphor must be A-bound in its Governing Category.

Principle B: A pronoun must be A-free in its Governing Category.

(4) a. Governing Category (GC) for an anaphor: The smallest Complete Functional Complex (CFC) where the anaphor could potentially be bound.

b. Governing Category (GC) for a pronoun: The smallest CFC where the pronoun could potentially be free.

c. Complete Functional Complex: A domain in which all grammatical functions compatible with its head are realized.

I will argue that the impossibility of using the pronoun as a bound variable in (1) also follows from Principle B, although not in a direct way. The central claim of the paper is summarized in (5).

(5) The Structural Position of Referentially Depenedent Elements:
At LF, pronominals interpreted as bound variables must be in a functional projection.[23]

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23 To be in a functional projection means to be immediately dominated by a projection of a functional head. More generally:
(i) a is in a projection of X^0 if a is adjoined to X^0 or a is in [Spec, XP].
I use this disjunctive formulation to account for the differences in the distribution of pronouns in Russian and English. For more discussion see Avrutin 1994.

(5) is a well-formedness condition that applies at the interface level between syntax and the interpretive mechanism, and rules out those representations where referentially dependent pronominals appear in a lexical projection.[24] Let us begin with analyses of the first type of referential dependency, that is with bound variable pronouns and reflexives.

I argue that the distributive interpretation of the pronoun *ix* in (1) is impossible because pronouns which are bound variables adjoin to Det at LF (in Russian) to satisfy condition (5) (I discuss the relevant difference between Russian and English in Section 5). More specifically, I assume that only head of the pronominal element undergoes LF raising to a functional category similar to the head movement of clitics in Romance languages (see also Hestvik 1992). This, however, leads to a Principle B violation in the following way. According to Heim, Lasnik and May 1991, the distributive interpretation of a plural NP is represented syntactically as a quantificational construction. The distributed plural NP adjoins to IP at LF. The LF representation of (1) is shown in (6).[25] DP does not contain a subject, therefore, given the definition in (4c), it is not a CFC because not all grammatical functions compatible with the head of DP are realized, more

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[24] Traces are allowed to appear in a lexical projection, although they are interpreted as variables. This is fully consistent with the proposed analyses, however, because traces lack phi-features. Since I claim that only those elements whose phi-features are used for interpretation are allowed to appear in lexical projections at LF, traces allowed to do so because they simply have no such features.

Another question is that if pronouns can, in principle, raise, why not all of them do so, but only those that are interpreted as bound variables. I assume that this follows from some economy considerations (Chomsky 1991). For pronouns interpreted as bound variables, there is a reason to move (they must be in a functional projection), but no such reason exists for referential pronouns, thus this movement is not allowed on the basis of economy.

[25] For more discussion of the bound variable interpretation of plural NPs see Heim, Lasnik, and May 1991. For my purposes it is sufficient to note that the distributive reading of the pronoun in (1) corresponds to its bound variable interpretation. Heim, Lasnik and May also argue that a plural NP in its distributive reading has a distributive operator D attached to it. The complex [[NP] D] then undergoes QR. For simplicity I omit the distributive operator.

precisely, the subject is not present. The smallest CFC (and, therefore, governing category for *ix*) is IP. The structure with *ix* on the distributive reading is ruled out because at LF the pronoun in Det is A-bound in its GC by (the trace of) the subject in violation of Principle B. For reflexives, however, there is a further requirement. Chomsky 1986a suggests that the relation between the antecedent and an anaphor is the relation of government and Yang 1992 argues that reflexives must be in a mutual m-command relation with their antecedent, given that government is defined in terms of m-command (Chomsky 1986b, Rizzi 1990). Slightly modifying their proposals, I assume that reflexives must be in a Spec-Head relation with their antecedents.[26] Thus, the reflexive in (6) adjoins at LF to another functional head, namely Infl (the movement proceeds through adjunction to Det; for simplicity I omit the intermediate trace of *svoi*). In this position the reflexive is correctly A-bound by (the trace of) the subject, and the sentence is acceptable.[27]

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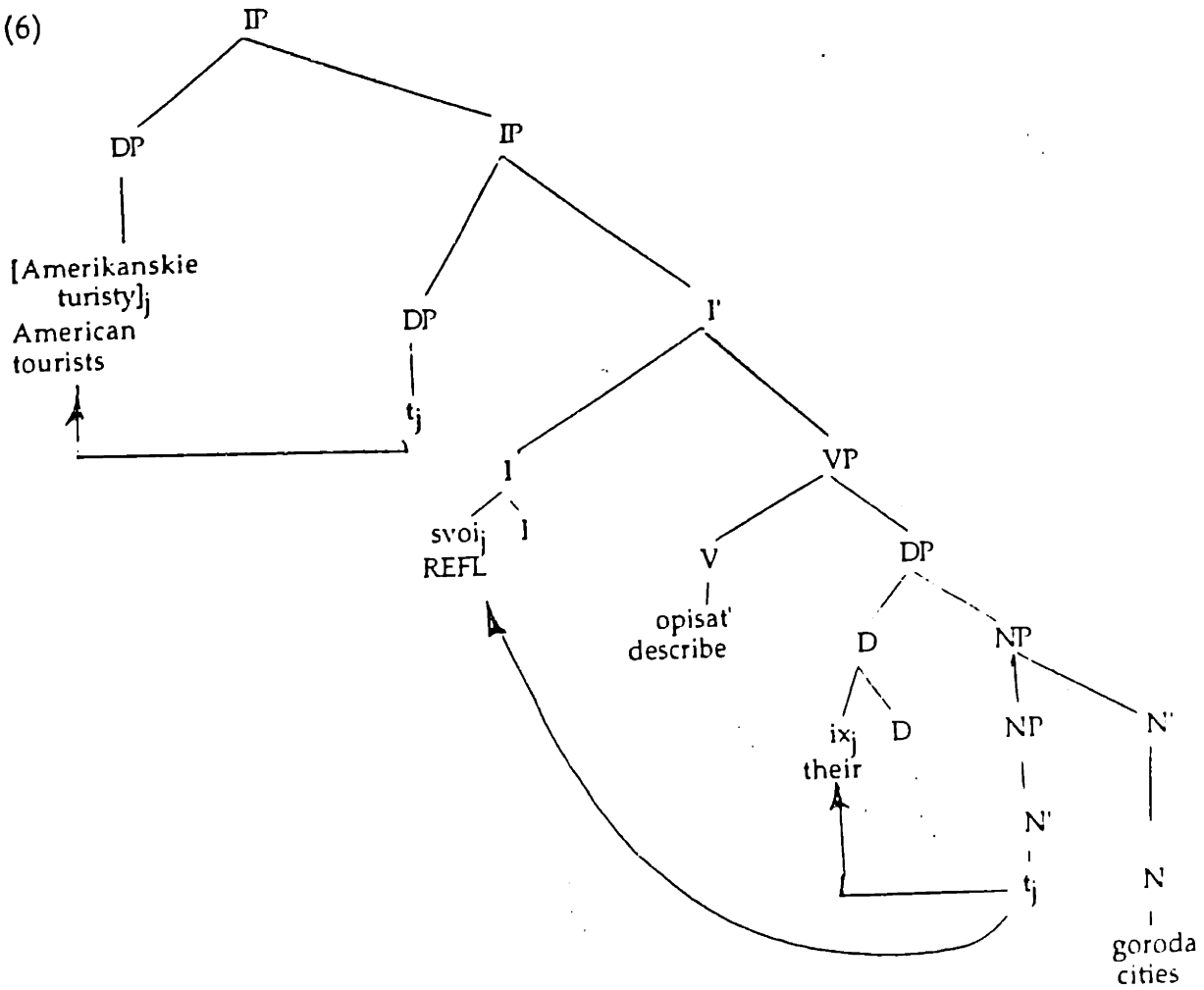
[26]The reformulation of this requirement in terms of a Spec-Head relation rather than in terms of a mutual m-command may be more plausible on conceptual grounds . Indeed, such a relation is known to play an important role in current linguistic theory (e.g. Rizzi's 1990 Relativized Minimality, Chomsky's 1992 Minimalist program). Although, as the reviewer points out, this is a stipulation, this stipulation will be shown to do a lot of work, and therefore seems to be plausible on empirical grounds as well. Interestingly, in Chomsky 1992, the movement of reflexive is also stipulated, and it is used to solve certain empirical problems (i.e. Reconstruction). Further research may show that this is not a stipulation at all. One possibility is that reflexives (that lack phi-features) must be in a Spec-Head relation with their antecedents in order to obtain these features. I will not discuss this possibility in this paper.

[27]Following Hestvik 1992 and Pica 1987, among others, I assume that only the head of the pronominal element undergoes LF movement in Russian. I also follow Hestvik 1992 in assuming that the Binding Principles can apply between an XP and a head. See Progovac 1992 for an alternative analysis.

(6)



The collective interpretation of pronoun *ix* is possible in (1) because in this case the pronoun is not a bound variable, and it does not move out of NP. Since NP is a governing category for a pronoun (which follows from the definition of the governing category in (4); see Huang 1983), the sentence is acceptable.[29]

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[29]Russian possessives are located in [Spec, NP] . Following Rappaport 1986, I assume the following structure:

(i) [DP [Spec NP POSSESSOR [N' N]]]

In (2) the pronoun can express either the collective, or the distributive reading. Under the collective reading, no movement takes place and the pronoun is locally free. Under the distributive reading, the pronoun, interpreted as a bound variable, moves to a functional head, e.g. Det. The antecedent (the subject of the matrix clause) and the pronoun are in different clauses, and no Principle B violation arises (the lower clause is the Governing Category for the pronoun, as follows from (4b)). The reflexive, on the other hand, is not possible here because it cannot move to the matrix Infl (head movement out of a Tensed clause is prohibited in general, see section 4.1 below); thus Principle A is not satisfied.

3. Anti-subject Orientation of Singular Pronouns[29]

Consider now bound singular pronouns and reflexives, as in (9).

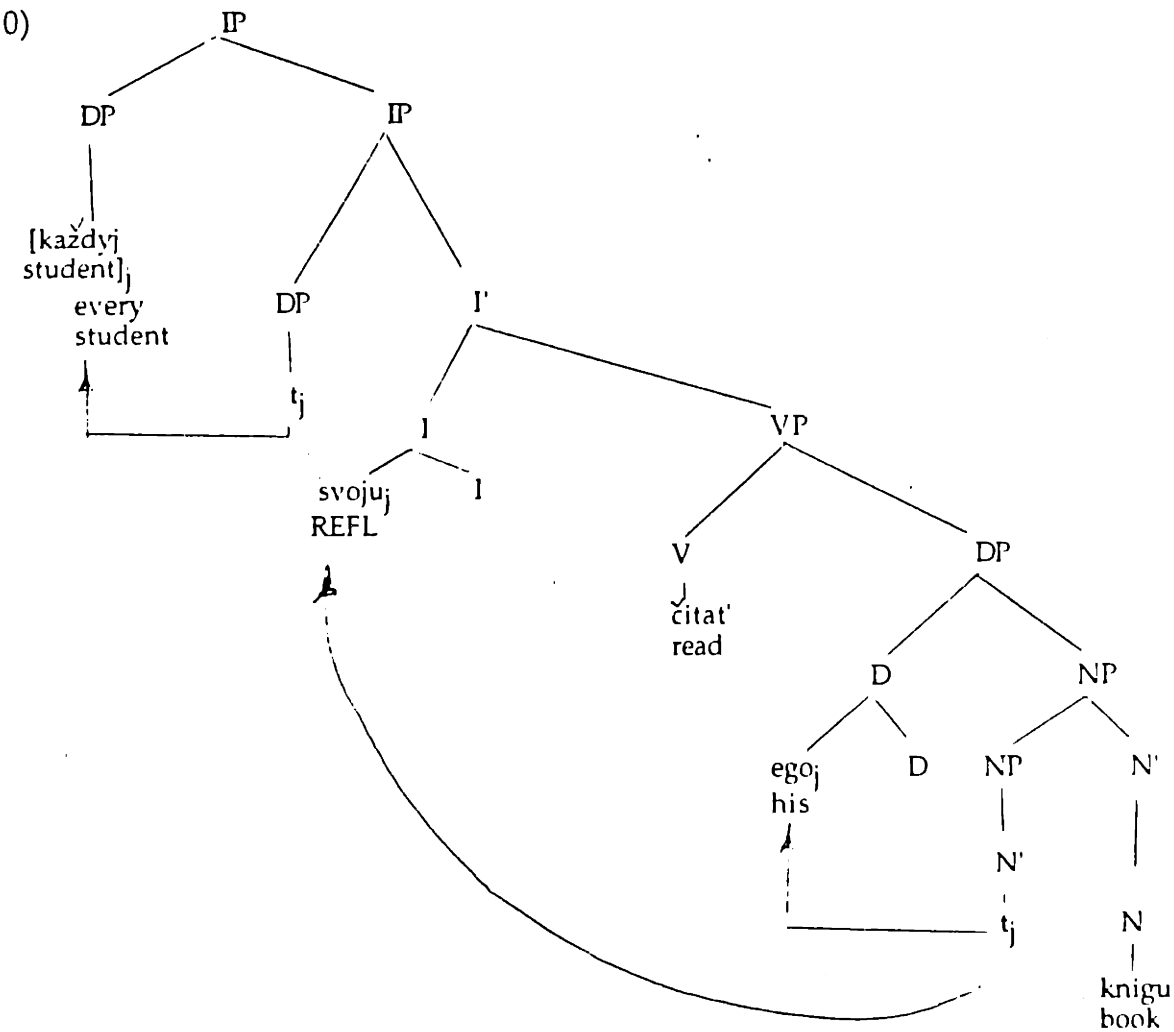
(9) [Každyj student]$_j$ čitaet [*ego$_j$/svoju$_j$ knigu].
every student is-reading his /REFL book

The analysis of the ungrammaticality of the pronoun in (9) is parallel to the analysis of the distributive reading of the plural pronoun in (1). The pronominal possessive is bound by a quantifier; thus it is interpreted as a bound variable. If the possessive is a pronoun, it must adjoin at LF to a functional head, e.g. Det or Infl (once again, I assume that only the head of the pronominal moves). But wherever the pronoun moves, the sentence is ruled out because the governing category is IP, and the pronoun is locally

[29]The analysis presented in this section is essentially identical to Hestvik's 1992 account of the anti-subject orientation of possessive pronouns in Norwegian. The only difference is that Hestvik does not distinguish between referential pronouns and pronouns as bound variables with regard to their LF movement.

bound at LF in its GC (DP is not a governing category because it does not contain a subject, thus it is not a CFC, see discussion in Section 1 above). The reflexive, on the other hand, is grammatical because it is locally bound by the (trace of the) subject after the subject undergoes QR and the reflexive adjoins to Infl. (10) shows the LF for (9).

(10)



The proposed theory accounts for the so-called anti-subject orientation of pronouns in Russian. In (11), the pronoun cannot be coindexed with the subject, while the reflexive can.

(11) [Každaja devočka]$_i$ pokazala Ol'ge [*eë$_i$/svoju$_i$ komnatu].

every girl showed to-Olga her REFL room

Being a bound variable, *eë* 'her' must move to Det or Infl, but in either case it is bound in its GC (DP is not a CFC since it does not contain a subject; thus the smallest CFC is IP). The reflexive is possible as in (9). (The binder in (11) is the trace of the subject which raises at LF.) Consider now (12).

(12) Ol'ga pokazala [každoj devočke]$_i$ [eë$_i$/*svoju$_i$ komnatu].

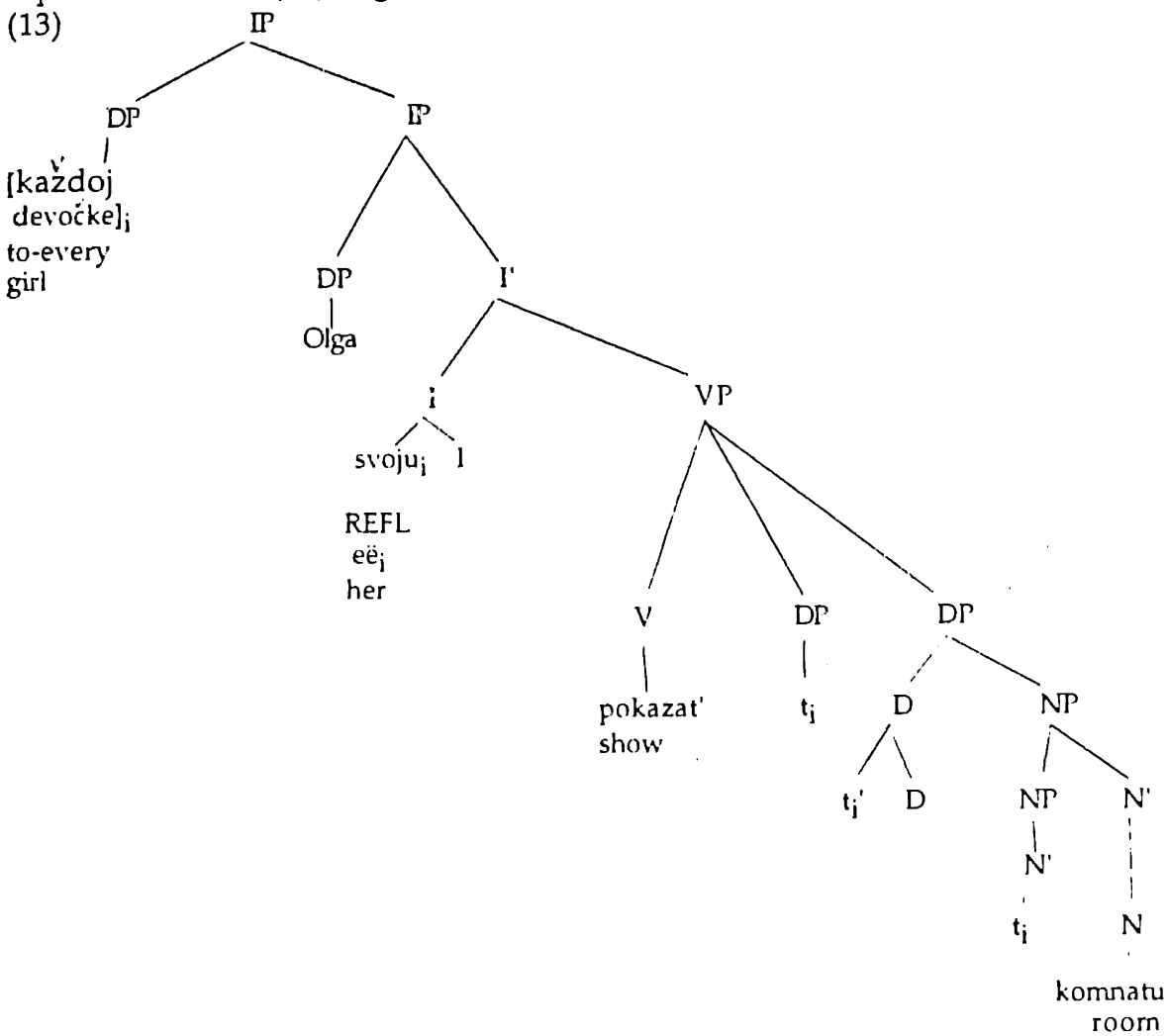
Olga showed to-every girl her REFL room

Now the situation is reversed: the pronoun can be coindexed with the indirect object, while the reflexive cannot. But this is exactly what the proposed theory predicts. If the pronoun/reflexive is coindexed with the quantified indirect object, it is interpreted as a bound variable. The pronoun can move to Infl; thus it satisfies the condition that bound variables must be in a functional projection. In this position the pronoun is not bound by the indirect object since it is higher than the trace of its antecedent (which raised at LF) and the sentence is acceptable.[30] For the reflexive, on the other hand, there is no *functional* position such that the reflexive and the indirect object would be in a Spec-Head relation with each other. This is so independent of

[30]It was pointed out to me that pronouns must be prohibited from moving to Comp because in this case they would not exhibit the anti-subject orientation. This follows, however, from the fact that an element is a variable if it is A'-bound, in other words if it is in the scope of the operator that binds it. Thus, pronouns interpreted as bound variables cannot raise to Comp because in this case they are no longer in the scope of the operator that binds them, and, therefore, cannot be interpreted as variables.

whether the reflexive adjoins to Det, or moves further to Infl. The LF representation of (12) is given in (13).[32]

(13)



This analysis also predicts the following contrast between (14a) and (14b).

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[32]A natural question is why there is no Principle C violation in this case given that the pronoun moves to a position higher than the trace of the indirect object it is coindexed with. Recall, however, that head movement takes place here. If only the head of the pronoun adjoins to Infl, such an adjunction will prevent a c-command relation. For more details see Hestvik 1992. Another question has to do with the role that traces play in the proposed analyses and in LF movement approach in general. The question is whether traces of moved pronominals can be bound. Recall, however, that in the proposed analyses only the head undergoes LF raising. Since a head movement forms A-chain (e.g. Chomsky 1986b, Rizzi 1990), and since A-traces are anaphors, they are allowed to be bound. Thus, no problem arises for the intermediate traces in Det (in (13), (15b), and other relevant examples), even if the element moves further to Infl and leaves a trace in Det.

(14) a. [Amerikanskie turisty]$_j$ opisali Ivanu$_i$ [ix$_j$ goroda].
American tourists described to-Ivan their cities

b. Ivan$_i$ opisal [Amerikanskim turistam]$_j$ [ix$_j$ goroda].
Ivan described to-American tourists their cities

(14a) has only a collective interpretation: it can only mean that the American tourists described cities in the US in general. But (14b) has both a collective and a distributive interpretation. It can either mean that Ivan described to the tourists American cities in general, or that he described to each of the tourists his/her native town. This asymmetry exactly parallels the subject/indirect object asymmetry in (11) and (12). Recall that only under the distributive reading is the pronoun a bound variable. Thus, it moves to Det (or Infl) at LF and the sentence is ruled out, as in (11). Therefore, the pronoun in (14a) can express only the collective reading because in this case it does not move out of the NP; and thus satisfies Principle B. In (14b), however, the pronoun can express a distributive reading (can be a bound variable) because after it adjoins to Infl, it is locally free, in exactly the same way as it is in (12).

4. Definite NP Antecedents

The central claim of this chapter is that referentially dependent elements in Russian undergo LF movement to a functional projection. All examples considered so far in this paper had a quantified antecedent for a pronoun (or reflexive). In all of these cases the pronominal element is clearly interpreted as a bound variable, that is as a dependent element. What is the status of the pronoun in (15)?

(15) a. Ivan$_i$ slomal ?*ego$_{i/}$svoj$_i$ velosiped.

Ivan broke his REFL bike

b. Ol'ga$_i$ pokazala Marii$_k$ eë$_{?*i/k}$/svoju$_{i/*k}$ komnatu.

Olga showed to-Maria her REFL room

Recall now our discussion of pronouns coindexed with a definite NP. As discussed in Chapter 2, coindexation in this case means that, in discourse, the pronoun is represented by the same file card as its antecedent, that is it is incorporated into an already existing card. But incorporation, as proposed in Section 5.1, is another type of referential dependency. The coindexed pronoun is dependent (at the level of discourse) in the sense that it is not represented by its own (independent) file card. This observation allowed us to make a generalization with respect to bound variables and incorporated pronouns, that is to provide a unified analysis of coindexation.

Thus, the ungrammaticality of (15) receives the following explanation. The pronoun (as a referentially dependent element) moves to Det, and the sentence is ruled out because Principle B is violated at LF. If a reflexive possessive *svoj* is used in (15a), it moves to Infl (as discussed above), and the sentence is grammatical because reflexives can and must be locally bound.[32] (18a) shows the LF representation of (15a) with the pronoun, and (18b) shows the LF of (15a) with the reflexive.

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32 In some contextually determined cases, Russian allows the logophoric use of reflexives. In these cases, reflexives are interpreted referentially and the reference is supplied by the context. Thus, reflexives in these cases do not have to be locally bound. In this article, however, I focus on reflexives interpreted as bound variables, and I do not discuss logophoricity. For a discussion of the non-local binding of Russian reflexives and relevant examples see Rappaport 1986, Timberlake 1979, and references cited there.

(18) a. *[$_{IP}$ Ivan$_i$ [$_{IP}$ t$_i$ [$_{VP}$ [$_V$ slomal] [$_{DP}$ Det-ego$_i$ [$_{NP}$ t$_i$ velosiped]]]].

Ivan broke his bike

b. [$_{IP}$ Ivan$_i$ [$_{IP}$ t$_i$ Infl-svoj$_i$ [$_{VP}$ [$_V$ slomal] [$_{DP}$ [$_{NP}$ t$_i$ velosiped]]]].

Ivan REFL broke bike

Notice that there is an interesting contrast between full ungrammaticality of sentences with quantified antecedents, and sentences with definite NP antecedents, as in (19) and (20):

(19) *[Každyj sportsmen]$_i$ slomal [ego$_i$ velosiped].

every sportsman broke his bike

(20) ?*Ivan$_i$ slomal [ego$_i$ velosiped].

Ivan broke his bike

Although (20) is unacceptable to most speakers, this sentence does not represent the same degree of ungrammaticality as one could expect from a 'typical' Principle B violation, e.g. (21).

(21) *Ivan$_i$ poxlopal ego$_i$.

Ivan patted him

Let us see how the mechanism of index intepretation discussed in Chapter 2 can account for the differences between (19) and (21), on the one hand, and (20), on the other.

When speakers hear sentence (21), they assign it a linguistic representation, which meand that the NP *ego* 'him' receives an index. Because of Principle B, this index cannot be identical with the index on *Ivan*.

Thus, representation (21) would violate a syntactic principle, which, we assume, is strong.

What about (20)? Unlike (21), when speakers hear this sentence, they *can* assign the pronoun the same index as that of *Ivan*. This is so because, when the index is assigned, the pronoun is inside of NP *ego velosiped:* it is in Spec, NP. In this position, it is inside of its governing category, and nothing prevents the coindexation. The problem arises *only* after speakers attribute a certain interpretation to the coindexation. This happens in discourse where, as I argued in Chapter 2, the coindexation is interpreted as incorporation, that is as another type of dependency. Now, there is a problem: the pronoun is referentially dependent, which means that it must be in a functional projection. If speakers 'go back', and assign a different representation to (21) such that the pronoun is in Det or Infl, the sentence will be ruled out by Principle B because the pronoun will no longer be inside of its governing category. I suggest, however, that, to rescue (20), speakers may attempt to interpret the pronoun *deictically*, that is as a *referentially independent element*. This means that the pronoun will be represented in discourse by its own, independent file card, and will receive its own index. In this case, the pronoun is not subject to Principle B, and the sentence is grammatical.[33] Such a deictic use of a pronoun, clearly, violates some pragmatic rules of discourse, but under assumption that such violations are milder than

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[33]When the pronoun is stressed, the sentence becomes acceptable:

(i) Ivan slomal [EGO velosiped].
Ivan broke HIS bike

This is, of course, predicted because stress can indicate the deictic use of a pronoun, e.g. *I like HER, not HER*! This precisely why week pronouns cannot be stressed: **I like IT, not IT*! See Chapter 3 for more discussion.

syntactic violations, we can explain then the difference in judgments between (19), (20) and (21). In (19), the pronoun must be interpreted as a bound variable because quantifiers do not have any reference. Therefore, the pronoun is necessarily dependent in this case. As such, it adjoines to Det at LF, and the sentence violates Principle B of the Binding Theory, which results in stronger judgments of ungrammaticality. There is no way to rescue this sentence by intepreting the pronoun deictically simply because dependency relation with a quantifier can be only of one type: a bound variable anaphora.

The difference between (20) and (21) is also explained straightforwardly. In (21), the index identical to that of *Ivan* cannot be generated on the object pronoun due to Principle B. The only representation that can possibly be submitted to interpretation is $Ivan_i$ *poxlopal* ego_j. And this is inerpreted as *Ivan* and *ego* being represented by two different file cards. The crucial difference between (20) and (21) is that in (21) coindexation is not an option already in syntax, while in (20) speakers have a chance to rescue the sentence by violating some discourse (pragmatic?) rules of conversation.

Double object constructions (e.g. (15b)) are analyzed in exactly the same way. If speakers interpret the pronoun as an element referentially dependent on its subject, the pronoun moves to adjoin to a functional head (Det or Infl), and the sentence is ruled out. But speakers have an option of violating some discourse constraints and interpreting the pronoun as referentially independent. In this case, the pronoun does not move out of NP. No Principle B violation arises, although the sentence is still (at best) marginal due to a violation of hte discourse constraint. The difference between (11) and (15b) is that, with the quantified antecedent, coindexation is the only way

of establishing dependency. Speakers cannot use the pronoun deictically because, simply speaking, there is nothing to point to: quantifiers do not have any reference. Hence, the difference in judgments. Coindexation of the pronoun with the indirect object *Marii* in (15b) is allowed because (as discussed above) the pronoun (as a bound variable) adjoins to Infl where it is not A-bound by its antecedent.

5. Non-Local Binding

5.1. Quantified NP Antecedents

Consider now (22a,b). (22b) is the LF representation for (22a).

(22) a. [Každyj student]$_i$ dumal čto Ivan$_j$ čital [ego$_{i/?*j}$/svoju$_{*i/j}$ stat'ju].
every student thought that Ivan read his REFL article

b. [Každyj student]$_i$ dumal [čto [Ivan Infl-*svoju$_i$ čital [$_{DP}$ Det-ego$_i$ [t$_i$ stat'ju]]
every student thought that Ivan REFL read his article

When coindexed with its antecedent, pronoun *ego* is a bound variable which adjoins to Det or Infl (as discussed above). The sentence is grammatical because after the movement, *ego* is not locally bound by its antecedent. The reflexive *svoju*, however, cannot move to the matrix clause (see Bailyn 1993, Pica 1987); thus the sentence does not satisfy Principle A.[34] Consider now (23).

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[34]Pica (1987) and Bailyn (1992) argue that in Russian infinitival clauses both T^0 and C^0 are empty at LF, which makes the movement of the reflexive possible in (24) but not in (23). Example in (23), however, shows that it is the presence of Comp that is relevant (the reflexive is higher than Tense in this example, and does not have to move through the Tense node). I assume therefore that a reflexive in Russian cannot move through Comp. In general, it is well known that head movement out of a Tensed clause is not allowed, for example clitics in Romance languages cannot move to a higher clause, e.g. French (i).

(i) *Jean me$_i$ croix que Marie t$_i$ aime.
Jean me believes that Marie loves
'Jean believes that Marie loves me'.

(23) [Každyj student]$_i$ skazal [čto [$_{DP}$ [$_D$ [$_{NP}$ ego$_i$/*svoj$_i$ drug]] xočet est']

every student said that his/REFL friend wants to-eat.

The pronoun *ego* adjoines to Det to be in a functional projection. In this position, it satisfies Principle B because the governing category is IP, and the pronoun is free in its GC. Reflexive *svoj* is impossible because (as above) it cannot move through Comp to the higher clause to be in a Spec-Head relation with its antecedent.

Long-distance binding of reflexives in Russian is possible out of an infinitival clause, however, as in (24a) (Rappaport 1986). (24b) shows its LF representation with the pronoun, (24c) with the reflexive coindexed with the matrix subject, and (24d) with the reflexive coindexed with PRO.

(24) a. [každyj student]$_i$ poprosil Ivana$_j$ PRO$_j$ pročitat' [ego$_{i/?*j}$/svoju$_{i/j}$ statju].

every student asked Ivan to-read his REFL article

b.[[$_{IP}$ [každyj student]$_i$ poprosil Ivana$_j$ [$_{IP}$ PRO$_j$ [$_{VP}$ pročitat' [$_{DP}$ Det-ego$_{i/*j}$ [$_{NP}$ t$_{i/*j}$ statju]]]]]

every student asked Ivan to-read his article

c. [[$_{IP}$ [každyj student]$_i$ Infl-svoju$_i$ [$_{VP}$ poprosil Ivana$_j$

every student REFL asked Ivan

[[$_{IP}$ PRO$_j$ [$_{VP}$ pročitat' [$_{DP}$ [$_{NP}$ t$_i$ statju]]]]]]].

to-read article

Thus, I suggest that the situation with the movement of reflexives in Russian is essentially similar to the situation with clitic movement in Romance languages with respect to the possibility of movement to a higher clause. For more discussion see Pica 1987 and Hestvik 1992.

d. [[$_{IP}$ [každyj student]$_i$ [$_{VP}$ poprosil Ivana$_j$

every student asked Ivan

[[$_{IP}$ PRO$_j$ Infl-svoju$_j$ [$_{VP}$ pročitat' [$_{DP}$ [$_{NP}$ t$_j$ statju]]]]]]]].

REFL to-read article

The pronoun (as a bound variable) adjoins to Det where it is not locally bound; thus the coindexation of the matrix subject and the pronoun is allowed. The reflexive, however, can move to the matrix clause and adjoin to the matrix Infl. Thus (24) exhibits a case of a non-complementarity between pronouns and reflexives in Russian.[35]

Consider now complex NP constructions. In these constructions the complementarity between pronouns and reflexives shows up again:

(25) [každyj student]$_i$ pročital [$_{DP}$ [$_{NP}$ perevod [$_{DP}$ [$_{NP}$ ego$_{*i}$/svoej$_i$ statji]]].

every student has-read translation of-his REFL article

At LF, *ego*, as a bound variable, adjoines to Det or to Infl. If it adjoins to Infl, it is locally bound by its antecedent in IP (which is a GC), and the sentence is ruled out. If *ego* adjoins to Det, its GC is still IP. This is so because *ego* is not a subject of the lower DP (it is adjoined to Det at LF). Thus, neither of the two DPs contains a subject. The GC for the pronoun, therefore, is IP where *ego* is bound by the subject of the clause, and, once again, the sentence is ruled out as a violation of Principle B. Only reflexive *svoej* can be used because at LF it

[35]At the moment, it is not clear to me why the pronoun in (24) cannot be coindexed with PRO. Given the outlined analysis, it should be possible for *ego* to move to the higher Infl where it is no longer bound by PRO. One possibility is that the intermediate trace of the pronoun retains some pronominal properties in the sense that it cannot be locally A-bound by PRO. This requires further investigation.

adjoins to Infl where it is correctly bound.[36] If NP itself contains a subject, however, the coindexation of the pronoun and the matrix subject becomes possible. (26b) shows the LF representation for (26a) with the pronoun adjoined to Det.

(26) a. [každyj student]$_i$ pročital [$_{DP}$ [$_{NP}$ Petin$_j$ perevod [$_{DP}$ [$_{NP}$ ego$_{i/j}$/svoej$_{i/*j}$

every student has-read Peter's translation of-his/REFL

statji]]]].

article

b. [každyj student]$_i$ pročital [$_{DP}$ [$_{NP}$ Petin$_j$ perevod [$_{DP}$ Det-ego$_i$ [$_{NP}$ t$_j$

statji]]]].

every student has-read Peter's translation of-his

article

In (26), the governing category for the pronoun is the higher DP. *ego* adjoins to the lower Det to be in a functional projection. If the pronoun is coindexed with the matrix subject, the sentence is still grammatical since it is locally free (that is, it is free in its Complete Functional Complex as defined in (4c)). But the coindexation with *Petin* is also possible. As in double object constructions, the pronoun can move to another functional category, to Infl, where it is no longer A-bound by *Petin*; thus no Principle B violation arises in this case. And, as in double object constructions, if the pronoun *ego* is replaced with reflexive *svoej* in (26), this reflexive can be coindexed only with the matrix subject, not with *Petin*. The explantion is exactly parallel to that proposed for double object constructions. Whether *svoej* adjoins to Det, or

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[36] I follow Baker and Hale (1990) who argue that an intervening *lexical* head does not block a head movement from a functional head to another functional head (that is, N does not block the head movement of the reflexive from Det to Infl in (25).

moves further to Infl, it is not in a Spec-Head relation with its antecedent, *Petin*. Such a relation is possible only with the matrix subject because the reflexive can adjoin to Infl where it is correctly bound by the subject (if they are coindexed). Thus, the matrix subject is the only possible antecedent for the reflexive in this sentence.

5.2. Plural NPs

As was mentioned in Section 1, plural pronouns in a tensed subordinate clause in Russian can express either a collective or distributive reading:

(27) [Amerikanskie turisty]$_j$ skazali [čto [Ivan posetil [ix$_j$/*svoi$_j$ goroda]]].

American tourists said that Ivan visited their/*REFL cities

This sentence can either mean that the tourists said that Ivan visited some cities in the US, or that Ivan visited their respective cities (e.g. Boston, New York, Dallas). The sentence is acceptable because the pronoun is locally free in both the collective and distributive readings. Under the collective reading, the pronoun (not being a bound variable) does not move at all, and the sentence is clearly acceptable. Under the distributive interpretation, pronoun *ix* in (27) moves to Det (or Infl, as with the singular pronouns discussed above) where it is still locally free from its antecedent in the matrix clause. Thus, (27) has both a collective and a distributive reading. The reflexive, on the other hand, cannot be used in (27) in either reading because (as discussed above) it cannot move to the matrix clause through the Comp node.

In infinitival constructions, pronoun *ix* can once again express either the distributive, or collective reading:

(28) [Amerikanskie turisty]$_j$ poprosili Ivana posetit' [ix$_j$/svoi$_j$ goroda].

American tourists asked Ivan to-visit their/REFL cities

Under the collective reading, the pronoun does not move at all, and the sentence is grammatical. Under the distributive reading, it moves to a functional head (Det or Infl) where it is locally free.

As predicted, in complex NP sentences the distributive/collective asymmetry shows up again:

(29) [Ivan i Ol'ga]$_i$ prinesli [fotografii [ix$_i$ /svoix$_i$ druzej]].

Ivan and Olga brought pictures of-their/REFL friends

When the pronoun is used, the sentence can only mean that Ivan and Ol'ga have some mutual friends whose pictures they brought. When the intended meaning is that Ivan brought pictures of his friends, and Ol'ga brought pictures of hers, reflexive *svoix* must be used. This is predicted because the smallest CFC in (29) is IP (the only category containing a subject). *ix*, as a bound variable, must adjoin to Det or Infl, but in either case it is locally bound by the subject in violation of Principle B at LF. The reflexive, however, can and must be bound; thus the distributive reading is expressed by using *svoix*, which moves at LF to Infl. As in (26), when the NP contains a subject, the pronoun can express either the distributive, or the collective reading:

(30) [Ivan i Ol'ga]$_j$ prinesli [moi fotografii [ix$_j$ druzej]].

Ivan and Olga brought my pictures of-their friends

Now, in addition to the collective reading, (30) can mean that Ivan brought my pictures of his friends, and Olga brought my pictures of her friends. The analysis is parallel to (26): the pronoun adjoines to Det, but due to the presence of the subject *moi* 'my', it is still locally free.

6. English Possessive Pronouns.

Why is (35a) grammatical in English while the corresponding sentence (35b) is bad in Russian?

(35) a. Every boy$_i$ walked his$_i$ dog.

b. *Každyj mal'čik vygulival ego sobaku.

Hestvik (1990) suggests that the relevant difference between Russian and English possessive pronouns lies in their X'-properties. He claims that English possessives are XPs while Russian possessives are X^os. Hestvik further stipulates that X^o pronominals move at LF to Infl, while XP pronominals must be in the Specifier of their governor. In English, according to Hestvik 1990, 1992, there is no movement in the mapping from S-structure to LF, because the pronoun satisfies this requirement already at S-structure. Since DP is the governing category, no Principle B violation arises. Russian pronouns, on the other hand, move to Infl, which leads to a Principle B violation at LF. The problem with this analysis, however, is that the test Hestvik uses to distinguish between X^o and XP pronominals does not work for Russian. Thus, according to Hestvik, the fact that English pronouns does not allow restrictive modifiers (as in (36)) shows that these elements are XPs

(as opposed to, for example, Norwegian, where the corresponding sentence is fully grammatical; for more details see Hestvik 1992).

(36) *He in the red hat.

But in Russian, the corresponding sentence is also ungrammatical:

(37) *On v krasnoj šapke.

he in red hat

Thus, we do not have any independent evidence for the proposed distinction in X'-properties between Russian and English pronominals. There is no need, however, to stipulate the difference between Russian and English pronouns. In the proposed theory, the relevant difference between English and Russian is accounted for straightforwardly in the following way. Abney (1987) discusses the structure as in (38) for English possessives. Although he ultimately chooses a somewhat different analysis, let us assume that English possessives, indeed, have the following structure:

(38) [$_{DP}$ he [$_{D}$'s [$_{NP}$ [dog]]].

Thus, the relevant difference between the English and Russian possessives (shown in (39) is that in English the pronoun is already in a functional projection (in [Spec, DP]) while in Russian, at S-structure, it is in a lexical projection (in [Spec, NP]).[37]

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[37]David Pesetsky (personal communication) pointed out to me that there is a reason why Russian possessives cannot undergo XP-movement to [Spec, DP] to derive a structure parallel to English. There is evidence that Russian possessives are adjectives modifying the head noun (a detailed discussion is beyond the scope of this thesis, but see, for example, Rappaport 1986). Assuming that [Spec, DP] is a position restricted to arguments, the impossibility of movement to this position in Russian follows.

(39) [DP [D [NP ego [sobaka]]].

his dog

There is independent evidence for the proposed difference in the structure of the possessive. The extraction of the possessor is impossible in English, while it is perfectly acceptable in Russian:

(40) *Whose did he walk dog?

(41) č'ju on vygulival sobaku?

whose he walk-PAST dog

'Whose dog did he walk?'

Given the structure in (38), the extraction in English is impossible because *he* and 's do not form a constituent, and therefore cannot be extracted. No such violation arises when the extraction is from [Spec, NP], as it is in Russian.

The requirement that bound variables must be in a functional projection, therefore, is already satisfied in English at S-structure. Moreover, assuming that *he* is the subject of DP, DP is a Complete Functional Complex, and therefore a governing category. The pronoun is free in its GC and Principle B is satisfied.

English does not exhibit the anti-subject orientation of pronouns (unlike Russian (15)):

(42) $John_i$ showed $Bill_j$ [DP $he_{i/j}$ [D 's [NP room]]].

This is, of course, expected if the pronoun does not move out of DP: as in (35), *he* is already inside of a functional category. Therefore, it can be coindexed with either the subject, or the indirect object.

Thus, the difference in binding possibilities between Russian and English possessive pronouns follows from the difference in their structural properties. Russian possessive pronouns are base-generated in [Spec, NP], while Englsih possessive pronouns are in [Spec, DP].

7. Conclusions.

The central claim of this chapter is that the range of positions where pronominals interpreted as referentially dependent may appear at LF is restricted to functional projections. In addition, for an element to be interpreted as a variable, it must be in the scope of (be A'-bound by) an operator. These restrictions, together with the Binding Principles, explain a number of phenomena in Russian. One of them is the three-way contrast between fully grammatical sentences, fully ungrammatical sentences with quantified antecedents, and "somewhat" ungrammatical sentences with definite NP antecedents. Other phenomena examined include the difference between singular and plural pronouns with respect to their grammaticality, and the anti-subject orientation of singular pronouns.

Overall, the distribution of Russian possessive pronouns shows an interesting characterstic of the syntax-discourse interface. I have argued that pronouns that are incorporated in discourse pattern with pronouns that are interpreted as bound variables with respect to their syntactic postion at LF. Thus, the semantic notion of *dependency* is reflected in syntax by what I labeled the Structural Positon of Referentially Dependent Elements.

8. Children's Knowledge of the Distribution of Pronominals in Russian.

In this section, I present results of an acquisition experiment with a group of Russian-speaking chidlren. A full description and discussion of this experiment can be found in Avrutin and Wexler 1992. The goals of the experiment were two-fold. First, we intended to replicate previously obtained results in another language. One of the reasons why such a replication is important is that, unlike English, Russian pronouns and reflexives are morphologically dissimilar (for example: *ego* 'him', *sebja* 'himself'). Thus, we do not expect any confusion on children's part regarding the pronoun-reflexive distinction. Second, we intended to investigate children's knowledge of the distribution of possessive pronominals, something that cannot be tested in English.

Let me begin with a description of the experiment. Sixteen Russian speaking children participated in the study. All of them live in the Greater Boston area. Children ranged in age from 4 to 7 years. All children acquired Russian as their first language, and all of them were born in Russia. Both parents of each child were monolingual native Russian speakers. The children spend most of their time in a Russian speaking environment. Several children did not know any English at all since they were tested shortly upon their arrival to the US. Three adult native speakers of Russian were also interviewed.

Procedure. The Truth-Value Judgment task (Crain and McKee (1985)) was utilized. The experimenter told the child a short story (staged as an event with props) in which characters did some action either to themselves, or to other characters. As the experimenter mentioned each action, he acted out

the action using props such as toys representing each character. In this way, it was made easy for the child to understand the story.

At the end of each story, a puppet (a frog) would say something he believed had happened in this story. Children were trained to feed the puppet a toy ice cream if it says something right (that is, what, indeed, happened in the story), and a shoe, if he says something wrong (that is, what did not happen in the story). Children received no feedback during the experiment: The experimenter did not tell the child whether his/her choice of the response was correct or wrong in a given situation. The three adults were tested in a slightly different way. One of the adults was shown the situations and made judgments as the children did. Two instances of each of the 17 conditions were given. For the other two adults, we didn't use the puppets, but simply described the situation and obtained judgments, on two sentences for each condition.

The sessions and materials. There were five experimental sessions per child, plus training. Four stories were told per session (occasionally more, depending on the child's willingness to continue playing) for a total of 20 stories. After each story the puppet said several sentences (all regarding the story). One to three of these were experimental sentences, the others were fillers. Fillers were inserted to avoid systematic "Yes", or systematic "No" responses. For example, if a child gave two "Yes" responses in a row, a definitely incorrect filler was inserted to elicit a "No" response. Four Russian verbs were used in all conditions: *'lizat'* (to lick), *'teret'* (to scrub), *'razrisovyvat'* (to paint, to draw over), *'dut'* (to blow). (Care was taken to avoid those verbs which could be used with a reflexive affix *-sja*). Each

session was audiotaped. Either 2 or 4 sentences were presented for each of the 17 conditions. There were a total of 50 sentences (not counting fillers). The stories were presented in the same order to all the children. A sentence testing a particular condition appeared in first, second, or third position after different stories. Moreover, parallel pronoun and reflexive sentences did not appear together after the same story. This was done to avoid causing the child to use a contrastive strategy. For example, sentences with pronouns (e.g. *Father bear scrubbed him*) did not appear after the same story as did sentences with reflexives (e.g. *Father bear scrubbed himself*).

The English translation of a sample experimental story is presented below. Pronouns are shown in brackets here because in Russian their use is optional. To avoid any hint to the child, no pronouns or reflexives were used in any of the stories.

BOYS AND BEARS STORY

One day these three boys and this Father Bear went to the river to swim. Father Bear went in the water and began scrubbing (his) legs, (his) arms, (his) back, he scrubbed all over.

And the boys also got in the water and also began scrubbing (their) legs, (their) arms, and (their) heads, because they were very dirty.

Then, Father Bear said: "Could somebody please help me scrub (my) head?"

But these two boys - this one and this one - said: "No way, bear! We're too busy! We have to go home soon, and we still have to scrub (our) heads!

But this boy said: " O.K., I'll help you a *little* bit, but not *too* much because I have to scrub (my) head, too".

So he helped Father Bear a little bit - scrub, scrub - and then he joined other boys again. They were scrubbing (their) heads, and he scrubbed (his) head, too.

And Father Bear was left alone. He said to the boy: "Thanks a lot, maybe next time I'll help you, but now I am too busy, I want to go home clean" - scrub, scrub.

Puppet:
1) I know who scrubbed his head: Every boy.
2) Father Bear scrubbed him.
3) Every boy scrubbed himself.

A more detailed discussion of the experimental situation, as well as a summary of all results can be found in Avrutin and Wexler 1992. The results regarding personal pronouns and reflexvies in Russian (a replication of the English experiment) were already presented in Chapter 1. To briefly recapitulate, children's performance on sentences with reflexives was almost perfect (over 90% correct acceptance, and over 90% correct rejection). This was so for both R-expression NP antecedent, for quantifier *kazdyj* and for quantifier *kto*. Here is a summary of the results with personal reflexives.

Table 1

Group Responses to Conditions with Personal Reflexives

Sentence Type	**Situation**	**Adults**	**Children** % accept
Father Bear scrubbed himself	True	YES	94
Father Bear scrubbed himself	False	NO	3
Every Bear scrubbed himself	True	YES	97
Every Bear scrubbed himself	False	NO	6
I know who scrubbed himself. Every Bear.	True	YES	95
I know who scrubbed himself. Every Bear.	False	NO	3

Children's responses to sentences with pronouns, however, were much worse. As in previous studies, Russian speaking children allowed *ego* 'him' to be *Papa Medved'* 'Father Bear' 52% of the time:

(43) Papa Medved' poter ego.

Father Bear scrubbed him

When the antecedent for a pronoun is a quantifier *kto* 'who', children's performance was significantly better (83% of the time).[38] The difference between these two conditions is statistically significant ($F(1,15)=18.7$, $p< .01$). These results are not surprising in the light of previous findings. Once again, chidlren demonstrate a good performance on sentences with reflexives, which can be interpreted as a demonstration of their knowledge of Principle A. In Principle B constructions, however, children allow the deictic use of the pronoun, which is necessary in order for the pronoun to receive an index different from its antecedent. The difference between a R-expression NP antecedent and a quantified NP antecedent cases was discussed in Chapter 3. Thus, these results can be explained in the same way as results with English-speaking children. And, once again, the crucial difference betwen pronouns and reflexives is that the interpretation of reflexives requires only teh speaker-internal, syntactic knowldge. The iferential capacity is not implicated in this case (I put the issue of logophors aside: in any case, reflexives in the experimental stories always appeared in argument postion which means that they cannot be interpreted logophorically, see Reinhart and Reuland 1993).

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[38]Children's performance on sentences with *kazdyj* 'every' was no different from chance (41% acceptance), that is no different from sentences with a definite NP antecedent. This difference between English and Russian experiments is predicted given the difference between the character of *kazdyj* and *every*. As discussed at some length in Avrutin and Wexler 1992, *kazdyj* can be interpreted sometimes as a D-linked element, which results in its non-quntificational interpretation. In this case, children's performance on this condition is not expected to be different from the R-expression antecedent condition. See Avrutin and Wexler 1992 for more details.

Let us turn now to possessive reflexives. Recall that, at LF, a reflexive in Russian adjoins to INFL. Thus, the LF representation of (44) is given in (45).

(44) Papa Medved' potjor svoju spinu.
Father Bear scrubbed self's back

(45) Papa Medved' INFL-svoju potjor [t spinu].
Father Bear INFL-self's scrubbed [t back]

The only acceptable LF representation of this sentence is such that the subject and reflexive possessive are coindexed. This means that in discourse the two NPs are represented by the same file card and they must be interpreted as identical individuals. Thus, when in the story Father Bear scrubbes his own back, the sentence is true, and if he scrubbes someone else's back, the sentence is false. Children once again demonstrated knowledge of this condition. Overall, they correctly accepted the true situation 94% of the time, and they correctly rejected the false situation 98% of the time.

The situation with possessive pronouns was again different. Recall the analyses of these elements proposed at the beginning of this chapter. Consider sentence (46).

(46) Papa Medved' potjor ego spinu.
Father Bear scrubbed his back

When a listener hears NP *Papa Medved'*, he or she assigns it an index. When pronoun *ego* is encountered, it must also receive an index. If the pronoun receives a different index, then, in discourse, it is represented by a different

file card, which means that Father Bear srcubbed someone else's back. Thus, children will not take this representation as being a true description of a situation where Father Bear is scrubbing his own back. But what happens if the pronoun receives the same index as the subject? Notice that the pronoun is inside of a possessive NP, which means that even under coindexation with the subject it does not violate Principle B (the pronoun is locally free, that is it is free inside of NP). The problem, however, arises when we interpret the coindexation. The coindexation means that the pronoun is incorporated, that is that it is represented in discourse by the same file card as its antecedent. In other words, it means that the pronoun is referentially dependent. But, as discussed at length at the beginning of this chapter, the Structural Position of Referentially Dependent Elements requires that this pronoun be in a functional projection. This is not observed if the pronoun is inside of the possessive NP. The only possible representation would be such that *ego* is moved to Det or INFL. In either case, however, the resulting representation violates Principle B, and the sentence is ruled out. This is what happens for adults, and that is why this sentence is unacceptable. The situation is somewhat different for children. As I argued for other cases of their errors with pronouns, children may try to rescue the sentence by using the pronoun deictically. This means, again, that it would receive a different index, and would be interpreted by bridging to the situation card. But, as I argued above, such a use requires that the constraint on bridging be observed. In attempting to compute these conditions, children get lost and may sometimes assume that this copnstraint is, in fact, satisfied. In this case, they will allow the possessive pronoun to be contraindexed with the subject, but to be "referring"

(in an indirect sense) to the same entity. And, once again, if the antecedent is a quantifier *kto* 'who', the pronoun cannot be interpreted deictically (see discussion above), and children are predicted to show a better performance. The experimental results confirmed this prediction. In cases where the antecedent was an R-expression (e.g. Father Bear), children overall incorrectly accepted the sentence 56% of the time. When the antecedent was *kto* 'who', the performance was much better: only 20% of acceptance (the difference is statistically significant: $F(1,15)=16.4$, $p< .01$). Another interesting result of this study (an indirect result of the condition with possessive pronoun and *kto* 'who' antecedent) is that children appear to know the constraint that I labeled the Structural Position of Referentially Dependent Elements. If they did not know such a constraint, the possessive pronoun would not have to move out of NP, and the sentence would be acceptable even under coindexation of the pronoun and subject. Thus, children's rejection of the sentence can be taken as (indirect) evidence of their knowledge of this condition.

Chapter 6

Plural Pronouns

1. Distributivity and Binding in Child Grammar.

In this chapter I look at children's understanding of the discourse representation of plural pronouns, and their understanding of the relationship between discourse and syntactic representations.

Plural pronouns are especially interesting in this respect. A plural NP can be interpreted either as denoting *a collection* of individuals ('collective reading'), or each of the individuals ('distributive reading'). The following example illustrates the point:

(1) John and Mary went to Paris last year.

Plural NP *John and Mary* can be interpreted either distributively, or collectively. Thus, (1) can either mean that John went to Paris in June, and Mary in July, or it can mean that they both together went to Paris some time last year. The question is how these two different readings are represented in syntax and discourse. It was proposed in the literature (and discussed in the next section) that the distributive reading is represented in syntax as a quantificational construction, while the collective reading does not have this property. In term of file change semantics, it means that only under the collective reading is the plural NP represented in discourse by a file card. This is so because, as discussed in Chapter 2, quantifiers and bound variables do not have corresponding file cards. It follows then that only under collective reading a plural NP can be interpreted deictically. At the same time, I argued

that children sometimes have problems with the correct use of deixis, while they have no problems with the syntactic distribution of pronominals. Thus, with respect to plural pronouns, we might expect that children will exhibit a different pattern of responses to collective and distributive situations. In fact, if it is the case, such a result would be evidence for a specific linguistic theory that argues that distributive and collective readings have different syntactic and representations. A population (children in this case) that has problems with a discourse rerpesentation but no problems with syntactic representation are predicted on this theory to show differences in two conditions. This hypothesis was put to test in the following experiment.

According to Heim, Lasnik and May (1991), differences between the collective and distributive interpretations of plural NPs are represented at LF. At LF, plural NPs interpreted distributively are accompanied by a distributive operator, and are quantificational. On the collective interpretation, plural NPs have no such operator, and are referential. Heim, Lasnik and May (HLM) propose that the difference in interpretation surfaces when plural NPs interact with principles of Binding Theory. Let us see now what predictions this theory (in conjunction with the approach argeud for in this thesis) make with respect to children's performance.

Recall first that some young children allow a pronoun to refer to a local antecedent in sentences like (2), in apparent violation of Principle B.

(2) Mama Bear is drying her.

By contrast, when the antecedent of the pronoun is a quantified NP, as in (3), these children are like adults in rejecting an anaphoric relation between the antecedent, *every bear*, and the pronoun, *her*.

(3) Every bear is drying her.

I have argued that the difference in performance is due to children's problem with deictic use of definite NPs. More specifically, I suggested that they allow this use in situations where normal adults don't. As discussed above, such a use results in a contraindexation of the pronoun and its antecedent, as in (4).

(4) Mama Bear$_i$ is drying her$_j$.

Quantified NPs, on the other hand, have no inherent reference (thus, no discourse considerations are involved), the only way to link *every bear* with *her* is by coindexation, with the pronoun being interpreted as a bound variable. Coindexation results in a violation of Principle B, however. Children's rejections of (3) can therefore be understood as demonstration of their knowledge of Principle B.

Children who have problems with the correct use of deixis provide an ideal test of Heim, Lasnik and May's (1991) theory of how plural NPs interact with Binding Theory. As previous experiments have demonstrated, these children are sensitive to the distinction between referential and quantificational antecedents. This is exactly what distinguishes the collective and the distributive readings of plural NPs on HLM's theory.

2. Plural Pronouns

Plural NPs can either denote a collection of individuals or they can quantify over members of some collection. In quantificational contexts, where members of a group are treated separately, the plural NP is accompanied by a distributive operator (Link, 1983, 1987, Roberts, 1987, Heim, Lasnik and May, 1991). According to Heim, Lasnik and May (1991), the distinct interpretations of plural NPs are represented at LF. There, the Binding Principles apply to the indices assigned to plural NPs and to the distributive operator, *D*. Consider two of the interpretations that can be given to the plural NP *the Smurf and the clown* in (5).[39]

(5) *The Smurf and the clown* dried Big Bird.

On one interpretation, the plural NP could be used to refer to a group who, together, dry Big Bird, say with a large towel. We will call such a context a 'collective context'. The representation for the collective context of (5) is shown in (6). Another interpretation of (4) corresponds to contexts in which the Smurf and the clown each dry Big Bird in different drying events. Such a context will be called a 'distributive context'. The representation in (7) corresponds to a distributive context for (5).

(6) [The Smurf and the clown]$_i$ dried Big Bird$_k$.

(7) [[The Smurf and the clown]$_i$] D$_j$] dried Big Bird$_k$.

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[39]HLM note five ways in which a pronoun may be anaphorically related to a plural NP antecedent. Just two of these are considered here.

In (8), *Big Bird* is replaced with the plural pronoun *them*: Principle B is now relevant to the representations.

(8) The Smurf and the clown dried them.

(9) *[The Smurf and the clown]$_i$ dried them$_i$.

(10)*[[The Smurf and the clown]$_i$] D$_j$] dried them$_j$.

Coindexation is ruled out in both (9) and (10) by Principle B. In (9), the relationship between the NPs denoting the two sets is one of coreference. The NP *the Smurf and the clown* shares the same index as the NP *them.* In (10), the operator D distributes over the set denoted by *the Smurf and the clown,* and this operator is coindexed with the plural pronoun *them.*

Recall now the interpretation of indices that was discussed in Chapter 2. When the antecedent is a quantifier, as in (10), the coindexation is interpreted as representing a bound variable (syntactic) type of dependency. When the antecedent is a referring deifinite NP (as in (9)), the coindexation represents identity of file cards. *The Smurf and the clown* is a referring NP in (9) because, under collective reading, it denotes a set of individuals, which can be represented in discourse with a file card.[40] What is important is that the plural pronoun in this case is *not* a bound variable. Although children will not accept the representation in (9) because it violates Principle B, they may attempt to interpret the pronoun deictically, in the same way they do in (4). If they decide that the deictic use is allowed (the constraint on bridging is satisfied), they will accept the sentence in (8), which (for them) will have representation in (11).

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[40]This set is conceptualized as on object to which it is possible to refer, or to point.

(11) [The Smurf and the clown]$_i$ dried them$_j$.

Notice that such a case of 'coreference under contraindexation' is possible only for pronouns with referential antecedents, i.e. only in collective contexts. In distributive contexts, the relationship is one of bound variable anaphora, and this is ruled out by Principle B *already in syntax*. If this distinction between plural NPs interpreted collectively and distributively appears in children's responses to sentences like "The Smurf and the clown dried them", this would be compelling evidence of the psychological reality of the D operator and its proposed interaction with Binding Theory at LF. This possibility is investigated in the experiment that follows.

3. Experiment

Thirty-three children between the ages of 3;10 and 4;10 (mean age 4;4) participated in the study. All were native speakers of English, tested individually at daycare centers in Storrs, CT and Arlington, MA. Children were tested using the Truth-Value Judgment task developed by Crain and McKee (1985). In this task, one experimenter acts out short stories using small toys and props. A second experimenter plays the role of a puppet, Kermit the Frog, who watches the stories along with the child. Following each story, Kermit says what he thinks happened in the story. If the child thinks Kermit said the right thing, she is instructed to feed Kermit an ice cream; but if she thinks Kermit said the wrong thing, she has him bite a shoe. Whenever a child gives a "No" (the shoe) response, she is asked to explain what really happened. Both children's response to Kermit's statement and their verbal

explanation of what really happened are used to evaluate their grammatical knowledge.

The test battery consisted of sentences like (8), presented in both collective and distributive contexts, with four trials of each type. Each story has four characters. In the story for (8), for example, in addition to the Smurf and the clown, there are two characters who are potential referents for *them*. In the collective context, the Smurf and the clown refuse to dry these other two characters, and use a big towel to (collectively) dry themselves instead. Children who allow the deicitc use of pronouns should take *them* to be the Smurf and the clown and therefore should say "Yes" in this context. Children with the adult grammar, however, should take *them* to refer to the other two characters, and should say "No" to (8).

The distributive context contains two separate events. In the first event, the Smurf won't dry the other characters, just himself. In the second event, the clown refuses to dry *them*, and dries himself instead. This context is assumed to give rise to a distributive interpretation of the plural NP. If so, taking *them* to refer to the Smurf and the clown would violate Principle B. That is, children should reject (8) in the distributive context because neither the Smurf nor the clown dry *them* (the other two characters).

The experiment also included control sentences like (12), to ensure that the children allowed both the collective and distributive interpretations of plural NPs (Crain and McKee, 1985, Lasnik and Crain, 1985). We reasoned that only children who could assign a distributive interpretation in the control condition in (12) would be able to distinguish collective and distributive interpretations in test sentences like (8). The control sentences

were based on contexts devised by Miyamoto and Crain (1991). Consider a situation in which there are two turtles, each with two pet bugs. In the experiment, Kermit the Frog's description established that the plural pronoun *they* was being used collectively, as in (12a), or distributively, as in (12b).

(12) a. I know how many bugs they have. Four. (=collective)

b. I know how many bugs they have. Two. (=distributive)

For adults, both (12a) and (12b) are accurate descriptions of the situation: "Four" is an appropriate answer when the pronoun is interpreted collectively, and "Two" is appropriate for the distributive interpretation. Children who assign both interpretations should say "Yes" to either of Kermit's descriptions. Children who assign only a collective interpretation, however, would say "Yes" to "Four", but "No" to "Two". Children with only the distributive interpretation should show the opposite pattern of responses.[41] There were four controls; two tested the distributive interpretation, and two tested the collective interpretation.[42]

4. Results

The 33 children accepted sentences like (8) in collective contexts on 50% of the trials. Of the 33 children, 17 children responded as adults, rejecting every trial

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[41]Miyamoto and Crain (1991) found that 3-4 year olds have a strong preference for the distributive reading (e.g. they allow (11b), but not (11a)). In our study, a somewhat different pattern emerged as we will see below. We attribute the difference to age, since the children in our study were older (4- 5-years-old).

[42]The experiment also included catch-trials to guard against a bias by children to say "Yes" (and to indicate when such a bias was present).

presented in the collective context. These children were not tested further.[43] The remaining sixteen children accepted the collective interpretation on at least three of the four experimental trials, and were designated as the target group for testing the same kinds of sentences in distributive contexts. The target group allowed coreference in collective contexts 93% of the time. In the distributive contexts, by contrast, they allowed the pronoun to refer to the plural NP significantly less often, only 42% of the time ($F(1,15 = 36.92)$, $p <$ .001). The results are stronger than the numbers suggest, however, once the findings from the control condition are taken into account. It turned out that four children consistently rejected the distributive interpretation of the control sentences, as in (12). These children accepted test sentences like (8) in both the collective and distributive contexts. Because these children only assign a collective interpretation to plural NPs, their responses to the test sentences have no bearing on the HLM account. Based on these observations, these four children were excluded from a final analysis of the data, which focused on the 12 children who allowed the distributive interpretation of plural NPs in the control condition. The responses of this group of children were quite different in the collective and distributive contexts. They accepted test sentences in the collective context 93% of the time, but only 27% of the time in the distributive context ($F(1,11) = 98.79$, $p < .001$).

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[43] It is possible that these children have the adult grammar. It is also possible that they lack the collective reading of plural NPs. We did not pursue these alternative possibilities.

5. Conclusion

The results show that most four-year-old children distinguish the collective and distributive interpretations of plural pronouns. The fact that the majority of children accepted a collective interpretation of sentences like (8), but rejected a distributive interpretation of such sentences, suggests that distributive contexts force a quantificational representation. This can be interpreted as further evidence of the distinction between quantification and reference. The results can be seen to support proposals such as that of HLM which advance a syntactic difference between distributive and collective readings of plural NPs.

These results also show that the difference between children's responses to sentence like "Every Bear washed her" and "Mama Bear washed her" is not due to their problems with lexical quantifiers (as was suggested, for example, in Grimshaw and Rosen 1990). In both collective and distributive readings the plural antencedent has the same lexical form: *the Smurf and the clown*. Thus, the relevant difference is in the interpretation of the antecedent (whether it is a quantificational, or referential expression), more specifically whether only syntactic knowldge is implicated, or the ability to carry out necessary computations about other speakers' representations.

Chapter 7

Pronouns in Subjunctive Clauses

1. The Disjoint Reference Requirement in Russian Subjunctive Clauses

In this chapter, I address a phenomenon observed in many languages, and sometimes referred to as 'the disjoint reference requirement', or 'the obviation phenomenon in subjunctive clauses'. A well-known observation is that the pronominal subject of a subjunctive clause cannot be coindexed with the matrix subject. This fact has been discussed in the literature with respect to a number of languages (particularly in the Romance family). I show, Russian provides an important insight into the nature of the phenomenon in question, and, as I argue, demonstrates that none of the existing accounts can fully explain the data. I propose a new theory of the disjoint reference requirement, which explains a wide range of data while making a limited number of assumptions.

A number of languages, among them Russian, does not allow the subject of the subordinate subjunctive clause to be coindexed with the subject of the matrix clause, although no such restriction is observed in Indicative sentences. (1) shows the normal way of forming a subjunctive clause in Russian.

(1) Volodja xočet čtoby Nadja pocelovala Feliksa.
Volodya wants that-by Nadya kissed Felix
'Volodya wants Nadya to kiss Felix'.

Notice that the verb of the subordinate clause is in the Past Tense, although it is interpreted as occurring in the future: Volodja desires that it will be true in the future that Nadya kisses Felix. This is important for our theory, and I will

come back to this point later. (2) shows an example of the disjoint reference requirement.

(2) Volodjai xočet čtoby on*i/j poceloval Nadju.
Volodya wants that-by he kissed Nadya

A parallel sentence with an indicative subordinate clause is well-formed:

(3) Volodjai skazal čto oni/j poceloval Nadju
Volodya said that he kissed Nadya

(2) and (3) show the contrast between the subjunctive and indicative clauses with respect to the subject obviation phenomenon. Let me mention one more contrast, namely the subject/object asymmetry in subjunctive clauses, as in (4). The matrix subject cannot be coindexed with the embedded subject, but it can be coindexed with the embedded object:

(4) a. *Volodjai xočet čtoby on*i/j poceloval Nadju.
Volodya wants that-by he kissed Nadya

b. Volodjai xočet čtoby Nadja pocelovala egoi.
Volodya wants that-by Nadya kissed him
'Volodya wants Nadya to kiss him'.

These are the basic facts. I turn now to the explanations proposed in the literature, and when discussing these explanations, I will provide more data, mostly from Russian, that show that a new theory is needed.

2. Previous Accounts.

One of the first attempts to explain the obviation phenomenon in the GB framework was proposed in Chomsky (1981). The question here is why pronoun *il* cannot be coindexed with *Jean*:

(5) *Jean$_i$ veut qu'il$_i$ aille à Paris

Jean wants that he go to Paris

Chomsky proposes that the obviative interpretation of the pronominal follows from some version of the Avoid Pronoun Principle that imposes the choice of an empty pronominal over a lexically specified one where possible. That is, in French, as well as in Russian, there is a possibility of avoiding the overt pronoun and use the anaphoric PRO instead, as in (6).

(6) Jean veut aller à Paris.

Jean wants PRO to go to Paris

Presumably, this option blocks the possibility of using the overt pronoun.[44] There are multiple problems with this proposal, however, both conceptual and empirical. Conceptually, this principle is totally arbitrary, that is, there is no *a priori* reason to avoid the use of a pronoun in a sentence. But there is also direct counter evidence discussed, for example, by Picallo 1985 for Catalan (which can be found, apparently, in most Romance languages). Similar examples can be found in Russian, too, as (7) demonstrates.

(7) a. Volodya ugovoril Nadju$_i$ čtoby ona$_i$ poexala v Evropu

Volodya persuaded Nadya that-by she went to Europe

b. Volodja ugovoril Nadju$_i$ PRO$_i$ poexat' v Evropu

Volodya persuaded Nadya PRO to go to Europe

(7a) shows that the coindexation of a lexically specified pronominal subject with the direct object in the matrix clause is allowed, although it is possible to use infinitival structure with anaphoric PRO, as in (7b). Thus, the Avoid Pronoun Principle fails to explain why both (7a), and (7b) are grammatical.

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[44]Bouchard (1983) also adopts the Avoid Pronoun Principle for his explanation of the French data.

According to an alternative explanation (adopted in different forms by different researchers), there is some sort of domain extension for the purposes of the Binding Theory in the case of subjunctive complements. There are several, somewhat different, accounts, originally proposed by Picallo (1984, 1985) for Catalan and Spanish, and later developed by Rizzi (1989) for these languages, Progovac (for Serbo-Croatian), Terzi (1992), and others. The central idea of the domain extension approach is the following. The subjunctive Tense is argued to be anaphoric in the sense that it depends in its interpretation on the Tense of the matrix clause. Then, using various mechanisms and assumptions, it is argued that the binding domain for the pronoun in the subject position is actually extended to include the matrix clause as well. The pronoun, then, violates Principle B of the Binding Theory because it is bound by the matrix subject in its governing category. Thus in (2) (repeated here as (8)), given that the Tense of the subordinate clause is in some sense anaphoric, the governing category of the pronoun *on* 'he' is extended to the matrix clause, which results in *on* being bound by Mixail. In (3), on the other hand, the Tense is independent (it is indicative), therefore no extension occurs, and no violation arises.

(8) Volodja$_i$ xočet čtoby on$*_{i/j}$ poceloval Nadju.

Volodya wants that-by he kissed Nadya

This account, however, fails to explain the following data from Russian. First, notice that the possessive pronoun in (9a) cannot be coindexed with the subject, but the reflexive can (and must) be coindexed, as in (9b).

(9)a. ?*Volodja$_i$ provodil ego$_i$ ženu v Evropu

Volodya saw off his wife to Europe

b. Volodja$_i$ provodil svoju$_i$ ženu v Evropu.

Volodya saw off REFL wife to Europe

Consider now (10), where the possessives are in the subject position of the subjunctive clause.

(10)a. Volodja xočet čtoby ego žena poexala v Evropu

Volodya wants that his wife went to Europe

b.*Volodja xočet čtoby svoja žena poexala v Evropu

Volodja wants that REFL wife went to Europe

Now, (10a) is grammatical, while (10b) is not. This is not predicted on the domain extension approach. Indeed, if there is a domain extension, that is, if "anaphoric tense" results in the matrix clause being the binding domain, the reflexive should be possible because it would be bound in its (extended) binding domain. Similarly, the pronoun in (10a) should violate Principle B (as in (9)), which is not the case.

There is further evidence that the domain extension cannot be the right explanation, and this evidence comes from Russian dative subjects. Russian, as well as a number of other languages, allows dative subjects, as in (11).

(11) Emu bylo veselo.

him was fun

'he was having fun'

Now, dative subjects are possible in the subject position of a subjunctive complement, that is, (12) is fully grammatical.

(12) Volodja xočet čtoby emu bylo veselo

Volodya wants that him was fun

'Volodya wants to be having fun'

According to the domain extension approach, (12) should be ungrammatical because the pronoun here is bound by the matrix subject, which should violate Principle B, if the binding domain is extended to the matrix clause. The sentence, however, is well-formed.[45]

Let me present two more pieces of data, both of which have remained completely unexplained so far by any of the proposed accounts. All pervious accounts crucially require some notion of coindexation between Tenses (the Tense of the matrix and subordinate clauses). The following sentences in Russian, however, show that the presence of a higher tense is not necessary at all in order for the obviation to occur:

(13) Volodino želanie čtoby rabočij klass vzjal vlast' zasluživaet uvaženie

Volodya`s desire that-by working class took power deserves respect

(14) a.*Volodino$_i$ želanie čtoby on$_i$ vzjal vlast' zasluživaet uvaženie

Volodya`s desire that-by he took power deserves respect

b. Volodino želanie PRO vzjat' vlast' zasluživaet uvaženie

Volodya`s desire PRO to take power deserves respect

There is no higher Tense here with which the subjunctive Tense could be coindexed, yet the sentence is ruled out in the presence of coindexation.

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[45]We should notice, by the way,that similar cases are discussed in Johnson (1990) for Icelandic. Johnson does not argue for a domain extension, but his analyses crucially rely on the i-within-i principle, and on some non-obvious treatment of indexing system. But importantly, the quirky case subjects in Icelandic behave in the same way as in Russian, with respect to the subject obviation in the subjunctive clauses, that is Icelandic sentences analogous to (12) are also grammatical.

One last piece of data to be accounted for. It has been reported that in many languages there is an interesting asymmetry between epistemic and volitional verbs with respect to subject obviation. Russian in this case is not a very good example, because the range of the verbs that take subjunctive complements is very limited, but the following Russian example involving a negative epistemic shows the point:

(15) a. Nadja somnevaetsja čtoby ona vyšla zamuž za Feliksa
Nadya doubts that-by she married Felix.
'Nadya doubts that she would marry Felix'

b.* Nadja ne xočet čtoby ona vyšla zamuž za Feliksa
Nadya not want that-by she married Felix.
'Nadya doesn't want that she would marry Felix'

Spanish and Catalan give a much richer set of examples, as the following minimal pair from Padilla (1990) demonstrates for Spanish:

(16) a. Juani ignora que proi/j haya ganado [SUBJUNCTIVE]
Juan does not know that he has won

b.* Juani quiere que proi gane [SUBJUNCTIVE]
John wants that he win

Thus, as, for example, Padilla (1987), argues for Spanish, there is a clear cut distinction in acceptability between epistemic and volitional verbs regarding the subject obviation. This is not predicted on the domain extension analysis because the anaphoric character of the subjunctive tense does not depend on the nature of the matrix predicate. Thus, in both cases the domain should be

extended, and (16a) should be ruled out in the same way as (16b), which is not the case.

3. Summary.

In this section I briefly summarize the data I intend to account for.

Coindexation of the pronoun and the matrix subject is not allowed:

(i) Subject of the subjunctive clause when the matrix verb is volitional:

(17) *Volodjai xočet čtoby oni poceloval Nadju.

Volodya wants that-by he kissed Nadya

(ii) Derived nominals:

(18) *Volodino$_i$ želanie čtoby on$_i$ vzjal vlast' zasluživaet uvaženie

Volodya`s desire that-by he took power deserves respect

Coindexation of the pronoun and the matrix subject is allowed:

(i) Indicative Clauses:

(19) Volodjai skazal čto on$_i$ poceloval Nadju

Volodya said that he kissed Nadya

(ii) Object of the subjunctive clause:

(20) Volodja$_i$ xočet čtoby Nadja pocelovala ego$_i$.

Volodya wants that-by Nadya kissed him

(iii) Possessive pronoun:

(21) Volodja xočet čtoby ego žena poexala v Evropu

Volodya wants that his wife went to Europe

(iv) Dative subjects:

(22) Volodja xočet čtoby emu bylo veselo

Volodya wants that him was fun

'Volodya wants to be having fun'

(v) Object of the matrix clause:

(23) Volodya ugovoril Nadju$_i$ čtoby ona$_i$ poexala v Evropu

Volodya persuaded Nadya that-by she went to Europe

(vi) The matrix verb is epistemic:

(24) ?Nadja somnevaetsja čtoby ona vyšla zamuž za Felixa

Nadya doubts that-by she married Felix.

'Nadya doubts hope that she would marry Felix'

Let me add one more grammatical configuration, as in (25):

(vii) The antecedent is not in the immediately adjacent clause:

(25) Volodja$_i$ skazal čto Felix$_j$ xočet čtoby on$_{i/*j}$ poceloval Nadju.

Volodya said that Felix wants that-by he kissed Nadya

Felix is not a possible antecedent for the pronoun *on*, while *Volodya* is. I turn now to our explanation of the observed facts.

4. V-to-I-to-C movement and Pronominal Agr.

First of all, I assume, along the lines proposed in the recent literature, that at LF, there is a movement of V to I to C even in those languages in which this movement doesn't show up in the overt form at S-structure. In other words, if in some Germanic languages there is movement of V to I to C at S-structure, in Russian this movement takes place at LF. (The conceptual basis for this claim is that at LF all languages in fact behave similarly, for discussion see Chomsky 1992, Watanabe 1993). (26) shows the LF representation of (17); (27) shows the LF representation of (19). In the first case the subordinate clause is subjunctive, in the second case it is indicative.[46]

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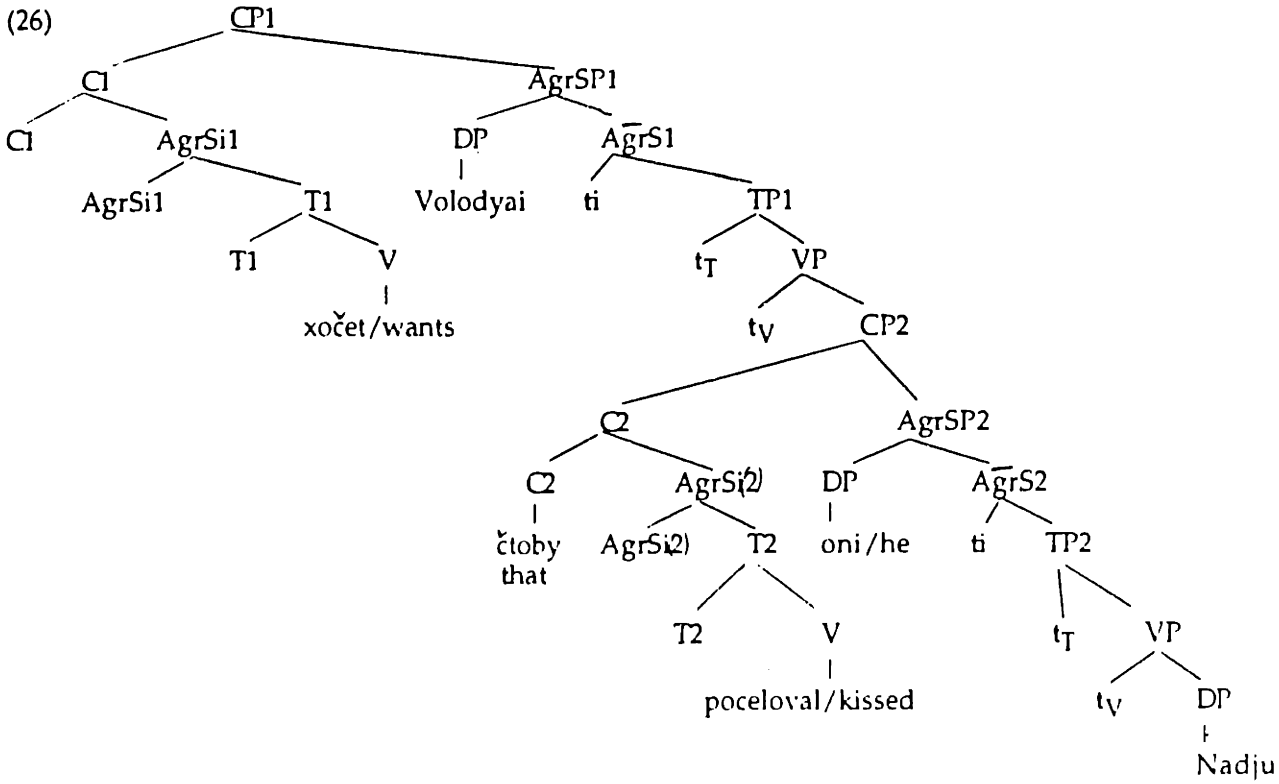
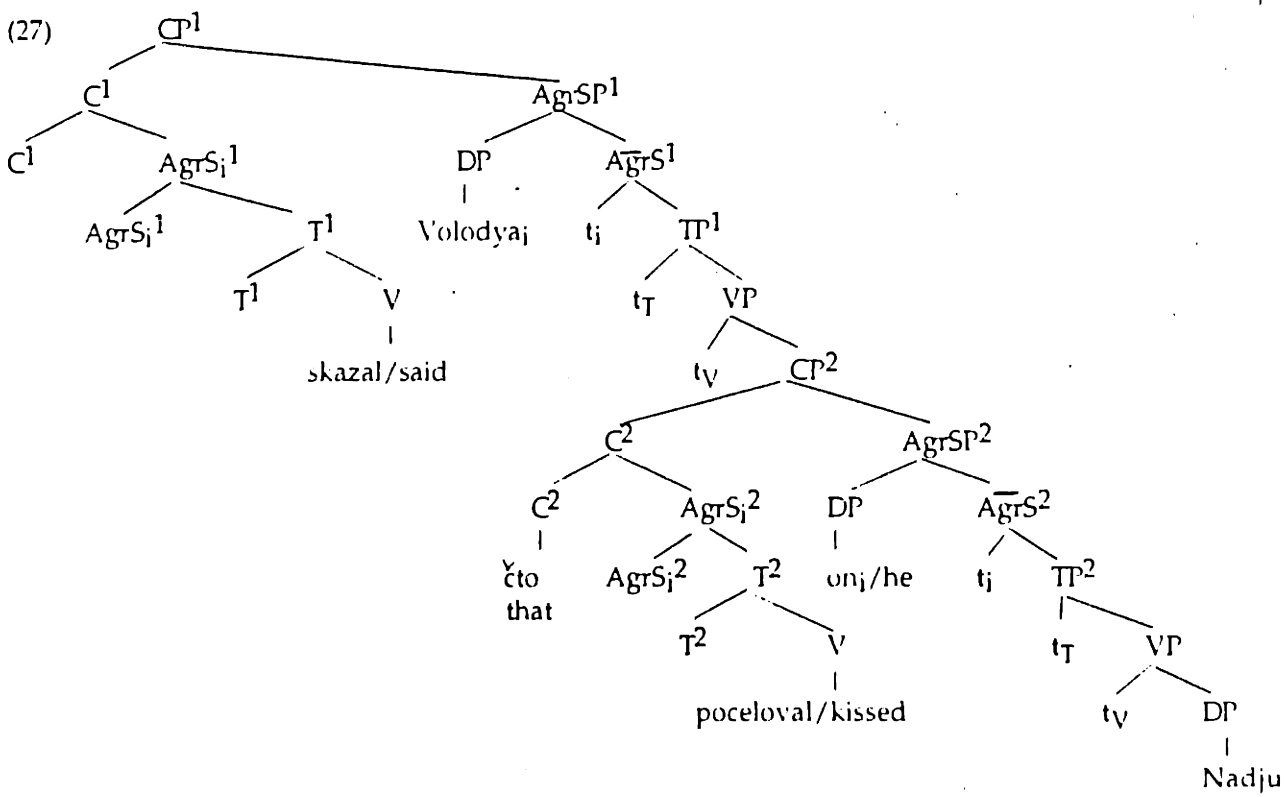
[46]For purposes of the current discussion, it isi irrelevant whether moved heads adjoin to the right, or to the left. Because of word-processor related reasons I show adjunciton to the right.

(26)


CP1
C1
AgrSP1
C1
AgrSi1
DP
AgrS1
AgrSi1
T1
Volodyai
ti
TP1
T1
V
tT
VP
xočet/wants
tV
CP2
C2
AgrSP2
C2
AgrSi(2)
DP
AgrS2
čtoby
that
AgrSi(2)
T2
oni/he
ti
TP2
T2
V
tT
VP
poceloval/kissed
tV
DP
Nadju

(27)


CP1
C1
AgrSP1
C1
AgrSi1
DP
AgrS1
AgrSi1
T1
Volodyaj
tj
TP1
T1
V
tT
VP
skazal/said
tV
CP2
C2
AgrSP2
C2
AgrSi2
DP
AgrS2
čto
that
AgrSi2
T2
onj/he
tj
TP2
T2
V
tT
VP
poceloval/kissed
tV
DP
Nadju

V moves to T, then to Agr, and then the whole complex adjoins to C.[47] The same process, however, occurs in both subjunctive, and indicative sentences. The question, thus, is why the subject obviation exists only in (26).

Recall now the interpretation of the subjunctive clauses, to which I alluded at the beginning of this chapter. The crucial point is that, although the subjunctive tense is morphologically past, the event described in the subjunctive clause is necessarily interpreted as taking place in the future with respect to the event of the matrix clause, that is the time, of desire. What this means, actually, is that there is some relationship between the two events. This is a relationship of temporal ordering that determines that the second event takes place necessarily after the first one. I suggest that this relation is the result of the two event variables (contained in the matrix and the subordinate clauses) being co-bound by one event operator. In other words, that there is an operator that takes two event variables as its variables. The result of its operation is some temporal ordering, such that the time of the occurrence of the first event necessarily precedes the time of the occurrence of the second event. In our example (17), this operator binds e_1, which is an argument of the verb *xoçcet* 'wants', and e_2, which is an argument of the verb *pocelovat'* 'kiss'. The result of this operation is a temporal ordering relation, such that e_2 (kissing) necessarily follows e_1 (wanting).

If this is correct, then, naturally, both of the variables must be in the scope of this operator, where scope is defined in terms of c-command. Thus, there is an operator in (17) (and (26)), such that at LF this operator c-

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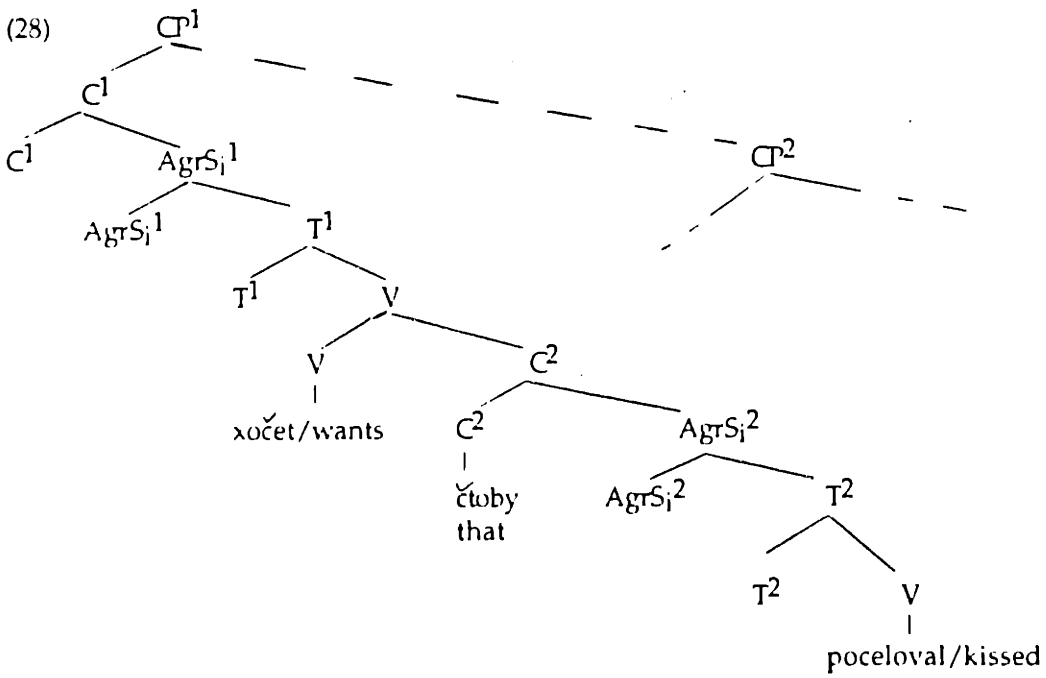
[47]It is irrelevant for our theory whether TP or AgrSP is the highest projection in the split INFL.

commands both of the event variables. Where is this operator? I suggest that this operator is the subjunctive Comp, Russian *ctoby*..

But, of course, in (26) the first event is not in the scope of *ctoby*, in fact, it is in the higher Comp. Therefore, *ctoby*, being an operator that must bind both variables, moves at LF to a position where it c-commands the first event variable as well. If I adopt Chomsky's economy conditions (Chomsky (1991)), I can make a stronger claim that this Operator (Comp) moves to the first available position where it c-commands the matrix verb (that is, where it gets the first event variable in its scope), and cannot move any further. Any further movement is prohibited as unnecessary by economy conditions. The (relevant part of) final LF configuration of (17) is shown in (28).

(28)



When the subordinate clause is in the Indicative Tense, there is no temporal ordering between the events of the matrix and subordinate clauses. This is so

because the Indicative Comp is not an operator and does not have to bind any event variables. Thus, (27) is the final LF representation of (19) (no further movement of Comp occurs in Indicative complements).

Let me now return to the original puzzle, namely, why the pronoun in (17) cannot be coindexed with the matrix subject, and the pronoun in (19) can be. I propose that (17) is ruled out by Principle B, but, in this case, Principle B applies not to the pronoun in the subject position of the subjunctive clause, but to Agr. Agr, of course, is coindexed with the subject pronoun. If the pronoun is coindexed with the matrix subject, then, by transitivity, Agr of the subjunctive clause is coindexed with the matrix subject, and with the matrix Agr. I further assume that, at least in Russian and some of the Romance languages, Agr is a pronominal element. We know that it can license null subjects in a number of languages, including Russian, Spanish, Catalan, and others. Crucially, Agr, being pronominal, is, like all other pronouns, subject to Principle B of the Binding Theory and cannot be locally bound.

Consider now the tree in (28). This configuration violates Principle B because Agr^2 is bound by Agr^1. They are coindexed (as discussed above), and Agr^2 c-commands Agr^1. No such problem arises with Indicatives. Comp in this case is not an operator, and it does not move to the matrix clause. The lower Agr thus remains inside of the embedded CP, which is its Governing Category.

Now that we have an explanation, let me go through all the examples I summarized in Section 2 and show how this theory explains all the data. As (20) shows, the coindexation of the object of a subjunctive clause with the

matrix subject is allowed. This is, of course, predicted, because the AgrS is coindexed with the subject of the subjunctive clause, not with the object. Thus, it has an index different from that of the matrix subject, and matrix Agr, and no Principle B violation arises, even after LF movement.

(29) Volodja$_i$ xočet ctoby Nadja$_j$ Agr$_j$ pocelovala ego$_i$.
Volodya wants that-by Nadya kissed him

Possessive pronouns are not a problem, either. (21) is grammatical because once again the Agr is not coindexed with the pronoun, but rather with the possessive NP (DP).

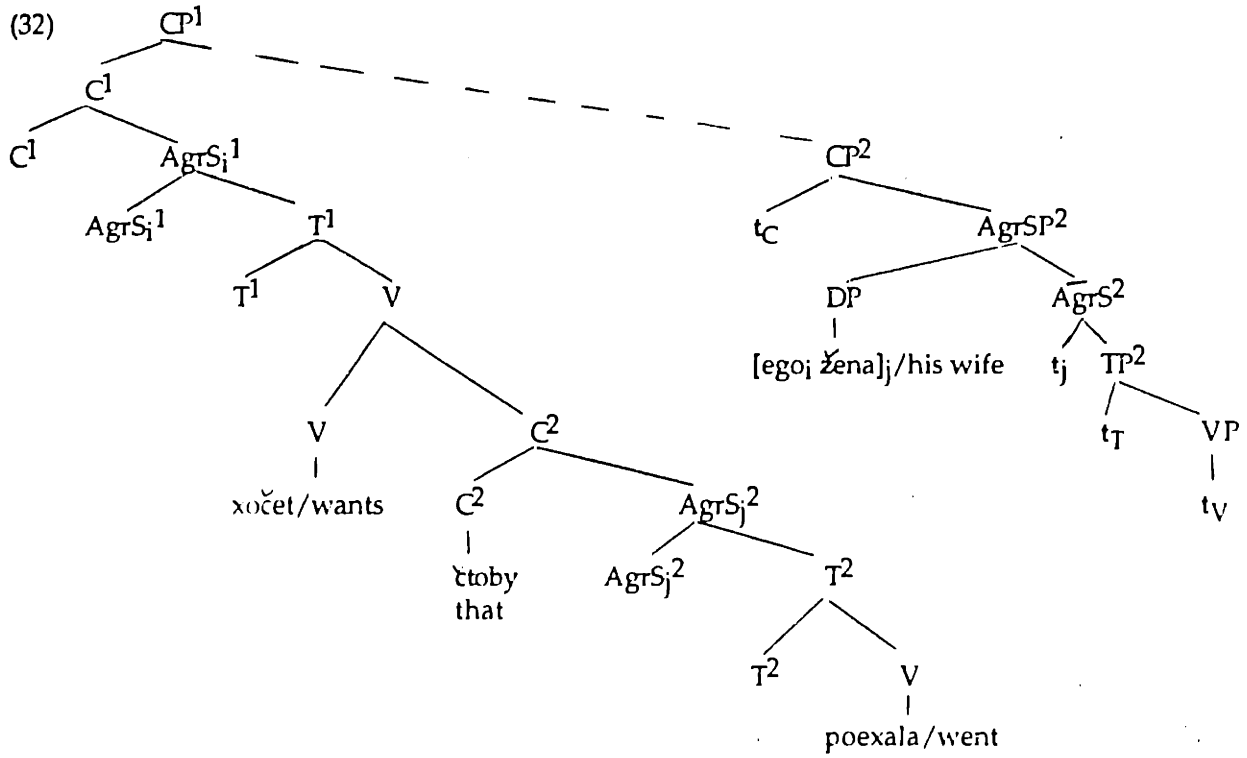
(30) Volodja$_i$ xočet čtoby [ego$_i$ žena]$_j$ Agr$_j$ poexala v Evropu
Volodya wants that-by his wife went to Europe

Similarly, the object of the matrix clause can be coindexed with the subject of the subordinate subjunctive clause, because in this case the matrix Agr has an index different from that of the lower Agr.

(31) Volodya$_j$ Agr$_j$ ugovoril Nadju$_i$ čtoby ona$_i$ Agr$_i$ poexala v Evropu
Volodya persuaded Nadya that-by she went to Europe

After LF movement, the configuration that arises for (30) is (32). (31) is analogous to (30) in that there is no coindexation between the two Agrs.

(32)



(25) is grammatial because Agr of the subjunctive clause is not coindexed with the Agr of the next clause up. This is so because the antecedent of the pronoun is in the highest clause.

(33) [Volodja$_i$ Agr$_i$ skazal [čto Felix$_j$ Agr$_j$ xočet [čtoby on$_i$/*$_j$ Agr$_i$/*$_j$

Volodya said that Felix wants that-by he

poceloval Nadju.

kissed Nadya

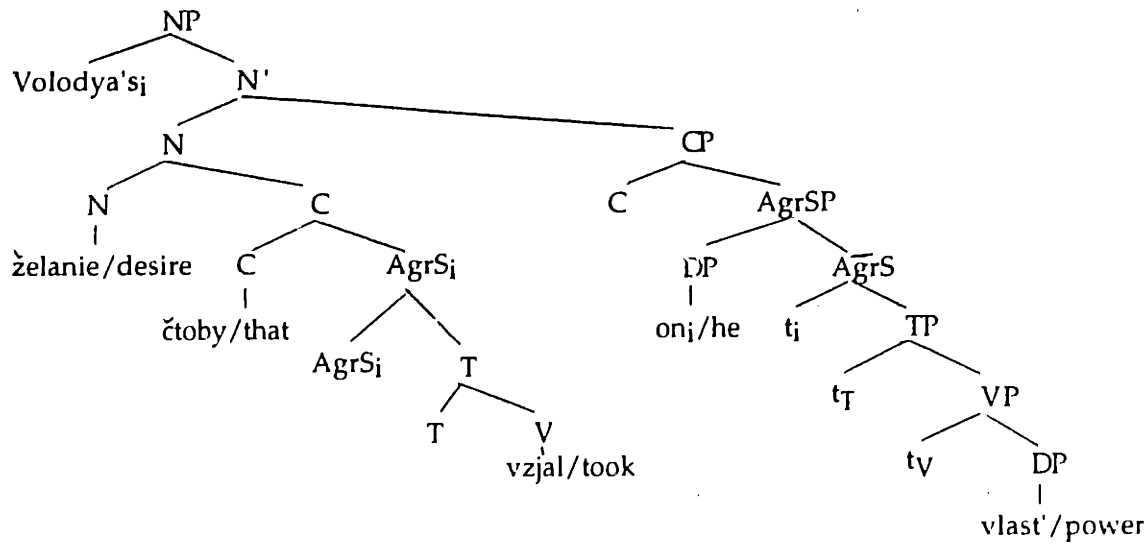
Derived nominals, in which the pronominal subject of the embedded clause is coindexed with the specifier head noun, are correcrtly predicted to be ungrammatical, as in (34).

(34) *Volodino$_i$ želanie čtoby on$_i$ vzjal vlast' zasluživaet uvaženie

Volodya's desire that-by he took power deserves respect

The event variable here is an argument of the noun *zelanie* 'desire'. Thus, the operator *ctoby* moves to adjoin to N, as shown in (35).

(35)



Agr is bound by the head of*Volodya's*, and the sentence is ruled out as a violataion of Principle B.[49] Notice that previous accounts failed to explain this example because the crucial property for them was a relationship between two Tenses, which absent here.

Now, there are two more phenomena that I want to explain. Namely, dative subjects (as in (36)), and matrix epistemic predicates, as in (37a) for Russian and (37b) for Spanish. Both of the sentences are grammatical, and this seems to be true cross-linguistically.

(36) a.Volodja xočet čtoby emu bylo veselo

Volody wants that him was fun

'Volodya wants to be having fun'

---

[49]Alternatively, it can be argued that there is an Agr node inside of the possessive DP (NP). In this case, the moved Agr would be bound by the poseesive Agr. This is, of course, compatible with the theory presented here.

b. Volodja$_i$ Agr$_i$ xočet čtoby emu$_i$ Agr$_j$ bylo veselo

Volody wants that him was fun.

(37) ?a. Nadja somnevaetsja čtoby ona vyšla zamuž za Felixa

Nadya doubts that-by she married Felix.

'Nadya doubts that she would marry Felix'

b. Juan$_i$ ignora que pro$_{i/j}$ haya ganado [SUBJUNCTIVE]

Juan does not know that he has won

The grammaticality of (36) follows straightforwardly on our account. Absence of agreement implies absence of coindexation between the subject and Agr. The lower Agr in (36) is not coindexed with the higher Agr, (as (36b) shows) and, therefore, it is not bound by it, even after the movement takes place. (This is a case similar to the case of object coindexation).

Now, what about the contrast between epistemic and volitional verbs in the matrix clause? Notice first of all that there is an interesting and, apparently, consistent cross-linguistic difference between these types of verbs regarding the tense dependency they impose on the subjunctive clause. Volitional verbs require that the subjunctive tense be interpreted as future with respect to the time of expressing desire. The second event must follow the event of desiring, which, as I argued, follows from the two event variables being co-bound by one operator. No such restriction exists with epistemic predicates. For example, in Russian (37a), there are two possible interpretations. One is that Nadja doubts that she will ever marry Felix, the second is that she doubts that she would have married him ten years ago. Padilla (1990) claims that a similar distinction is true in Spanish (38).

(38) Dudo que reciba/recibiera/haya recibido un premio

I doubt that she will receive/ received /has received a prize.

According to Padillo, in Spanish (that has a richer variety of verbs taking subjunctive complements) there is a clear distinction between epistemic and volitional verbs with respect to the tenses' dependency. Thus, I can say that there is a correlation between tense dependency and the possibility of using a pronoun in the subject position of the subjunctive clause, a correlation that has been noticed in the literature on Romance languages (e.g. Picallo (1985)). I suggest that the tense dependency is absent in this case because the Comp here is not an operator. Presumably, only volitional verbs subcategorize for a clause headed by an operator. In the case of epistemic verbs, there is no restriction imposed on the subjunctive tense because there is no operator that binds the two events together.[49]

If this is true, then the absence of the subject obviation follows straightforwardly on our account. Because Comp is not an operator, it does not move to the higher clause. Consequently, the lower Agr, which is adjoined to Comp, remains inside of the lower CP (which is its governing category) and no Principle B violation arises. Hence, there is no subject obviation.

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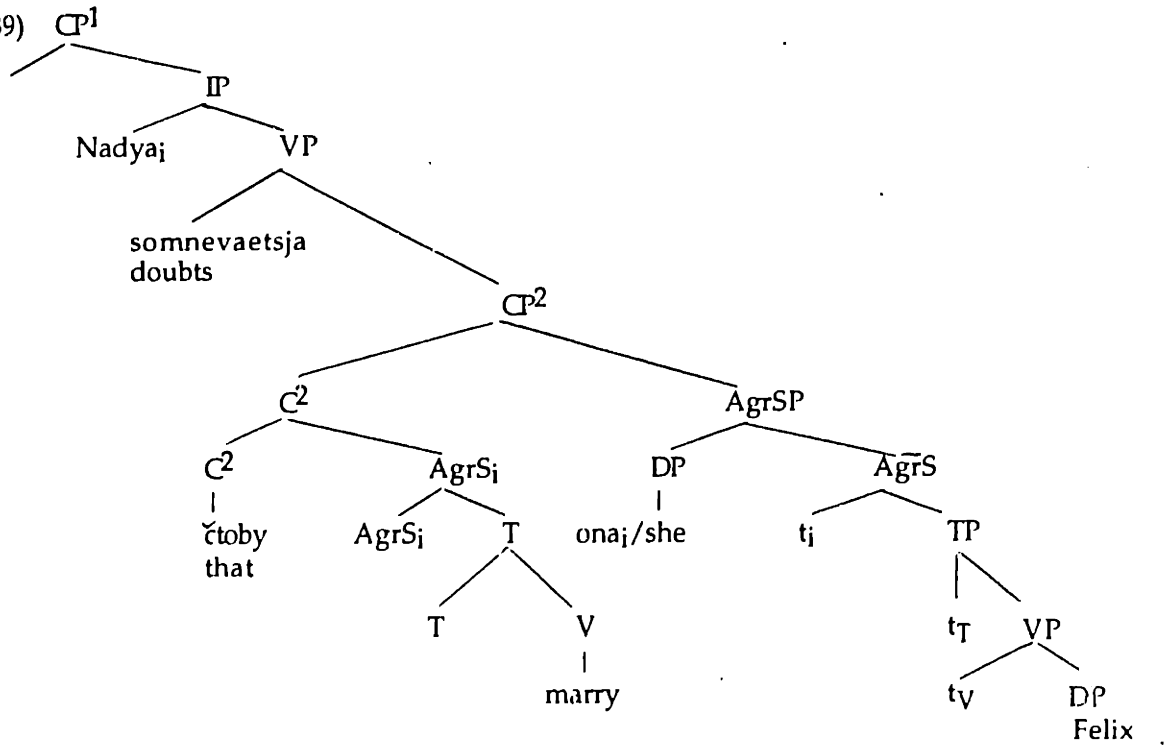
[49]See Padilla 1990 for a somewhat similar proposal

(39)



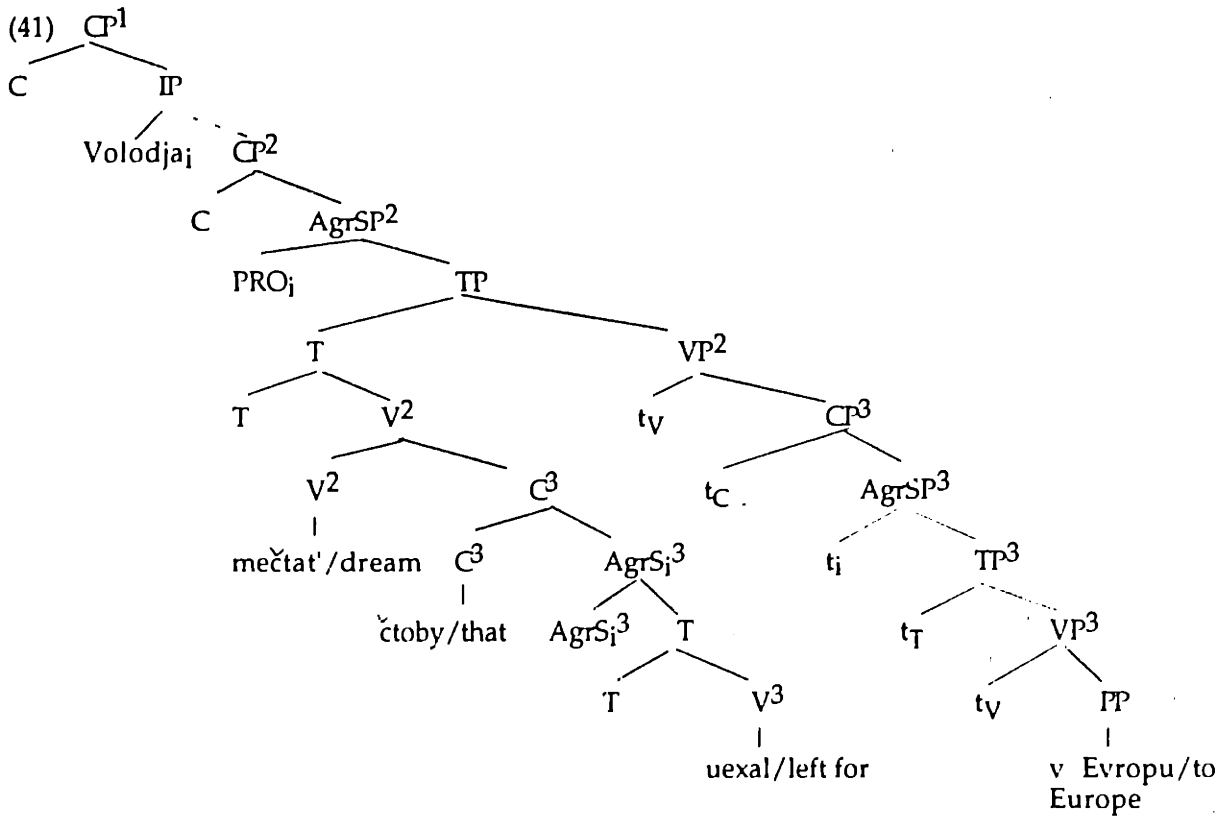
Finally, I want to consider one more example. Given that in our theory violations arise as a result of an interaction between two Agr's, what happens in a situation when the higher Agr is absent, namely, in Infinitival constructions like (40).

(40) Volodjai načal PROi mečtat' čtoby oni/j uexal v Evropu.

Volodya began PRO to dream that-by he left for Europe

This sentence is ungrammatical under coindexation of *on* and *Volodya*.. I account for this fact in the following way. As before, the operator *ctoby* moves at LF and adjoins to the matrix verb to bind both event variables. The verb in an infinitival clause, I assume, only moves to T, not higher, because there is no Agr in these clauses and movement of V to I to C has been traditionally associated with the presence of Agr (Pollock 1989). Thus, the (relevant part of) LF representation of (40) is shown in (41).

(41)



Agr is coindexed with PRO, which c-commands it, and the sentence is ruled out as a Principle B violation. The only difference from other conditions is that in this case the lower Agr is bound not by another Agr, but by (the head of) PRO.[51]

This theory makes a further prediction with respect to languages, whose subjunctive clauses have infinitival verbs lacking Agreement. In this theory, subject obviation follows from Principle B applied to pronominal Agr.

---

[51] In fact, this approach also predicts that in the absense of Agr in the embedded clause, the coreference of the embedded subject with the matrix subject should be allowed. This is, indeed, the case as Russian Purpose clauses demonstrate, e.g. (i). Even though the operator *ctoby* is present, absense of Agr yields a grammatical sentence.

(i) Volodjai prinës domoj edy čtoby PROi poest'.
Volodya brought home some food that-by PRO to eat

Thus, I predict that in such languages no obviation arises because there is no Agr to which to Principle B applies. This prediction is borne out in English:

(43) Bill suggested that he (should) become President.

(44) Mary requested that she (should) read the document herself.

Of course, the range of verbs allowing subjunctive complements in English is very limited, but these examples demonstrate the point. There is no Agreement in the subjunctive clause, thus even after the movement of the Comp, no Principle B violation arises. English, therefore, does not show the obviation exhibited in Russian and other languages that have agreement in subjunctive clauses.

5. Theoretical Conclusions.

I have argued that the phenomenon of the disjoint reference requirement, or the obviation phenomenon, exhibited by the subject of subordinate clauses in a number of languages follows from a Principle B violation at LF. Importantly, it is not the pronoun itself that becomes locally bound, but rather Agr, which is coindexed with the pronoun. I assume that Agr is pronominal, and therefore subject to Principle B like all other pronouns.

The interpretation of the subjunctive clauses, that is, the temporal ordering of events, lead me to suggest that the two events are co-bound by the same operator, and that this operator is the subjunctive Comp. Being an operator, Comp (together with Agr adjoined to it) undergoes LF raising, which results in a Principle B violation.

6. Children's Knowledge of the Obviation in Subjunctive Clauses.

In this section, I report results of an acquisition experiment with a group of Russian-speaking children. As previous sections show, the distribution of pronouns in subjunctive clauses in Russian is subject to a number of constraints. Importantly, these constraints are highly abstract in nature, that is they are not immediately noticeable in linguistic input. This means that in order to demonstrate a good performance on sentences with pronouns in subjunctive clauses, one has to possess a very specific, non-trivial linguistic knowledge. The goal of this experiment was to investigate to which degree 4-5 year old children demonstrate knowledge of the relevant constraints.

6.1. Previous results.

Children's knowledge of the pronominal distribution in subjunctive clauses was not extensively investigated. To the best of my knowledge, this is the first study of subjunctive clauses in Russian-speaking children. There was, however, a similar study reported in the literature conducted with a group of Spanish-speaking children (Padilla 1990). Spanish also exhibits the subject obviation phenomenon, thus this experiment is directly relevant to the study with Russian children.

The theoretical framework adopted in Padilla 1990 is the domain extension. This approach was already discussed in previous sections where I argued that it does not work for Russian. Therefore, I will not discuss this framework in here, but rather focus on the experimental results and their interpretation.

In an act-out task, Padilla presented Spanish-speaking children with sentences that, in adult Spanish, do not allow coindexation of the embedded pronoun with the matrix subject. An example of this sentence is given in (45).

(45) El zorrillo deseaba que pro cogiera la galleta.
the skunk wished that pro took the cookie

Spanish is an obligatorily null subject language, therefore *pro* has to be used in all subordinate clauses. In (50), *pro* cannot be coindexed with the matrix subject, and the sentence cannot mean that the skunk wished to take the cookie. It can only mean that the skunk wished someone else to take it. Children ranged in age from 3;0 to 9;11, but here I will discuss only one group which is compatible in age with the Russian-speaking children, namely children between 5;0 and 5;11.

Padilla reports that children at this age do not obey this restriction. In fact, they appear to have some preference for the incorrect interpretation and they act out the sentence as if the skunk itself wanted to take the cookie in approximately 90% of the time.[51] Padilla interprets these results as evidence that children at this age do not know some lexical properties of volitional predicates. He claims (on the basis of the theoretical framework he adopts) that it is the lexical property of volitional predicates that leads to the extension of the binding domain in Spanish. Children, presumably, do not

[51]This figure is taken from Graph 29 in the original text (p.129). It represents the number of coreferential inteprretatin after correction for certain biases. The same is true about 10% of acceptances of locally bound pronouns discussed below.

know this property assume that the (unextended) binding domain for the pronoun in (45) is the lower clause.

There is, however, a confound in this experiment. The problem is that the only type of antecedent used in the experiment was an R-expression NP. Evidence from other experiments (extensively discussed in previous sections of this thesis) shows that in this case children may accept even locally bound pronouns (e.g. 'Mama Bear washed her'). As discussed above, this acceptance is due to the deictic use of pronouns. Thus, the fact that children incorrectly allow *pro* to be interpreted as *the skunk* in (45) does not tell us anything about their knowledge of the restrictions imposed on the pronouns in subjunctive clauses. In fact, it shows just another instance where children at this age incorrectly establish pronominal reference in the case of an R-expression antecedent.

It may be argued, however, that children's responses to locally bound pronouns in Padilla's experiment were significantly better, and, therefore, the problem is, indeed, due to their knowledge of subjunctive clauses. Padilla reports that children interpreted a pronoun as coreferential with its local antecedent (as in (46)) only 10% of the time (see footnote 52).

(46) La rana la cepilla detras del helicoptero.

the frog her combs behind the helicopter

Notice, however, that there is an important difference between this construction and (45). The difference is in the type of the pronominal element. In (46), the pronoun is clitic, and, as discussed in Chapter 3 of this thesis, week pronouns (clitics) are always referentially dependent and cannot be used deictically. And, as discussed earlier, children in these cases

demonstrate a significantly better performance (recall McKee's results with Italian-speaking children). In (45), on the other hand, the pronominal element is a full pronoun (although phonologically empty). These elements are not necessarily referentially dependent, and can (potentially) be used deictically. Thus, children's responses to sentences of type (46) cannot be used as a control for their responses to sentences of type (45). Children's nearly perfect performance on sentences of type (46) is a replication of McKee's experiment with week pronouns, and these results were already discussed in Chapter 3.

To claim that children at this age do not know the restrictions on the use of pronouns in subjunctive clause, it is necessarily to control for the possibility of the deictic use of pronouns. As discussed above, this can be done by replacing the matrix subject by a quantifier, which was not done in the above experiment. Thus, one of the motivations for the experiment with Russian-speaking children, was to see whether there is any difference in children's responses to sentences with different types of matrix subjects: a quantifier, and an R-expression.

6.2 Theoretical Background and Experimental Design.

As discussed in Section 5 of this Chapter, the subject obviation phenomenon in Russian subjunctive clauses is a consequence of an intricate interplay of a number of factors. Because the goal of the experiment was to investigate children's knowledge of the obviation, it is important for the experimental design to clearly state all the factors involved and avoid possible confounds.

To correctly demonstrate the obviation, children must possess the following knowledge and capacity.

a). Principle B. Children must possess knowledge of Principle B of the binding theory. This is so because the obviation follows from the lower (pronominal) AgrS being subject to this principle.

b). Pronominal AgrS. Children must know that Agr in Russian is pronominal, and, therefore, subject to Principle B.

c). Coindexation. Children must know that the subject of a sentence is coindexed with AgrS only if there is subject-verb agreement. Children, therefore, will not allow the pronoun in subject position to be coindexed with the matrix subject in case of subject-verb agreement, but they will allow it when no agreement is present.

d). Head movement. Children must know that, at LF, V moves to Agr, and together they adjoin to Comp.

e). Subjunctive Comp is an operator. Children must know that Russian subjunctive complementizer functions as an operator that binds two event variables. This necessitates its movement to the higher clause, which does not occur in case of Indicative Comp. Thus, the obviation shows up only in subjunctive clauses.

f). Children must be able to compute whether a pronoun can be used deictically and reject such an option if the bridge well-formedness condition (discussed in Part I) is not satisfied. Only those Children who cannot perform the relevant computations might allow the deictic use. In this case, the subject pronoun (and AgrS) receives a new index, and AgrS, therefore, is not bound (it is not coindexed with AgrS of the higher clause).

Notice that the requirements for exhibiting obviation ı ıctive. To know that the subject pronoun in Russian subjunctive clai .not be coindexed with the matrix subject, children have to know *all of the above* factors. If knowledge of at least one of the factors (a) - (f) is miɔsing, the obviation should disappear. Consider, for example, (47).

(47) *Kot$_i$ xočet čtoby on$_i$ prygnul.

Cat wants that he jumped.

As discussed above, this sentence is ungrammatical on a reading where the cat wants to jump. Suppose some children accept (47) under this reading. In principle, it can mean that they lack knowledge of one of the linguistic principles listed in (a) through (e). However, it is possible that children do have all the relevant knowledge but they assign the pronoun a different index. This could happen if children incorrectly used the pronoun deictically, which means that it receives a new index different from the index of its antecedent. In this case, children's acceptance of (47) does not tell us anything about their knowledge of the relevant linguistic principles. This is so because the sentence in (47) is eventually r·ıled out by Principle B that applies only to pronominal elements coindexed with its antecedent. To control for such a possibility, the following condition was included in the experiment:

(48) Ja znaju kto xočet čtoby on prygnul. Kot.

I know who wants that he jumped. Cat.

As discussed in previous sections, when the antecedent is a quantifier *kto* 'who', the deictic use becomes impossible. Thus, if children's acceptance of

(47) is indeed owning only to their problems with a correct use of deixis, this sentence should be rejected because no such problems arise in this case.

Suppose now children correctly reject (48). This correct performance can be taken as a demonstration of their knowledge of the relevant linguistic principles only if we control for other possibilities. One such possibility is that children simply don't like binding of a pronoun by a quantifier *kto* 'who', perhaps because this quantifier lacks phi-features, or because of some other reasons. To show that children's rejection of (48) is a demonstration of their linguistic knowledge, and not their dislike to bind the pronoun by a quantifier, the following conditions were included in the experiment.

(49) Ja znaju kto$_i$ xočet čtoby devočka sfotografirovala ego$_i$. Kot$_i$.

I know who wants that the girl photographed him. Cat.

(50) Ja znaju kto$_i$ xočet čtoby emu$_i$ bylo teplo. Kot$_i$.

I know who wants that him was warm. Cat.

(51) Ja znaju kto$_i$ skazal čto on$_i$ prygnet. Kot$_i$.

I know who said that he (will) jump. Cat.

These three sentences are grammatical in Russian. If children accept these sentences, it will demonstrate that they, in principle, allow the pronoun to be bound by a quantifier, and that their rejection of (48) is not to this factor. Moreover, each of these three sentences constitutes a minimal pair with (48) with respect to one of the linguistic principles listed in (a) through (e). (49) is different from (48) with respect to the position of the pronoun. If children show a different response patterns to these two sentences, it will demonstrate that they know that only AgrS, but not AgrO in Russian is pronominal. (50)

is different from (48) with respect to the presence of Agreement, hence coindexation of AgrS and the subject pronoun. If children discriminate between these two sentences and allow the pronoun to be bound by the matrix subject only in (50), it will show that they are sensitive to the presence or absence of coindexation. Finally, (51) is different from (48) with respect to the mood of the subordinate clause. Only in (48) the subordinate clause is in subjunctive mood and is introduced by a subjunctive complementizer. If children show the different pattern of responses to (48) and (51), it will be a demonstration that they know the operator-like nature of the subjunctive complementizer.

As discussed in previous chapters, children sometimes allow pronouns to be used deictically where normal adults do not allow this use. In the light of previous experiments with both English, and Russian-speaking children, we can actually predict their relatively poor performance on sentences of type (47). This, of course, would be a replication of results obtained by Padilla (1990) for Spanish-speaking children. The goal of this experiment, however, is more than replication of previous results in a another language. The goal was to use children's knowledge of Principle B (demonstrated in previous experiments) to investigate their knowledge of the relevant linguistic principles involved in the obviation phenomenon. In addition, a contrast between (47) and (48) would falsify Padilla's claim that children at this age do not possess the relevant lexical/syntactic knowledge necessary for the correct interpretation of pronouns in subjunctive clauses. Clearly, to falsify this claim it is necessary to show that children's performance on relevant control sentences (exemplified in (48)-(50)) is different from their performance on

(47). Let us turn now to the experiment itself that included both target and control conditions.

6.3 Experiment.

Eighteen Russian-speaking children participated in the study. All of them live in St. Petersburg, Russia, and attend a daycare center where the experiment took place. Children ranged in age from 4;1 to 5;10 years (mean age 5;0). All children acquired Russian as their first language. Both parents of each child were monolingual native Russian speakers. In addition, four adults (native speakers of Russian) were interviewed. The Truth-Value Judgment task (Crain and McKee (1985)), was utilized. This task was described in previous sections.

There were three or four experimental sessions per child, including training. Five or six stories were told per session (depending on the child's willingness to continue playing) for a total of 18 stories. After each story the puppet said a sentence (regarding the story), and the child was supposed to say whether the sentence is true or false. Fillers were inserted to avoid systematic "Yes", or systematic "No" responses. For example, if a child gave two "Yes" responses in a row, a definitely incorrect filler was inserted to elicit a "No" response. The following Russian verbs were used in all conditions: *prygat'* (to jump), *pit'* (to drink), *poigrat'* (to play), *byt' teplo* (to be warm), *cistit* (to clean), *poprobyvat'* (to taste). Each session was audiotaped. The six experimental conditions are given in Table 1.

Three sentences were presented for each of the six conditions. There were a total of 18 sentences (not counting fillers). The stories were presented

in the same order to all the children. The English translation of two sample experimental stories are presented below. Similar stories were made up for each of the experimental conditions.

A Jumping Story

These three people - the boy, the clown, and the astronaut were living in the same neighborhood, and they were good friends. Once, they were playing on the street, but very soon they became bored and tired. So the boy says:

"I am tired, I don't want to do anything, I just want to see something funny. Hey, astronaut, people say you are very strong and can jump really, really high, higher than the tree. Could you please jump?, I really want to see it, please jump."

The astronaut says: "No, no, I don't want to. I am tired, too, and I have very heavy boots, I don't really want".

But the clown was not tired at all, so he says: "Of course, you are tired, don't even think of jumping, you should just sit down and relax. And I am not tired, I work in the circus, and I love jumping, I really want to do it."

Puppet: " I know who wants that he jumped. Clown".

If the child interprets the pronoun as coindexed with *who*, which is ungrammatical in this case, he or she will say YES to the puppet because it is true that the clown wants to jump. If the child interprets it as contraindexed (which is the only grammatical representation), he or she will have a

plausible opportunity to say NO. This is so because in this case the child can interpret the pronoun as referring to the astronaut. The clown, however, doesn't want him to jump, it is the boy who does. Thus, the child has a plausible opportunity to reject the sentence and say that it is not the clown, it is the boy who wants him (the astronaut in this case) to jump.

Jump-Across-the River Story

> Once upon a time, a giraffe, a deer, and a bear went hiking. They were wandering in the forest for a while, but then they came out and saw a river [THE TOYS ARE PLACED IN FRONT OF A TOY RIVER]. They have to get over, on the other side of the river, so they have to jump because there is no bridge around.
>
> The Deer says: "Oh, well, you, giraffe, will certainly be able to jump over, I am sure, you have such long legs. And I don't, so I won't jump over, I am afraid."
>
> Giraffe replies: "No, I don't think so... My legs are long, but they are very week, look, I can't really jump".
>
> The Bear says: "Of course you won't jump over! Your legs are not strong enough. Look at my legs. I will jump! I am very strong, not you!".
>
> Puppet: "I know who said that he will jump. The Bear."

The rational behind such a design is the same as for the first story. The child has to have a plausible opportunity either to accept the sentence, or to reject it. Stories for other experimental conditions were very similar.

6.4 Results.

The experimental data for all six conditions listed in Table 1 are summarized in Tables 2 and 3. Table 2 shows average percentages of acceptances, and Table 3 shows individual responses. In Table 3, "+" stands for a *yes* response (which is sometimes correct, sometimes wrong), and "-" stands for a *no* response (which is sometimes correct, sometimes wrong). Data are given individually for 18 subjects. For example, Subject 3 gave two *yes* (wrong) responses, and one *no* (correct) response to Condition 5. All of the judgments made by the four adults agree with the judgments discussed in previous sections. Therefore, I simply list in Tables 2 and 3 a *yes* or *no* to indicate these adult judgments. Notice that in all but two conditions the pronoun can either refer to the matrix subject, or some extrasentential antecedent mentioned in the discourse, but not in the sentence. In Conditions 1 and 5, however, the pronoun cannot grammatically refer to the matrix subject. The readings for which these grammaticality judgments are presented correspond to the underlined interpretation of the pronoun.

Consider first Condition 5 (R-expression antecedent), that is the condition that was tested in Padilla's experiment. Children (incorrectly) accepted this sentence 39% of the time, which to some degree replicates Padilla's results (but see Discussion for the explanation between the overall percentages of acceptances). When the antecedent is a quantifier *kto* 'who' (Condition 1), children's performance improves significantly. Overall, they incorrectly accept this sentence only 20% of the time. The difference between the two conditions is statistically significant: $F(1,17)=7.3$, $p= .015$. When the

subordinate clause is Indicative (Condition 2), that is when the coindexation of the pronoun and the matrix subject is allowed, children accept such a coindexation 50% of the time. The difference between Condition 1 and Condition 2 is also statistically significant: $F(1,17)=12.2$, $p= .003$.

Comparison of Condition 1 and Condition 3 shows that children discriminate between pronouns in subject and object positions. When the pronoun is in the object position (Condition 3), it can be coindexed with the matrix subject. Children accept coindexation in this case 70% of the time, which is significantly different from Condition 1 ($F(1,17)=31.2$, $p< .001$). Children also demonstrated sensitivity to the presence of agreement in Condition 1, and its absence in Condition 4. When the agreement is absent, the pronoun can be coindexed with the matrix subject, and children allowed such a coindexation 61% of the time. The difference between Condition 1 and Condition 4 is statistically significant: $F(1,17)=17.0$, $p= .001$.

Finally, comparison of Condition 5 and Condition 6 shows that children discriminate between grammatical and ungrammatical sentences with an R-expression antecedent. Children accepted grammatical sentences of Condition 6 80% of the time, while they accepted ungrammatical sentences of Condition 5 only 39% of the time. The difference is statistically significant: $F(1,17)=73.3, p=.002$.

Table 1
Experimental Conditions

Sentence Type	Characters	Actual Situation
1. I know who wants that he jumped. X Ja znaju kto xočet čtoby on prygnul. X.	X, Y, Z	Y wants X to jump X doesn't want to jump Z doesn't want X to jump Z wants to jump
2. I know who said that he will jump. X. I znaju kto skazal čto on prygnet. X.	X, Y, Z	X says that he'll jump Y says that Z will jump Z says that he won't jump
3. I know who wants that Girl scratched him. X. Ja znaju kto xočet čtoby devocka pocesala ego. X.	X, Y, Girl	X wants G. to scratch him Y doesn't want Girl to scratch him, but he wants her to scratch X
4. I know who wants that him was warm. X. Ja znaju kto xocet čtoby emu bylo teplo. X.	X, Y, Z	X wants himself to be warm X doesn't want Y to be warm Z doesn't want to be warm,but he wants Y to be warm Y doesn't want to be warm
5. X wants that he jumped. X xočet čtoby on prygnul.	X, Y, Z	Y wants Z to jump Z doesn't want to jump X wants to jump, and he doesn't want Z to jump
6. X said that he will jump. X skazal čto on prygnet.	X, Y, Z	Y says that Z will jump Z says that he won't jump X says that he'll jump

Table 2
Group Responses to Experimental Conditions

#	*Sentence Type*	*Grammatical?*	% *accept*
1	I know <u>who</u> wants that <u>he</u> jumped. <u>Cat.</u>	NO	20
2	I know <u>who</u> said that <u>he</u> will jump. <u>Cat.</u>	YES	50
3	I know <u>who</u> wants that Girl scratched <u>him.</u> <u>Cat.</u>	YES	70
4	I know <u>who</u> wants that <u>him</u> was warm. <u>Cat.</u>	YES	61
5	<u>Cat</u> wants that <u>he</u> jumped.	NO	39
6	<u>Cat</u> said that <u>he</u> will jump.	YES	80

Table 3

Individual Responses to Experimental Conditions

#	*Sentence Type*	*Subject Age: O.K.for Adults?*	1 4;1	2 4;1	3 4;3	4 4;4	5 4;5	6 4;8	7 4;8	8 4;8	9 4;8	10 4;9	11 5;0	12 5;2	13 5;7	14 5;7	15 5;7	16 5;10	17 5;10	18 5;10
1	I know <u>who</u> wants that <u>he</u> jumped. <u>Cat.</u>	NO	3-	2+ 1-	2+ 1-	3-	3+	3-	3-	3-	3-	1+ 2-	3-	3-	3-	2+ 1-	3-	3-	3-	1+ 2-
2	I know <u>who</u> said that <u>he</u> will jump. <u>Cat.</u>	YES	2+ 1-	3+	3+	3-	3+	2+ 1-	2+ 1-	3-	2+ 1-	3-	1+ 2-	3+	3-	3+	3-	3-	2+ 1-	1+ 2-
3	I know <u>who</u> wants that Girl scratched <u>him.</u> <u>Cat.</u>	YES	3-	3+	3+	2+ 1-	3+	2+ 1-	1+ 2-	3-	3+	3+	3+	3+	1+ 2-	3+	3+	3-	1+ 2-	3+
4	I know <u>who</u> wants that <u>him</u> was warm. <u>Cat.</u>	YES	3+	2+ 1-	3+	1+ 2-	2+ 1-	1+ 2-	1+ 2-	3-	3+	2+ 1-	2+ 1-	3+	3-	3+	1+ 2-	1+ 2-	3+	2+ 1-
5	<u>Cat</u> wants that <u>he</u> jumped.	NO	1+ 2-	3+	2+ 1-	3-	3+	1+ 2-	3-	3-	2+ 1-	1+ 2-	3-	2+ 1-	3-	2+ 1-	3-	3-	2+ 1-	2+ 1-
6	<u>Cat</u> said that <u>he</u> will jump.	YES	3+	3+	3+	1+ 2-	3+	1+ 2-	3+	2+ 1-	3+	3-	3+	3+	1+ 2-	3+	3+	2+ 1-	3+	3+

6.5 Discussion.

Let me begin with a relatively poor performance demonstrated by children on Condition 5. Children incorrectly accepted this sentence 39% of the time. To a certain degree, this is a replication of Padilla's 1990 experiment with Spanish-speaking children.[52] The interpretation of these results that I propose, however, are different from those proposed by Padilla. As discussed in Section 6.1, Padilla interprets his results as a demonstration children's lack of knowledge of the relevant constraints on pronouns in subjunctive clauses. He also claims that it takes children some time to learn the relevant lexical properties of verbs that are responsible (in the theoretical model he adopts) for the obviation. It is not clear, however, why learning lexical properties of such common verbs as, for example, *querer* and *desear* should take that long. These verbs are, presumably, very widely used by adult speakers, and,

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[52]Spanish-speaking children interpret the pronoun as referring to the matrix subject much more often that Russian-speaking children (90% vs 39%). The question, of course, is why there is such a big differnece between the two sets of results. Although I do not know exactly what is responsible for this difference, I would like to point out several differences between the two experiments. First, Padilla used an act-out task, while in my experiment the task was truth-value judgment. It is possible that the nature of the task played an important role, for example children, when asked to perform an action, had a tendency to do it with one and the same toy, even in those cases where they were in doubt. Second, it is unclear from the results reported in Padilla 1990 whether children demonstrated 90% coreferential responses with all verbs, or there was a difference between them. It is logically possible that children had some preferences for the coreferential interpretation only for one type of the verb. Third, the experiment, obviously, was carried out with learners of a different language. There are many differences between Spanish and Russian, some of which may directly or indirectly be responsible for the observed difference. One difference that is likely to be relevant is that Spanish is an obligatory null subject language, thus *pro* was used in all experimental constructions. By contrast, in Russian, subject can be dropped optionally. In the experiment wiht Russian-speaking chidlren, I used only overt pronouns to make all conditions as close to each other as possible (in particular, to demonstrate subject/object contrast in Conditions 1 and 3). It is possible that the different characters of the pronominals in Russian and Spansish are responsible for the observed difference. Of course, this is also a speculation, in the sense that I do not have a particular theory why this difference should be reflected in children's performance, but I just wanted to point it out as one of possible explanations.

apparently, are used correctly. More importantly, this lexical learning hypothesis predicts that there should be no difference between antecedents that are R-expressions (Condition 5 of the Russian experiment), and antecedents that are quantifiers (Condition 1 of the Russian experiment). If children do not know some relevant linguistic principles that are responsible for the obviation phenomenon, they should demonstrate an equally poor performance in both conditions.

By contrast, the theory proposed in this thesis, makes a prediction that children should show a different pattern of responses to these two conditions. I argued in previous sections that children's acceptance of locally bound pronouns is a result of limitations of inferential resources that make it difficult for them to compute the constraint on bridging in the case of deictic use. But exactly the same limitation should show in Condition 5. Suppose children do know all relevant linguistic principles. When a child hears a sentence of type (45) (Condition 5), he or she assigns the matrix subject some index, say *i*. When the pronoun is encountered, it cannot receive the same index because in this case AgrS would have to have the same index, and, at LF, the sentence would violate Principle B. Thus, the only possibility for children to accept this sentence is to give the pronoun a different index, say *j*. This, however, means that in discourse, this pronoun must be represented by a new file card. The pronoun, on the other hand, is a definite NP that can introduce a file card only if it is bridged to another card, for example the Situation Card (the deictic use). Such a bridging, in turn, is possible only if the constraint on bridging is satisfied. As discussed in Part I of this thesis, children may get lost in the computation of this constraint, and they may

incorrectly allow the deictic use of the pronoun. In this case, the pronoun will have a new index, and so will AgrS of the lower clause In this case, AgrS of the subordinate clause is not coindexed with the matrix AgrS, and the sentence is grammatical. Children, therefore, may sometimes (incorrectly) allow sentence (47) to mean that the cat wants to jump.

Comparison of Conditions 1 and 5 shows that this prediction was borne out. Children accepted sentences of Condition 1 only 20% of the time, which is significantly less frequent than their acceptance of Condition 5. Thus, this comparison suggests that children are sensitive to the nature of antecedent, which is consistent with previous acquisition results. Moreover, it suggests that children do know all the relevant linguistic principles involved in the obviation phenomenon. To make this claim, however, it is necessary to compare their performance on grammatical (Conditions 2,3,4), and ungrammatical sentences (Condition 1), that is on sentences where the pronoun can and cannot be coindexed with the matrix subject.

Condition 2 is different from Condition 1 with respect to the mood of the subordinate clause, and, therefore, the nature of the complementizer. Indicative Comp is not an operator, and it does not move to the matrix clause. Thus, the lower AgrS is never locally bound by the higher AgrS. Children in this case accepted the relevant sentences 50% of the time, which is significantly different from 20% in Condition 1. This comparison shows that children are sensitive to the nature of the complementizer (subjunctive vs. indicative).

There was another difference between Condition 1 and Condition 2, however. The verb used in Condition 1 was volitional ('to want'), while in

Condition 2 the verb was reportive ('to say'). It is possible that children somehow have more problems with volitional verbs and therefore they tend to say NO more often in this condition. Comparison of Conditions 1 and 3, and Conditions 1 and 4, however, shows that this is not the case. Consider first Condition 3. The same verb and the same quantified antecedent were used in this condition as in Condition 1. The only difference is that in Condition 3 the pronoun is in object position, and the sentence is grammatical. Children again demonstrated a statistically significant difference in their responses to this condition compared to Condition 1. They accepted sentence of Condition 3 70% of the time, much more often than sentences of Condition 1 where the pronoun shows up in the subject position. Thus, children reject pronouns in the subject position of a subjunctive clause (ungrammatical) much more often than they reject pronouns in the object position (grammatical).

Consider now Condition 4. Once again, the same verb and the same antecedent were used in this condition as in Condition 1. The only difference in this case was that in Condition 4 there is no agreement between subject and verb, while in Condition 1 the subject agrees with the verb. Recall from the discussion Section 4 of this chapter that the absence of subject-verb agreement reflects the absence of coindexation between the subject and AgrS. This absence of coindexation explains why sentences of Condition 4 are grammatical in Russian. AgrS is not coindexed with the subject of the subordinate clause, therefore it is not coindexed with the matrix subject, and, consequently, it is not bound. Thus, no Principle B violation arises, and the sentence is grammatical. Children, once again, showed a statistically

significant difference in their responses to Condition 4 compared to Condition 1. They accepted sentences of Condition 4 61% of the time, that is much more often than sentences of Condition 1. Thus, presence vs. absence of agreement was demonstrated to be a significant factor for children's acceptance of sentences with pronouns in subject position.

Recall that in Section 6.2 I argued that the obviation phenomenon is a result of an interplay of a number of linguistic principles. Let us see what the experimental results tell us about children's knowledge of these principles.

a). Principle B. If children do not know Principle B, sentences of Condition 1 should not be ungrammatical for them. In this case, everything else being equal, there is no apparent reason for them to reject these sentences more often than sentences of any other condition. The statistically significant difference between Condition 1 and all other conditions shows that this is not the case. Moreover, if children do not know Principle B, we should not expect any difference between their responses to Condition 5 (ungrammatical for adults) and Condition 6 (grammatical for adults). In both cases children should interpret the pronoun as referring to the matrix subject. This was not the case, however. Children accepted sentences of Condition 6 significantly more often than Condition 5 ($F(1,17)=73.8$, $p< .001$). Condition 6, actually, shows that when the matrix subject is an R-expression which can be grammatically coindexed with the embedded pronoun, children have preference for interpreting the pronoun as referring to this expression (they accept these sentences 80% of the time). If we take these 80% to be a baseline for sentences with R-expression matrix subjects, we see that their responses to analogous ungrammatical sentences (Condition 5) is significantly below the

baseline. This difference, I argue, can be takes as evidence that children are sensitive to the (un)grammaticality of Conditions 5 and 6. The reason why they still accept sentences of Condition 5 almost 40% of the time is discussed below.

b). Pronominal AgrS. If children do not know that AgrS in Russian is pronominal, and, thus, subject to Principle B, sentences of Condition 1 should be as grammatical for them as sentences of Condition 3 that involve the non-pronominal AgrO. The statistically significant difference between Condition 1 and Condition 3 shows that this is not the case.

c). Coindexation. If children do not know that AgrS is coindexed with the subject only in the presence of the subject-verb agreement, sentences of Condition 1 (where there is agreement) should be no different form sentences of Condition 4 (with no agreement). The statistically significant difference between Condition 1 and Condition 4 shows that this is not the case.

d). Head movement. If children do not know that, at LF, V moves to AgrS and to Comp, sentences of Condition 1 should be grammatical and no different from sentences of Condition 2, 3, or 4. The statistically significant difference between Condition 1 and Conditions 2,3 and 4 shows that this is not the case.

e). Subjunctive Comp is an operator. If children do not know that Russian subjunctive complementizer functions as an operator that binds two event variables (which necessitates its movement to the higher clause), sentences of Condition 1 should be no different form sentences of Condition 2 where no movement takes place. The statistically significant difference between Condition 1 and Condition 2 shows that this is not the case.

Children accepted grammatical sentences of Condition 2 50% of the time, but they accepted ungrammatical sentences of Condition 1 only 20% of the time. If we take the 50% as a baseline for children's acceptances of grammatical sentences with a quantified antecedent and two possible referents for the pronoun, we can see that their acceptance of analogous ungrammatical sentences is significantly below the baseline. This difference, I argue, demonstrates that children are sensitive to the (un)grammaticality of Conditions 1 and 2.[53]

f). Children must be able to compute whether a pronoun can be used deictically. If children cannot perform the relevant computations, sentences of Condition 5 will be accepted more often than sentences of Condition 1. This is so because in Condition 1 the deictic use is impossible (see discussion above). Comparison of Condition 1 and Condition 5 reveals a statistically significant difference, which is consistent with the proposed deficit.

To summarize, the selective rejection of ungrammatical sentences with a quantified antecedent suggests that children at this age possess very intricate, highly abstract linguistic knowledge. And, consistently with previous findings, their relatively poor performance on sentences with R-expression antecedents may be taken as additional evidence for the deficit of inferential resources, as proposed in this thesis.

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[53]There is, of course, a question why the baseline for the two grammatical conditions (2 and 6) should be different (children accept sentences of Condition 6 80% of the time, but sentences of Condition 2 only 50% of the time; the difference is statistically significant: $F(1,17)= 73.3$, $p= .002$). This difference may be a result of children's preference to establish reference for a pronoun within a sentence when their grammar allows them to do so (this possibility was also discussed by Grimshaw and Rosen 1990). In sentences of Condition 1, however, such an option is not available because quantifier *who* does not provide any reference by itself. While this can account for the difference between Condition 2 and Condtion 5, however, it is important that it cannot account for the difference between Condtion 1 and Condtion 2. In both cases the antecedent is a quantifier, yet children reject ungrammatical sentences of Condition 1 significantly more often than grammatical sentences of Condtion 2.

6.6 A Note on Learnability: Null Subjects and Obviation.

In this section, I want to briefly address the issue of learnability with regard to the obviation phenomenon and its relation to the null subject option in Russian. The questions I would like to posit are the following:

(i) How do Russian-speaking children learn that the pronoun in subject position of a subjunctive clause cannot be coindexed with the matrix subject, while no such restriction exists for objects?

(ii) How do Russian-speaking children learn that the subject can be (optionally) dropped, but the object can never be?[54]

I suggest that these phenomena are related to each other and can be used by children to solve the learnability problem.

First, recall that the subject pronoun of a subjunctive clause cannot be coindexed with the matrix subject, while no such restriction exists for objects:

(52)*Volodja$_i$ xočet čtoby on$_i$ poexal v Evropu.
Volodja wants that he went to Europe

(53) Volodja$_i$ xočet čtoby Nadja pocelovala ego$_i$.
Volodya wants that Nadya kissed him

(54) Volodya ugovoril Nadju$_i$ čtoby ona$_i$ poexala v Evropu.
Volodya persuaded Nadya thatshe went to Europe

At the same time, Russian allows (optional) subject pro-drop, while object drop is never allowed:

(55) Volodja skazal čto on/pro poedet v Moskvu.

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[54]On the basis of limited data, it appears to be that Russian children almost never drop objects, while subject drop is a ubiquotious (and grammatical) option for them. This observation is based on Gvozdev 1961, as well as on personal (albeit informal) observations.

Volodya said that he/pro will-go to Moscow

(56) Volodya skazal čto Masha ljibit ego/*pro.

Volodya said that Masha loves him/*pro

In the theoretical analyses of the obviation, I suggested that these two phenomena are related. The subject obviation is a result of AgrS being pronominal, and therefore subject to Principle B. It has also been proposed in the literature (see Rizzi 1986, Jaegli and Safir 1989, among others) that the possibility of subject drop is a related to the pronominal nature of AgrS. The pronominal nature of Agreement is required to license the null subject. By contrast, object drop in Russian is not allowed, which can be taken as evidence that AgrO is not pronominal, and it cannot license a null object. Thus, (53) and (54) are grammatical in Russian because the AgrO of the lower clause can be bound by AgrO of the higher clause. AgrO is not pronominal (as evidenced by (56)), thus it is not subject to Principle B. How do children learn the relevant distinctions? First, along the lines of much of the current discussion of learnability, I assume that children do not receive any negative data that could be used by them for learning purposes (Wexler and Culicover 1990, Marcus 1993, among others). Thus, I assume that if children incorrectly use a pronoun in (52), they are not corrected. And I assume that if children incorrectly drop object in (56), they are not corrected, either (provided their listeners understand what they are talking about, which could be the case under many circumstances). Moreover, it is clear that learners cannot use sentences that do not appear in the input to make any conclusions about ungrammaticality of such sentences. In other words, the fact that children never hear ungrammatical sentences of type (52), does not tell them that such sentences

are ungrammatical. And the fact that children never hear object drop sentences, does not tell them that this is impossible.

Consider now questions (i) and (ii) posited at the beginning of this section. I suggest that children can use positive only data to solve both puzzles. When children hear sentences of type (55) with a null subject, their knowledge of conditions on null subjects tells them that AgrS in Russian is pronominal because it can license the null subject. Once they have figured it out, they will know that the pronoun in subject position of a subjunctive clause cannot be coindexed with the matrix subject because in this case AgrS would be bound by the higher AgrS. But AgrS is pronominal (as evidenced by the null subject sentences), thus it is subject to Principle B. Thus, children can use positive data from subject drop sentences for their analyses of the obviation.

The situation with object pronouns is reversed. Children do hear grammatical sentences of type (53) and (54). Now their knowledge of the relevant linguistic phenomena tells them that these sentences can be grammatical only if AgrO in their language is not pronominal. Otherwise, these sentences would be ungrammatical as well as (52). But if AgrO is not pronominal, object drop is not allowed. Thus, children can use positive data from sentences of type (53) and (54) to realize that (56) (with a null object) in their language is ungrammatical.

Thus, the proposed theory of the obviation in subjunctive clauses shows that two apparently unrelated phenomena in Russian are, in fact, related. Moreover, they are related in such a way that makes adequate predictions with respect to learnability. Positive data from one type of

constructions provide sufficient information for the correct analyses of the other, which means that children can acquire the relevant knowledge without receiving any negative input.

6.7 Conclusions.

The experimental results show once again that 4-5 year old children sometimes incorrectly establish reference for a pronoun when the antecedent for the pronoun is an R-expression. This result is consistent with previous results obtained for children's interpretation pronouns in various constructions and in various languages. And, consistently with previous findings, children's performance improves when the antecedent is a quantifier, which makes the deictic use of a pronoun impossible.

The fact that Russian-speaking children reject the ungrammatical Condition 1 significantly more often than grammatical Conditions 2, 3 and 4 can be interpreted as a demonstration of their knowledge of subtle linguistic principles involved in the obviation phenomenon in Russian subjunctive clauses. These principles are highly abstract in nature and are not immediately noticeable in the input. Thus, the experimental results suggest that the principles involved in the regulation of pronominal distribution in subjunctive clauses may be part of UG. In this case, it is not surprising that 4-5 year old children know these principles without being explicitly taught about them. All the child has to do is to learn the meaning of relevant lexical items and their syntactic distribution. Principles of UG (which are, presumably, innate) will do the rest.

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