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EXPERIMENTAL INVESTIGATIONS OF PRINCIPLE C AT THE SYNTAX-PRAGMATICS INTERFACE

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ABSTRACT OF THE DISSERTATION

Experimental Investigations of Principle C at the Syntax-Pragmatics Interface

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Pronouns appear frequently in natural language, thus ensuring that speakers are faced with the task of resolving pronominal reference. Traditionally, syntactic structure is thought to place constraints on pronominal interpretation. But what other factors affect pronominal reference, and do these other factors interact with – and possibly override – structural constraints? In this dissertation, I appeal to backwards anaphora with Principle C effects as a case study, and experimentally investigate a range of factors affecting pronominal reference, even when the structural constraint in the form of Principle C predicts that coconstrual is barred. The findings demonstrate that variation in speakers’ acceptability judgments is a result of an interaction between structural and extra-syntactic factors.

Typically, when a pronoun c-commands a name, as in (1), coconstrual between the two is ruled out. This failure of coconstrual is traditionally referred to as the “Principle C effect” (Bruening 2014, Chomsky 1981, Johnson 2012, Rizzi 2004, Safir 1999, Sportiche 1998). Yet, some speakers occasionally allow for structurally marked coconstruals, suggesting that pragmatics and discourse pressures may be weighed on par with syntactic constraints on interpretation, cf. (1) and (2)-(3).

(1) ***He_i** said that **John_i** would win. (Chomsky 1981)

(2) **She_i** was out of spirits when I last talked to **Mary_i**. (Bolinger 1977)

- (3) The teacher warned **him**_{*i*} that in order to succeed[,] **Walter**_{*i*} was going to have to work a lot harder from now on. (McCray 1980)

While a few theoretical proposals have been presented to account for the variability in the data (Chien and Wexler 1990, Grodzinsky and Reinhart 1993, Heim 1982, Higginbotham 1985, Reinhart 1983, Safir 2004), they draw primarily on intuitive judgments and fail to explicitly identify the specific conditions that give rise to varying acceptability. To fill this gap, I employ offline measures (forced choice task and judgment tasks) and systematically manipulate a range of independent variables to demonstrate that unavailability of coconstrual in structurally marked backwards anaphora traditionally referred to as the “Principle C effect” is, in fact, a more nuanced phenomenon.

I propose that a more accurate way of conceiving of the depressed acceptability of coconstrual in structurally marked backwards anaphora is in terms of the “overall obviation effect.” Based on previously unavailable experimental data, I argue that this effect is both composite and gradable. It incorporates the Principle C effect, which is a strong, but not a categorical restriction on pronominal interpretation. The magnitude of the overall obviation effect further varies depending on a wide range of factors that are common to all cases of backwards anaphora: structurally marked and structurally neutral. These other factors include, but are not limited to, plausibility of coconstrual, salience of the pronominal antecedent (subjecthood, topicality, prosodic prominence), (Not)-At-Issue status of the proposition containing the two nominals, and order of operations during incremental processing. These findings allow us to begin to make clear predictions about linguistic environments that will (or will not) give rise to coconstrual and enrich our understanding of the complex mechanisms behind pronominal reference resolution.

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Chapter 1

Principle C: Syntax vs. Pragmatics

In this chapter I provide an overview of theoretical and experimental investigations into Principle C of the Binding Theory, with a special emphasis on cases that constitute apparent counterexamples to syntactic Principle C. I further present a brief summary of alternative, pragmatic accounts of Principle C targeting these counterexamples, discuss their strengths and shortcomings, and show that certain classes of data still cannot be fully addressed by these alternative approaches. The chapter is organized as follows. Section 1.1 outlines the standard syntactic approach to the Binding Theory, focusing on the version of Principle C as formulated in Chomsky (1981). Section 1.2 lays out representative classes of problematic data that have been accumulated in the linguistic literature over the years and examines pragmatic approaches proposed to account for such apparent counterexamples to Principle C. In this section I also show that while these approaches properly account for certain classes of problematic data, they nevertheless fall short of generating accurate predictions of acceptability for all the data in the spectrum. Finally, Section 1.3 concludes the chapter with a summary of the theoretical questions to be addressed in the dissertation, and an overview of the material presented in subsequent chapters.

1.1 Chomsky's (1981) classical Binding Theory and Principle C

Referential noun phrases, i.e., phrases whose function in the discourse is to identify some entity (person, object, concept, event, etc.) can be subcategorized into three different types according to the degree of their syntactic and semantic (in)dependence (Chomsky 1981). The first type is names, or R-expressions. R-expressions are DPs that have a fixed reference; and the resolution of this reference is independent of other DPs in the sentence. The examples of such expressions typically include names and definite descriptions such as *the girl*, *my*

cat, Sasha, the president of France, etc. R-expressions do not require having an antecedent of any kind: they do not stand for another referential expression, and they have their own semantic content.

The second type is pronouns, i.e., expressions such as *I, you, she, he, they*, etc. Those elements are only specified for their ϕ -features, i.e., person, number, and gender, or a subset of those (Chomsky 1981, Sudo 2012). Unlike R-expressions, pronouns do not have a fixed referent. They can have a specific linguistic antecedent (e.g., an R-expression pointing to the same individual in the preceding linguistic context); however, they are not required to have one, as their reference can be also delivered deictically, e.g., through gesture.

The third type of referential expressions is anaphors, a class that includes reflexives such as *himself* or *herself*, and reciprocals such as *each other*. The crucial property of anaphors is that they have no capacity for “inherent reference” (Chomsky 1981). They fully rely on other types of referential expressions for their meaning, i.e., they require a sentence-internal linguistic antecedent from which they receive their semantic interpretation.

Thus R-expressions, pronouns and anaphors are distinct in terms of whether or not they have their own semantic content and how their semantic content is delivered. Furthermore, this subcategorization of DPs into three classes is also supported by the empirical facts about the distribution of referential expressions in the discourse. Each class reveals unique patterns in their syntactic distribution, particularly their relative distribution with respect to one another sentence-internally. The examples in (4) and (5) illustrate this strict division. In (4), only a pronoun can be used as an embedded subject to refer to the same individual as the matrix subject pronoun, as shown in (4a), but not the name, as in (4b), and not the anaphor, as in (4c). Similarly, in (5), where both referential expressions are within the same clause, only one type of nominal can refer to the same individual as the matrix subject pronoun. Here it can only be an anaphor, as in (5a), but not the name, as in (5b), and not another pronoun, as in (5c).

- (4) a. **She_i** argued that **she_i** was the best person for the job.
- b. ***She_i** argued that **Barbara_i** was the best person for the job.
- c. ***She_i** argued that **herself_i** was the best person for the job.
- (5) a. **He_i** talked about **himself_i** during a job interview.

- b. ***He**_{*i*} talked about **Jason**_{*i*} during a job interview.
- c. ***He**_{*i*} talked about **him**_{*i*} during a job interview.

Beside the distinctions in the relative distributions of different types of DPs in the language, the examples in (4a) and (5a) illustrate yet another important phenomenon. They show that it is possible for one referential expression to receive its interpretation from another referential expression. In such cases a dependency relation between the two is established. This relation, known as anaphoric relation or anaphora, emerges when a DP that appears later in the sentence (a dependent referential expression) obtains its reference from a DP introduced earlier (an antecedent) (Büring 2005, Chomsky 1981, Safir 2004). Data in (6)-(7) present examples of sentence-internal anaphora where a dependent DP, the reflexive *herself* in (6) and the pronoun *her* in (7), is referentially defined via an antecedent, the R-expression *Mary* or *Jane* respectively.

- (6) **Mary**_{*i*} was looking at **herself**_{*i*} in the mirror.
- (7) **Jane**_{*j*} said that this meeting was important to **her**_{*j*}.

Anaphora is traditionally represented by marking referential expressions with matching indices, e.g., *i* or *j*, as shown in (6) and (7). The semantic interpretation of this notation is the following: if the two DPs carry the same index, this means that there is a full overlap between their referential values¹.

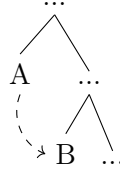
Within the Generative approach to syntax, it is the Binding Theory that focuses on the patterns associated with the availability of anaphoric relations based on the structural positions of nominals (Büring 2005, Chomsky 1980, 1981, Reinhart 1983, Safir 2004). The Binding Theory is primarily concerned with the structural rules and restrictions governing the extent of possible syntactic positions and the range of accessible interpretations for all three types of referential expressions: anaphors, pronouns and names. The framework was first introduced in Chomsky (1973), and then revised and amended in a number of later works (Chomsky 1980, 1981, 1986).

¹In this dissertation, I will use coindexation as a theoretically neutral notation to indicate cases where two nominal expressions share the same referent.

The classical Binding Theory addresses conditions on structural positioning of referential expressions within a sentence. Specifically, it relies on a structural relationship *c-command* (8), which stands for *constituent-command*, in characterizing relations between DPs sentence-internally. This relation was first introduced in Reinhart (1981) and is schematically represented in Fig. 1.1.

- (8) **c-command**: Node A c-commands node B if and only if
- a. A does not dominate B and B does not dominate A, and
 - b. the first branching node dominating A also dominates B.

Figure 1.1: Tree structure illustrating the *c-command* relation between A and B

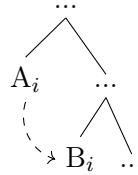


The notions of c-command and co-indexation are then brought together in the classical definition of *binding* (Chomsky 1981), as shown in (9) and schematically represented in Fig. 1.2.

- (9) **Binding**: A binds B if and only if
- a. A is co-indexed with B, and
 - b. A c-commands B.

If a category is not bound, it is **free**.

Figure 1.2: Tree structure illustrating the *binding* relation between A and B



While **binding** is the first key factor in establishing the scope of possible referential relations between different types for DPs, and ultimately for relative distribution of DPs in a sentence, the second key factor is **locality**. In Chomsky (1981), each of the three types of referential noun phrases is associated with a structural constraint on possible referential

relations. For anaphors and pronouns, these constraints are defined in terms of local binding domains, or governing categories (the smallest DPs or clauses that properly contain the nominal in question). For names, there is no locality restriction. Accordingly, Chomsky (1981) formulates his binding principles as follows:

(10) **The Binding Principles:**

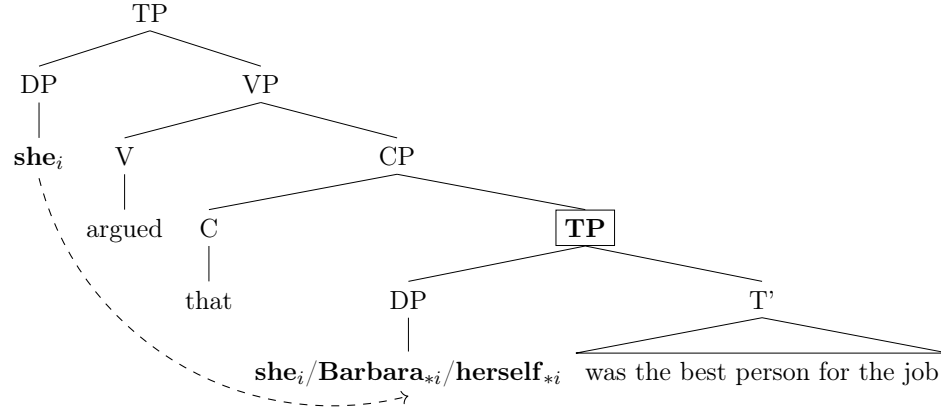
- a. Principle A: An anaphor must be bound in its local domain.
- b. Principle B: A pronoun must be free in its local domain.
- c. Principle C: An R-expression must be free.

We can now apply these binding principles to account for the intuitive judgments of possible anaphoric relations presented in (4) and (5), and repeated here as (11) and (12) for convenience.

- (11) a. **She_i** argued that **she_i** was the best person for the job.
- b. ***She_i** argued that **Barbara_i** was the best person for the job.
- c. ***She_i** argued that **herself_i** was the best person for the job.
- (12) a. **He_i** talked about **himself_i** during a job interview.
- b. ***He_i** talked about **Jason_i** during a job interview.
- c. ***He_i** talked about **him_i** during a job interview.

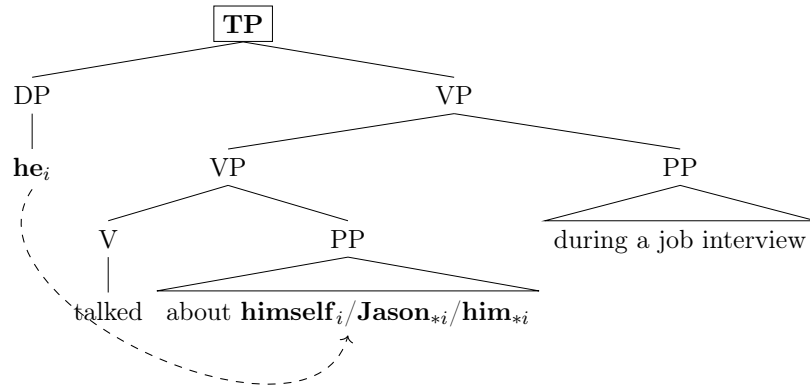
As shown in Fig. 1.3, in (11a) the subsequent pronoun *she* is free in its local domain (in the figure, it is the embedded clause indicated by a squared maximal projection in bold), as it is the subject of this embedded clause and is not c-commanded by any other DP within it. This is in agreement with the restriction imposed by Principle B, thus both matrix and embedded subjects can refer to the same individual. In (11b), the name *Barbara* is in the same structural position. i.e., it is the embedded subject, but the condition on R-expressions is such that they must be free *everywhere*. Here the name *Barbara* is not free: it is bound by the matrix subject, and consequently Principle C rules out the anaphoric relation between the two. In (11c), the anaphor *herself* does not have an antecedent that binds it in its local domain, as it is in the subject position of the embedded clause, which is a violation of Principle A.

Figure 1.3: Tree structure illustrating the *c-command* relation and the local binding domain for the embedded subject in (11)



As illustrated in Fig. 1.4 for the examples in (12), the second referential expression is within the same clause as the matrix subject, i.e., it has a *c-commanding* antecedent within its local domain (in this case, the matrix clause, which is also indicated by a squared maximal projection in bold in Fig. 1.4). This makes anaphoric relation possible for (12a): the anaphor *himself* is bound in its local domain, as Principle A requires. At the same time, the anaphoric dependency is ruled out for (12b) and (12c). In the former, the name *Jason* is not free within the sentence, which is in conflict with Principle C. In the latter, the pronoun *him* is bound in its local domain by the matrix subject, which constitutes a Principle B violation.

Figure 1.4: Tree structure illustrating the *c-command* relation and the local binding domain for the PP-embedded nominal expression in (12)



The first two Binding Principles are closely connected to one another, as they predict that reflexives and pronouns should appear in complementary distribution within their local

domain. Principle C, on the other hand, stands aside in that it is non-local, i.e., it imposes a structural restriction on cases where a name can (or cannot) pick out the same referent as another nominal expression *within the entire sentence*. Following Safir’s (2004) terminology, I will use the term *coconstrual* to broadly indicate a full identity overlap relation between two nominal phrases². Principle C can be then viewed as a syntactic constraint imposed on potential intra-sentential coconstruals involving names.

As formulated in Chomsky (1981), Principle C accounts for a wide range of empirical data, including the barred coconstruals in sentences such as (13) and (14). In both examples, the name *John* and the nominal expression that precedes it (the pronoun *he*, as in (13), or another name *John*, as in (14)), cannot pick out the same individual. In each sentence the coconstrual between the two nominals is deemed ungrammatical by Principle C.

(13) ***He**_{*i*} said that **John**_{*i*} would win. (Chomsky 1981: p. 193, ex. (25i))

(14) ***John**_{*i*} said that **John**_{*i*} would win. (Chomsky 1981: p. 193, ex. (25ii))

Both (13) and (14) represent cases where anaphoric relations between the two nominal expressions are not possible. Following Higginbotham (1985) and Safir (2004, 2013), I will further refer to such induced failure of coconstrual as *obviation*. In (13), *he* c-commands *John*. As a result, a syntactic condition, Principle C, applies; and it promotes an interpretation where *he* and *John* refer to two distinct individuals. This means that because of this condition *he* and *John* stand in a relation of *obviation*, or that *he* and *John* are *obviative*. The same applies to both instances of *John* in (14).

Chomsky’s Principle C was not the first theoretical proposal that aimed at restricting the possibility of coconstrual involving names. To account for coconstruals that do not involve anaphors, Lasnik (1976) (later republished as Chapter 4 in Lasnik (1989)) suggested that those are not licensed syntactically and proposed the Non-Coreference Rule, where instead

²Evans (1980) and Reinhart (1983) were the first ones to discuss a distinction between two different types of coconstrual: bound variable anaphora and coreference. With bound variable anaphora, the value of the dependent nominal expression, a pronoun or an anaphor, varies with that of the c-commanding antecedent. In case of coreference, the dependent nominal expression only *happens* to pick out the same individual as its antecedent. Still, both of these relations establish an identity overlap between the two nominals in the discourse. In this dissertation, I primarily focus on names in the c-commanded position. Accordingly, the type of coconstrual that I investigate can be classified as “coreference” under Reinhart’s (1983) terminology. Still I anticipate that the observations and conclusions presented here can be eventually generalized to both bound variable anaphora and coreference. For this reason, I choose the term *coconstrual* as it is a broader one.

of formulating licencing principles that make certain coconstruals possible, he introduced blocking principles to ensure that some of them are ruled out.

First, Lasnik (1976) proposed that whenever a pronoun occurs in the c-commanding domain of a name, as in (15), the hearer makes the decision about whether or not this pronoun is coconstrued with the c-commanding name based on the pragmatic information available to them. Thus, the pronoun does not enter into a syntactic binding relation with the nominal; it may pick out the same referent as the c-commanding name, based on the context, discourse situation or real world knowledge.

- (15) **Jane**_{*i*} took **her**_{*i*} car to be inspected.

The proposed rule introduces the possibility for a pronoun to pick the same referent as the c-commanding nominal expression without requiring a syntactic dependency relation with this nominal expression. For this reason, Lasnik (1976) further needed to exclude this option for cases where the pronoun is in the c-commanding position; and the name is the c-commanded nominal expression, as in (16).

- (16) **She**_{**i/j*} said **Jane**_{*i*} would be on time for the staff meeting.

Under unmarked prosodic conditions and unexceptional discourse setting, the sentence in (15) can be naturally interpreted so that pronoun *she* in the embedded clause picks out the same individual as the matrix subject R-expression *Jane*. On the contrary, in (16), if the prosody and the context are equally neutral, the natural interpretation is that of *obviation* between pronoun *she* and name *Jane*. To account for this contrast and rule out the possibility of the two nominals accidentally picking out the same referent in (16), Lasnik (1976) introduced the Non-Coreference principle, as shown in (18) (with a minor modification)³.

- (18) **Non-Coreference Principle:** If NP₁ c-commands NP₂, and NP₂ is not a pronoun, then NP₁ and NP₂ are obviative.

³In his arguments, Lasnik (1976) appeals to the combination of two factors – *precedence* and the syntactic relation of *kommand* – instead of *c-command*. Kommand is defined as follows:

- (17) A kommands B if the minimal cyclic node dominating A also dominates B, with cyclic nodes being CP, vP and NP (cf. similar syntactic relation discussed in Langacker (1969), Jackendoff (1972), Bruening (2014)).

The requirement that an R-expression must be *obviative* (i.e., free) from any c-commanding antecedent, be it a pronoun or a name, applies to a significant part of empirical data in English, but it may not necessarily be applicable cross-linguistically. This was first noted for Thai and Vietnamese in Lasnik (1989), and then discussed in multiple sources including Hoonchamlong (1992), Lee (2003), Larson (2005) and Deen and Timyam (2018).

As Lasnik (1989) points out, in both Thai and Vietnamese, coconstrual is ruled out only when the c-commanding nominal is a pronoun, but it can hold with repeated names when one R-expression c-commands the other. This is illustrated by the Thai data below. In (19), the pronoun c-commands the name, so the two positions are obviative, and coconstrual is impossible. In a minimally different example (20), the R-expression *Noi* c-commands an identical R-expression *Noi*; and this is a grammatical sentence of Thai if coconstrual is intended by the speaker.

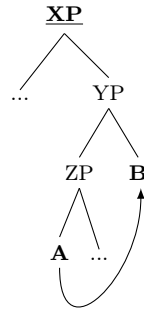
- (19) ***kháw**_i khít wâa **nây**_i cà? chaná?
 she think that **Noi** will win
 “She thinks that Noi will win.”

(Deen and Timyam 2018: p. 163, ex. (7c))

- (20) **nây**_i khít wâa **nây**_i cà? chaná?
 Noi think that **Noi** will win
 “Noi thinks that Noi will win.”

(Deen and Timyam 2018: p. 163, ex. (7a))

Figure 1.5: Tree structure illustrating the *kommand relation* between A and B (XP is a cyclic node, YP and ZP are not)



Here, when citing Lasnik’s Non-Coreference Principle in (18), I switch to the term *c-command* instead, for the sake of uniformity. Indeed there are cases where appealing to c-command fails to provide accurate predictions of possible binding relations (for a detailed review and discussion of such cases, see Bruening (2014)). Still this problematic data is not the center of discussion in this dissertation.

Based on this observation, Lasnik (1989) proposes that Principle C should be viewed as consisting of two parts. The first part is a universal principle that addresses coconstruals where a name is c-commanded by a pronoun, as in (21); and this principle is observed cross-linguistically. The other part is more general; it addresses all c-commanding nominal expressions, as in (22), and it is language-specific (e.g., it applies to English, but not Thai or Vietnamese).

(21) A pronoun must not bind an R-expression.

(22) An R-expression must be free (i.e., obviative).

In this dissertation I will primarily focus on Principle C as a universal constraint, as in (21), i.e., I will investigate cases where the name is c-commanded by a potentially coconstrued pronoun.

In the following section, I present a range of counterexamples to Chomsky's (1981) Principle C, where the pronoun c-commands the name, but coconstrual between the two is still judged as acceptable. I further lay out several alternative theoretical accounts that address such problematic data and discuss their explanatory force and predictive ability.

1.2 Problematic data and pragmatic accounts of Principle C

As formulated in Chomsky (1981), Principle C provides accurate predictions of acceptability for a significant portion of empirical data. However, over the years a large number of cases have been brought to light where Principle C fails to predict acceptability judgments, e.g., as in (23)-(27) below. These representative classes of data have been compiled from a variety of sources, both preceding and following the publication of Chomsky's (1981) work on the Binding Theory.

(23) Statements of guises:

a. Clark Kent hurried. **He_i** realized that **Superman_i** was urgently needed. (Levinson 2000: p. 302, ex. (40b))

b. **He_i** just could not believe that [**Ralph Barton Evans**]_i could be wrong.
(Bolinger 1977: p. 3, ex. (19))

(24) Identity statements:

- a. (Who is this man over there?) **He_i** is [**Colonel Weisskopf**]_i. (Grodzinsky and Reinhart 1993: p. 78, ex. (19a))
- b. **He_i** put on **John_i**'s coat; but only John would do that; so **he_i** is **John_i**. ((Higginbotham 1985: p. 570, ex. (63)), adapted and further discussed in detail in Safir (2004: p. 28, ex. (7)))
- c. **He_i** became known as **Napoleon_i**. (Levinson 2000: p. 302, ex. (40j))

(25) “Instantiation context” statements:

- a. I know what Ann and Bill have in common. She thinks that Bill is terrific and **he_i** thinks that **Bill_i** is terrific. (adapted from Evans (1980: p. 356, ex. (49)), cited in Grodzinsky and Reinhart (1993: p. 79, ex. (19d)))
- b. Everyone has finally realized that Oscar is incompetent. Even **he_i** has finally realized that **Oscar_i** is incompetent. ((Evans 1980: p. 357, ex. (52)), also cited in (Grodzinsky and Reinhart 1993: p. 78, ex. (19c)))
- c. What do you mean John loves no one? **He_i** loves **John_i**. (Evans 1980: p. 360, ex. (59))
- d. Only **Churchill_i** remembers **Churchill_i** giving the speech about blood, sweat, toil, and tears. (Fodor (1975: p. 134), cited in Grodzinsky and Reinhart (1993: p. 78, ex. (19b)))
- e. What did he do? – **He_i** did what **John_i** always does – he complained. (Bolinger (1979: p. 292, ex. (30)), cited in (Sag 2000: ex. (17a)))

(26) “Backgrounding” statements:

- a. **He_i** would have been like a son to both of us, if my wife and I could have kept **John_i** away from the influence of his family. (Bolinger 1977: p. 40, ex. (383))
- b. **He_i** was in a better health, when **John_i** paid us his next visit. (Bolinger 1977: p. 12, ex. (91))
- c. **She_i** was out of spirits when I last talked to **Mary_i**. (Bolinger 1977: p. 17, ex. (137))

- d. **He_i** had already shot himself before **John_i** quite knew what he was doing. (Bolinger 1977: p. 14, ex. (104))
- e. **He_i** had been staring at the control panel for over an hour when **Jack_i** received a message from his commander. (attributed to personal communication with G. Lakoff in Harris and Bates (2002: p. 239, ex. (4)))
- f. **He_i** is not to be believed, when **John_i** tells a crazy story like that. (Bolinger 1977: p. 30, ex. (296))

(27) Miscellaneous:

- a. I bought **him_i** the house that **John_i** always wanted. (Bolinger 1977: p. 21, ex. (193))
- b. The teacher warned **him_i** that in order to succeed[,] **Walter_i** was going to have to work a lot harder from now on. (McCray (1980: p. 331, ex. (6b)), cited in Sag (2000: ex. (17c))
- c. It was rather indelicately pointed out to **him_i** that **Walter_i** would never become a successful accountant. (McCray 1980: p. 331, ex. (7b)), cited in (Sag 2000: ex. (17d))
- d. If you try to tell **him_i** that the reason why **John_i**'s dog was taken away from him_[i] was rabies, he_[i]'ll get very upset. (Sag 2000: ex. (173))

It is important to emphasize that for the majority of data presented above, the authors used their own judgments to access the well-formedness of the examples in question. Evans (1980) describes his data as something that “someone might reasonably say”; Sag (2000) acknowledges acceptability of coconstruals above without qualification; and Grodzinsky and Reinhart (1993) even deem their examples as “perfectly grammatical” (Grodzinsky and Reinhart 1993: p. 78)⁴.

With one possible exception that will be discussed later in this chapter, in the data presented in (23)-(27), the first nominal in bold (a pronoun or an R-expression) c-commands the second nominal in bold (an R-expression). And, in the overwhelming majority of cases,

⁴Grodzinsky and Reinhart (1993) indicate the coconstrual relation with italic font, but it may in fact be no coincidence that focus placement that favors acceptable coconstrual coincides with the italics.

the first nominal *c*-commands the name from the matrix subject position. The subsequent name typically occupies one of the following three positions *c*-commanded by the matrix subject: (i) a constituent within the same minimal clause, e.g., (24a)-(24c), or (25c), as illustrated in Fig. 1.6; (ii) a constituent in the embedded complement clause, e.g., (23a), (25a), or (25d), as illustrated in Fig. 1.7; or (iii) a constituent in the vP-adjoined adverbial clause, e.g., (26b), (26c) or (26f), as illustrated in Fig. 1.8.

Figure 1.6: Tree structure illustrating the *c-command* relation between a matrix subject and a constituent in the matrix clause

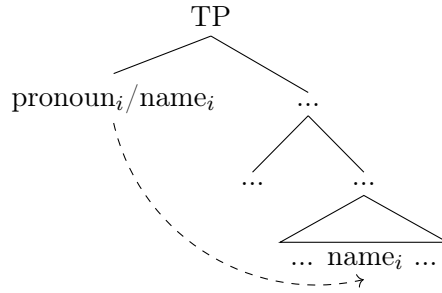


Figure 1.7: Tree structure illustrating the *c-command* relation between a matrix subject and a constituent in the embedded complement clause

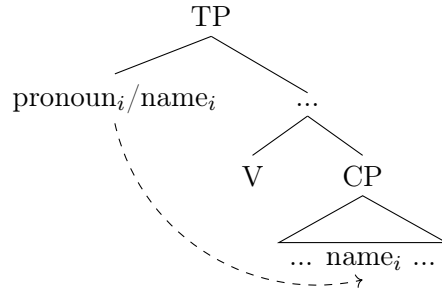
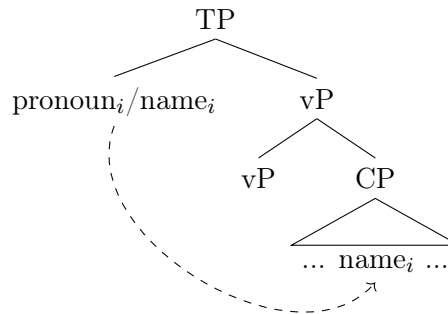
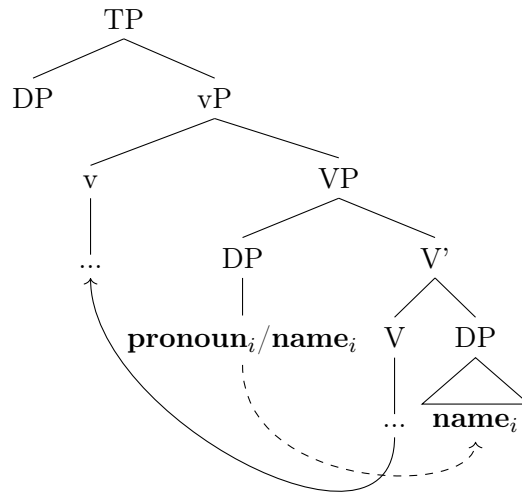


Figure 1.8: Tree structure illustrating the *c-command* relation between a matrix subject and a constituent in the vP-level adjunct clause



Thus for the majority of counterexamples, when the first nominal expression is in matrix subject position, the structural relation between the two nominal expressions is uncontroversial. The only cases where the c-commanding nominal is not the matrix subject are (27a), (27b), (27c) and (27d). In all of these sentences, the pronoun occupies the position of a higher argument in a double object construction. Following Larson (1988), Hale and Keyser (1993), and Chomsky (1995), I adopt the VP shell analysis, as represented in Fig. 1.9, and I will discuss the arguments for assuming the c-commanding relation between the indirect object and direct object in an English double object construction in more detail in Chapter 2. In Fig. 1.9, a solid line represents syntactic movement, while a dashed line represent c-command.

Figure 1.9: Tree structure illustrating the *c-command* relation between the indirect and direct object in a double object construction



Thus in all the problematic data presented in (23)-(27), the first nominal expression (a pronoun or a name) c-commands the following name⁵. At the same time, coconstrual between those two nominals is judged as acceptable. This means that each sentence from this set of data poses an apparent counterexample to Chomsky's Principle C.

These multiple counterexamples suggest that when a pronoun or a name c-commands an R-expression, Principle C alone is insufficient for determining whether the coconstrual relation between the two is possible or not. In order to provide more accurate predictions

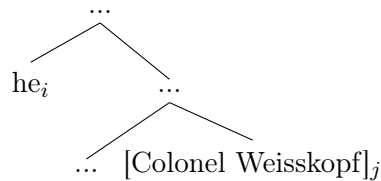
⁵Kazanina (2005) proposed that examples such as (26d) and (26e) do not have the pronoun c-commanding the R-expression, since the adjunct clause is merged as a clausal conjunct. I will discuss this claim in more detail later in this section.

of which coconstruals are acceptable, one needs to appeal to factors other than structural constraints. This observation is not novel. Previous theoretical proposals have also pointed out that Principle C alone is not enough to determine the range of possible coconstrual relations and attempted to account for apparent counterexamples by appealing to factors outside syntax (e.g., Chien and Wexler 1990, Evans 1980, Grodzinsky and Reinhart 1993, Harris and Bates 2002, Heim 1982, Johnson 2012, Levinson 2000, Reinhart 1983, Safir 2004, Schlenker 2005). Still, each of these accounts only explains a portion of the problematic data; and none of them puts forward a proposal detailed enough to allow us to systematically predict when such structurally problematic coconstruals will be judged acceptable by native speakers. To illustrate these points, I will review the main claims distilled from some of these proposals below.

Heim (1982) offered an account of a part of the problematic data appealing to the notion of *guises* (Lewis 1979), an approach she further advanced in Heim (1998). Heim (1982) proposed that in order to account for possible coconstruals ruled out by Principle C, it is critical to capture the correct relation between coindexing and coreference. Heim’s key point was that even if the two nominal expressions refer to the same individual, it is still not obligatory for them they carry the same index. She proposed that “contextually furnished referents come in *guises*”. If the pragmatics of the situation is such that it supplies distinct perspectives (or mental representations) of an individual, this individual may be present in the discourse in two (or more) distinct guises and consequently, be associated with two (or more) distinct indices. If the pair of nominal expressions in question are not coindexed, then there is no binding relation between the two; the c-commanded name is free; and Principle C is observed. This is shown in (28) and Fig. 1.10.

(28) (Who is this man over there?) He_i is [*Colonel Weisskopf*] $_j$.

Figure 1.10: Tree structure for (28) illustrating contraindexation



Formulated as such, Heim’s proposal may account for (i) sentences that (quite literally) refer to distinct guises/perspectives of the same individual, as in (23); (ii) *identity statements*, as in (24); and perhaps also (iii) ‘*instantiation context*’ examples, as in (25). I will now discuss each of these categories individually.

With the first group of examples (I’ll refer to them as “statements of guises”), as in (23), the listener knows from the start that all the nominals in the sentence refer to one and the same individual: *Superman*, as in (23a), or to *Ralph Barton Evans*, as in (23b). Still in these examples, there are certain properties that the individual in question possesses only when under a particular *guise*: it is only *Superman* who can help the city in (23a), and it is *Ralph Barton Evans* who, when referred to by his full name, is apparently a highly authoritative person and is always right, as in (23b). Thus Heim’s contraindexation approach successfully accounts for the possibility of coconstrual in such cases.

With identity statements in (24), it is only at the time of the statement that the listener is made aware that the two nominal expressions in the sentence refer to one and the same individual. Thus the individual in question can be also viewed as existing in two distinct *guises* (e.g., *he* - the topic of the conversation, and *Napoleon* - a historical figure in (24c)) in the eyes of the listener.

Finally, one can argue that the “guises” approach can be also applied to ‘*instantiation context*’ examples, as in (25). *Instantiation context* is a term introduced in Safir (2004) to refer to cases where individuals are singled out as instantiations of properties under discussion. That is, they serve to support or refute some posited generalization in the common ground (also discussed as *structured meanings* in Evans 1980, Fiengo and May 1994, Heim 1998, Reinhart 1983). One can argue that in all the examples in (25) the same individual is also represented by two guises: one of an observer/judge and the other of a person being observed/judged, e.g., in (25b) the unfortunate Oscar is assessing his own performance from an outside perspective, just as impartially as everyone else in the firm.

While Heim’s (1982) approach explains why coconstrual is possible in cases such as (23)-(25), is not straightforwardly applicable to the remaining problematic data, as in (26)-(27). The problem is largely due to the fact that this proposal does not offer a precise formulation of which specific pragmatic factors give rise to multiple guises of the same individual in

the discourse. Heim (1982) views *the guise* as “a bunch of properties that the discourse participants perceive about the individual, i.e., properties concerning its vital appearance and its location relative to the discourse participants” (Heim 1982: p. 201). She does not elaborate on formal characteristics of sentences/contexts that allow for the emergence of two distinct sets of such properties. Even though the notion of guises seems intuitively clear, the lack of formal definition renders it impossible to make an unambiguous decision regarding its applicability to each individual data point on our list.

Grodzinsky and Reinhart (1993), following an earlier work by Reinhart (1983), also argued for the division of labor between syntax and pragmatics in establishing referential dependencies between nominals intra-sententially. They proposed the existence of two distinct mechanisms of establishing coconstrual relations between referential expressions: bound anaphora and pragmatic coreference. Grodzinsky and Reinhart (1993) assume that coindexation is only relevant for bound anaphora relations, and that Principle C effects follow from an independently necessary restriction on bound anaphora, as stated in (29), and the pragmatically interpreted Rule I, as stated in (30).

- (29) a. An empty category is a variable if it is A-bound⁶ by a quantifier.
 b. A pronoun or anaphor that is interpreted as a variable must be A-bound.
- (30) **Rule I:** NP A cannot corefer with NP B if replacing A with C, C a variable A-bound by B, yields an indistinguishable interpretation.

Grodzinsky and Reinhart (1993) formulated Rule I to create competition between two different forms of establishing coconstrual relations and favor bound variable anaphora as the preferable form of coconstrual whenever it is available. If the speaker could have used a pronoun that could be interpreted as a bound variable, but used a name instead, the listener must assume that the speaker intended for the two nominals to be obviative, i.e., to refer to distinct individuals. To illustrate this point, suppose a speaker uttered a sentence as in (31). If the speaker had intended coconstrual between the matrix subject and the DP denoting the possessor of the car, they could have used an alternative way to express the same meaning: possessive pronoun *her* instead of *Hanna's*, where the possessive would be

⁶A-binding is a binding relation in which an antecedent is in an argument position.

interpreted as a variable bound by the subject pronoun *she*, as shown in (32).

(31) **She** drove **Hanna**'s car to Montreal.

(32) **She**_{*i*} drove **her**_{*i*} car to Montreal.

Since the speaker chose to say (31) and not (32), the listener is to assume that coconstrual was not intended, and the driver was someone other than Hanna.

According to Grodzinsky and Reinhart (1993), the only time when a name can be c-commanded by its intended antecedent is when replacing the name with a bound variable (pronoun or anaphor) does not produce an identical interpretation of the sentence. This point can be best illustrated using *instantiation context* sentences, as in (25). Let us consider (25a) repeated below as (33).

(33) I know what Ann and Bill have in common. She thinks that Bill is terrific and **he** thinks that **Bill** is terrific.

The point made in (33) is about a property shared by Ann and Bill, specifically, that they both think that Bill is terrific. Thus the second sentence in this example is about the set of individuals $S = \{x \mid x \text{ thinks that Bill is terrific}\}$, to which both Ann and Bill belong⁷. Replacing the name *Bill* with the pronoun *he*, which would potentially be eligible for a bound variable interpretation, as shown in (34), would bring about a interpretation where Ann and Bill no longer belong to the same set.

(34) I know what Ann and Bill have in common. She thinks that Bill is terrific and **he**_{*i*} thinks that **he**_{*i*} is terrific.

In (34), Ann is in the set of people $S_1 = \{x \mid x \text{ thinks that Bill is terrific}\}$, while Bill belongs to $S_2 = \{x \mid x \text{ thinks that } x \text{ is terrific}\}$. Even though these sets may be coextensive, such interpretation is distinct from the one proposed for (33), which makes Rule I applicable, and allows for establishing pragmatic coreference between *he* and *Bill* in (33).

Rule I can be successfully applied to account for the same classes of problematic data as

⁷I use this notation to designate that *S* is a set of individuals such that for every person *x* in the set, it holds that this person possesses the specified property (here – believing that Bill is terrific).

Heim’s (1982) theory of guises: it explains why *statements of guises* in (23), *identity statements* in (24), and *instantiation context statements* in (25) allow for the c-commanded name to refer to the same individual as the c-commanding name/pronoun. In all of those cases, replacing the c-commanded R-expression with a bound variable would yield an interpretation distinct from the original.

Still, whether Rule I can be applied to data in (26)-(27) remains unclear. When Reinhart (1983) argued that the constraint on intra-sentential coreference cannot be syntactic, she proposed instead that it must be based on an inference derived from sources such as knowledge of the grammar, meaning, and appropriateness to context. One might consequently argue that replacing the name with a bound variable in cases such as (26)-(27) delivers a slightly different, nuanced reading, (compare (35a) to (35b)), but none of those distinctions rise to the sharpness of the contrast observed between (36a) and (36b), or (37a) or (37b), where such replacement changes the intended meaning.

- (35) a. I bought **him** the house that **John** always wanted.
 b. I bought **him_i** the house that **he_i** always wanted.
- (36) a. **He** became known as **Napoleon**.
 b. **He_i** became known as **himself_i**.
- (37) a. **Clark Kent** hurried. **He** realized that **Superman** was urgently needed.
 b. **Clark Kent** hurried. **He_i** realized that **he_i** was urgently needed.

Summing up, Rule I as pragmatic restriction on coreference (Grodzinsky and Reinhart 1993, Reinhart 1983) offers a clearly defined test for whether a c-commanded name can felicitously refer to the same individual as a c-commanding nominal expression. As a result, Rule I can be unambiguously applied to account for some of the problematic data in question (statements of guises (23), identity statements (24), and instantiation context statements (25)). Still, just as with Heim’s (1982) theory of guises, we are faced with a problem of accounting for acceptability judgments of only a part of the problematic data set.

Reinhart’s Rule I was one of the first proposals introducing *competition-based theories of anaphora*. For this group of theories, the fact that binding Principle A and binding Principle B are observed within to the same local domain is not coincidental or unexplained (as it

might be for Chomsky’s Binding Theory). Instead this complementarity in the distributions of pronouns and anaphors (Principle A vs. Principle B cases), and also in the distribution of pronouns and names (Principle A/B vs. Principle C cases), is attributed to lost competition, i.e., “a *less anaphoric* form cannot be coconstrued with the antecedent if a *more anaphoric* form is available” (Safir 2013: p. 544).

Safir (2004) also views the patterns observed in the distributions of nominal expressions relative one another as evidence that there is competition between forms to deliver an interpretation in a given syntactic context. Following Burzio (1989) and Levinson (1987), Safir built on the intuition that Principle B effects can be derived based on an assumption that anaphors are obligatory if they are available. This means that if an intended interpretation can be delivered via the use of an anaphor, it follows that replacing that anaphor with a pronoun would result in an unacceptable coconstrual. Similarly, Principle C effects follow from an assumption that bound pronouns are obligatory when those are available. This leads to a reformulation of the syntactic restriction on backwards anaphora (i.e., case where a pronoun linearly precedes a name in a sentence) as Pragmatic Obviation, or Syntax-Induced Obviation (38), as it is labeled in Safir’s later work (Safir 2013: p.118).

- (38) **Syntax-Induced Obviation:** If X can be a binder for D-bound in position Y and Y is not D-bound, then X and Y are not expected to be coconstrued (i.e., they are obviative).

Unpacking theory-specific terminology, Syntax-Induced Obviation states that if X c-commands Y, and at the same time Y is not a D-bound, i.e., it is not a dependent pronominal form (feature-compatible A-bound variable), this creates an *expectation* of non-coconstrual between X and Y. As a result, the coconstrual between X and Y is not barred, but rather marked as *unexpected*. To account for cases where coconstrual in backwards anaphora with c-command is still available, Safir (2004, 2014) proposes that this expectation of non-coconstrual can be overridden given the right *pragmatic conditions*. Safir (2004, 2014) does not specify what these conditions are, or what it means that these conditions are “pragmatic”. Once again, we encounter a proposal that appeals to pragmatics without the levels of specificity required for it to be predictive. Thus applying this proposal to counterexamples to Principle C in question proves problematic.

While Reinhart (1983), Grodzinsky and Reinhart (1993) and Safir (2004) argued for a competition-based approach to the relative distribution of nominal expressions in the sentence, Chien and Wexler (1990) addressed the problematic data by questioning the relation between coindexation, on the one hand, and reference overlap, on the other. Chien and Wexler (1990) still proposed a division of labor between syntax and pragmatics: specifically, they argued that the relation between indices is regulated by syntax, while the interpretation of those indices is governed by pragmatic and semantic principles.

First, Chien and Wexler (1990) introduce pragmatic Principle P, as stated in (39).

(39) **Principle P:** Contraindexed DPs are non-coreferential.

Further, to account for the problematic data similar to those presented in (23)-(27), Chien and Wexler (1990) propose that exceptions to Principle P may be observed in cases where the *context* explicitly forces an interpretation where the two DPs pick out one and the same individual (Chien and Wexler 1990, Thornton and Wexler 1999), i.e., in such cases contraindexed DPs can be coconstrued. Formulated so broadly, this proposal also falls short of specifying the exact properties that a context should (or even more weakly, might) possess in order to allow coconstruction in the face of Principle C effects. As a result, it is not possible to precisely define the range of data that this proposal could account for, or to appeal to it to make specific predictions about acceptability judgments of coconstruction in a given context.

Harris and Bates (2002) take a somewhat different route, as they aim to address a very specific, syntactically restricted subset of the problematic data. Implementing a functionally oriented approach, Harris and Bates (2002) target sentences such as those presented in (26) that have the pronoun in the matrix subject position and the name embedded under the adverbial adjunct clause. They argue that manipulating information structure (“back-grounding” the matrix clause with the subject pronoun, e.g., via the use of progressive or pluperfect aspect) allows this pronoun to refer to the same individual as the name in its c-commanding domain contained in the adverbial adjunct clause, e.g., as in (26a), (26d), (26e), and also (40)-(41) below.

(40) **He_i** was threatening to leave when **Billy_i** noticed that the computer had died (Harris

and Bates 2002: p. 244, Table 1)

- (41) **He_i** was about to place a few bets when **Mike_i** was advised that the cops were in the bar. (Harris and Bates 2002: p. 262)

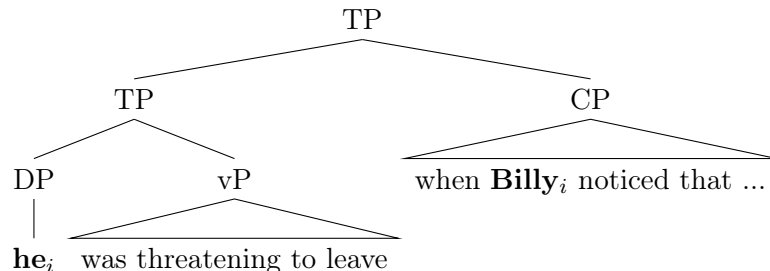
Unlike many other proposals, Harris and Bates (2002) do in fact identify a set of specific factors that foster coconstrual between the pronoun and the name in its c-commanding domain. However, they require all those multiple factors to be observed at the same time for a coconstrual interpretation to become accessible. As a result, they offer an account of an extremely restricted set of data which needs to satisfy all the following conditions simultaneously:

- a) the matrix clause has a verb in progressive or pluperfect aspect (e.g., *was discussing* or *had just begun*);
- b) the matrix subject pronoun c-commands the name in the subject position of an adverbial temporal adjunct clause introduced by subordinator *when* or *after*;
- c) the thematic role of the embedded subject is either a patient or experiencer.

As Harris and Bates (2002) themselves claim, deviating from any one of these conditions rules out the possibility of coconstrual.

Addressing the findings by Harris and Bates (2002), Kazanina (2005) questions whether cases such as (40)-(41) should be treated as counterexamples to Principle C at all. She proposes that in the data under consideration, the pronoun does not c-command the R-expression, as was suggested earlier in Fig. 1.8. Instead, the temporal clause is merged above the matrix subject; and there is no structurally problematic relation between the pronoun and the name, as shown in Fig. 1.11.

Figure 1.11: Kazanina's (2005) proposal for the structure of (40)



If this analysis is correct, the proposal from Harris and Bates (2002) is no longer relevant for the discussion of Principle C.

In this section I presented a range of counterexamples to syntactic Principle C compiled from multiple sources including Bolinger (1977, 1979), Evans (1980), Fodor (1975), Grodzinsky and Reinhart (1993), Harris and Bates (2002), Higginbotham (1985), Levinson (2000), McCray (1980), Safir (2004) and Sag (2000). Many of these counterexamples have been cited and discussed in more than one source, as these data present clear representative instances that have proven to be problematic for a syntactic account of Principle C effects.

I then gave a brief overview of crucial proposals alternative to Chomsky’s account of binding Principle C. Many of the influential proposals (Grodzinsky and Reinhart 1993, Heim 1982, Reinhart 1983) offered pragmatic accounts that could be successfully applied to the first three categories on the list: statements of distinct guises (23), identity statements (24), and instantiation content statements (25). In their own turn, Harris and Bates (2002) proposed a functionalist account of data with adverbial adjuncts similar to those presented in (26).

At the same time, proposals offering a pragmatic account of the problematic data (Chien and Wexler 1990, Grodzinsky and Reinhart 1993, Reinhart 1983, Safir 2004, 2014) lack the specificity needed to make systematic and accurate predictions of coconstrual acceptability across all the problematic data. As a result, acceptability of coconstrual in sentences such as (27) repeated here as (42) for convenience, remains largely unaccounted for.

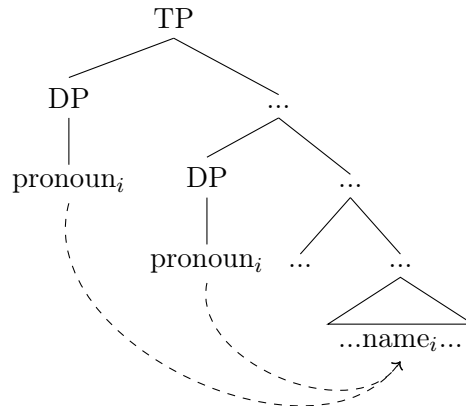
- (42) a. I bought **him_i** the house that **John_i** always wanted. (Bolinger 1977: p. 21, ex. (193))
- b. The teacher warned **him_i** that in order to succeed[,] **Walter_i** was going to have to work a lot harder from now on. (McCray (1980: p. 331, ex. (6b)), cited in Sag (2000: ex. (17c))
- c. It was rather indelicately pointed out to **him_i** that **Walter_i** would never become a successful accountant. (McCray 1980: p. 331, ex. (7b)), cited in (Sag 2000: ex. (17d))
- d. If you try to tell **him_i** that the reason why **John_i**’s dog was taken away from him_[i] was rabies, he_[i]’ll get very upset. (Sag 2000: ex. (173))

Given this state of affairs, our knowledge of the conditions under which coconstrual might be permitted in the face of the Principle C effect remains uncertain. In order to present a fully generative and predictive theory of coconstrual, it is incumbent upon us to gather empirical evidence about specific factors that play a role in allowing a coconstrual interpretation to become accessible, and explain why these factors perform the role that they do.

1.3 Open questions and the road map of the dissertation

Looking more closely at the data in (23)-(27), we can now make several observations concentrating on cases that are counterexample to Principle C as a universal constraint, i.e., cases where the c-commanding nominal is a pronoun. The first observation has to do with the *structural position of the c-commanding nominal* which varies between subject and object position. This variation is to be expected, since Principle C does not differentiate based on the structural position of the c-commanding nominal. It uniformly rules out coconstrual in cases where the pronoun c-commands the name from subject position or from a lower structural node, as shown in Fig. 1.12.

Figure 1.12: Tree structure illustrating ambivalence of Principle C to the structural position of the c-commanding pronoun



Still, the data in (27), which remains unaccounted for by the classical Binding Theory, as well as alternative, pragmatic accounts, suggests that the choice of pronominal syntactic position matters. Moreover, pronominal position further interacts with *prosody* and *focus structure* (Bolinger 1977, 1979, McCray 1980), as illustrated by the examples in (43)-(44).

(43) **He_i** just could not believe that [**Ralph Barton Evans**]_i could be wrong.

(44) What did he do? – **He_i** did what **John_i** always does – he complained.

When the pronoun is in the subject position, as in (23b) or (25e) (repeated as (43) or (44) for convenience), coconstrual appears to be made possible with focus prosody. For example, a H* pitch accent placement on the pronoun *he* and/or the c-commanded name does not ameliorate such examples. Instead, another element in the sentence hosts the focus also or instead (e.g., *believe* in (43) or *always* in (44)). By contrast, when the pronoun is in object position, e.g., (27b) or (27d) (repeated as (45) or (46) below), coconstrual is facilitated when the pronoun is de-stressed (or at least lacks a pitch accent). If the c-commanding pronoun *him* in (45)-(46) were given an H*, coconstrual would most likely not be an option.

(45) The teacher warned **him_i** that in order to succeed[,] **Walter_i** was going to have to work a lot harder from now on.

(46) If you try to tell **him_i** that the reason why **John_i**'s dog was taken away from him_[i] was rabies, he'll get very upset.

While the special role of subject position of the antecedent has been noted in the literature as early as in Lakoff (1968) and Bolinger (1977), the explanation of the observed differences between the two structural positions and their relation to prosody has not been addressed systematically.

The second important property of the counterexamples to Principle C presented in the previous section is that many of them are constructed in such a way as to encourage (or at least leave the door open for) coconstrual between the pronoun and the name based on the *plausibility of coconstrual* in a given context, as defined by the real world knowledge. For example, in (27b)-(27c) (repeated as (47)-(48) below), it may be possible that the salient male referent for the pronoun is a paternal caregiver for Walter, but it is just as likely (or even more likely) that the referent is poor Walter himself.

(47) The teacher warned **him_i** that in order to succeed[,] **Walter_i** was going to have to work a lot harder from now on.

(48) It was rather indelicately pointed out to **him_i** that **Walter_i** would never become a successful accountant.

Conceptualizing plausibility in such a way that its effect on interpretation is objectively measurable might be a challenging task that has not been attempted previously. Still, given the observations of the role of plausibility in judgments of coconstruals disfavored by syntax, it is important to formalize plausibility in order to provide an account of the data in question.

In the following chapter, I begin to present a set of experiments investigating the role of these two previously unaddressed factors in establishing coconstruals that are barred by Principle C: structural position of the c-commanding pronoun and plausibility of coconstrual.

In this chapter I have presented a brief overview of theoretical literature on coconstrual in backwards anaphora with c-command including Chomsky’s Principle C. I have also reviewed crucial counterexamples and alternative accounts of this data, and pointed out the weaknesses of these proposals where they fail to make systematic predictions about acceptability. The remainder of the dissertation has two primary goals: first, to show that there are multiple factors that have a consistent, systematic influence on judgments of structurally illicit coconstruals; and second, to provide an account of why this influence exists and how we can make accurate predictions about acceptability based on this knowledge. Chapter 2 researches the role of structural position of the c-commanding nominal and conceptual plausibility in acceptability of structurally illicit coconstruals. Building on these findings, in Chapter 3 I investigate (and eventually reject) the hypothesis that subject/non-subject asymmetry in pronominal reference resolution in structurally marked backwards anaphora has syntactic nature, i.e., it results from a structural reanalysis (extraposition) adopted by charitable speakers. Chapter 4 addresses an alternative hypothesis that the subject/non-subject asymmetry is non-syntactic by nature – and moreover – that this asymmetry is independent of Principle C effects and observed with both structurally-marked and structurally neutral backwards anaphora. Chapter 5 more broadly investigates the role of salience of the c-commanding nominal (including structural and prosodic prominence) coupled with increased processing load caused by processing multiple dependencies. Chapter 6 further addresses the role of plausibility and information structure and its relation to processing in two distinct types of constructions (attributive relative clauses and temporal clauses respectively). Finally Chapter 7 summarizes the discussion and considers the implications of the findings for the theory of the grammar and the theory of language processing.

Chapter 2

Plausibility and Subjecthood

In Chapter 1, I presented a brief overview of the theoretical literature on coconstrual in backwards anaphora with c-command. I further reviewed crucial counterexamples and alternative (pragmatic) accounts of this data, and pointed out the weaknesses of these alternative proposals, i.e., cases where they fail to make systematic predictions of acceptability. I also proposed that acceptability of coconstrual results from the combined effect of multiple structural and non-structural factors, not only the c-commanding relation between the pronoun and the name.

In this chapter, I explore the influence of two factors – conceptual plausibility of coconstrual and structural position of the c-commanding pronoun – on judgments of acceptability of coconstrual in sentences with Principle C effects. In particular, I ask the following three questions: (i) Does high plausibility of coconstrual between a pronoun and an R-expression in its c-commanding domain systematically increase coconstrual acceptability? (ii) Does the structural position of the c-commanding pronoun matter for how acceptable coconstrual is independent of plausibility? (iii) Are those two factors related to one another (and if yes, what is the nature of this relationship)?

Chomsky’s Principle C predicts that neither plausibility, nor structural position of the c-commanding pronoun should matter for acceptability of coconstrual in sentences with Principle C effects (Chomsky 1981). At the same time, as I have shown in the previous chapter, data that is problematic for syntactic Principle C demonstrate that these factors may have an effect on speakers’ judgments. This chapter aims at investigating this potential relationship experimentally.

Further I present the results of a forced choice experiment along with a follow-up judgment study designed for generalizability and replicability. The experimental results reveal that both factors — plausibility of coconstrual and the structural position of the

c-commanding pronoun – exert influence on speakers’ judgments, and yield a systematic additive effect. These findings override accounts that only appeal to syntactic Principle C, and substantially complement theoretical approaches that appeal to pragmatic expectations.

The chapter is organized as follows. In Section 2.1 I discuss the concept of plausibility in its application to linguistic research. In Section 2.2 I focus on the role of pronominal position in relation to Principle C and propose a link between plausibility manipulations and manipulations of pronominal position. In Section 2.3 I present the norming study conducted to create the stimuli for the experiments. In Section 2.4 I lay out the results of Experiment 1, a forced choice task study, and discuss its implications. Section 2.5 picks up this discussion and presents Experiment 2, a judgment task designed to confirm replicability of the findings of Experiment 1 across tasks and populations. In Section 2.6 I seek to integrate the findings of Experiments 1 and 2 to provide an account of how participants approach pronominal reference resolution in the face of a structural restriction on pronominal interpretation. Section 2.7 concludes the chapter.

2.1 Plausibility in psycholinguistic research

One of the questions frequently raised in psycholinguistic literature is how syntactic and extra-syntactic information (e.g., semantic or pragmatic information, or the knowledge of the real world and experience) interact with one another during language comprehension and processing. According to the influential “Garden Path Model” (Frazier and Fodor 1978), this interaction occurs in two stages: during the first stage only syntactic information is analyzed. Semantic and pragmatic data are taken into consideration later, during a second stage, to evaluate appropriateness of the syntactic analysis to the context and/or knowledge of the world (Altmann et al. 1992, Ferreira and Clifton Jr 1986, Ferreira et al. 2002, Frazier 1979, Frazier and Fodor 1978, Whitney 1998). When an individual encounters an ambiguous sentence, only one meaning is primarily processed. If this meaning does not make sense when assessed against the linguistic context or the real world scenario, an alternative analysis is then calculated. This can be illustrated by considering a structurally ambiguous example, such as (49).

- (49) The astronomer saw an accountant with a telescope.

The sentence in (49) allows for two distinct structural analyses, and consequently – two distinct interpretations. One possibility is that the PP “*with a telescope*” is adjoined to the vP; and then the reading is such that the astronomer used the telescope as an instrument to see the accountant. The other possibility is that this PP is embedded under the DP “*an accountant*”, which then delivers an interpretation where the accountant, who was holding a telescope, happened to be within the visual field of the astronomer.

Without any context, comprehenders would typically assume that the meaning of (49) is that the astronomer used the telescope as an instrument. One explanation for this would be that the DP “*the astronomer*” is semantically related to the DP “*the telescope*”, which supports a VP-adjoined parse as a result of semantic priming. Our knowledge of the real world also favors an interpretation where a representative of a particular profession uses the tool associated with this profession. Probability calculations based on usage combined with anticipatory properties of incremental processing also make such interpretation most plausible in the absence of a context that would suggest otherwise.

Alternatively, if the linguistic context preceding the example in (49) contained a reference to the fact that the accountant was studying the night sky from their window, while the astronomer was passing by in the street, the most plausible interpretation would be the one where it was the accountant who was holding the telescope. Thus the parse with the vP-adjoined prepositional phrase would be abandoned as inconsistent with the given scenario; and structural reanalysis would be performed.

Assessment of plausibility is an integral part of cognitive processing that is critical for a wide range of tasks including problem solving, decision making, and language comprehension. Within the domain of language processing, it has been interpreted and approached in several distinct ways: plausibility of co-occurrence of certain lexical items, plausibility of a particular pattern in the distribution of thematic roles in a given scenario, relative plausibility of competing interpretations of an ambiguous sentence given the real world knowledge and personal experience, etc. As a result, plausibility manipulations have been frequently used in a range of language processing studies; and much evidence has been collected to show that varying plausibility has significant effects on both comprehension and interpretation during sentence processing (Boland et al. 1990, 1995, Clifton 1993, Clifton Jr et al. 2003,

Ferreira and Clifton Jr 1986, Pickering and Traxler 1998, Tanenhaus et al. 1989, Traxler and Pickering 1996, Trueswell et al. 1994).

A sizable amount of experimental research has shown that manipulating plausibility influences such structure-rooted process as parsing; and it also has a significant effect on resolving ambiguities (Boland et al. 1990, 1995, Clifton 1993, Clifton Jr et al. 2003, Ferreira and Clifton Jr 1986, Garnsey et al. 1997, Kizach et al. 2013, Ni 1996, Pickering and Traxler 1998, Rayner et al. 1983, Tanenhaus et al. 1989, Traxler and Pickering 1996, Trueswell et al. 1994). For example, participants display a delay in reading times in the region following the verb *shot* for an implausible instrument *garage*, as in (50b), relative to a plausible one – *pistol*, as in (50a). A similar delay in reading times is observed in (50d), as compared to (50c).

- (50) a. That’s the **pistol** with which the heartless killer shot the hapless man...
 b. That’s the **garage** with which the heartless killer shot the hapless man...
 c. That’s the **garage** in which the heartless killer shot the hapless man...
 d. That’s the **pistol** in which the heartless killer shot the hapless man...

(Traxler and Pickering 1996: p. 458-459, ex. (8a-d))

In (50), two of the examples, i.e., (50a) and (50c), make sense. The other two, (50b) and (50d), though syntactically well-formed, are implausible or “semantically anomalous” (Traxler and Pickering 1996). This is consistent with our knowledge of the world and intuitions about language, since a plausible location of shooting, such as *garage*, is expected to be associated with preposition *in*, while a plausible instrument of shooting, such as *pistol*, is likely to be paired up with preposition *with*, and not the other way around.

Comparing examples such as (49) and (50) leads us to the following observation: in the language processing literature the term *plausibility* is often used as an umbrella term to refer to a variety of related, but still distinct phenomena. On the one hand, plausibility can be assessed based on conceptual coherence, which stems from the context, the inferences made between parts of the discourse, our experience and knowledge of the world (Collins and Michalski 1989, Connell and Keane 2004, Johnson-Laird 1983). Thus it is more conceptually coherent, or more in line with our knowledge of the real world that astronomers (and not

accountants) use telescopes. On the other hand, plausibility is also interpreted as related to word coherence (Connell and Keane 2004, Lapata et al. 1999), which is based on word co-occurrence frequencies. For example, we more frequently find the word *garage* in the vicinity of preposition *in*, while *pistol* is more frequently encountered next to preposition *with*.

Investigating the nature of plausibility judgments, Connell and Keane (2004) manipulated both concept coherence and word coherence to assess which of the two factors has more influence on assessments of plausibility. First, for concept coherence, they manipulated different inference types linking sentences in the discourse (causal, attributal, temporal), as shown in (51).

- (51) a. The bottle fell off the shelf. The bottle smashed. (causal)
 b. The bottle fell off the shelf. The bottle was pretty. (attributal)
 c. The bottle fell off the shelf. The bottle sparkled. (temporal¹)

The participants were then asked to assess the plausibility of each sentence pair on a Likert scale from 0 to 10. The results showed that the plausibility judgments are sensitive to the type of conceptual coherence established in event descriptions when different inferences are made. The perceived plausibility was greatest in the causal pairs, such as (51a). Connell and Keane (2004) attributed this finding to the fact that in such cases the two sentences are covered by a single direct informative inference.

Further, to compare the effect of manipulating concept coherence with the effect of word coherence, Connell and Keane (2004) used latent semantic analysis to ensure that two sentence pairs describing the same event had contrasting co-occurrence frequencies of lexical items involved. This is shown in (52).

- (52) a. *Causal inference, high co-occurrence ranking:*
 The opposition scored a penalty. The goalie wept.
 b. *Causal inference, low co-occurrence ranking:*
 The opposition scored a penalty. The goalie cried.

¹Connell and Keane (2004) suggest that the relation between the two sentences here is temporal, as they illustrate the sequence of events following one another: the bottle falling off the shelf, and then sparkling as it was going down.

c. *Attributal inference, high co-occurrence ranking:*

The opposition scored a penalty. The goalie was sluggish.

d. *Attributal inference, low co-occurrence ranking:*

The opposition scored a penalty. The goalie was slow.

The research question that Connell and Keane (2004) posed was which of the two types – conceptual coherence or word coherence – has a more pronounced effect on speakers’ judgments of plausibility. The procedure was identical to that of the first experiment; and the results replicated the previously observed causal-attributal effect, where the plausibility associated with causal inference was ranked higher than for attributal sentence pairs. The novel finding of Experiment 2 was that the main effect of co-occurrence frequency (i.e., word coherence) was not observed. Connell and Keane (2004) concluded that distributional properties of word co-occurrences can aid sentence interpretation and provide some necessary constraints by potentially offering thematic cues to situation goals and word semantics (Burgess et al. 1998). However, the contribution of this factor is considered at earlier stages of making plausibility judgments, and therefore may be overridden when the interpretation is later assessed against the context or the real world knowledge. Crucially, based on these experimental findings, Connell and Keane (2004) argue that the effect of word coherence on speakers’ judgments of plausibility is negligibly small as compared to that of conceptual coherence. When speakers make judgments or render behavioral responses, they primarily call upon their knowledge of the world, their experience and memory of prior events and relations to make inferences about the linguistic stimuli and assess whether the relations in the scenario evoked by their parse are a good match.

Coherence has been also shown to play a key role in pronominal reference resolution. One of the first theoretical proposals linking pronominal interpretation to discourse coherence was presented in Hobbs (1979), where the author argued that pronominal interpretation was not an independent process, but rather a result of more general reasoning about the most plausible interpretation of the utterance. Hobbs (1979) proposed that the mechanisms that are responsible for pronominal reference resolution are driven primarily by semantics: world knowledge and inference in particular. Specifically, Hobbs (1979) argued that both world knowledge and inference are key factors in establishing the coherence in discourse. To

illustrate, Hobbs (1979) analyzed paradigmatic examples from Winograd (1972), as shown in (53), and pointed out that pronominal reference resolution in each case is based solely on semantics and world knowledge, as the syntactic structures of both (53a) and (53b) are fully parallel.

(53) The city council denied the demonstrators permit because...

a. ... *they* feared violence.

b. ... *they* advocated violence.

Hobbs (1979) argued that the correct choice of referent for pronoun *they* in both (53a) and (53b) is a “side-effect” of the process of establishing *explanation coherence* in the discourse (as signaled by the subordinating conjunction *because*). Thus the crucial information determining the choice of the most plausible pronominal referent is semantic in nature, as it is primarily based on the establishment of the specified type of coherence relationship between the part of the utterance containing the pronoun, and the part of the utterance containing potential referents (Hobbs 1979, Kehler 2002, Kehler et al. 2008).

Kehler et al. (2008), seeking to bridge the gap between semantics and psycholinguistic research on pronominal reference resolution, took Hobbs’s proposal further and, through a series of psycholinguistic experiments, showed that the strategies in resolving pronominal ambiguities commonly cited in the psycholinguistic literature (grammatical role parallelism, distribution of thematic roles, implicit causality) are in fact epiphenomena of the methods through which various types of discourse coherence are established. Kehler et al. (2008) demonstrated that when the type of coherence (e.g., *explanation*, *parallelism*, *result*, etc.) is carefully controlled for, the effects of grammatical role parallelism (or other) preference can be neutralized.

To sum up, psycholinguistic research suggests that speakers assess plausibility based primarily on conceptual coherence, which relies on a number of factors including how well a particular interpretation agrees with the linguistic context, inferences made between parts of discourse, our experience and knowledge of the world (Collins and Michalski 1989, Connell and Keane 2004, Johnson-Laird 1983). Coherence-driven approaches have been also discussed in the context of pronominal reference resolution, with theoretical and psycholinguistic evidence demonstrating that in cases where syntax is mute, speakers are prone to

select the most plausible referent for the pronoun based predominantly on the type of coherence relation established in the discourse (Hobbs 1979, Kehler 2002, Kehler et al. 2008, Winograd 1972).

At the same time, previous work on coherence and its role in establishing the most plausible pronominal referent have focused (almost) exclusively on forwards anaphora (i.e., cases where the name linearly precedes the pronoun in a sentence). Moreover, they targeted cases of forwards anaphora that comply with Principle B of the Binding Theory. This means that in examples such as (53), the pronoun is free in its local domain, i.e., the syntax is silent with respect to the choice of pronominal referent; and the information required to resolve pronominal ambiguity is sought elsewhere. I will instead turn the focus to backwards anaphora with Principle C effects to test whether the effect of plausibility is still observed in cases where the syntax marks one of the referents as structurally illicit.

As I discussed in Chapter 1, alternative, pragmatic approaches proposed to account for data problematic for syntactic Principle C lack specificity with respect to which “pragmatic” or “contextual” factors make structurally illicit coconstruals viable (Chien and Wexler 1990, Grodzinsky and Reinhart 1993, Heim 1982, Reinhart 1983, Safir 2004, 2014). Here I propose that conceptual plausibility plays a role in pronominal reference resolution not only in structurally neutral, but also in structurally marked environments, i.e., conceptual plausibility is one of the factors that influences acceptability of coconstrual in sentences with Principle C effects.

In order for the information about conceptual plausibility to be efficiently and effectively recruited during online processing, it needs to have a structural representation. One way of operationalizing conceptual plausibility as a structure is in terms of a *schema*, a concept first introduced by Piaget (1926), and further developed in Bartlett (1932). In their terms, *schemata* are higher-level (consciously accessible) generic knowledge structures that organize lower-level (neural) representations and influence the comprehender’s interpretations, inferences, and expectations. They are *generic* in that they encode an abstracted summary of the components, attributes and relations that are typically instantiated in specific exemplars of real life scenarios (Ghosh and Gilboa 2014, Gilboa and Marlatte 2017, Graesser and Nakamura 1982).

Thus, our experience with individuals, objects, and events in the world leads us to encode certain relations and concepts which are further stored in our memory as structured representations (*schemata*). These representations guide our expectations and inferences about linguistic information in terms of plausibility, including plausibility of coconstrual. As we encounter novel scenarios, the schemata we encode in our memory set up expectations about coconstrual based on what we consider to be prototypical relations between event participants and objects involved.

Thus, the hypothesis that I entertain is as follows: apart from syntactic binding constraints, the processor is also guided by schemata, leading the comprehender to draw a comparison between referent/role assignments within a given scenario (or target sentence) and prototypical relations represented in memory. As a result, when a coconstrual interpretation is not consistent with a relevant schema, the interpretation is judged as implausible and may be ruled out even if Principle C is silent (if coconstrual is not syntactically constrained). Alternatively, if the role assignment that corresponds to a coconstrual interpretation is in agreement with a relevant schema, coconstrual may be seen as plausible and may be allowed by the speaker, even if it is ruled out by Principle C.

My goal in this chapter is to test this hypothesis experimentally, and propose a model of interaction between structural and extra-syntactic information during language processing.

2.2 The role of subjecthood in structurally marked backwards anaphora

Grammatical role, and subjecthood in particular, is known to matter for pronominal reference resolution in forwards anaphora (i.e., cases where the name linearly precedes the pronoun in a sentence) (Chafe 1976, Crawley and Stevenson 1990, Gordon et al. 1993, Kaiser 2006, 2011, McDonald and MacWhinney 1995, Stevenson and Urbanowicz 1995). At the same time, as I discussed in Chapter 1, Chomsky's Principle C does not distinguish whether the pronoun c-commands the name from a subject or from a non-subject position in the clause. In other words, regardless of what the specific position of the pronoun is, as long as it c-commands the R-expression, the prediction from the classical Binding Theory is such that coconstrual between the two is not possible (Chomsky 1981). Thus Chomsky's Principle C predicts that both (54) and (55) are equally unacceptable, if the reading is such

that the pronoun and the name refer to the same individual.

(54) ***She**_{*i*} told James that Bill picked up **Mary**_{*i*}'s dry cleaning.

(55) *James told **her**_{*i*} that Bill picked up **Mary**_{*i*}'s dry cleaning.

At the same time, as I noted in Section 1.2, counterexamples to Principle C that feature pronouns in a variety of structural positions lead us to propose that the choice of pronominal syntactic position matters. At the very minimum, the distinction between the two sentences reveals that pronominal position interacts with *prosody* and *focus structure* (Bolinger 1977, 1979, McCray 1980). While coconstrual with the subject pronoun in many cases appears to be made possible with focus prosody on the pronoun, coconstrual with the object pronoun is facilitated when the pronoun is de-stressed (or at least lacks a pitch accent).

One of the first linguists to document the subject/non-subject asymmetry in acceptability of coconstrual in backwards anaphora was George Lakoff (1968). He noted that it is more “unusual” to have coconstrual between a subject pronoun and a following R-expression (*He ... John ...*), as in (56) than between a non-subject pronoun and a following name (*... him ... John ...*), as in (57). Lakoff even claimed that the former was impossible.

(56) ***He**_{*i*} was hit by Mary, before **John**_{*i*} had a chance to get up. (Lakoff 1968: p. 6, ex. (40))

(57) Mary hit **him**_{*i*} before **John**_{*i*} had a chance to get up. (Lakoff 1968: p. 6, ex. (38))

Lakoff (1968) used (57) to show that pronominalization can go backwards to direct objects of main clauses; and he further suggested that the same is true for DPs in other non-subject positions: e.g., dative object, as in (58), and PP complement, as in (59).

(58) Mary gave **him**_{*i*} a dollar bill, before **Sam**_{*i*} had a chance to refuse.

(59) Mary placed a bowl of chicken soup before **him**_{*i*}, before **Sam**_{*i*} had a chance to refuse.

(Lakoff 1968: p. 6, ex. (41)-(42))

Bolinger (1977) also discussed subject/non-subject asymmetry in backwards anaphora contexts and proposed that the reason behind this asymmetry lies “in the possible motives for reidentifying the referent by means of a noun”. One specific motive that Bolinger cited

was to reintroduce the referent as a topic. In the sequence *he... John*, the referent is most likely already the topic of the utterance, since the pronoun referring to that individual is in the subject position of the sentence, and there is less motivation for using the name *John* later to reinstate the topicality of this character. In the sequence *him... John*, the referent is most likely not topical, and there is more reason then for repeating the name *John* further in the sentence.

Bolinger (1977) also suggested that coconstrual between a non-subject pronoun and a following name can be facilitated by particular prosodic focus placement, and that the same focus placement does not rescue coconstrual with a subject pronoun. This is illustrated by the contrast in (60)-(61).

(60) Why are you tackling him *nów*? – You can persuade him when John is *flush*. (Rise-fall-rise on *flush*). (Bolinger 1977: p. 33, ex. (328))

(61) Why are you tackling him *nów*? – *He can be persuaded when John is *flush*. (Rise-fall-rise on *flush*). (Bolinger 1977: p. 33, ex. (329))

Similarly to our earlier observations, Bolinger (1977) points out that here coconstrual with a non-subject pronoun is facilitated when the pronoun is destressed and other elements (*persuade* and *flush*) are focused.

Both Lakoff (1968) and Bolinger (1977) were among the first works that discuss the influence of pronominal position on the possibility of coconstrual in backwards anaphora, and both had been written before Chomsky (1981) formulated the Binding Theory linking the possibility of coconstrual to the structural relation of c-command. In their arguments, neither Lakoff (1968), nor Bolinger (1977) appealed to any type of hierarchical relation between the pronoun and the name, but concentrated primarily on linear precedence. On the other hand, generative (post-1981) works on coconstrual in backwards anaphora (Büring 2005, Grodzinsky and Reinhart 1993, Higginbotham 1985, Reinhart 1983, Sag 2000, Safir 2004, 2014) were concentrating primarily on the structural relation between the pronoun and the name, which is *distinct from* linear precedence (e.g., as illustrated by frequently cited contrasts such as (62)-(63).

(62) ***He**_{*i*} loves **John**_{*i*}.

(63) **His_i** mother loves **John_i**.

As a result, the influence of pronominal position was for the most part left out of discussion in the generative literature on coreference and binding, because as long as the pronoun c-commanded the name, coconstrual was predicted to be ruled out. None of the sources reviewed in Chapter 1 discuss contrasts such as (56)-(57) or (60)-(61).

My goal with this chapter is to revisit the observation that in backwards anaphora coconstrual can be established more easily when the pronoun c-commands the name from a non-subject position, and to account for this observation from the point of view of generative approach to anaphora. I will show that structural position of the pronoun matters for pronominal reference resolution in structurally marked backwards anaphora. Furthermore, it interacts with conceptual plausibility, and, as a result, we observe varying acceptability of coconstrual depending on both these factors.

Summing up, we have some empirical evidence suggesting that structural position of the pronoun influences acceptability of coconstrual in backwards anaphora (Bolinger 1977, Lakoff 1968). We also have abundant experimental evidence demonstrating that conceptual plausibility influences interpretation, and pronominal reference resolution in particular, and interacts with structural and prosodic information during processing. Given this, we are now faced with the following question: when syntax imposes a restriction on the possibility of coconstrual between the pronoun and the name, what is the role of non-structural information, e.g., conceptual plausibility of a particular interpretation? And consequently, what is the mechanism for the interaction between the input from the syntactic component vs. non-syntactic information? These are the questions that I will address in the following sections.

I will now proceed to the experimental part of this chapter: a norming study, followed by a forced choice task experiment along with a judgment study with two independent variables – the structural position of the c-commanding pronoun and plausibility of coconstrual. We manipulated these two factors to determine their influence on acceptability of coconstrual in sentences with Principle C effects.

2.3 Norming study: Controlling for plausibility of coconstrual

I begin with an overview of a norming study designed to obtain quantitative baseline data on judgments of coconstrual plausibility in the absence of Principle C effects. The rankings obtained in the norming study were then used to select stimuli for the studies proper (Sections 2.4 and 2.5). The test sentences from the norming study, which involved structurally neutral forwards anaphora, were ranked for coconstrual plausibility and then transformed into sentences describing identical scenarios but featuring structurally marked backwards anaphora.

2.3.1 Participants

25 Rutgers University undergraduate students enrolled in an introductory Linguistics or Cognitive Science course, all native speakers of English (as determined by a demographic questionnaire), participated for course credit.

2.3.2 Materials

Test items were constructed as triplets of sentences, with each triplet based on the same matrix verb, which was either a double object (DO) or an exceptional case marking (ECM) predicate. This choice was motivated by the fact that both types of predicates select for two distinct argument DP positions – a subject and an object, which can both be filled with DPs designating animate referents, and which both c-command a third DP in the structure (Chomsky 1995, Hale and Keyser 1993, Larson 1988). This is shown in Fig. 2.1 and Fig. 2.2 for sentences in (64)-(65) respectively. In the figures, the solid lines show movement, while the dashed lines show c-command relations. These structures allowed us to manipulate the position of the antecedent (subject vs. non-subject), while holding the predicate and the structure of the sentence, including the c-command relations between the DPs, constant within each triplet of target items.

(64) **DO predicate:**

Mary_{DP1} gave Jason_{DP2} [a present]_{DP3}.

(65) **ECM predicate:**

Mary_{DP1} wanted Jason_{DP2} to take [a present]_{DP3}.

Figure 2.1: Tree structure illustrating the *c-command* relation between subject/indirect object DP and direct object DP for the sentence with a DO predicate in (64)

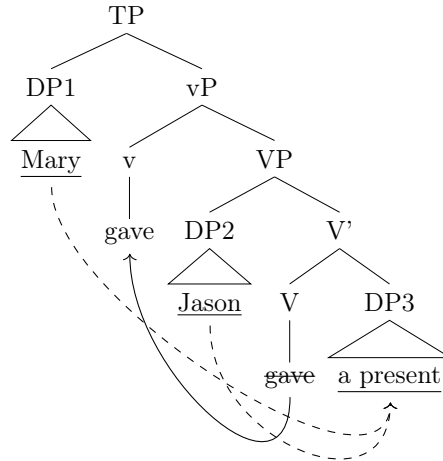
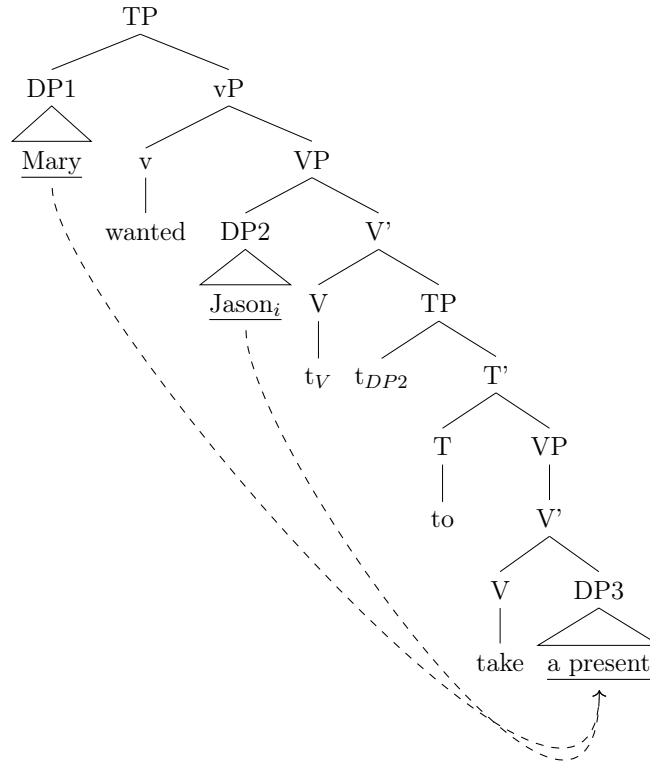


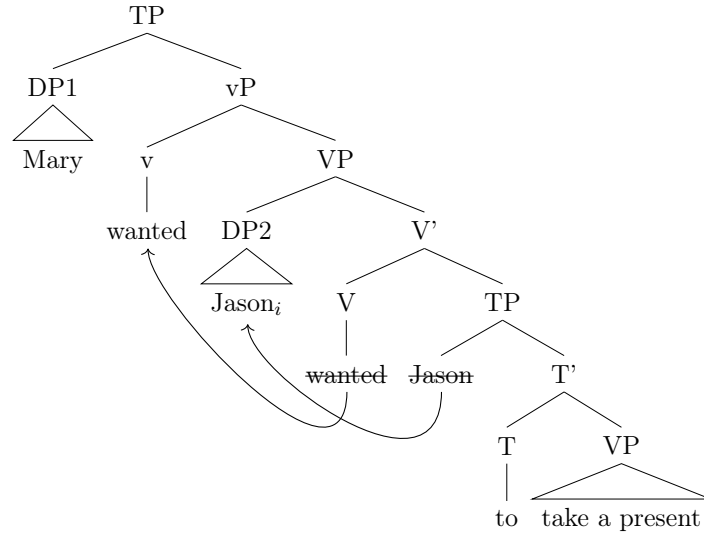
Figure 2.2: Tree structure illustrating the *c-command* relation between subject/object DP and a DP embedded in an ECM clause for the sentence with an ECM predicate in (65)



For the DO construction, following Larson (1988), Hale and Keyser (1993), and Chomsky (1995), I adopt the VP shell analysis and assume that the benefactive, indirect object (i.e., *Jason* in (64)) is the specifier of the VP phrase projected on the left and c-commanding

the direct object (i.e., *a present*). For exceptional case-marking predicates, I assume that in English the subject of an embedded ECM clause undergoes raising to object to the matrix clause, as shown in Fig. 2.3.

Figure 2.3: Tree structure showing V and DP movement in an ECM clause for the sentence with an ECM predicate in (65)



There has been discussion in the literature regarding the nature of the movement associated with raising-to-object, i.e., whether it is covert and the embedded subject raises to a main clause position at LF (Chomsky 1995, Lasnik and Saito 1991), or whether it is overt (Lasnik 1999, Rosenbaum 1967, Runner 1995). Given the evidence from anaphor binding and NPI licensing such as (66)-(67), I assume that in English raising to object takes place overtly.

- (66) The DA proved [[two men]_i to have been at the scene of the crime] during each other_i's trials.
- (67) The DA proved [no suspect to have been at the scene of the crime] during any of the trials.

(Lasnik and Saito (1991), following Postal (1974))

The overt raising account requires an additional assumption that the matrix verb also undergoes overt movement to a position higher than the landing site of the raised object in order to derive the V-DP linear word order, as shown in Fig. 2.3. Again, there is no consensus in the literature regarding the landing site of the verb. This landing site is expected to be

a head position to the left of the V. It cannot be the T head, otherwise the well-known differences between English and French verb-adverb relative positioning (Pollock 1989) would no longer be explained. Thus in an ECM construction, similarly to DO constructions, DPs in both matrix subject and object positions c-command the third DP in the sentence, as shown in Fig. 2.2 for (65).

To provide additional supporting evidence that the c-command relation holds as indicated in both types of target structures, examples (68)-(71) demonstrate quantifier binding (which requires c-command (Reinhart 1983)) from subject and object positions in both DO and ECM constructions. Tree structures for the cases of c-command from the object position ((69) and (71)), are presented in Fig. 2.4 and Fig. 2.5 respectively. (I zero in on object position here, since I take c-command from subject position to be uncontroversial).

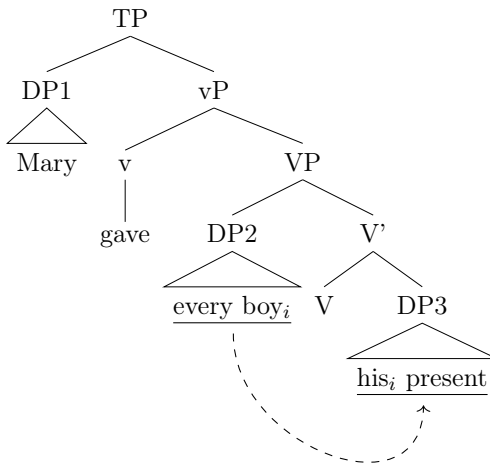
(68) *DO, binding by subject:*

[Every girl]_i gave James her_i manuscript.

(69) *DO, binding by object:*

Mary gave [every boy]_i his_i present.

Figure 2.4: Tree structure illustrating the *c-command* relation between object DPs for a sample sentences with a DO predicate in (69)



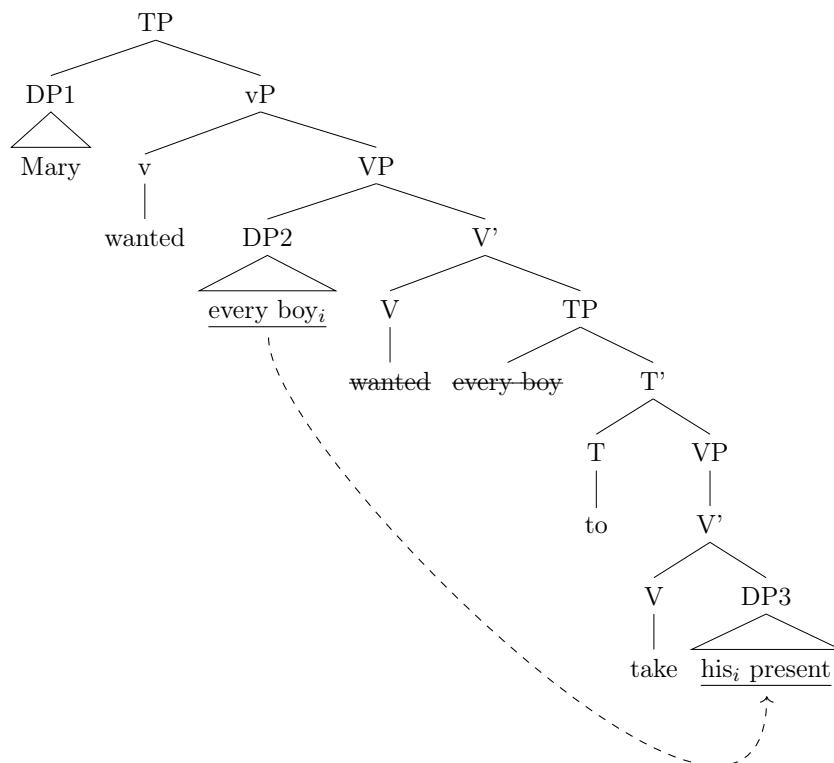
(70) *ECM, binding by subject:*

[Every girl]_i wanted James to read her_i manuscript.

(71) *ECM, binding by object*:

Mary wanted [every boy]_i to take his_i present.

Figure 2.5: Tree structure illustrating the *c-command* relation between object DPs for a sample sentence with an ECM predicate in (71).



Having selected DO and ECM predicates for our target sentence structures, we then created stimuli where each target sentence featured a name c-commanding a same-gender pronoun. Specifically, all target sentences involved forwards anaphora with a female name (e.g., *Emily*) c-commanding a possessive phrase with a gender-matching possessive pronoun (e.g., *her book*). The name c-commanded the possessive phrase either from a subject or from an object position. Since the name was in the c-commanding position, Principle C imposed no restriction on coconstrual for any of the target items in the norming study, thereby permitting coconstrual between the pronoun and the name. We further manipulated the sentences to reflect a range of plausibility in coconstrual relations (i.e., sentences varied between those where it was highly plausible for the name and the pronoun to refer to the same individual based on our knowledge of the world, and those where the opposite was most plausible) in order to obtain quantitative data that could be used to categorize sentences into

high or low plausibility of coconstrual. The norming task was therefore a reduced version of a 2×2 design (3/4 conditions) with *structural position of the c-commanding nominal* (subject vs. non-subject) and *plausibility of coconstrual* (high vs. low) as within-subject factors.

Constructing a full fourth condition of the 2×2 design (*subject DP × low plausibility of coconstrual* with sentence-internal referent) turned out to be impossible. Since DO predicates often denote physical transfer (e.g., *give, send, sell, lend, hand*) or mental transfer (e.g., *tell, explain, show*) (Krifka 2004), the sentence-internal referent denoted by the subject DP (agent) is most typically a more plausible possessor of the direct object (theme) than a sentence-external referent (in the absence of a preceding discourse favoring one or the other). This observation is illustrated in (72): *her* could be either *Emily's* or *another woman's*; however, without any preceding context, Emily is a more plausible possessor of the painting than a female not mentioned in the sentence. While there exists a small number of DO predicates that do not follow this pattern (e.g., a sentence with predicate *buy* in (73)), the number of such verbs is too limited to yield a diverse set of test items.

(72) Emily_i gave John her_i painting.

(73) Emily_i bought John her_j painting.

Two sample sets of test items (one triplet of sentences based on a DO predicate *give*, and another based on an ECM predicate *believe*) are presented in (74) and (75) below.

(74) Sample sets of DO test items (DO predicate = *give*) in the norming study, with position of antecedent and contrastive levels of plausibility of coconstrual between DPs in italics.

a. *subject antecedent/high plausibility of coconstrual*

Emily_i gave Tommy **her_{i/j}** phone number.

b. *object antecedent/high plausibility of coconstrual*

Mr. Barker gave **Emily_i** **her_{i/j}** report card.

c. *object antecedent/low plausibility of coconstrual*

Richard gave **Emily_i** **her_{i/j}** contact information.

(75) Sample sets of ECM test items (ECM predicate = *believe*) in the norming study,

with position of antecedent and predicted level of plausibility of coconstrual between DPs in italics.

a. *subject antecedent/high plausibility of coconstrual*

Pamela_i believed the doctors to have **her_{i/j}** scan results.

b. *object antecedent/high plausibility of coconstrual*

The classmates believed **Pamela_i** to have finished writing **her_{i/j}** essay.

c. *object antecedent/low plausibility of coconstrual*

The gallery owners believed **Pamela_i** to admire **her_{i/j}** painting.

The third argument DP in all test items was either a DP with an unambiguously male referent (e.g., *Tommy* or *Mr. Barker*) or a plural DP (e.g., *the classmates*, or *the gallery owners*). We manipulated grammatical gender and number marking on the third DP so that it were not a possible candidate for coconstrual with pronoun *she/her*.

2.3.3 Procedure

Participants were asked to read each sentence and judge on a Likert scale (with values ranging from 1 to 5) whether the possessive pronoun *her* referred the sentence-internal antecedent (e.g., *Emily*) (1: “it is definitely the case that *her* means *Emily’s*”) or to another female (5: “it is definitely the case that *her* means *another girl’s*, and not *Emily’s*”). See Appendix A for the entire scale, the full set of test items and instructions to participants.

2.3.4 Results

The findings of the norming study are presented in Table 2.1.

Table 2.1: Average ranking and standard deviation (SD) for each type of target items in the norming study and cut-off range for the stimuli selected for the norming study

Type of Target Item	Average Ranking	SD	Cut-off Range
subject antecedent/high plausibility	1.49	0.24	1 < n < 1.73
object antecedent/high plausibility	1.72	0.25	1 < n < 1.97
object antecedent/low plausibility	3.67	0.46	3.21 > n > 5

We fit a cumulative link mixed model (designed for ordinal data) with random intercept for subjects and items. The statistical analysis revealed that factor *high plausibility* was

associated with systematically lower rankings on the Likert scale ($\beta = -3.6849$; $SE = 0.1820$, $p < 0.001$). There was no effect of factor *pronominal position* ($\beta = 0.1785$; $SE = 0.1457$, $p = 0.221$)².

We further targeted the edges of the distributions of ratings to select items that were further transformed into the stimuli for the experiment proper. We averaged within each category of sentence type, as shown in Table 2.1, and selected triplets of test items where each member of the triplet was within the specified cut-off range (an interval of 1 standard deviation from the group mean) reflecting high or low plausibility of coconstrual. This filtering processes yielded 11 out of 15 triplets. The four remaining triples included sentences whose ratings fell outside the cut-off range (i.e., were too close to the middle of the scale to be unambiguously classified as either “high” or “low” plausibility of coconstrual). The sentences in the 11 remaining triplets were then transformed into stimuli for the experiment by switching the positions of the name and pronoun, thereby creating a Principle C effect.

2.3.5 Discussion

The norming study was designed to obtain a quantitative baseline on judgments of coconstrual plausibility in sentences with forwards anaphora in the absence of structural restrictions on coconstrual.

The variance among participants’ responses to target items shows that while judgments of certain test items are highly polarized and those are ranked at the edges of the proposed scale, for other cases participants were much more ambivalent about assigning increased plausibility to one interpretation over the other. Thus, as expected, the results of this norming study show that plausibility is treated as a gradable property by the speakers.

The rankings obtained in the norming study were then used to design stimuli for the experiments featuring a Forced Choice Task (Exp. 1) and a Judgment Task (Exp. 2).

²Here and further: all statistical analyses were performed in R open software (R Core Team, 2012).

2.4 Experiment 1

Experiment 1 was a forced choice task study designed to test for the effect of varying conceptual plausibility and the structural position of the c-commanding pronoun on speakers' judgments of coconstrual acceptability in sentences with structurally illicit backwards anaphora.

2.4.1 Participants

31 Rutgers university undergraduate students enrolled in an introductory Linguistics or Cognitive Science course, all native speakers of English (as determined by a demographic questionnaire), participated in a binary forced choice task for course credit.

2.4.2 Materials

As indicated in the previous section, target stimuli for the forced choice study were generated from 11 triplets of test items from the norming study, for a total of 33 target sentences, all of which had a pronoun c-commanding a name DP. Table 2.2 presents the target stimuli for the *give* DO predicate, which were transformed from the norming stimuli (cf. (74a)-(74c) vs. (76)-(78)).

Table 2.2: Sample test items for DO predicate *give* in the norming study

Example target sentences	Pronoun Position	Plausibility
(76) She _{<i>i/j</i>} gave Tommy Emily _{<i>i</i>} 's phone number.	subject	high
(77) Mr. Barker gave her _{<i>i/j</i>} Emily _{<i>i</i>} 's report card.	object	high
(78) Richard gave her _{<i>i/j</i>} Emily _{<i>i</i>} 's contact information.	object	low

The forced choice task thus had a reduced 2×2 design with *pronominal position* (subject vs. non-subject) and *plausibility of coconstrual* (high vs. low) as factors manipulated within subjects. There were two types of controls featuring forwards anaphora, which were also predicted to vary in their level of plausibility of coconstrual (high, as in (79), vs. low, as in (80)), in order to obtain a baseline for the influence of this factor outside cases restricted by Principle C.

(79) **Emily**_{*i*}'s car let **her**_{*i/j*} down again last week.

(80) **Emily**_{*i*}'s story brought **her**_{*i/j*} to tears.

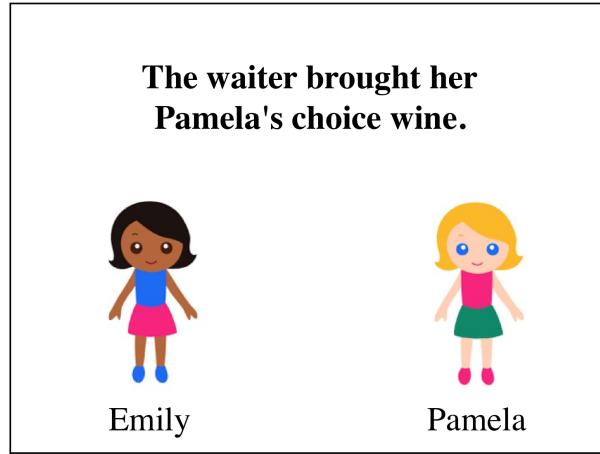
Each participant saw all 33 target sentences, 14 control sentences, and 13 filler items for a total of 60 items. There was no confound in participants viewing all three members of the triplet within one experimental sessions, since the items within each triplet were different sentences that only shared the matrix verb and the name, but no other semantic content.

2.4.3 Procedure

The study was conducted in a laboratory setting, where participants were run one or two at a time in a quiet room at individual response stations. Items were presented on an iMac using SuperLab stimulus presentation software (v. 5). Each experimental session began with a brief training with non-target items, to acclimate participants to the task.

Each trial had the same structure (see Fig. 2.6). Participants viewed a screen in which they saw images of two female characters side by side labeled as *Emily* and *Pamela*. Both female characters were introduced with equal prominence during the training session. The target or control sentence appeared above the images. Participants were asked to read each sentence to themselves, and choose between a sentence-internal and a sentence-external same-gender referent for the pronoun by pressing a key marked with a respective name on the response pad. (See Appendix A for the full set of instructions). The use of one or the other female name in the sentence was counterbalanced across all items, but the position of the female referents (left vs. right) remained constant on the screen. Target, control, and filler items were randomized within the session. Each session lasted approximately 10-15 minutes.

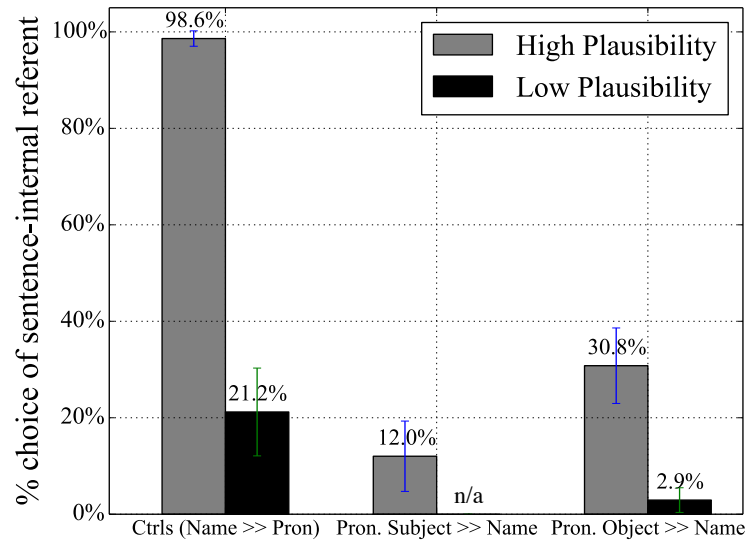
Figure 2.6: Sample stimulus for the forced choice task in Exp. 1



2.4.4 Results

The results for control and target items in Experiment 1 are summarized in Fig. 2.7 below.

Figure 2.7: Percentage choice of intra-sentential referent for the pronoun across items and conditions in Exp. 1 (Forced Choice Task)



Control sentences with predicted high plausibility of coconstrual yielded near-ceiling choice of sentence-internal referent (98.6%), while those with low plausibility (determined as part of the ranking study) yielded only 21.2%. This means that almost 80% of the time,

participants chose a sentence-external referent guided by plausibility of coconstrual, while there was no restricting input from the syntactic component.

Target sentences with low plausibility of coconstrual yielded an (expectedly) low percentage of sentence-internal referent chosen. Participants chose the intra-sentential referent for cases where the pronoun c-commands the name from the object position only 2.9% of the time. (Recall that low-plausibility was not tested with pronominal subjects for reasons outlined above in Section 2.3.2.) This result is perhaps not so surprising for sentences where Principle C is invoked, and also conceptual plausibility of coconstrual is steering the participant away from choosing an intra-sentential referent for the pronoun. That is why the true test of our hypotheses comes with the items from the “high plausibility of coconstrual” condition with the pronoun in subject and object position. And here we find a significant influence of both factors (*plausibility* and *pronominal position*).

Test items with highly plausible coconstrual yielded percentages of intra-sentential referent selection that were not only higher than with their low plausibility counterparts, but were also higher than what would be predicted by structural constraints or experimental noise. This effect was especially pronounced in cases where the pronoun c-commanded the name from non-subject position. While we observed only 12% choice of intra-sentential referent for cases where the pronoun c-commanded the name from the subject position, this referent was selected 30.8% of the time when the pronoun was in non-subject position. To underscore this point, near one third of the time, participants allow coconstrual in cases where the Principle C effect is active.

A binomial logistic regression model and pairwise comparisons revealed significant effects of pronominal position ($\beta = -1.5654$; $SE = 0.2901$; $p < 0.001$), plausibility ($\beta = 3.2866$; $SE = 0.4125$; $p < 0.001$), and Principle C status ($\beta = -2.4622$; $SE = 0.4452$, $p < 0.001$).

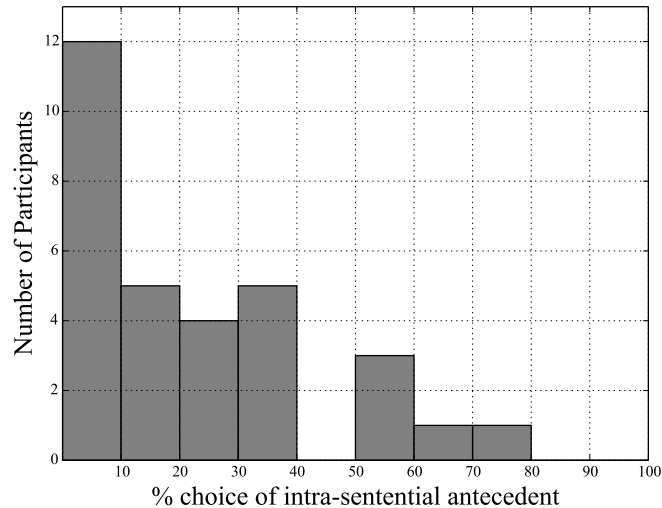
Since this study was created as a reduced version of the 2×2 design, the binomial logistic regression model was not able to reveal the significance of interaction between the two experimental factors (*pronominal position* vs. *plausibility*). Nevertheless, it was the combination of two factors favoring coconstrual (pronominal object position and high plausibility of coconstrual) that gave rise to an additive effect. First, the average percentage observed in this condition (over 30%) exceeds the closest ranking category by 2.4 standard deviations,

or by the factor of 2.6). Second, the combined force of the two factors is further confirmed by the data on the distribution of individual participant responses across the target item types, as shown in Fig. 2.9 and the discussion that follows.

There was no significant effect of predicate/construction type (DO vs. ECM) ($\beta = 0.3260$; $SE = 0.4922$; $p = 0.508$), indicating that the type of syntactic structure did not influence participants' decisions about possible coconstruals.

Distribution of participants. Given the striking results of acceptability in the face of Principle C effects, we analyzed the pattern of results from individual participants (following a strategy from Syrett (2015)). Fig. 2.8 presents a histogram of the distribution of individual participants' selection of an intra-sentential antecedent for a pronoun in target sentences with high plausibility of coconstrual. (For this and other histograms, the maximum value on the y axis is set to slightly exceed the maximum value for the largest bin of participants, and therefore varies between Figures 2.8 and 2.9.)

Figure 2.8: Distribution of participants' selection of intra-sentential referent in target sentences with the Principle C effect but high plausibility of coconstrual in Exp. 1 (Forced Choice Task)

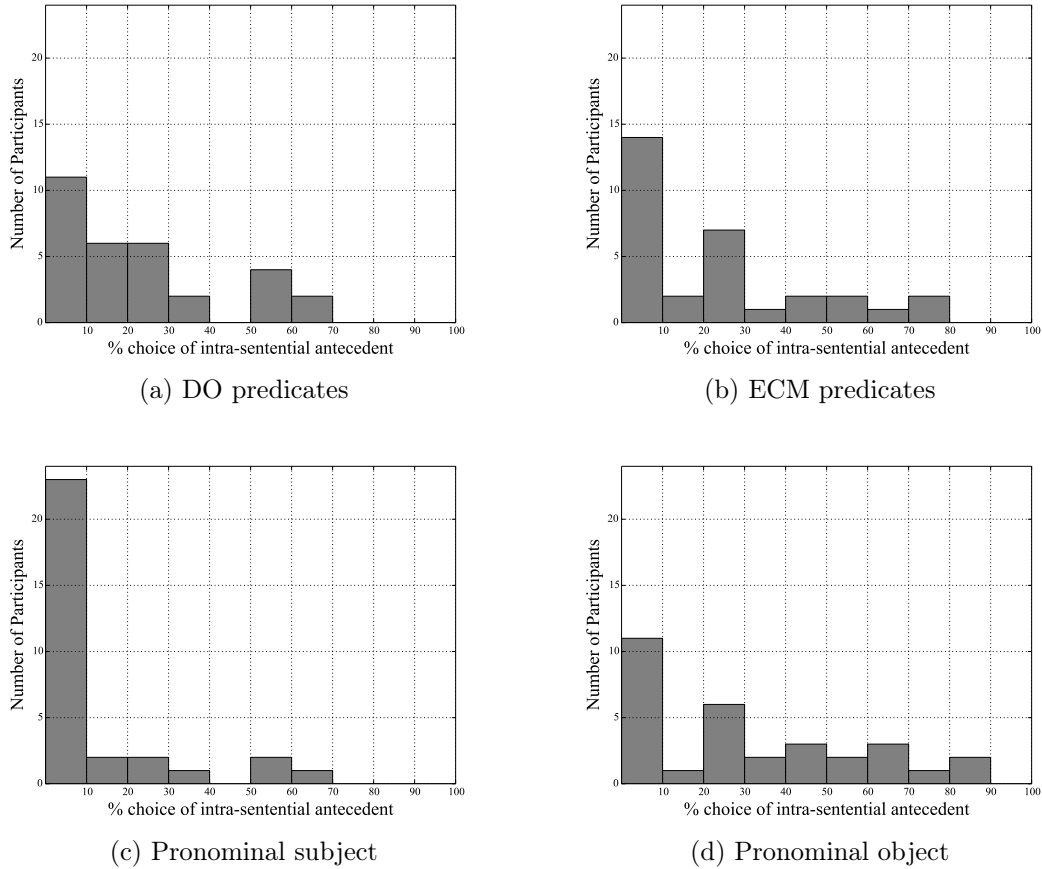


As Fig. 2.8 shows, participants' responses to target items were not uniform, and there was a positive skew. While approximately half (17 of 31) of the participants (54.8%) selected a structurally illicit antecedent less than 20% of the time, as Principle C (plus allowable noise)

would have it, nine (29%) selected it 20-40% of the time, and five (16.2%) selected it 50-80% of the time. Recall that responses to control and filler sentences, as well as to questions the in-lab demographic questionnaire, provide us with no reason whatsoever to doubt either the native-speaker status or judgments of these participants or their attention during the task.

Distribution of responses across target types. To further investigate the factors influencing accessibility of coconstrual in the face of Principle C effects, we evaluated the distribution of the selection of an intra-sentential referent across different groups of target sentences, controlling for plausibility and focusing on just those cases with high plausibility where coconstrual was allowed by participants. These analyses appear in Fig. 2.9.

Figure 2.9: Distribution of selection of intra-sentential referent across target sentence types with high plausibility (all subject to the Principle C effect) in Exp. 1 (Forced Choice Task)



As Fig. 2.9 shows, responses to sentences with DO or ECM predicates resulted in similarly skewed distributions of intra-sentential referent selection: under 20% of the time: DO – 17 participants (54.8%), ECM – 16 (51.6%)); between 20-50% of the time: DO – 8 participants

(25.8%), ECM – 10 (32.3%); between 50-80%: DO – 6 participants (19.4%), ECM – 5 (16.1%). These distributions are consistent with the statistical analysis, which revealed no significant effect of predicate type.

On the other hand, the distributions of the pronominal subject and object sentences, while also positively skewed, diverge, and are therefore consistent with the statistical analysis, which revealed a significant effect of structural position of the c-commanding pronoun. Responses to the target sentences with a pronominal subject were remarkably uniform (Fig. 2.9c): an overwhelming 26 of the 31 participants (80.6%) selected a structurally illicit referent less than 20% of the time, while three (9.7%) selected it 20-50% of the time, and three (9.7%) selected it 50-70% of the time (and none more often than that). This pattern is entirely consistent with structural constraints on coconstrual driving responses. By contrast, responses to target sentences with a pronominal object were more disperse (Fig. 2.9d). Less than half (12) of the 31 participants (38.7%) selected a sentence-internal referent less than 20% of the time, and 19 of the 31 selected it between 20-90% of the time: 11 of these (35.5%) 20-50%, and eight of these (25.8%) 50-90% of the time. This difference across participants not only highlights the subject/non-subject asymmetry, but also suggests that non-structural factors are not uniformly influential for all speakers. I will return to this point in the General Discussion section.

2.4.5 Discussion

Experiment 1 was a forced choice task study designed to investigate the role of conceptual plausibility and the structural position of the pronoun in speakers' judgments of acceptability in sentences with structurally marked backwards anaphora.

With control sentences, which involved forwards anaphora and did not yield a Principle C effect, our prediction was that the choice of referent for the pronoun will be guided by plausibility of coconstrual, as determined by the norming study. The results confirmed this prediction. Thus, we offer a proof of concept for the robust role of plausibility in establishing coconstrual relations in the absence of structural restrictions, when the choice of referent is up for grabs.

With target sentences, we observed an effect of plausibility as well. Even when the

coconstrual was structurally marked, i.e., when the sentence had a pronoun c-commanding a name, plausibility still exerted its influence on speakers' judgments. At the same time, it did not have the effect of the same magnitude across both experimental conditions. While high plausibility in target sentences with non-subject c-commanding pronouns made it easier for the participants to access a coconstrual interpretation, it did not have the same effect in target sentences with a subject pronoun. In addition, the effect of pronominal position and plausibility did not hold for all participants in the study. I will discuss each of these findings and their implications for our research questions in detail in the General Discussion section of this chapter, after I present Exp. 2, which aimed at replicating the results of Exp. 1.

One concern regarding the findings presented above could be that the influence of two factors, *non-subject pronoun* and *high plausibility of coconstrual*, only surfaces in a particular experimental paradigm, i.e., when the participants are forced to make a binary choice between the two possible referents for a pronoun, while only one of those referents is mentioned within a given target sentence. In order to generalize our findings across tasks and demonstrate replicability across populations, we presented the exact same target sentences to participants in a follow-up judgment task run both in-lab and online (via Amazon Mechanical Turk). This follow-up study is reported in Experiment 2.

2.5 Experiment 2

Experiment 2 was a judgment task study designed to replicate the findings of Experiment 1 in a different experimental paradigm and with different populations.

2.5.1 Participants

There were 97 participants (56 Rutgers university undergraduate students, recruited and compensated as in Experiment 1, and 41 participants recruited online via Amazon Mechanical Turk, compensated \$5 for their participation). Native speaker status was determined by a demographic questionnaire in the lab, and via demographic questions and control questions included in the experiment in the MTurk version, along with a US IP address. All participants accessed the study via an online link.

2.5.2 Materials and procedure

The judgment task was designed and administered via Qualtrics software. The same sentences from Experiment 1 were used in Experiment 2, presented in pseudorandomized order. This time, instead of being asked to choose between two salient female referents in a binary forced choice paradigm, participants were given a sentence prompt (target sentence) and then asked, *Can [she/her] and Emily refer to the same person?*

The inherent challenge of such a question is that it seems to lead to the calculation of the Gricean (manner) implicature that by default, *she* most likely does not refer to the name in the question, and the speaker is ascertaining the possibility that it could in some circumstance(s). Because of this, we anticipated obtaining depressed percentages of coconstrual, but predicted that if the factors we are interested in are robust enough, the same trends as in Exp. 1 would hold.

2.5.3 Results

Both versions of the judgment study revealed the same cline previously observed for the three groups of target items in the forced choice study, regardless of the participant population, as shown in Table 2.3. The sentences with the pronoun in subject position where plausibility was low received minimal percentage of coconstrual, while those with the pronoun in object position revealed higher percentages, and those where coconstrual plausibility was high exhibited the highest percentages by far. Thus, the two factors we have identified exert a significant influence on the availability of coconstrual relations in the face of Principle C effects regardless of the experimental task we employ, although a task (or question prompt) that is more neutral in its assumptions about whether or not coconstrual is possible opens the door for even higher percentages.

Table 2.3: Comparison of experimental results between Exps. 1 and 2 and the two experimental populations of Exp. 2, and tests for significance of factors

	Type of Target Item			Statistical Analysis	
	obj. pron./ low plaus.	subj. pron./ high plaus.	obj. pron./ high plaus.	factor: plausibility	factor: pron. position
Experiment 1: Forced Choice, in-lab (% choice of intra-sent. referent)	2.9%	12%	30.8%	$\beta = 3.2866$ SE = 0.4125 p < 0.001	$\beta = -1.5654$ SE = 0.2901 p < 0.001
Experiment 2: Judgment Task, in-lab (% coconstrual)	2.1%	10.1%	16.2%	$\beta = -2.8615$ SE = 0.5996 p < 0.001	$\beta = -1.0839$ SE = 0.4823 p < 0.05
Experiment 2: Judgment Task, MTurk (% coconstrual)	2.6%	7.9%	14.6%	$\beta = -2.1893$ SE = 0.5759 p < 0.001	$\beta = -0.8604$ SE = 0.4549 p < 0.05

2.5.4 Discussion

Experiment 2 was a Judgment Task study designed to replicate the findings of Experiment 1. Similarly to Exp. 1, here we investigated the effect of plausibility and pronominal position on speakers' judgments of acceptability of structurally marked coconstruals.

The results of Exp. 2 displayed the same trends as those of Exp. 1, where we revealed the effect of both *plausibility of coconstrual* and *pronominal position* on speakers' judgments. I will discuss the implications of those findings in the General Discussion section, since they are equally relevant for both experiments presented in this chapter. In this section, I will address on the role of experimental methodology and its influence on participants' responses.

As predicted, Exp. 2 revealed suppressed levels of acceptability of structurally illicit coconstruals, as compared to Exp. 1. We attribute this difference to the choice of experimental methodology and the inherent differences between the two tasks involved.

In Exp. 1, a binary forced choice task, the participants were asked to choose between two salient female referents for the pronoun in the target sentence, i.e., the participants were covertly requested to compare two alternative structure/interpretation pairings. In Exp. 2, the participants were faced with a question prompt "Can *she* (or *her*) and *Emily* refer to the same person?", which emphasized one particular interpretation where the pronoun and the

name were referring to the same individual. At the same time, as we mentioned previously, the inherent challenge of a prompt question in Exp. 2 is that it leads to the calculation of the Gricean (manner) implicature that (by default), *she* most likely does not refer to the name in the question.

As a point of comparison, consider the same question with *Mary likes herself*, where the reflexive *herself* must be construed with *Mary*. It seems odd to ask if *herself* can refer to *Mary*, since it *must*. We argue that participants interpreted the question in the judgment task as implying that the construal relation probably does not hold, but asking if it was in principle possible, which caused lower percentages of construal in the follow-up study. Still, the effect of the factors that we manipulated was statistically significant and robust enough for the same trends to hold – not only in comparison to the previous forced choice study, but also across two different populations of speakers (see Sprouse and Almeida (2012), Sprouse et al. (2013), Erlewine and Kotek (2016) for related discussion about online data collection).

2.6 General discussion

As originally formulated in Chomsky (1981), binding relations between a pronoun and a name are categorically constrained by the syntax: if a name has a co-indexed c-commanding antecedent, construal between the two is ruled out *tout court*. In more recent years, researchers have offered a handful of counterexamples accompanied by introspective judgments to illustrate that pragmatics and discourse pressures conspire to allow construal in instances where structural relations would bar it (Bolinger 1977, Büring 2005, Chien and Wexler 1990, Evans 1980, Grodzinsky and Reinhart 1993, Harris and Bates 2002, Higginbotham 1985, McCray 1980, Reinhart 1983, Safir 2004, Sag 2000). While a few theoretical proposals have been presented to account for these exceptions, they do not account for the full range of counterexamples, or else they overgenerate acceptability judgments across contexts. Crucially, they fail to explicitly identify the specific factors that give rise to reported judgments on a systematic basis.

This chapter investigated the role of two such factors (structural position of the c-commanding pronoun and varying conceptual plausibility) and experimentally probed their

influence on accessibility of coconstrual in sentences with Principle C effects. Our findings add to the mounting evidence that Principle C alone is insufficient to explain the full range of coconstrual judgments. However, they go beyond previous approaches to precisify the conditions under which structurally illicit coconstrual is allowed. Succinctly put, the findings presented in this chapter allow us to begin to make clear predictions about which environments involving backwards anaphora with Principle C effects will or will not give rise to coconstrual.

Our results offer three main takeaway points that are not predicted by previous theoretical proposals, but fall out from the discussion earlier in the chapter addressing the role of processing, conceptual coherence, and syntactic structure. First, plausibility exerts an influence on speakers' judgments with both forwards and backwards anaphora, including structurally marked backwards anaphora (i.e., sentences with Principle C effects). The control (forwards anaphora) sentences that are not subject to structural restrictions on coconstrual demonstrate that when Principle C is not invoked, plausibility of coconstrual strongly influences interpretation. When we move to target sentences with structurally illicit coconstrual, plausibility continues to play a role. Even in cases where Principle C would rule out coconstrual, many participants select an intra-sentential referent for the pronoun when plausibility of coconstrual is high.

Second, the structural position of the c-commanding pronoun *matters*. Coconstrual in structurally illicit cases is significantly more likely when the pronoun is in object position than when it is in subject position. The specific construction type (DO or ECM) does not appear to matter.

Third, certain speakers were more willing than others to select an intra-sentential referent when Principle C disallows it. Crucially, it is not the case that these speakers were simply more inclined to allow coconstrual with names in syntactically illicit positions across the board. On the contrary, they uniformly reject coconstrual in target sentences with a pronominal subject and in those with low plausibility of coconstrual. At the same time, they increasingly allow structurally illicit coconstrual when it is favored by high plausibility and non-subject position of the pronoun. Let us focus on each of these factors in turn.

2.6.1 The role of the structural position of the c-commanding pronoun and its interaction with plausibility

As Rayner et al. (2004) point out, plausibility has been frequently targeted as an important variable in experimental research showing that plausibility manipulations can override *structural preferences* in initial parsing strategies. The research question that I have posed in this chapter concerns an even stronger version of this proposal with respect to the role of plausibility: can it override *structural restrictions* on interpretation, and if yes – (i) what are the favorable conditions that allow for the structural restriction to be overcome, and (ii) what is the mechanism for the interaction between the restriction on interpretation imposed by syntax and the assessment of conceptual plausibility of a particular interpretation.

The fact that plausibility has an effect on pronominal reference resolution in the absence of syntactic restriction on interpretation is to be expected. Significantly less straightforward is the finding that increased conceptual plausibility can still exert measurable influence on speakers' judgments of acceptability even in cases where coconstrual in subject to Principle C effects. An even bigger puzzle is the effect of the pronominal position. So why does the structural position of the pronoun matter for whether or not speakers are sensitive to plausibility manipulations?

Varying plausibility is a factor that has been known to have not only significant but also *immediate* influence on interpretation, including resolution of ambiguous pronominal reference. Plausibility is assessed at a very early stage during language comprehension. For example, investigating filler-gap dependencies, Tanenhaus et al. (1989) presented a series of self-paced reading studies that provided evidence that plausibility effects can be observed as early as the matrix predicate is reached. Similar findings have been reported in multiple event-related potential studies (Boland et al. 1990, Garnsey et al. 1989, Stowe et al. 1991).

Since we assume that processing occurs incrementally, we may predict two orders of operation during processing, and consequently – two distinct strategies for the assessment of plausibilities, depending on the position of the c-commanding pronoun. Each of those strategies is associated with a distinct sequence of steps during sentence parsing, and, as a result, assigns distinct weights to input from different sources.

Suppose first that the pronoun occupies a **subject position** in the sentence. If that

pronoun is the first word encountered, as was the case with our target items, the parser instantly receives two distinct cues that the search for a pronominal referent should be conducted extra-sententially. The first cue has to do with information structure, and the second – with the order of operations triggered during incremental processing.

First let us consider the information structure cue. Pronouns in subject position – a position where topics are typically realized – facilitate coherence in the discourse (the linguistic context preceding the given sentence, and the sentence itself). Topical position of the pronoun signals to the listener that the referent is most likely one that is already in the common ground, or given (Arnold et al. 2013, Bolinger 1977, Kaiser 2011, Strube and Hahn 1996, 1999). Consistent with this observation is the fact that pronouns are triggers whose presuppositions are not easily accommodated if there is not a salient referent of the gender indicated by the pronoun (e.g., a salient female for *she*). So the speaker’s use of a pronoun in subject position (even with backwards anaphora) should signal to the listener that a referent has previously been mentioned or made salient in the discourse, and steer the search for such referent towards preceding linguistic context.

The second cue has to do with a structural restriction on pronominal interpretation, and consequently – with the order of operations performed during incremental processing. When the pronoun occupies sentence-initial position, it is encountered prior to all other syntactic material in the matrix clause. Thus, the parser is straightaway engaged to launch a search for the referent. It thereby immediately activates syntactic binding constraints (Principle C, in particular) to restrict the range of possible positions for the antecedent (Kazanina et al. 2007). The first signal that the parser receives given a sentence with a subject pronoun is that the DPs that are in the c-commanding domain of this pronoun and follow later in the sentence are not structurally licit candidates for coconstrual; and the most likely location for the referent DP is in the preceding discourse.

I propose that in such case the primacy of the restriction imposed on the potential position of the coconstrued DP leads to a situation where the competing (coconstrual) interpretation is never entertained. As a result, from the very start, all subsequent DPs in the sentence are interpreted as obviative from the subject, i.e., they are not considered as candidates for coconstrual with the subject. This is in line with our findings that plausibility

effect for subject pronominal position is quantitatively small.

Suppose now that the pronoun is in a **lower structural position** in the clause. With our tests items, this lower structural position was the indirect object of the DO predicate and a raised-to-object subject DP of the embedded ECM clause. In that case, the first words encountered by the parser are the matrix subject DP and the verb, which convey no information directly relevant for pronominal reference resolution. On the other hand, plausibility effects start building up as soon as the matrix verb is encountered (e.g., Tanenhaus et al. (1989)).

As we discussed earlier in this chapter, each matrix verb is linked to a specific memory-encoded schema associated with the type of event or scenario denoted by this verb in the mind of the speaker. And, in its own turn, each schema includes information about the prototypical roles and properties of individuals/objects associated with it. For example, as I pointed out earlier, for both matrix verb *buy* and matrix verb *give* an obvious expectation will be that the indirect object of the verb is the beneficiary of the transfer event. At the same time, these verbs differ in the schema representation of a direct object. For *buy*, the expectation is that the direct object is not originally possessed by the individual denoted by the matrix subject, while for *give*, the most plausible interpretation is the exact opposite (see the examples in (72)-(73)).

As a result, when a non-subject pronoun is encountered in the structure following the matrix subject and the verb, it is incorporated into an already activated scenario/schema. At the same time, we would also expect that structural constraints on coconstrual are activated at that point. Upon encountering a non-subject pronoun, the parser receives a signal that the DPs in the c-commanding domain of this pronoun are not to be considered as licit antecedents for it. However, a non-subject structural position of the pronoun delays the moment when the c-commanding domain of this pronoun is established. Since Spec TP subjects typically c-command all other linguistic material in the clause, with a subject pronoun the restriction can be instantly imposed on all the following DPs in this clause. With an object pronoun, it is not necessarily the case. For instance, some of the consequent syntactic material in the clause may be merged at vP level, which is outside the c-commanding domain of an indirect object pronoun. Thus the activation of the structural restriction on

coconstrual in such cases may be delayed until the c-commanding domain of the object pronoun is definitively restricted.

Summing up, with subject pronouns, the parser receives the signal to discard all following DPs as candidates for coconstrual instantly upon encountering the pronoun, before the plausibility comes into play. With lower, non-subject pronouns, the assessment of conceptual plausibility begins before encountering the pronoun; and when the pronoun is encountered eventually, syntax still leaves the door partially open for a possibility of a referent DP in the vP adjoined position later in the clause. This explains why the effect of increased coconstrual plausibility on speaker’s acceptability judgments is observed with non-subject, but not with subject pronouns.

2.6.2 Principle C effect vs. the overall obviation effect

In the experiments presented in this chapter, I revealed a statistically significant effect of plausibility for non-subject pronouns in the following two positions: an indirect object of the DO predicate and a raised-to-object subject of the embedded ECM clause. So far, I have been addressing both with a cover term “non-subject”; however, at this point it is important to discuss the nature of the pronominal position more closely.

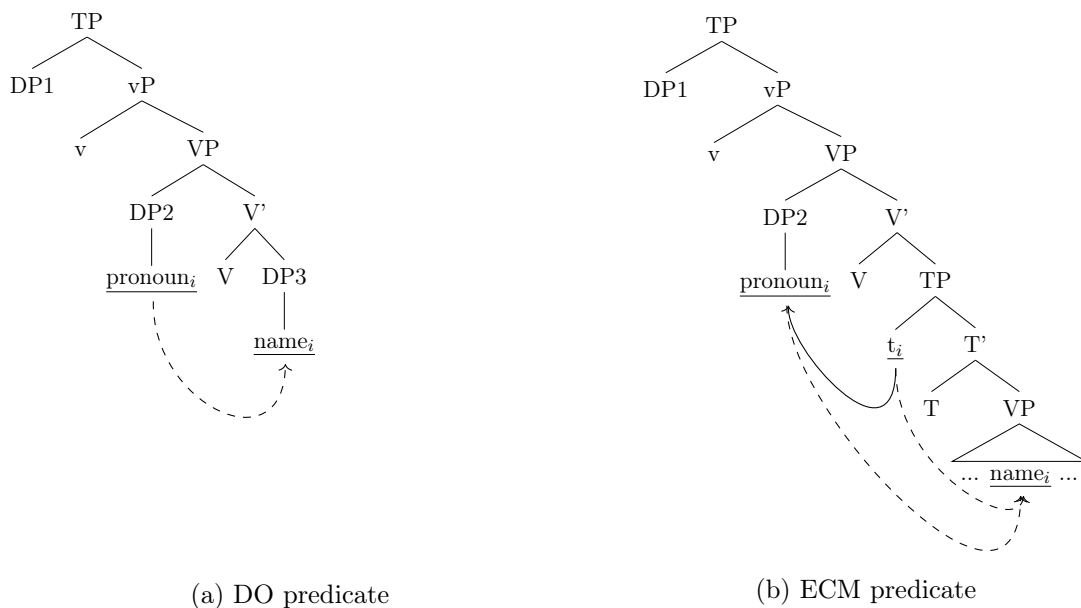
The two structural types of test items in Experiment 1 and Experiment 2, i.e., DO target sentences and ECM target sentences, are significantly different with respect to (i) the base position of the non-subject pronoun in question, and (ii) whether or not this pronoun is the most local c-commanding nominal for the name DP.

With both types of predicates, the non-subject pronoun in the target sentence c-commands the name DP from the matrix Spec VP position. The non-subject pronoun in sentences with DO predicates is the indirect object (the DP designating the beneficiary), which is structurally associated with the specifier of the matrix VP, as I discussed earlier in Section 2.3.2 and as shown in Fig. 2.10a. This DP does not undergo syntactic movement: following Larson (1988), Hale and Keyser (1993) and Chomsky (1995), I assume that the DP in question is base-generated in this position and assigned dependent Dative case as a higher DP in the verb phrase (Baker 2015, Baker and Bobaljik 2017, Bittner and Hale 1996).

The non-subject pronoun in sentences with ECM predicates is a raised-to-object subject

DP of the embedded ECM clause (Lasnik 1999, Postal 1974, Rosenbaum 1967, Runner 1995), as discussed in Section 2.3.2 and shown in Fig. 2.10b. Here the DP in question is base-generated in the specifier position of the embedded TP and then moves to the specifier of the matrix VP to receive structural Accusative case (Bittner and Hale 1996, Chomsky 2008, Lasnik 1999).

Figure 2.10: Tree structures illustrating the structural position of the c-commanding nominal for the two types of predicates in target sentences in Exps. 1-2



Thus, while in both cases the pronoun occupies the same structural position at the end of syntactic derivation, with DO predicates it *originates* in Spec VP, and with ECM predicates it *moves* into it. Still, we observed a similar effect of conceptual plausibility on acceptability of coconstrual with both types of predicates.

Furthermore, the DO and the ECM target sentences in Exp. 1 and Exp. 2 differ in terms of whether or not the pronoun is the most local c-commanding antecedent for the name. In sentences with DO predicates, the Principle C effect is induced only by the overt DP in Spec VP position, as shown in Fig. 2.10a. In sentences with ECM predicates, the most local nominal expression c-commanding the name is the trace of the raised-to-object ECM subject in the embedded Spec TP position, as shown in Fig. 2.10b.

Chomsky (1981) predicts that all co-indexed c-commanding antecedents cause the same Principle C effect, regardless of their overt/covert status. According to the Binding Theory,

a trace in Spec TP is expected to suppress acceptability of coconstrual the same way as an overt Spec TP subject pronoun. This is not what has been observed experimentally, as ECM target sentences with a trace in the specifier of the embedded TP patterned with DO target sentences with pronouns in Spec VP, and not with DO target sentences with pronouns in matrix Spec TP position. Based on these findings, I offer the following proposal.

Proposal: Obviation between a pronoun and a name in sentences with structurally marked backwards anaphora is not induced by a single syntactic condition (i.e., Principle C). Instead, it results from simultaneous application of several distinct restrictions on coconstrual. I propose that a more accurate term to refer to such induced failure of coconstrual is *overall obviation effect*. This effect is composite. It includes the Principle C effect (syntax-induced obviation); and it also varies in its magnitude depending on a range of additional factors, both structural and non-structural: syntactic position of the pronominal antecedent, information structure, coconstrual plausibility, prosodic conditions, etc.

In line with Chomsky (1981), I propose that the Principle C effect is invariable. Its magnitude (i.e., the degree by which it decreases coconstrual acceptability) does not vary with pronominal position (Spec TP vs. Spec VP), nor does it depend on the *overt/covert* status of the c-commanding nominal expression. I will further use the term *binding antecedent* to refer to a co-indexed c-commanding nominal expression that induces a Principle C effect. Specifically, for the *non-subject pronoun* condition in sentences with DO predicates, the binding antecedent that creates a Principle C effect is an overt Spec VP pronoun. In sentences with ECM predicates, there are two binding antecedents inducing Principle C effect of the same magnitude: the trace in the Spec TP position of the embedded clause and the DP in the matrix Spec VP position³. In the presence of any binding antecedent, the Principle C effect equally decreases acceptability of coconstrual; and we observe this with all target items in Exp. 1 and Exp. 2.

At the same time, unlike Chomsky (1981), I propose that the Principle C effect alone does not completely rule out coconstrual, i.e., the fact that the name has a binding antecedent does not bring acceptability of coconstrual down to zero, which is what we observed in Exp.

³Given the experimental findings, I assume that there is no additive effect; and two binding antecedents within one sentence cause the same magnitude of the Principle C effect as one.

1 and 2. To account for this, in line with Safir (2004, 2014), I propose that such coconstruals are marked as *unexpected*, which means that acceptability is decreased substantially, but it is not at the floor level.

This leaves the door open for factors other than Principle C to exert their influence on coconstrual acceptability. Varying plausibility, as well as the structural position of the overt pronominal antecedent each make their individual contribution to the overall obviation effect. Further I will use the term *discourse antecedent* to refer to a co-indexed overt nominal linearly preceding the name. The properties of the discourse antecedent have impact on the overall obviation effect that is separate from syntax-induced obviation (Principle C) induced by the binding antecedent. Accordingly, low plausibility of coconstrual and a discourse antecedent in the subject position both increase the magnitude of the overall obviation effect; and in combination with Principle C this leads to a (near-)floor level of coconstrual acceptability. On the contrary, when the plausibility of coconstrual is high, and the discourse antecedent is non-subject, we only observe the effect of Principle C, which manifests itself in suppressed, but not floor-level acceptability.

This proposal predicts that conceptual plausibility and structural position of the discourse antecedent (and potentially other factors contributing to the overall obviation effect) would exert their influence on coconstrual acceptability not only in structurally marked, but also in structurally neutral backwards anaphora. When the pronoun linearly precedes and also c-commands the name, i.e., when it is both a binding antecedent and a discourse antecedent, all factors come into play. The binding antecedent triggers the Principle C effect; and the structural position of the pronoun as that of the discourse antecedent coupled with plausibility of coconstrual further factor into the overall obviation effect independent of the structural relation between the pronoun and the name. This predicts that we should observe a similar effect of plausibility and pronominal position in sentences featuring structurally neutral backwards anaphora. That is the research direction that I will take up in the following chapters.

2.6.3 Variability of responses among speakers and possible structural re-analysis

As shown in Fig. 2.8 and Fig. 2.9, and also discussed in Section 2.4.4, participants' responses in Exp. 1 were not uniform. For target sentences with a non-subject pronoun and high plausibility of coconstrual, 36.7% of participants selected a sentence-internal referent less than 10% of the time, while the remaining 63.3% selected it between 10-90% of the time (Fig. 2.9d). This variability in participants' responses suggests that they may have used different strategies of pronominal reference resolution in structurally marked backwards anaphora.

Principle C still remains a strong factor in speakers' judgments of structurally illicit coconstruals: more than a third of participants in our study adhered to the restriction imposed by Principle C throughout. On the other hand, there is also a second group who repeatedly choose in favor of a more plausible referent for a non-subject pronoun. The question is whether the behavior of participants within this group was uniform in that they all considered a broader range of factors during pronominal reference resolution, or whether in certain cases they attempted to structurally accommodate the most plausible interpretation by eliminating the Principle C effect.

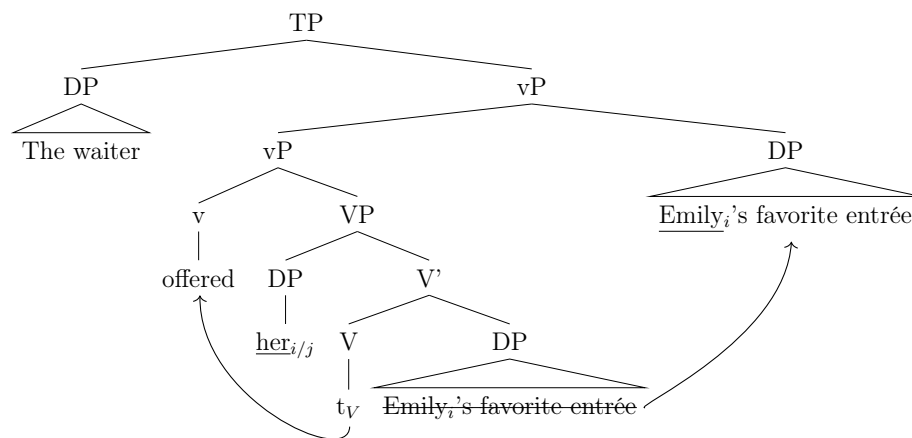
One possibility is that the observed subject/non-subject asymmetry is partially due to the fact that participants reanalyze the structure of the sentence in such a way that the name is no longer in the c-commanding domain of pronoun, similar to structural reanalysis that occurs with garden path sentences (Ferreira and Henderson 1991, Frazier and Rayner 1982). This process would look as follows. A speaker appears to intend coconstrual where the syntax doesn't license it. A listener is charitable and Gricean, and thinks that the speaker must be adhering to grammar, especially if the interpretation is a plausible one given the context and/or knowledge of the world. As a result, the listener looks for a way to license the coconstrual relation intended by the speaker within the confines of the grammar, as we discussed in Section 2.1 with respect to the "Garden Path Model" (Frazier and Fodor 1978), and resorts to a structural reanalysis of the original parse, in order to create a structure which makes the coconstrual licensed.

In the case of our data, one possibility of such structural reanalysis is extraposition of

the constituent that includes the name, structurally similar to a heavy NP shift (Kayne 1998, Ross 1967). The extraposed XP would then adjoin to vP, higher and to the right of the non-subject pronoun (Fox and Nissenbaum 1999), as shown in Fig. 2.11 for target item in Fig. 2.6 repeated here in (81) for convenience. Note that such extraposition would not change the c-commanding relation between the subject pronoun and the name, since the landing site would still be dominated by Spec TP.

(81) The waiter offered **her_i** **Emily's_{i/j}** favorite entrée.

Figure 2.11: Alternative structural representation illustrating object extraposition for target item (74b)



I will explore the possibility of such structural reanalysis in more detail in Chapter 3. At this point, I will limit myself to the following observations.

Participants who allowed for plausible interpretations that are nevertheless in conflict with the binding Principle C, did not prefer such interpretations across the board. For each individual speaker, each target item seems to have evoked a distinct memory schema, as we discussed in Section 2.2. This schema may have been based on their personal life experience and knowledge of the real world.

In each case, the derivational effort needed to structurally accommodate an alternative interpretation is weighed against how strong this judgment of plausibility is. For this reason, we observe structural accommodation of some plausible coconstruals but not others across individual participants. Further, even if we find experimental evidence for the proposed

syntactic movement, the extraposition account is not enough to singlehandedly explain the observed subject/non-subject asymmetry. First of all, structural reanalysis is cognitively costly (Fodor and Ferreira 1998, Frazier and Clifton 1998) and limited significantly by the parser's ability to access and revise the structure in working memory (Ferreira and Henderson 1991, Frazier and Clifton 1998, Sturt 1996, Van Dyke and Lewis 2003). For this reason it is unlikely that this strategy was used extensively by participants.

Second, the extraposition hypothesis leaves us with the following dilemma: either the name that has been extraposed reconstructs back into the c-commanding domain of the pronoun at LF (e.g., Fox (1999), Freidin (1986)), or else it remains at the extraposition site, no longer dominated by the pronoun (e.g., Safir (1999), Kuno (2004)). The former predicts that there should be no asymmetry between pronominal positions, since both subject and non-subject cases would give rise to Principle C effects, assuming that Principle C is evaluated at LF (Chomsky 1981, Chomsky et al. 1993). The latter predicts that extraposition should bleed Principle C for non-subject pronouns. While this situation gives rise to the reported subject-object asymmetry, it erroneously predicts that there should be near-ceiling acceptability for coconstrual with pronouns in object position, which is not the pattern that we observed.

Finally, as the findings of Exp. 1 and 2 show, participants' responses to sentences with DO and ECM predicates both displayed an increase in the rates of preference for coconstrual with a non-subject pronoun. If extraposition applied across the board, this would not be the case. The extraposing constituent in a sentence with a DO predicate is the DP that contains the name, as shown in Fig. 2.11. Within this DP the name is free; thus the Principle C effect is not expected to surface.

In a sentence with an ECM predicate, the extraposing constituent is the embedded TP, as show in Fig. 2.12 for the example in (82).

- (82) The classmates [_{vP} believed [_{VP} **her**_{i/j} —] [_{TP} to have finished writing **Pamela**_i's essay]].

preceding a name). I have argued that those two factors interact with one another: structural position of the *discourse antecedent* implicates information structure and incremental processing of content, which opens the door for plausibility (and perhaps other factors) to step in and exert their influence on potential coconstruction.

I have further proposed that the *overall obviation effect* that is observed in sentences with structurally marked backwards anaphora is composite: it includes the Principle C effect, i.e., syntactic obviation induced by the *binding antecedent* (an overt/covert co-indexed c-commanding nominal), and it is also dependent on a range of factors that are relevant for all backwards anaphora environments. This raises intriguing and fundamental questions about the very nature of Principle C in the grammar and the specific mechanisms that speakers may use to resolve the conflict between the structurally marked derivation and the most plausible interpretation. I will address these questions in the following chapters.

Chapter 3

Principle C and Movement: Researching the Structural Hypothesis

In Chapter 2, I presented the findings of two experiments which revealed that structural position of the c-commanding pronoun (TP-level vs. VP-level) matters for the possibility of coconstrual in backwards anaphora with Principle C effects. It was observed experimentally that when a pronoun c-commands a name from a position other than Spec TP, participants choose coconstrual interpretations more frequently. In this chapter I explore the hypothesis that the role of pronominal position may be in part attributed to a structural transformation adopted by charitable speakers to structurally accommodate an interpretation that is conceptually plausible given their experience and their knowledge of the world.

Here I test the hypothesis that movement may bring the name outside the c-commanding domain of a non-subject pronoun, but not outside the c-commanding domain of the subject. To investigate this hypothesis, in this chapter I present (i) the findings of a baseline study conducted to determine syntactic environments that allow for complement extraposition; (ii) the findings of a forced choice study investigating whether extraposition of a constituent containing a name outside the c-commanding domain of a non-subject pronoun influences participants' preference for intra-sentential coconstrual. The experimental results reveal that extraposition appears to play no role in participants' judgments, thereby leading us to reject the structural hypothesis and attribute the subject/non-subject asymmetry discovered in Chapter 2 to factors other than syntactic movement.

This chapter is organized as follows: in Section 3.1 I provide an overview of key structural assumptions related to extraposition. In Section 3.2 I present an acceptability ranking study that informed the design of target constructions for the experiment proper. In Section 3.3 I present the design of the forced choice task, lay out its findings, and discuss its implications. Section 3.4 concludes the chapter.

3.1 Extraposition, locality and acceptability

In Chapter 2, we presented the findings of two studies (forced choice task and judgment task) that targeted speakers' preference for coconstrual with an intra-sentential antecedent in structurally marked backwards anaphora. In these two studies we tested whether speakers' preference is influenced by coconstrual plausibility and/or structural position of the c-commanding pronoun. We provided experimental evidence that plausibility is a significant factor that influences participants' decisions with respect to their choice of pronominal referent, even in the face of Principle C effects. We also demonstrated that participants allow coconstrual with an intra-sentential antecedent significantly less often when the pronoun c-commands the name from Spec TP, and more often – with a pronoun in Spec VP position.

Based on these findings I entertained the possibility that the observed subject/non-subject asymmetry is linked to an optional structural transformation. Accordingly, in this chapter I will test the structural hypothesis: increased preference for coconstrual with non-subject pronouns is partially due to a syntactic reanalysis (namely, extraposition) adopted by charitable speakers when the plausibility of coconstrual is high. This reanalysis removes the constituent that contains the name from the c-commanding domain of a co-indexed nominal and is only available with non-subject pronouns. If we obtain empirical evidence to support this hypothesis, this would indicate that participants use different strategies during pronominal reference resolution in structurally marked backwards anaphora, and that the subject/non-subject asymmetry observed in Exp. 1 and Exp. 2. may (at least in part) be attributed to participants adopting the strategy of structural reanalysis.

It has been noted in the literature that extraposition often bleeds Principle C (Adger et al. 2017, Bruening 2014, 2018, Culicover and Rochemont 1990, Fox and Nissenbaum 1999, Reeve and Hicks 2017). So first, let us consider theoretical assumptions underlying the structural (extraposition) hypothesis. Baltin (2006) defines extraposition as a process by which an element is moved to the right of, or subsequent to, its canonical position, as shown in (83)-(84) illustrating the movement of the relative clause *who is a novelist*.

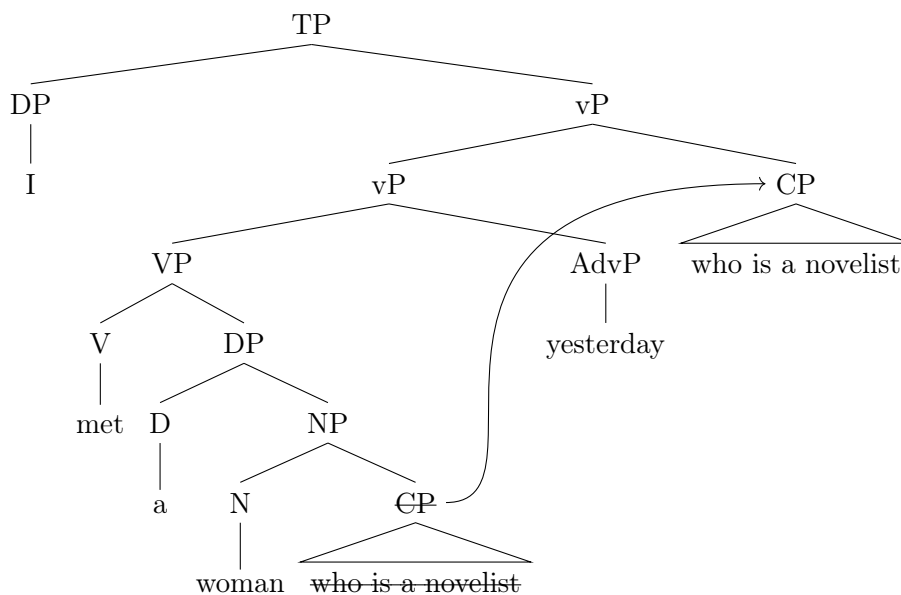
- (83) I met a woman [who is a novelist] yesterday.

(84) I met a woman yesterday [who is a novelist]¹.

In (83), the relative clause occupies a canonical position immediately following the noun it modifies. In (84), the temporal adverb *yesterday* intervenes between the noun and the relative clause. To achieve the surface word order, the relative clause shifts to the right leaving a trace in base position, as shown in (85), and also in corresponding Fig. 3.1².

(85) I met a woman t_{RC} yesterday [_{RC} who is a novelist].

Figure 3.1: Tree structure illustrating relative clause extraposition in (85)



Rightward movement, such as shown in (85), does not cross the vP boundary; and this locality of movement is constrained by several factors. One of them is the Right Roof Constraint (Akmajian 1975, Dillon et al. 2017, Grosu 1973, McCloskey 1999, Ross 1967), presented in (86), as it was formulated in McCloskey (1999).

(86) **Right Roof Constraint (RRC):**

Rightward movement may move an element X to the right edge of the cyclic node that most immediately contains X, but no further (McCloskey 1999: p. 207).

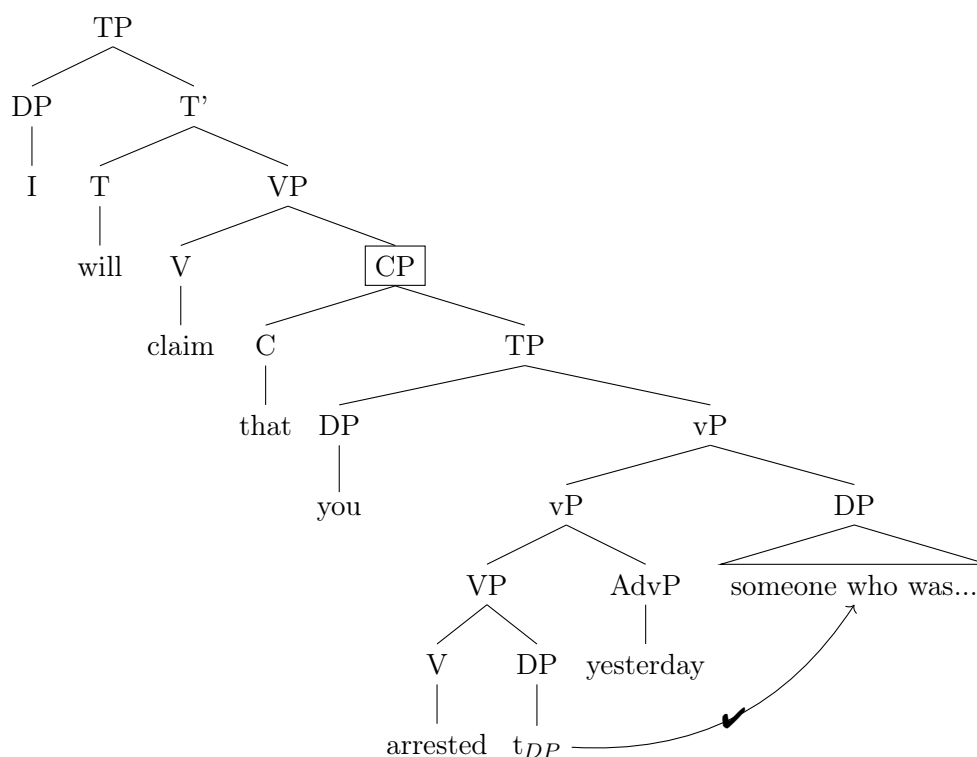
¹Hear and further in this chapter, square brackets indicate the constituent targeted by extraposition.

²One analysis of extraposition from DPs asserts that the relative clause is base-generated into a higher, unpronounced copy of the host DP, i.e., Late Merged into this position (Fox and Nissenbaum 1999). Under Late Merger analysis, in cases such as (84), the relative clause is merged at the vP level, and thus it is not c-commanded by any VP material. Then the prediction is also that if a pronoun is embedded under a VP and a name is embedded under the relative clause, there is no Principle C effect, as the former does not c-command the latter.

The Right Roof Constraint requires that extraposition is strictly clause-bounded, i.e., does not cross the CP boundary, as illustrated by examples in (87)-(88), and respective tree structures in Fig. 3.2 and Fig. 3.3³.

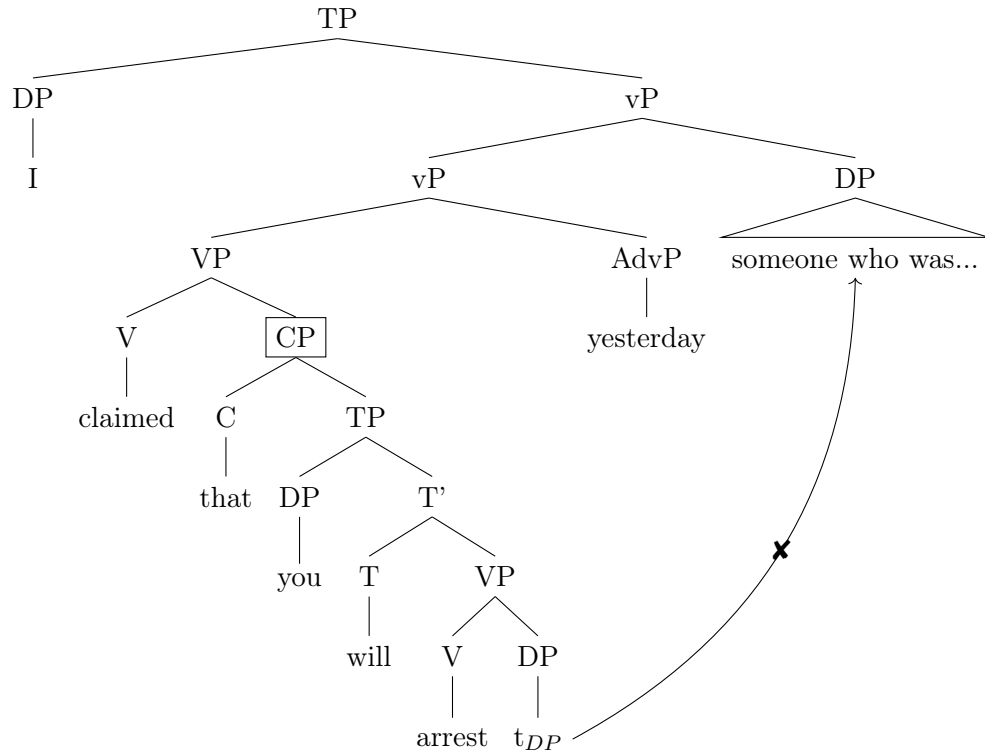
- (87) I will claim [_{CP} that you arrested _{t_{DP}} yesterday [_{DP} someone who was responsible for the murder]].
- (88) *_{[_{TP} I claimed [_{CP} that you will arrest _{t_{DP}} yesterday [_{DP} someone who was responsible for the murder]]}. (Dillon et al. 2017: p. 2, ex. 2(a-b); structural symbols not in the original paper)

Figure 3.2: Tree structure illustrating local DP extraposition in (87)



³Overfelt (2015) and Strunk and Snider (2008) argue that DPs, as well as CPs, are cyclic nodes, and therefore also impose sub-clausal locality restrictions on rightward movement. In this chapter, we will be focusing on extraposition of VP complements, and consequently the status of DP as a cyclic node is irrelevant for the syntactic material considered.

Figure 3.3: Tree structure illustrating unlicensed DP extraposition in (88)

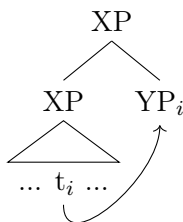


Dillon et al. (2017) constructed the examples in (87)-(88) so that the temporal adverb *yesterday* that intervenes between the extraposed DP and its trace either attaches to the vP of the past tense embedded clause, as in (87), while the matrix clause is future tense, or it attaches to the vP of the past tense matrix clause, as in (88), while the embedded clause is future tense. In (87), the extraposed DP remains in the embedded clause, and so the RRC is not violated. When the adverb adjoins to the matrix vP, as in (88), the extraposed constituent is forced to extrapose to a structural position above the adverb adjunction site to derive the surface word order. This violates the RRC, because extraposition has targeted a position in the matrix clause, which is beyond the minimal cyclic node containing the trace (i.e., the embedded CP, shown in a rectangle in both Fig. 3.2 and Fig. 3.3). As a result, the latter derivation is unacceptable.

Baltin (1981, 1983, 2006) proposed that rightward movement obeys an even stricter, sub-clausal locality constraint: the adjunction site of an extraposed constituent within the clause is linked to the position of the *host* constituent: the higher the host, the higher the extraposition landing site, and vice versa (also noted in Guéron (1980) and Culicover and Rochemont (1990)). More specifically, Baltin (1981, 1983, 2006) and Culicover and Rochemont (1990),

propose that rightward movement adjoins to the closest maximal projection that dominates the base position of the extraposed constituent, as shown in Fig. 3.4.

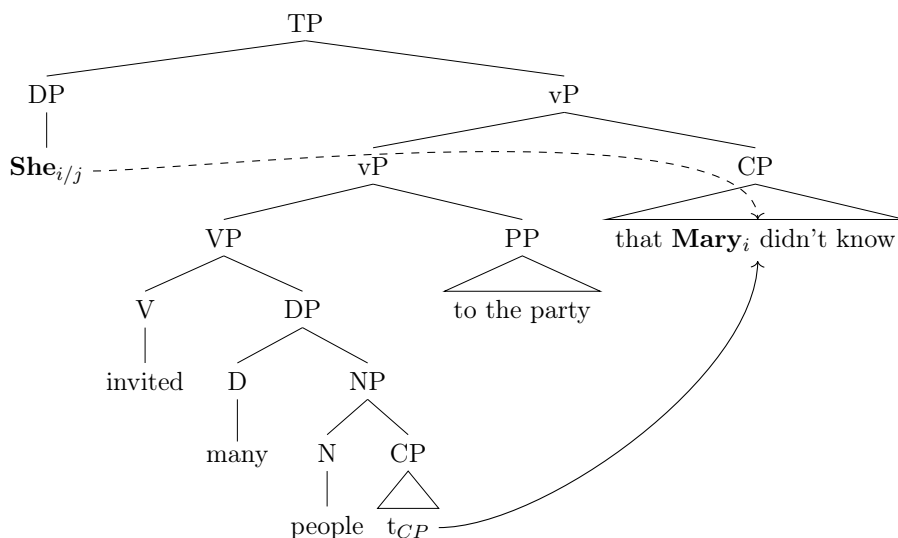
Figure 3.4: Tree structure illustrating locality of extraposition within the closest maximal projection



Thus in cases where an extraposed constituent modifies the subject, it adjoins to TP. When it is a verb complement, it adjoins to the minimal vP/VP that contains that verb. This argument is based on the observation that an extraposed constituent may not contain a name bound by a pronoun in the Spec TP position (Culicover and Rochement 1990).

- (89) ***She**_i [_{vP} [_{VP} invited many people _{t_{CP}}] [_{PP} to the party]] [_{CP} that **Mary**_i didn't know]]. (Culicover and Rochement 1990: p. 28, ex. (12))⁴

Figure 3.5: Tree structure illustrating binding of the name by a Spec TP pronoun in (89)



Given that coconstrual between the matrix subject pronoun *she* and the name *Mary* is unavailable in (89), Culicover and Rochement (1990) conclude that the extraposed CP must remain in the c-commanding domain of the matrix subject, as shown in Fig. 3.5, and cannot

⁴Here and further, solid arrows show movement; dashed arrows show the c-command relation between the key nominals.

be adjoined to TP above the matrix subject, where it would be outside its c-commanding domain.

Similarly, Bruening (2018) proposes that when the rightward movement of a complement CP only crosses syntactic material inside the minimal vP (e.g., as with vP adjoining temporal adverbs), the extraposed CP adjoins to the vP, just above the temporal adverb. Bruening (2014, 2018) does leave the door open to the possibility of extraposed constituents targeting higher landing sites, but only when forced to move there across high, e.g., IP-level, adjuncts, as illustrated in (90).

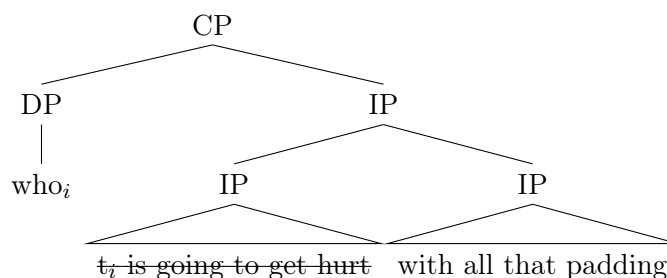
- (90) Marissa wouldn't say to **him**_{*i*} t_{CP} with her mother hanging around [_{CP} that she loves **her fiancé**_{*i*}]. (Bruening 2018: p.368, ex. 12(a))

Bruening (2014, 2018) provides additional supporting evidence for IP-level extraposition across adjuncts such as *with her mother hanging around* by pointing to sluicing, which is available in examples (91)-(92).

- (91) A: Someone is going to get hurt.
 B: Who, with all that padding? (Bruening 2014: p.351, ex. 33(a))
- (92) A: We should be able to sneak someone into CIA headquarters.
 B: Who, without them catching him? (Bruening 2014: p.351, ex. 33(b))

Following the standard assumption that sluicing involves ellipsis of IP/TP (Merchant 2001), Bruening (2014) proposes the following: since the adjunct can be stranded in (91)-(92), it must be at least as high as IP, as shown in Fig. 3.6.

Figure 3.6: Tree structure illustrating IP-level adjunction in (91)



Since (90)-(92) are acceptable, Bruening (2014, 2018) concludes that the landing site for the extraposed CP complement in (90) is at least as high as IP. Ultimately, the extraposition landing site is linked to the adjunction site of the syntactic material that causes

extraposition.⁵

Thus I assume that when rightward movement is motivated by low adjuncts (i.e., vP adjoining syntactic material), it does not reach higher than the vP. For this reason, when presenting the design of experimental studies that manipulate extraposition availability later in this chapter, we control for the adjunct position in the structure.

Now that we have presented our basic structural assumptions about extraposition, let us return to the discussion of the structural hypothesis of subject/non-subject asymmetry with respect to intra-sentential coconstrual in structurally marked backwards anaphora. In Experiments 1 and 2, the target items included two distinct structural types: sentences with Dative Object predicates and sentences with ECM predicates. Each target sentence had *structurally marked* backwards anaphora (i.e., a pronoun linearly preceding and also c-commanding a name). When it comes to extraposition, these two types of predicates give rise to distinct predictions with respect to Principle C effects. With Dative Object predicates, the pronoun is the only potentially co-indexed nominal that c-commands the name. This is shown in Fig. 3.7 for a sample sentence in (94).

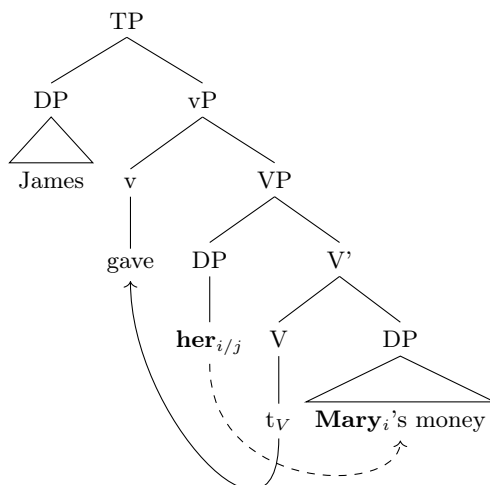
(94) James gave **her**_{*i/j*} **Mary**_{*i*}'s money.

⁵It is important to emphasise here that Bruening (2014, 2018) and Bruening and Al Khalaf (2019) assume that binding is defined based on the syntactic relation of *precede-and-command*, not *c-command*. Accordingly, their diagnostics for movement landing sites that involve Principle C effects are based on a set of different theoretical assumptions. For this reason, Bruening (2014, 2018) is not testing whether the name contained in the extraposed CP in structures similar to (90) can be coconstrued with the matrix subject pronoun, e.g., as suggested in (93).

(93) ***He**_{*i*} wouldn't say to Marissa t_{CP} with his mother hanging around [_{CP} that **John**_{*i*} loves his fiancé].

For Bruening (2014, 2018), coconstrual is unavailable in (93) since the name remains in the *precede-and-command* domain of the matrix subject, which includes all the syntactic material merged at the level of the matrix IP. We will return to the discussion of predictions from *precede-and-command* in the Discussion section of this chapter following Experiment 3.

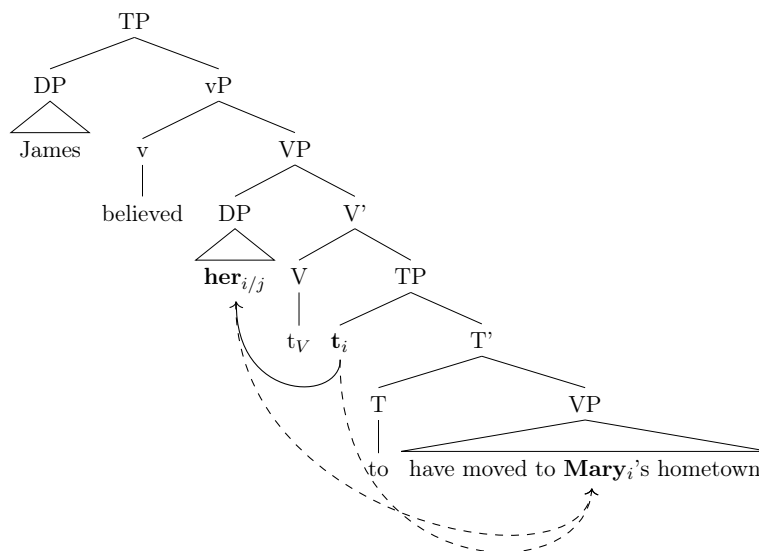
Figure 3.7: Tree structure showing a single c-commanding nominal for the embedded name in a sentence with a DO predicate in (94)



With ECM predicates, the name is c-commanded not only by the pronoun, but also by the trace of this pronoun which is left in the embedded Spec TP following the raising of the pronoun to the matrix VP (Lasnik 1999, Postal 1974). This makes the trace the closest binding antecedent for the name. This is illustrated in Fig. 3.8 for a sample sentence in (95).

- (95) James believed **her**_{*i/j*} to have moved to **Mary**_{*i*}'s home town.

Figure 3.8: Tree structure showing two distinct c-commanding nominals (the pronoun and its trace) for the embedded name in a sentence with an ECM predicate in (95)



According to Principle C, a name has to be free of any *binding antecedent*, i.e., *any* co-indexed c-commanding antecedent, overt or covert (Chomsky 1981). This means that in the absence of an overt c-commanding DP, an unpronounced co-indexed and c-commanding

trace is predicted to cause the same Principle C effect as an overt nominal. Now let us consider this observation in the context of subject/non-subject asymmetry in structurally marked backwards anaphora.

Suppose that increased preference for coconstrual with non-subject pronouns could in some cases be attributed to a structural reanalysis of the input by the listener, as proposed by the structural hypothesis. When plausibility of coconstrual with a sentence-internal antecedent is high, the listener might be charitable and Gricean, and attempt to structurally accommodate the most plausible interpretation by performing structural reanalysis of the sentence so that Principle C is observed. The outcome of such reanalysis would be different, depending on the syntactic structure of the sentence. Let us consider sample DO and ECM stimuli from Experiment 1, as shown in (96) and (99), to see how this would play out.

(96) *DO / subject pronoun:*

She_{*i/j*} gave Tommy **Emily**_{*i*}'s phone number.

(97) *DO / object pronoun:*

Mr. Barker gave **her**_{*i/j*} **Emily**_{*i*}'s report card.

(98) *ECM / subject pronoun:*

She_{*i/j*} believed the doctors to have **Pamela**_{*i*}'s scan results.

(99) *ECM / object pronoun:*

The classmates believed **her**_{*i/j*} to have finished writing **Pamela**_{*i*}'s essay.

In each of these examples, the plausibility of coconstrual with an intra-sentential antecedent is high, as determined by the norming study reported in Chapter 2. The difference between (96) and (98), on the one hand, and (97) and (99), on the other hand, lies in the structural position of the pronoun. In the former, the pronoun c-commands the name from matrix Spec TP, while in the latter the pronoun is merged with the matrix VP.

Now suppose the listener attempts to structurally accommodate the most plausible interpretation by extraposing the constituent that contains the name, i.e., applying overt string-vacuous movement to the right (Baltin 1987, Clements et al. 1983), and merging the moved constituent above its base-generated position. The underscores in examples (100)-(103) show the original structural position of the constituents that undergo such movement.

(100) *DO / subject pronoun:*

She_{*i*} [_{*vP*} gave [_{*VP*} Tommy _____] [_{*DP*} **Emily**_{*i*}'s phone number]].

(101) *DO / object pronoun:*

Mr. Barker [_{*vP*} gave [_{*VP*} **her**_{*i*} _____] [_{*DP*} **Emily**_{*i*}'s report card]].

(102) *ECM / subject pronoun:*

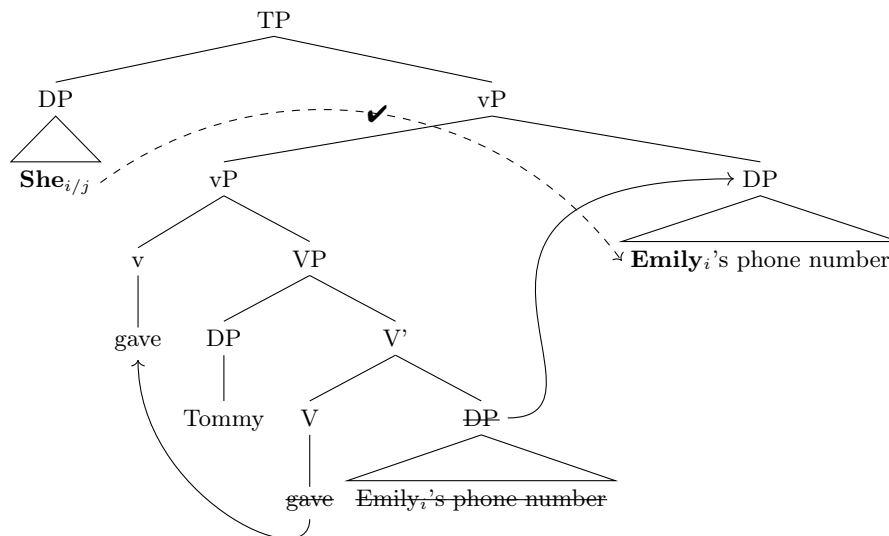
She_{*i/j*} [_{*vP*} believed [_{*VP*} the doctors _____] [_{*TP*} to have **Pamela**_{*i*}'s scan results]].

(103) *ECM / object pronoun:*

The classmates [_{*vP*} believed [_{*VP*} **her**_{*i/j*} _____] [_{*TP*} to have finished writing **Pamela**_{*i*}'s essay]].

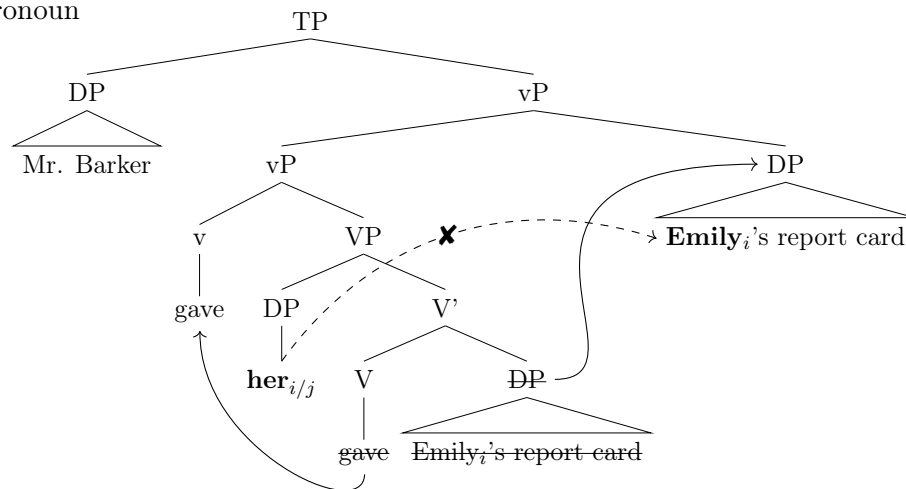
As stated earlier, we assume that the extraposed complement merges with the minimal *vP*, as shown in the tree structures in Fig. 3.9 – Fig. 3.12. Let us begin with the DO target items. In Fig. 3.9, which illustrates extraposition analysis of (100), we see that after the movement, the name still remains in the c-commanding domain of the subject pronoun, so extraposition does not bleed Principle C.

Figure 3.9: Tree structure illustrating the extraposition analysis of (100): DO predicate, subject pronoun



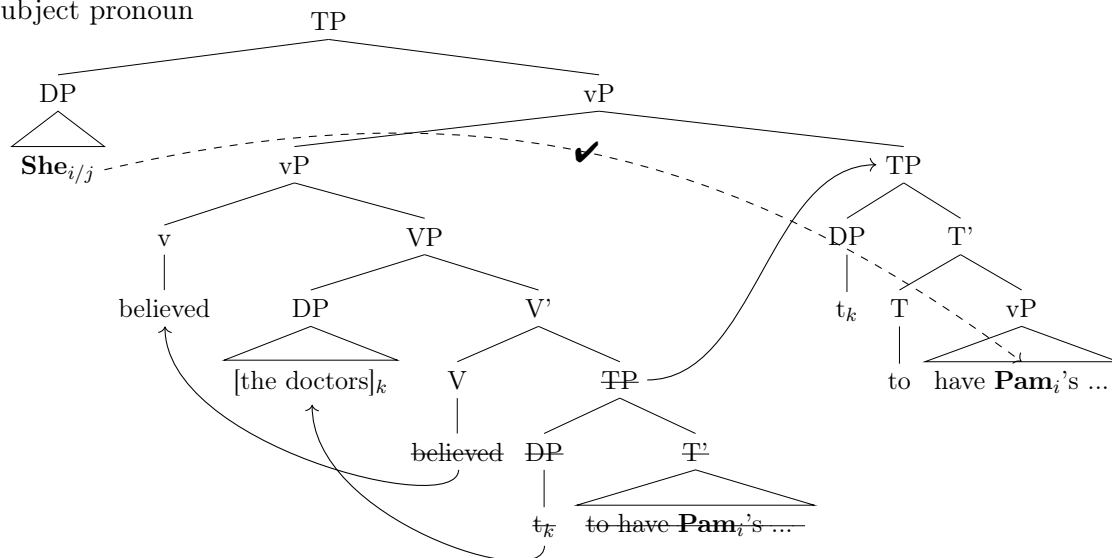
On the contrary, as Fig. 3.10 (the extraposition analysis of (101)) shows, the constituent that contains the name moves to a position outside the c-commanding domain of the non-subject pronoun, thereby bleeding Principle C.

Figure 3.10: Tree structure illustrating the extraposition analysis of (101): DO predicate, object pronoun



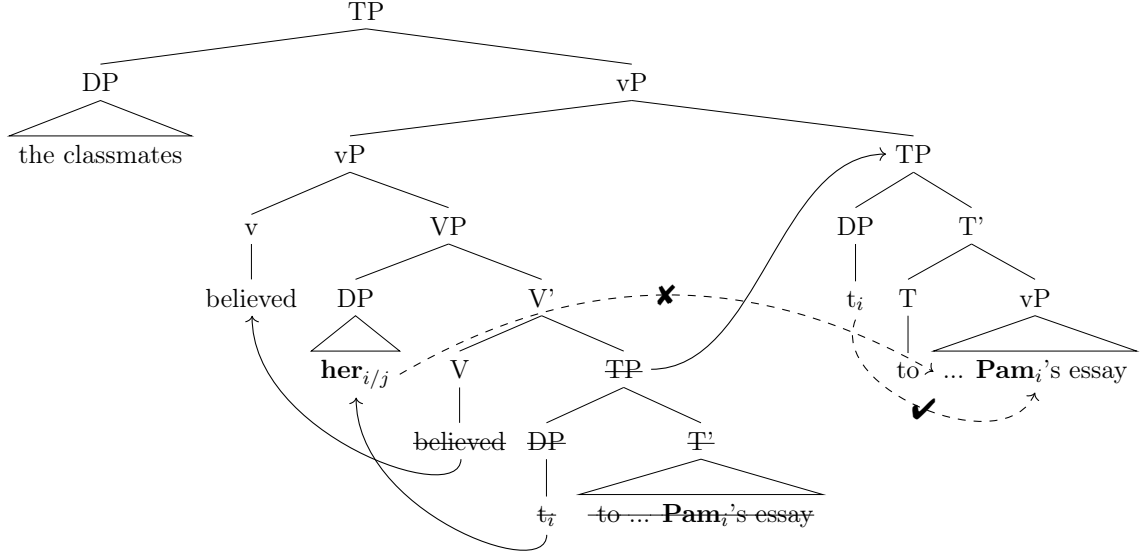
Now let us consider the ECM target items. Fig. 3.11 illustrates extraposition analysis of (102), an ECM sentence with a pronoun in matrix subject position. Here, the binding predictions are similar to those in Fig. 3.9 for (100): after the rightward movement, the constituent with the name adjoins to vP, and so it remains within the c-commanding domain of the matrix subject pronoun. It is also c-commanded by a coindexed trace in the Spec TP position of the embedded ECM clause.

Figure 3.11: Tree structure illustrating the extraposition analysis of (102): ECM predicate, subject pronoun



Finally, we turn to Fig. 3.12, which shows the extraposition analysis for the target sentence in (103). Here, the embedded TP moves to a position outside the c-commanding domain of pronoun *her*, but the name still remains in the c-commanding domain of a coindexed trace of this pronoun in the Spec TP position of the ECM clause.

Figure 3.12: Tree structure illustrating the extraposition analysis of (103): ECM predicate, object pronoun



Thus the extraposition analysis provides us with clear predictions with respect to absence/presence of Principle C effects depending on the type of predicate and the structural position of the pronoun. These predictions are summarized in Table 3.1. The cross (X) indicates that Principle C is active post-movement and coconstrual is not expected to be fully acceptable. The check-mark (✓) shows that the name no longer has a binding antecedent after extraposition, and coconstrual interpretation should be accessible.

Table 3.1: Participants rejecting (X) / allowing (✓) coconstrual in target items with Principle C effects in Exp. 1 and Exp. 2: Predictions from the structural hypothesis

	Subject Pronoun	Non-Subject Pronoun
ECM predicate	X	X
DO predicate	X	✓

The structural hypothesis is fully consistent with the findings of Exp. 1 and Exp. 2 in the subject pronoun condition, where we observed near-floor preference for intra-sentential coconstrual. As demonstrated above, because of the locality of syntactic movement, extraposition cannot take the name outside the c-commanding domain of the matrix subject. At the same time, as Table 3.1 shows, extraposition cannot singlehandedly account for the findings on the non-subject condition. If structural reanalysis were applied by all participants with all target items, we would have observed increased acceptability of intra-sentential

coconstrual with DO target items, but not with ECM target items, which was not the case.

The analysis of the findings in Exp. 1 demonstrated that the participants' responses were not uniform. Because of that, we first hypothesized that speakers make different decisions about acceptability of coconstrual based on their personal assessment of coconstrual plausibility in each individual case, while such assessment is linked to a relevant memory schema different for each individual. We further hypothesized that in cases where syntax allows it, some speakers may attempt to accommodate the most plausible interpretation structurally.

To investigate the nature of variability among participants and to pursue the possibility of such structural accommodation by some speakers in select structural environments, in the experimental part of this chapter we put in place two features that were not part of design in Exp. 1 and Exp. 2: (i) systematic manipulation of the type of matrix predicate, and (ii) structurally forced extraposition.

It is possible to induce rightward movement of the constituent containing the name by inserting a vP adjoining adverbial between the pronoun and the complement that contains that name (a DP or a TP/CP). The target complement would then be forced to move locally to a higher vP adjoining position to achieve the surface word order, cf. (104)-(105) vs. (106)-(107), as discussed earlier.

(104) Mr. Barker gave **her**_{*i/j*} **Emily**_{*i*}'s report card.

(105) The classmates believed **her**_{*i/j*} to have finished writing **Emily**_{*i*}'s essay.

(106) (?) Mr. Barker gave **her**_{*i/j*} on Tuesday **Emily**_{*i*}'s report card.

(107) (?) The classmates believed **her**_{*i/j*} fully to have finished writing **Emily**_{*i*}'s essay.

While examples in (104)-(105) are well-formed with respect to word order, the degree of acceptability of examples in (106)-(107) may vary depending on the speaker, which may in turn affect speakers' judgments with respect to intra-sentential coconstrual in such sentences. To independently assess the well-formedness of structures with vP-level adjuncts, let us consider sentences in (108)-(111). These sentences are analogous to (104)-(107), but the pronoun has been replaced with an unrelated proper name to eliminate a potential Principle C effect and focus primarily on how acceptable the word order is.

(108) Mr. Barker gave Tom Emily's report card.

- (109) The classmates believed Tom to have finished writing Emily’s essay.
- (110) ?? Mr. Barker gave Tom on Tuesday Emily’s report card.
- (111) *? The classmates believed Tom fully to have finished writing Emily’s essay.

The acceptability judgments reported for the examples in (108)-(111) have been verified with 6 native speakers of English via a short questionnaire⁶. These judgments show that the presence of a vP-level adjunct may decrease overall acceptability of the sentence independent of pronominal reference ambiguity. For this reason, our goal for the experiment presented in this chapter has been that all test items are based on predicates that systematically allow for the adjunct to intervene between the verb and one of its complements.

Continuing to target DO and ECM predicates would serve the purposes of replicability and also provide us with a useful contrast with respect to whether the extraposed constituent is no longer / is still c-commanded by a co-indexed nominal (pronoun and/or trace), i.e., whether it still has a binding antecedent when sentence is evaluated for Principle C effects. On the other hand, as one can see from questionable acceptability of examples in (108)-(111), DO and ECM predicates may not be straightforwardly suitable in terms of their compatibility with extraposition. Thus we need to consider a broader set of candidate constructions, and also manipulate factors known to improve acceptability when rightward movement is involved, e.g., the “weight” of the extraposed constituent. Consider, for example, the contrast in acceptability between (112) and (113).

- (112) *Lucy ate t_{DP} with a fork [$_{DP}$ peas]. (Staub et al. 2006: p. 389, ex. (2b))
- (113) Lucy ate t_{DP} with a fork [$_{DP}$ the extremely delicious, bright green broccoli]. (Staub et al. 2006: p. 389, ex. (1))

Both (112) and (113) have similar syntactic structure and involve extraposition of a direct object DP across a PP adjunct *with a fork*. The difference between the two examples is that in (112) the extraposed constituent is “light”, while in (113) it is “heavy” (lengthy, and/or syntactically complex).

⁶The participants were instructed that adverb *fully* in (111) should be interpreted as referring to the matrix clause and were asked to provide their assessment of the sentence under such interpretation.

As first noted in Ross (1967), the movement operation across an intervening adjunct is typically only able to apply when the direct object noun phrase is relatively long or “heavy”, which explains acceptability of (113) and unacceptability of (112). Because of this requirement, the type of extraposition illustrated by (113) is referred to as “Heavy NP Shift” in the literature (Arnold et al. 2000, Kayne 1998, Rochemont and Culicover 1997, Ross 1967, Staub et al. 2006). Later research also suggests that it is the length or “heaviness” of the NP relative to that of intervening constituents, and not the length of the NP alone, that predicts acceptability of the shifted structures (Arnold et al. 2000, McDonald et al. 1993, Stallings and MacDonald 2011, Wasow and Arnold 2003).

As proposed by Arnold et al. (2000) and Wasow (2002), extraposing heavier constituents affords speakers additional time to plan longer, more complex phrases. This could explain why “heaviness” is a property that improves acceptability of sentences with shifted DPs; and the same should be relevant for other syntactic types of extraposed constituents, e.g., shifted relative clauses (RCs).

A number of corpus studies, offline acceptability judgment studies, and online production measures have shown that speakers prefer sentences with RCs in the sentence-final position, as in (114), over RCs that are adjacent to the host subject noun when the RC is long in relation to the VP, as in (115) (Arnold et al. 2000, Francis 2010, Francis and Michaelis 2014, 2017, Walker 2013).

(114) Some research t_{CP} [VP was conducted] [CP that refutes the existing theories with very clear and convincing new evidence]. (Francis and Michaelis 2017: p. 345, ex. (2a))

(115) Some research [CP that refutes the existing theories with very clear and convincing new evidence] [VP was conducted]. (Francis and Michaelis 2017: p. 345, ex. (2b))

As Francis and Michaelis (2017) report, when participants were asked to select a sentence that sounded most natural in a binary preference task, sentences similar to (114), where a long RC extraposed across a short VP, were judged as more natural in 71.9% of cases, as compared to sentences such as (115), where a long RC was followed by a short VP. Statistical analysis revealed significant main effects of both RC length ($p < 0.001$) and VP length ($p = 0.02$).

Based on these findings and theoretical observations, in order to test the structural hypothesis, i.e., whether the subject / non-subject asymmetry reported in Chapter 2 is in part due to extraposition, we will further systematically manipulate the following two factors (i) whether or not extraposition is forced by an intervening adjunct; and (ii) whether or not the extraposed constituent contains a local antecedent for the name inducing a Principle C effect. For the former, our experimental items will vary in terms of absence/presence of a low (vP-adjointing) adverb separating the extraposing constituent from the rest of the VP material. For the latter, our test items will include structures that have a co-indexed nominal c-commanding the name inside the moved constituent, and also test items where the name post-movement is free. As our requirement is that all target items are fully acceptable structures of English independent of pronominal reference resolution, we begin the experimental part of this chapter by selecting syntactic types of predicates that systematically allow for complement extraposition and manipulate “heaviness” as a means of improving acceptability.

3.2 Extraposition acceptability: Baseline study

We began by conducting a baseline study to obtain acceptability rankings for a range of structures that involve rightward movement. Since acceptability of extraposition constructions is known to be influenced by multiple factors, as discussed in the previous section, our goal here was to manipulate these factors to determine which constructions with extraposition are judged as most acceptable, and then to use them to design target stimuli for the experiment proper.

For the baseline study, we assessed acceptability of structures that do not involve pronominal reference resolution. In the experiment proper (forced choice study), our goal was to select structures ranked as most acceptable by participants and transform them so that there is an R-expression in the extraposed constituent, and the pronoun c-commands this constituent before extraposition (see Section 3.3, Experiment 3).

3.2.1 Participants

60 Rutgers University undergraduates enrolled in an introductory Linguistics or Cognitive Science course participated for course credit. All participants were native speakers of English as determined by a demographic questionnaire.

3.2.2 Materials

To create target stimuli for the baseline study, we manipulated three factors: (i) “weight” of the extraposed constituent, as in (116), (ii) syntactic type of construction, as in (117), and (iii) semantic type of adverbial preceding the extraposing DP, as in (118).

For the factor “*weight*”, we manipulated the length of the extraposing constituent: the length of “heavy” phrases exceeded the length of “light” phrases 3.2-4-fold.

(116) Factor 1: “Weight” of extraposed constituent

- a. LIGHT: 2-4 words in an extraposed DP/PP, 3-6 words in an extraposed CP/TP
- b. HEAVY: 7-13 words in an extraposed DP/PP, 12-19 words in an extraposed CP/TP

To manipulate the factor *syntactic type of construction*, we created a design that included a wide range of structural types of sentences varying in (i) whether the extraposing constituent was sub-clausal (DP or PP) or clausal (TP or CP), (ii) whether the extraposing constituent contained a covert nominal in the Spec TP position or not (ECM and control predicates vs. all other types).

(117) Factor 2: Type of Syntactic Construction

- a. V + DP: monoclausal sentence, transitive verb followed by a direct object DP
 LIGHT: Lucas fixed [a broken lamp].
 HEAVY: Amy purchased [a brand-new mahogany dining room table from Ethan Allen].
- b. V + DP + PP: monoclausal sentence, ditransitive verb followed by a direct object DP and a complement PP
 LIGHT: Amy gave an award [to Robert].

HEAVY: Sarah sent a complaint [to the Macy’s customer service and support department].

- c. V + PP + DP: monoclausal sentence, ditransitive verb followed by a complement PP and a direct object DP

LIGHT: Jason offered to Ellen [a cold drink]⁷.

HEAVY: Sarah transferred to Brandon [earnings from her investments and assets in the past quarter].

- d. V + DP + DP: monoclausal sentence, ditransitive verb followed by an indirect object DP and a direct object DP

LIGHT: Sarah sent Amy [a check].

HEAVY: Robert brought Lucas [a pie from Melbourne’s most talked about baking company].

- e. V + ECM: multiclausal sentence, Exceptional Case-Marking predicate followed by a complement clause

LIGHT: Nina wanted Brandon [to come to the meeting].

HEAVY: Nina allowed Jason [to borrow her pickup truck to move the furniture to his new apartment in Brooklyn].

- f. V + CONTROL: multiclausal sentence, object-control predicate followed by a complement clause

LIGHT: Ellen persuaded Jason [to buy a Roomba].

HEAVY: Nina told Jason [to go through a stack of mail to see whether any of the missing bills were there].

- g. V + FINITE: multiclausal sentence, ditransitive verb followed by an indirect object DP and a complement clause

LIGHT: Nina told Ellen [that dinner was ready].

HEAVY: Nina persuaded Lucas [that going to see “Mamma Mia II” was a complete and utter waste of time].

⁷Sentences of this type are typically not judged as fully acceptable by native speakers, as the findings of this study will also confirm. However, it has been observed that a “heavy” object DP in a ditransitive may extrapose (Staub et al. 2006), so we included this construction in the design to maintain symmetry.

For the factor *intervening adverb*, we manipulated whether the adverb was absent vs. present (i.e., extraposition was optional vs. obligatory), and the semantic status of adverb, which correlates with the adjunction site (Alexiadou 1997, Cinque 1999, Valois 1991). Thus we included low (temporal and manner) and high (speaker-oriented evaluative) adverbs to control for the extraposition landing site.

(118) **Factor 3: Intervening Adverb**

a. NONE

Brandon convinced Robert [that a new Rolex watch would be too expensive and flashy for his interview]⁸.

b. TEMPORAL: temporal adverb “yesterday”

Brandon convinced Robert **yesterday** [that a new Rolex watch would be too expensive and flashy for his interview].

c. MANNER: manner adverb

Brandon convinced Robert **quickly** [that a new Rolex watch would be too expensive and flashy for his interview].

d. EVAL: evaluative (subject-oriented) adverb

Brandon convinced Robert **conveniently** [that a new Rolex watch would be too expensive and flashy for his interview].

This resulted in a $2 \times 7 \times 4$ design with each of the subtypes represented by 4 individual test items (for a total of $= (2 \times 7 \times 4) \times 4 = 224$ test items). The first two factors (“*weight*” and *syntactic type of construction*) were manipulated within subjects; the third factor (*intervening adverb*) was manipulated between subjects. Stimuli were then grouped into 4 lists using a Latin-Square Design, so that each participant saw 56 items from the list.

As shown in (118), the between-subjects factor *intervening adverb* had 4 conditions: no intervening adverb (118a), temporal adverb (118b), manner adverb (118c), and evaluative adverb (118d). The first (118a) and the last (118d) conditions were intended to establish two base lines. The condition without an intervening adverb was expected to be assessed as fully

⁸The examples presented to illustrate manipulations within this factor are of the type “V + FINITE” and “HEAVY”.

acceptable, while the condition with an evaluative (subject-oriented) adverb was expected to be assessed as fully unacceptable, since it forces the extraposition to be non-local.

8 additional control items involved extraposition of a subject-adjoined or object-adjoined relative clause (Fox and Nissenbaum 1999, Fox 2002), as shown in (119) and (120) respectively.

(119) A man walked into the room [who looked very much like Rob’s younger brother].

(120) Jason read an article yesterday [that discussed the rising student tuition in the United States].

Each participant also saw 36 additional filler sentences that included monoclausal and multicausal sentences of structural types listed in (117). 28 of those had either a temporal, manner, or evaluative adverb in a structural position other than preceding the extraposing constituent, as was the case in (118). In those fillers, adverbs were placed sentence-initially, as in (121), pre-verbally, as in (122), and sentence-finally, as in (123).

(121) **Unfortunately**, Ellen had to take her work home for the weekend.

(122) Nina **proudly** showed Robert her gold award certificate.

(123) Robert asked Jason to get him tickets for the game **last Tuesday**.

Overall, each participant saw 56 items from the target items list, 8 controls and 36 filler items for a total of 100 sentences presented in randomized order during the experimental session. See Appendix B for a full set of experimental items.

3.2.3 Procedure

The experiment was designed and administered online using Qualtrics survey software (Qualtrics, Provo, UT). Participants signed up for the study via Rutgers SONA SYSTEMS website (cloud-based participant pool management software), and received a link to the Qualtrics survey through this website. First, each participant was required to indicate their consent to participate in an online study and answer 3 demographic questions about whether or not (i) English was their native language, (ii) the United States were their primary place of residence between their birth and the age of 13, and (iii) both parents spoke English

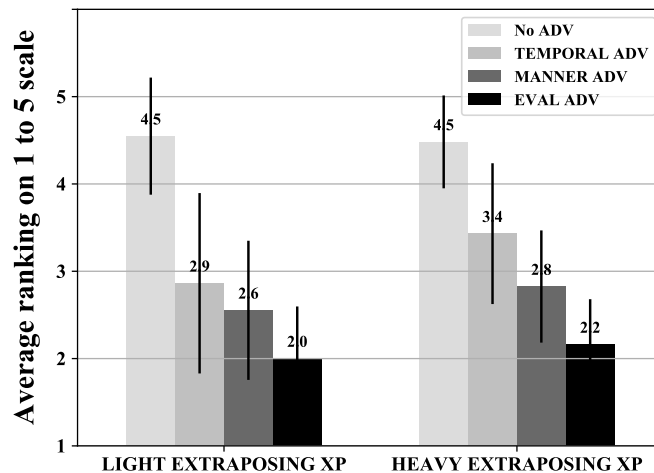
to them during those years. Further, each experimental session included a brief training session to acclimate participants to the task. The training involved non-target items that were similar to the ones used in the study proper. Participants responded to training items and received feedback based on their answers. They further proceeded to the experimental session.

Each experimental trial had the same structure. In the middle of the screen participants saw a sentence. They were asked to read the sentence and rank it on a Likert scale (with values ranging from 1 to 5) indicating how acceptable the sentence was (1 - fully unacceptable, 2 - rather unacceptable, 3 - in between, 4 - rather acceptable, 5 - fully acceptable). See Appendix B for a full set of instructions to participants.

3.2.4 Results

Results for target items across the four conditions based on the type of intervening adverb are presented in Fig. 3.13⁹.

Figure 3.13: Average acceptability rankings for test items across all conditions



As expected, sentences without an intervening adverb on average were judged as *rather/fully acceptable* (average 4.5 on a 5-point Likert scale), while sentences with an intervening speaker-oriented (evaluative) adverb were mostly judged as *rather unacceptable* (average 2-2.2 on a 5-point Likert scale). Given significant standard deviation in the conditions with

⁹One target item was excluded from the analysis since it contained a typo. Total number of target items in the analysis is 223 (out of 224).

low (temporal and manner) adverbs, let us break these findings down further by factors *syntactic type of predicate* and “*weight*” of *extraposed constituent*.

These results are presented in Fig. 3.14 and Fig. 3.15 below. Fig. 3.14 shows average acceptability rankings for test items with “light” extraposing constituent; and Fig. 3.15 shows average acceptability rankings for test items with “heavy” extraposing constituent, both broken down by predicate type.

Figure 3.14: Average acceptability rankings for test items across conditions: “Light” extraposing constituent

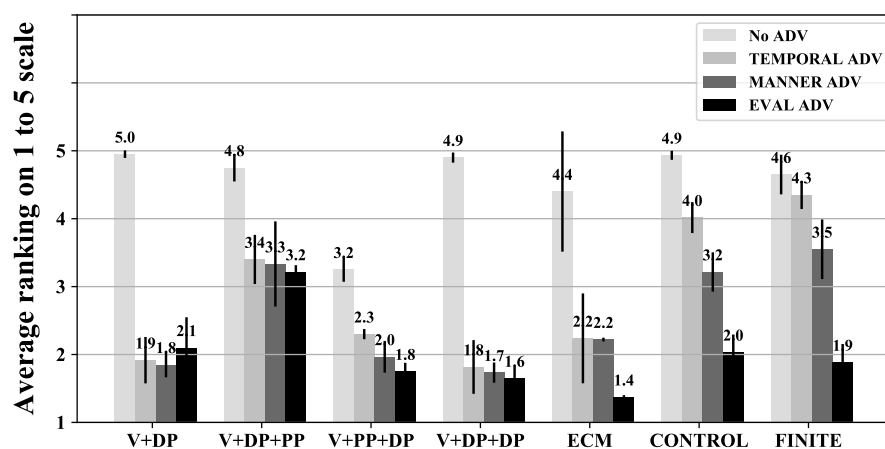
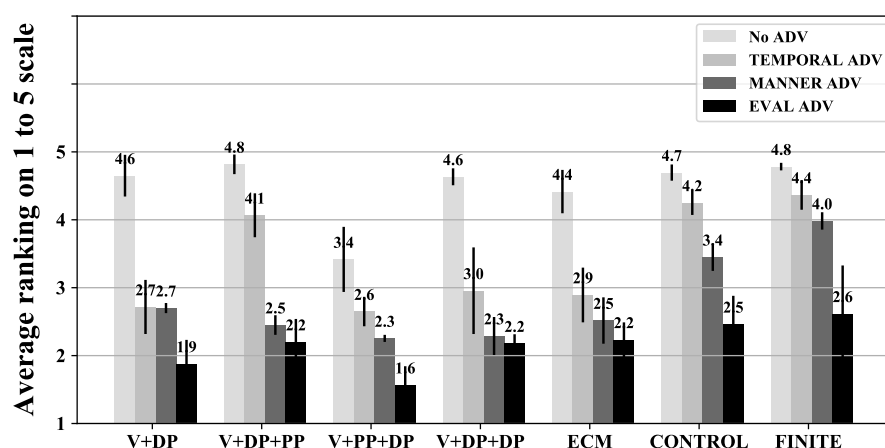


Figure 3.15: Average acceptability rankings for test items across conditions: “Heavy” extraposing constituent



As Figures 3.14 and 3.15 show, sentences with temporal adverbs were systematically judged as more acceptable than sentences with manner adverbs (higher acceptability for all individual types of predicates, and with both “light” and “heavy” extraposing XPs). This

was confirmed by the results of the statistical analysis: a cumulative link mixed model with random intercept for subjects and items and planned pairwise comparisons revealed significant effect of factor *intervening adverb*. Also for 13 out of 14 conditions (with the exception of condition "V+DP+PP" $\times$ "manner adverb"), extraposition of a "heavy" XP over a low (temporal or manner adverb) was judged as more acceptable than extraposition of a "light" XP. Finally, the types of predicates that best tolerated rightward movement were sentences with control predicates (labeled as "CONTROL") and ditransitive predicates with finite clause complements (labeled as "FINITE").

3.2.5 Discussion

Sentences with obligatory rightward movement of a complement XP across an adjunct vary significantly in terms of their acceptability. To select structures that are considered most natural by native speakers of English, we conducted a baseline acceptability ranking study that included test items where a clause-final complement XP was separated from the rest of the clause by an adverbial. This allowed us to define design features relevant for target items in the experiment proper, where we test the structural (extraposition) hypothesis by incorporating backwards anaphora with c-command into the structures selected via the acceptability ranking study.

The acceptability ranking task provided us with the following findings with respect to design features to be implemented in the study proper.

First, as reported in the literature (Arnold et al. 2000, Francis 2010, Francis and Michaelis 2014, 2017, Kayne 1998, Rochemont and Culicover 1997, Ross 1967, Staub et al. 2006, Walker 2013), the "weight" of extraposed constituent matters. We found that sentences where an extraposed XP is "heavy" are systematically judged as more acceptable than those where it is "light". We propose that this is linked to the fact that intervening adverbs were temporal or manner adverbs, i.e., they modified the verb by providing additional information about the time or manner in which the action was performed, respectively. If an adverb is sentence-final, and no extraposition takes place, a "heavy" constituent linearly separates the verb from its modifier, which makes it more difficult for the listener to parse the sentence. This difficulty may be eliminated by extraposing a "heavy" constituent, so that the verb

and the modifying adverb become linearly adjacent. This makes extraposing “heavy” XP more preferable than the alternative without movement. A “light” complement does not create a parsing difficulty of this kind; and as a result, its extraposition is not justified from the point of view of processing ease, and is judged as less acceptable. These results, overall, support theoretical approaches to alternations in constituent order that assume a tight connection between speakers’ choice of syntactic structure and ease of production and processing (Francis and Michaelis 2017, Hawkins 2004, Kuperman and Bresnan 2012, MacDonald 2013).

Second, as the acceptability study showed, extraposition across a “low”, vP-adjoining adverb was judged as significantly more acceptable than across a “high” IP-adjoining speaker-oriented adverb. This is in line with the literature suggesting strict locality constraints on rightward movement (Baltin 1981, 1983, 2006, Bruening 2018, Guéron 1980, Overfelt 2015). In addition, sentences with intervening temporal adverbs were overall judged as more acceptable than those with a manner adverb. This may be due to the fact that manner adverbs can appear in both pre-verbal and post-verbal position, while temporal adverbs resist appearing pre-verbally (cf. (124) vs. (125)).

(124) Mary quickly ran across the field.

(125) (??) Mary yesterday ran across the field.

Thus sentences with manner adverbs have an existing acceptable alternative, where an adverb is still adjacent to the verb on the left, and no constituent movement is required. This alternative is not available with temporal adverbs. Absence of such alternative justifies rightward movement and the associated increase in processing difficulty.

Finally, the structures that best tolerate extraposition of a constituent are object-control sentences and sentences with finite clause complements. This finding is also in line with the literature suggesting that it is not just the length of XP (e.g., Francis and Michaelis (2017)), but also its structural complexity that contributes to “heaviness”. The findings show that sentences with extraposed DPs on average rank lower than sentences with extraposed PPs and TPs/CPs, i.e., more structurally complex constituents.

The findings of the norming study allowed us to select two syntactic types of sentences that both have high acceptability ratings with extraposition. Moreover, these two types

of structures also have distinct predictions in terms of presence/absence of the Principle C effect post movement, as we discussed in the beginning of this chapter. When the extraposing clause contains a name that is co-indexed with a non-subject pronoun in the matrix clause, in sentences with finite clause complements extraposition brings this name outside the c-commanding domain of all co-indexed nominals. In sentences with object control clauses, the extraposing clause still has a binding antecedent: a PRO subject co-indexed with the pronoun and the name, which still induces the Principle C effect after movement. This, along with the selected semantic type of intervening adverb (temporal) and the “weight” of the extraposing clause (“heavy”), will play a key role in the design of the forced choice study.

3.3 Experiment 3

Experiment 3 was designed to test whether extraposition of the constituent that contains a name contributes to the subject/non-subject asymmetry in pronominal reference resolution in structurally marked backwards anaphora. Here we directly test the structural hypothesis.

3.3.1 Participants

72 Rutgers University undergraduates enrolled in a Linguistics or Cognitive Science course participated for course credit. All participants were native speakers of English as determined by a demographic questionnaire.

3.3.2 Materials

3.3.2.1 Target items

The target stimuli for this experiment were designed based on the ranking study reported in the previous section. The two structures that evoked consistently high acceptability rankings were sentences with object control embedded clauses and sentences with finite clause complements where a “heavy” embedded clause was extraposed across a temporal adverb *yesterday* (as illustrated by sample stimuli from the baseline study in (126) vs. (127)).

(126) *Heavy object control clause:*

Nina told Jason_i [TP] **yesterday** [_{TP} PRO_i to go through a stack of mail to see whether any of the missing bills were there].

(127) *Heavy finite clause complement:*

Nina persuaded Lucas [CP] **yesterday** [_{TP} that going to see “Mamma Mia II” was a complete and utter waste of time].

We took the baseline sentences and incorporated structurally marked backwards anaphora relation into them, so that a pronoun was merged with a matrix clause VP, and a name was in the embedded clause, in the c-commanding domain of this pronoun. As a result, in cases where extraposition is forced, the name moves with the embedded clause and merges above the structural position of both the adverb and the Spec VP pronoun.

To test for the influence of extraposition on acceptability of coconstrual relations in backwards anaphora with c-command, we manipulated two factors: (i) *type of clausal complement* (object control vs. finite clause complement) and (ii) *intervening temporal adverb* (absent vs. present). This led to a 2×2 design with each of the sentence types represented by 20 individual test sentences (for the total number of test sentences = (2×2)×20 = 80). The resulting four conditions for a sample target item are shown in (128). Both factors (*type of clausal complement* and *absence/presence of temporal adverb*) were manipulated between subjects. Based on that, stimuli were grouped into 4 lists using Latin-Square Design, so that each individual participant saw 20 target items out of 80.

(128) Sample target item in Experiment 3 with 4 between-subject conditions:

a. *Object control clause; intervening temporal adverb:*

John told her_{i/j} **yesterday** to order one more slice of buffalo chicken pizza with extra cheese for Jane_i’s twin sister.

b. *Finite clause complement; intervening temporal adverb:*

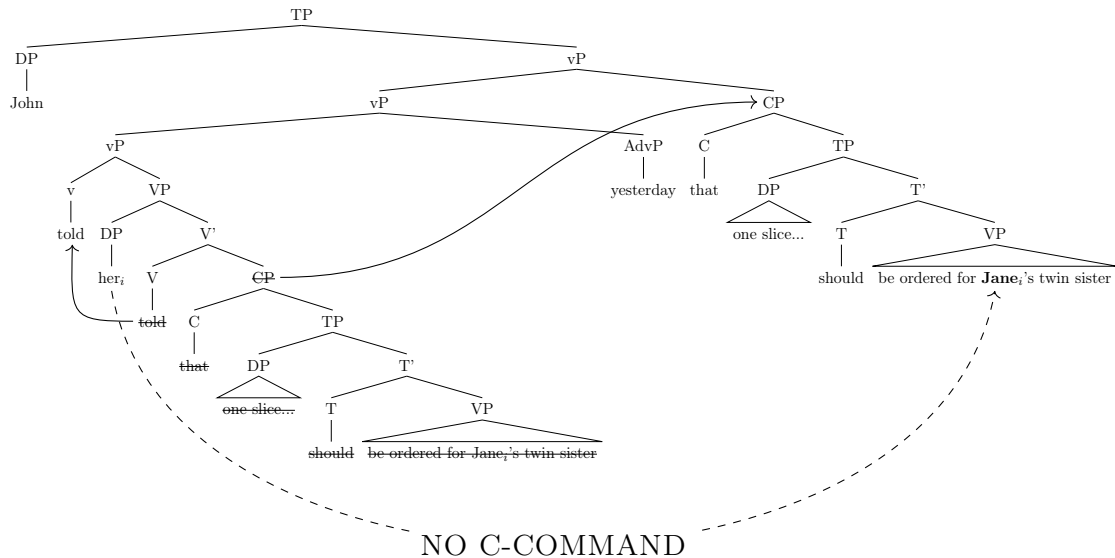
John told her_{i/j} **yesterday** that one more slice of buffalo chicken pizza with extra cheese should be ordered for Jane_i’s twin sister.

c. *Object control clause; no intervening adverb:*

John told her_{i/j} to order one more slice of buffalo chicken pizza with extra cheese for Jane_i’s twin sister.

The situation is different when the embedded clause is finite. Before the syntactic movement takes place, the name is c-commanded by pronoun *her*. However, as shown in Fig. 3.17, after the movement, the CP merges above the pronoun; and the CP itself contains no nominal elements co-indexed with the name, thus the name is free in the post-movement position.

Figure 3.17: Syntactic structure for a finite clause complement construction in (128b)



Given these two distinct structural types of target items, we have two alternative hypotheses about participants' preferences with respect to pronominal reference resolution.

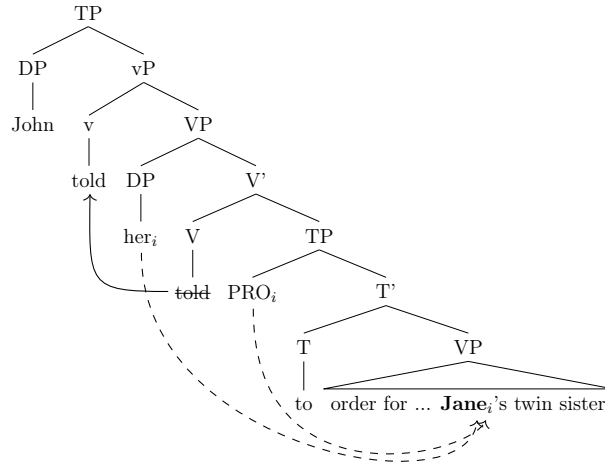
Structural Hypothesis: participants will allow coconstruction with sentence-internal referent in target items with finite clause complements and intervening adverbs, such as (128b), more often than in target items with object control infinitival clauses and intervening adverbs, such as (128a). With the former we will observe preference for intra-sentential antecedent similar to control sentences with no Principle C effects (about 90%, as in Exp. 1). With the latter, preference for intra-sentential antecedent will be similar to sentences with Principle C effects, where the pronoun c-commands the name from the subject position of the matrix clause (about 10%, as in Exp. 1). This would simultaneously lead to two conclusions: (i) higher acceptability of coconstructions with non-subject pronouns is in part due to extraposition of the constituent containing the name, in line with the structural hypothesis; and (ii) there is no reconstruction for Principle C following extraposition; and the Principle C effect is evaluated in the post-movement position (Adger et al. 2017, Bruening and

Al Khalaf 2019).

Non-Structural Hypothesis: participants will allow coconstrual with a sentence-internal antecedent to an equal degree with both types of target items (sentences with object control and sentences with finite clause complements). This would also lead to two main conclusions: (i) the asymmetry observed in Exp. 1 and Exp. 2 is not due to a change in the c-commanding relation between the pronoun and the name, contrary to the structural hypothesis; and (ii) argument clauses reconstruct, and Principle C effects are evaluated in the base-generated position. In this case we expect the preference rate to be close to the one observed with target items with c-commanding object pronoun (about 30%, as in Exp. 1), i.e., significantly higher than with control sentences with Principle C effects, where the pronoun c-commands the name from the subject position of the matrix clause (which was about 10%, as in Exp. 1).

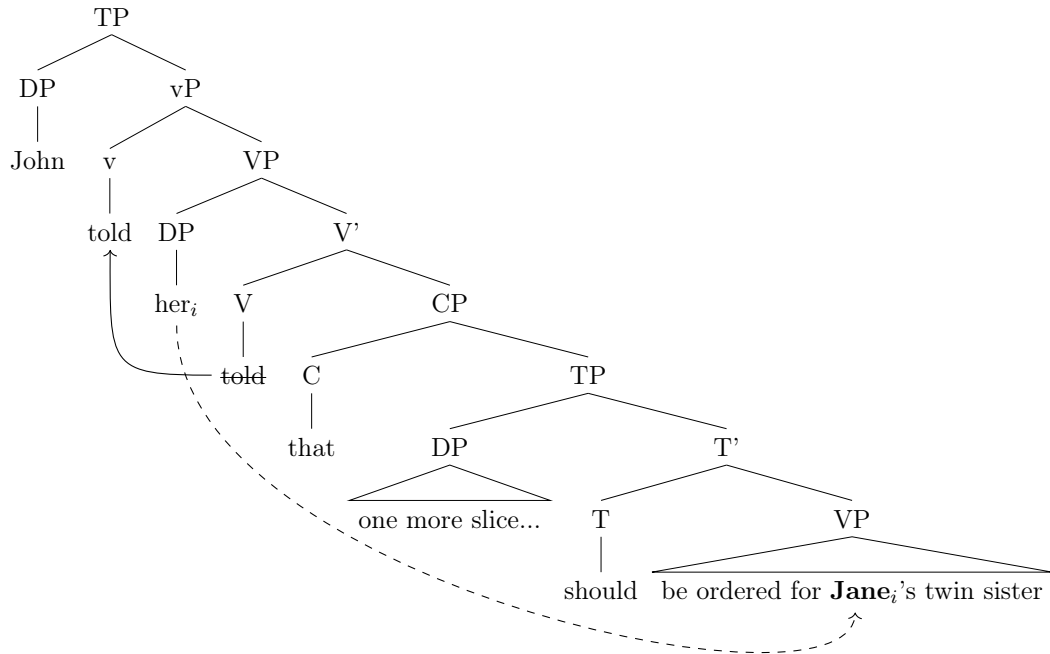
While the first two conditions of the 2×2 design (sentences similar to (128a) and (128b)) are crucial for answering the theoretical questions that motivated this experiment, the remaining two conditions, as shown in (128c) and (128d), served to maintain a fully-crossed design and also establish a baseline for cases without a temporal adverbial intervening between the pronoun and the embedded clause. Our expectations with respect to these two conditions are as follows. The object control conditions, i.e., (128a) and (128c), should yield similarly low rates of coconstrual with a sentence internal referent, since regardless of whether or not extraposition takes place, the name remains bound. The option where extraposition does not proceed is shown in Fig. 3.18.

Figure 3.18: Syntactic structure for an object control construction in (128c)



Further, due to optionality of extraposition for sentences with finite clause complements that have no intervening adverb, as in (128d), we expected preference rates for coconstruction with sentence-internal antecedent to be similar or lower than the same structural types with the temporal adverb, as in (128b). Again, the structure for the version of this condition where the clause does not extrapose is presented in Fig. 3.19.

Figure 3.19: Syntactic structure for a finite clause complement construction in (128d)



All four conditions for each target item were designed so as to describe the same scenario and be as lexically close to one another as possible given the structural properties of the predicates involved. This was done to maintain the plausibility of coconstruction with the

sentence-internal antecedent constant between the conditions for each of the target items, since it was shown in both Exp. 1 and Exp. 2 that plausibility is a significant factor influencing the choice of pronominal referent.

In this study we did not systematically manipulate plausibility of coconstrual between the pronoun and the name. Based on the findings of Exp. 1 and Exp. 2, where the test items had no vP-adjoining syntactic material intervening between the pronoun and the complement containing the name, we hypothesized that structural reanalysis may be adopted by some speakers in cases where plausibility of coconstrual was high, i.e., the reanalysis is driven by speakers trying to structurally accommodate the most plausible interpretation. Since in this study we enforce extraposition structurally as a part of experimental design, we therefore no longer need to manipulate plausibility.

All test sentences were designed in such a way that picking either the sentence-internal or a sentence-external referent for the pronoun would result in a felicitous interpretation. The use of one female name vs. the other (i.e., *Kate* or *Jane*) was balanced across all test items. The possessive phrases that had those names in the possessor position were balanced between 5 distinct semantic types to allow for systematic diversity of scenarios across target items. The possessive phrases were of the following types: family member (e.g., *Jane's twin sister*), object (e.g., *Jane's homemade brownies*), person (e.g., *Jane's next-door neighbor*), information (e.g., *Jane's test results*), and location (e.g., *Jane's dorm room*).

In the General Discussion section of Chapter 2, I formulated a hypothesis that a matrix subject pronoun causes a stronger overall obviation effect due in part to an early introduction of pronominal dependency in the sentence, which triggers binding constraints early in processing, as compared to non-subject pronouns, which are introduced later. To collect preliminary data on whether decreased accessibility of coconstrual with subject pronoun is also influenced by linear order, Experiment 3 included a second, smaller set of test items with two conditions ($N = 6 \times 2 = 12$) that varied in terms of whether a pronoun was a subject or a non-subject, but in both cases the pronoun was introduced into the structure late, i.e., in the embedded clause.

These test items were balanced between constructions with embedded infinitival and embedded finite clauses and had the name in the possessive phrase in the embedded clause.

Matrix predicates were chosen in such a way that they were compatible with both structural types of complements to allow for minimal variation between conditions for each of the items. The key distinction between the two conditions was that in sentences with infinitival clauses, the pronoun occupied a position in the matrix VP, while with finite clause complements, the pronoun was in the embedded subject (Spec TP) position. Sample sentences for both conditions are given in (129) and (130) below.

(129) *Embedded infinitival clause, pronoun raising from embedded object to matrix object:*

John asked her_i to allow the social workers to speak with Jane_i's daughter.

(130) *Embedded finite clause, pronoun in the embedded subject position:*

John asked that she_i allow the social workers to speak with Jane_i's daughter.

In both (129) and (130), the pronoun is not sentence-initial, and in (130), where the pronoun is in Spec TP, it is even further from the beginning of the sentence than in (129), where it is non-subject. If linearity influences acceptability of coconstrual with sentence-internal referent, we should not see an effect here: both conditions should be judged similarly by native speakers; and we should observe preference similar to that of test items with non-subject pronouns in Exp. 1. If linearity is irrelevant, but what matters is whether the pronoun occupies a TP or a VP position, we should observe increased preference for coconstrual with a non-subject pronoun, as in (129) (as in Exp. 1), and lower preference for coconstrual with a Spec TP pronoun, as in (130) (as in Exp. 1). The two conditions were distributed between subjects, so that each participant saw 6 test items from the second set.

3.3.2.2 Control items

The control items ($N = 20$) shared most design features with the target items. They were equally balanced between sentences with control predicates, i.e., with embedded infinitival clauses, and sentences with embedded finite clause complements. They all featured backwards anaphora with pronoun c-commanding the R-expression. The R-expression was in the specifier position of a possessive DP embedded in the complement clause; and the possessive DPs were balanced between the same 5 semantic types (family member, object, person, information, location) discussed for the target items. The use of one name vs. the other was

balanced across all control items. The pronoun was in the matrix clause; and it could be felicitously coconstructed with either a sentence-internal or sentence-external antecedent.

The main distinction between target items and control items was that the pronoun occupied Spec TP position of the matrix clause, as shown in (131) and (132).

(131) *Subject control infinitival embedded clause:*

She_{*i/j*} managed to thoroughly follow the diet advice from Jane_{*i*}'s yoga instructor.

(132) *Finite embedded clause:*

She_{*i/j*} agreed that the cellphone picture was not suitable for Kate_{*i*}'s travel passport.

Our prediction with respect to these test items was that they would reveal floor levels of preference for intra-sentential referent for a pronoun. The name would remain in the c-commanding domain of the pronoun for both types of control items. This would be consistent with our findings in Exp. 1 where the target items with subject pronouns yielded the selection of the sentence internal referent on average 12% of the time.

3.3.2.3 Filler items

The study included 54 filler items similar to target and control items in terms of structure and of comparable length, but featuring forwards anaphora with different levels of plausibility of coconstruction. As a result, each participant saw $N = 20$ target items + 6 additional target items + 20 controls + 54 fillers = 100 sentences during the trial. A full set of test items can be found in Appendix C.

3.3.3 Procedure

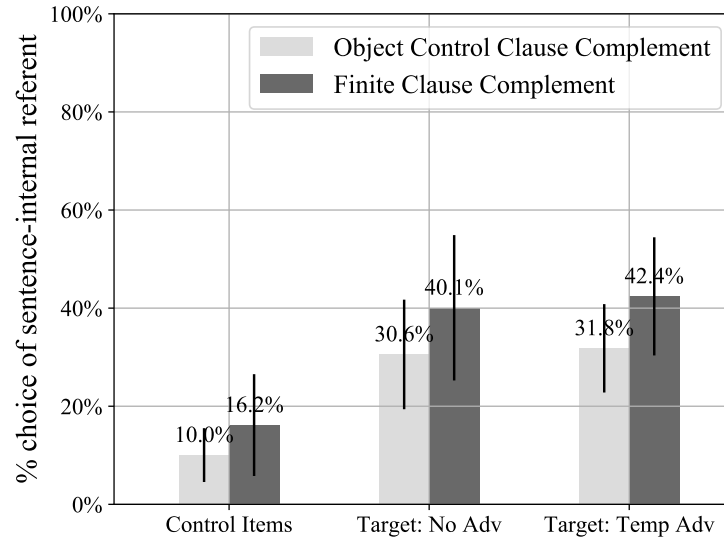
The experiment was a binary forced choice task. It was designed and administered online using Qualtrics survey software (Qualtrics, Provo, UT), as described earlier in section 3.2.3. Each experimental trial had the same structure. In the middle of the screen participants saw a sentence which had a pronoun (*she* or *her*) and a name (*Kate* or *Jane*) in it. They were asked to read the sentence and then pick the name of the female character which they thought the pronoun referred to (intra-sentential vs. extra-sentential). Each individual experimental

session took 15-20 minutes on average. See Appendix C for a full set of instructions to participants.

3.3.4 Results

The results for control and target items in Exp. 3 are summarized in Fig. 3.20 below.

Figure 3.20: Percentage choice of intra-sentential referent for the pronoun across items and conditions in Exp. 3 (Forced Choice Task)



As in Exp. 1, the dependent measure was the percentage choice of intra- / extra-sentential referent for the pronoun in the target sentence. The data were analyzed using a binomial logistic regression model with subjects and items as random intercepts. The statistical analysis revealed a significant effect of factor *type of clausal complement* ($\beta = 0.71361$, $SE = 0.25679$, $p = 0.005$). This effect was revealed for across experimental control items (which had the pronoun in the subject position) and target items (which had the pronoun in the non-subject position), i.e., it was not limited to target sentences where absence/presence of extraposition was manipulated. This shows that the effect of the type of clausal complement stems from the properties of the embedded clauses (object control clause vs. finite clause complement), and is independent of pronominal position and absence/presence of temporal adverb in the sentence.

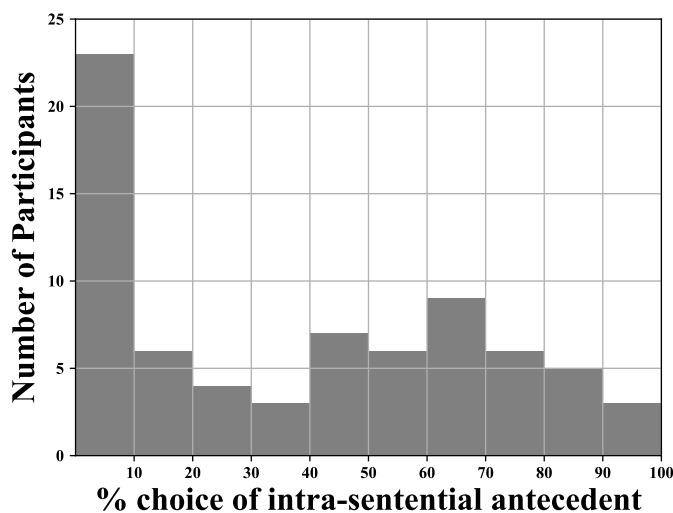
As expected, there was a significant effect of pronominal position ($\beta = -1.8166$, SE

= 0.2295, $p < 0.001$), consistent with the findings of Exp. 1 and Exp. 2, where we observed a subject/non-subject asymmetry. Crucially, there was no significant effect of presence/absence of temporal adverb ($\beta = 0.09557$, $SE = 0.25749$, $p = 0.71$), indicating that forced extraposition was not a factor in participants' judgments of coconstrual acceptability.

Finally, there was no significant effect of factor *semantic type of possessive phrase* (object: $\beta = 0.469421$, $SE = 0.307975$, $p = 0.127$; location: $\beta = 0.473793$, $SE = 0.308574$, $p = 0.125$; information $\beta = 0.271485$, $SE = 0.308082$, $p = 0.378$; person $\beta = -0.009164$, $SE = 0.309716$, $p = 0.976$).

We then analyzed the pattern of results from individual participants. Fig. 3.21 presents the histogram of the distribution of individual participants' selection of an intra-sentential antecedent for a pronoun in target sentences in Exp. 3.

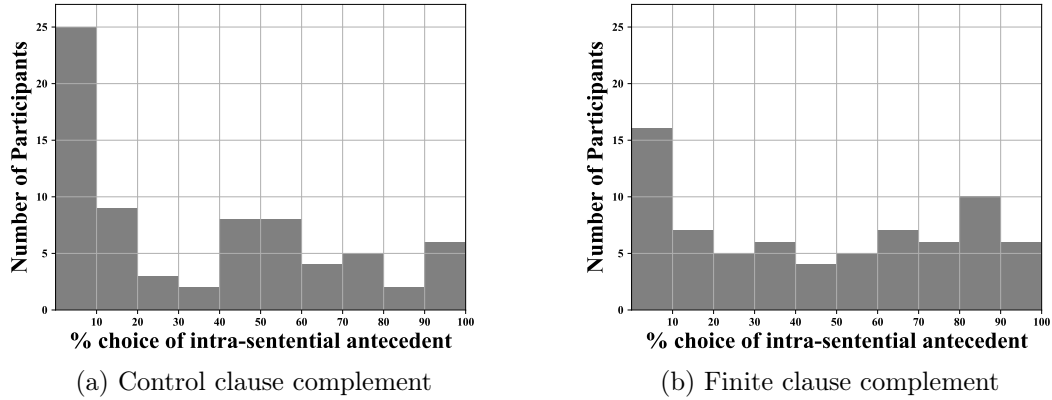
Figure 3.21: Distribution of participants' selection of intra-sentential referent in target sentences in Exp. 3 (Forced Choice Task)



As Fig. 3.21 shows, participants' responses to target items were not uniform, and there was a positive skew. Approximately 32% of participants (23 of 72) selected an intra-sentential referent for the pronoun less than 10% of the time, as Principle C plus allowable noise would have it. There was a substantial variation among the remaining 68% of participants, with percentages of selection of intra-sentential referent for the pronoun ranging between 10% and 100%.

We further considered the influence of factor *type of clausal complement* sentences with object control clauses (Fig. 3.22a) and sentences with finite clause complements (Fig. 3.22b) on participants' responses, since that factor revealed a significant effect in the statistical analysis.

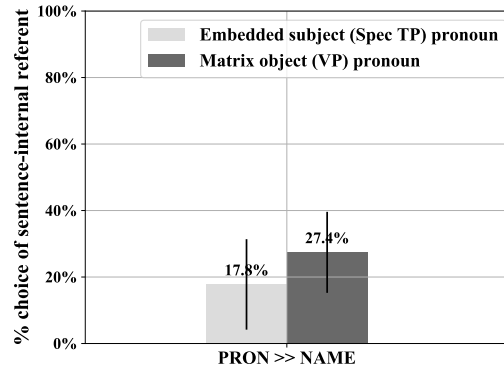
Figure 3.22: Distribution of selection of intra-sentential referent across target sentence types in Exp. 3 (Forced Choice Task)



As Fig. 3.22a and Fig. 3.22b show, responses to sentences with object control clauses and finite clause complements resulted in a similar skewed distribution of intra-sentential referent selection: a significant part of participants (35% for object control and 22% for finite clause complement test items) selected an intra-sentential antecedent less than 10% of the time, while the remaining participants displayed percentage of selection of structurally marked antecedent distributed between 10% and 100%.

Finally, let us consider participants' responses to the second group of test items that investigated whether it was the linear position of the pronoun (early vs. late introduction) or structural position of the pronoun (TP or VP) that had a more pronounced influence on participants' preference for intra-sentential coconstruction. These findings are presented in Fig. 3.23.

Figure 3.23: Percentage choice of intra-sentential referent for the pronoun for pilot test sentences in Exp. 3 (Forced Choice Task)



We first performed a binomial logistic regression model with both subjects and items as random intercepts. There was no significant effect of factor *pronominal position* ($\beta = -1.1601$, $SE = 0.8268$, $p = 0.16057$). We followed up performing a binomial logistic regression model with random intercepts for subjects only, which revealed that the effect of this factor was significant ($\beta = -0.7342$, $SE = 0.2776$, $p = 0.008$), suggesting that more experimental items are needed. This is reasonable given the number of pilot test sentences (6 items with 2 conditions each).

3.3.5 Discussion

In Chapter 2, we presented the findings of two experiments that revealed systematic subject / non-subject asymmetry with respect to pronominal reference resolution in backwards anaphora with Principle C effects. As the data showed, participants are significantly more likely to select an intra-sentential referent for the pronoun when this pronoun c-commands the name from a non-subject position. Experiment 3 was designed to test whether this asymmetry was (at least in part) a result of a structural transformation altering the c-command relation between the pronoun and the name. We manipulated structural type of test sentences (object control vs. finite clause complement) and whether or not a test sentence had an adverb forcing extraposition.

3.3.5.1 Rejecting the structural hypothesis

When discussing possible outcomes of Exp. 3 in section 3.3.2.1, we considered two options. The **structural hypothesis** was motivated by the structural hypothesis and predicted that the predicate type would have an effect, but only in the condition with an intervening adverb forcing extraposition (i.e., object control sentences, which have a PRO subject in the Spec TP of the extraposing constituent, would yield much lower preference for intra-sentential coconstrual than sentences with finite clause complements where the name is free post-movement). The **non-structural hypothesis** rejected the possibility of extraposition influence and predicted that there will be no effect of predicate type, and both types of target items would yield similar rates of preference for intra-sentential antecedent.

The effect of predicate type revealed in Exp. 3 does not fully match either of the hypotheses. However, we will argue here that it is, in fact, in line with the non-structural hypothesis, and not compatible with the structural one. Our argument is based on the fact that the effect of predicate was observed across both control experimental items and target items (i.e., sentences with matrix subject pronoun and sentences with and without adverbs), not just between the items where extraposition was forced by temporal adverb. For the structural hypothesis to be supported, the effect of predicate type had to be (i) quantitatively large, i.e., comparable to the difference between test items with and without a Principle C effect in Exp. 1 (i.e., the difference would be about 70-80%), and (ii) strictly linked to forced extraposition, meaning that the difference between the two predicate types in terms of whether or not the name is free may only emerge in the extraposed structure. The reason for such expectations was that with an object control sentence, the name is still c-commanded by PRO post movement, while in sentences with a finite clause complement, the name is free. In all other cases (sentences with matrix subject pronoun (experimental controls) and target sentences with no adverb), c-command is expected to hold, and no effect of predicate should be observed.

What we observed instead was that items with object control predicates yielded slightly lower percentages of preference for intra-sentential coconstrual than items with finite clause complements. While this effect is statistically significant, it is small (about 10%). Given that we observe robust contrasts in judgments between structurally marked and structurally

neutral backwards anaphora, this difference is quantitatively too small to represent this distinction. Moreover, the effect is not linked to only one condition, but observed throughout experimental items. Thus, it is not related to extraposition, which was manipulated across test items only, but rather, to properties of the types of predicates that were used as target items in this study¹⁰. Since the effect of predicate type is small and unrelated to extraposition, the findings of Exp. 3 are, in fact, compatible with the non-structural hypothesis and argue against the structural hypothesis. Apart from an independent predicate effect, both types of test items with temporal adverbs yield close rates of preference for intra-sentential antecedent; and there was no effect of extraposition.

Now let us consider what these findings mean for the Principle C effect. As we mentioned earlier, in sentences with object control clauses, the name is in the c-commanding domain of a co-indexed nominal (pronoun and/or PRO) at all times: with and without extraposition. Still we see that in this condition, with target sentences where the Principle C effect is definitively active, slightly over 30% of participants still select coconstrual with structurally marked referent. We observe a similar pattern in sentences with finite clause complements: the rate of preference for coconstrual with intra-sentential referent is the same with and without extraposition, and quantitatively it is similar to that of object control sentences (slightly over 40%, where the 10% difference is attributed to an independent predicate effect). This leads us to conclude that the Principle C effect is also active in all sentences with finite clause complements (with and without an adverb), just as it is active with object control sentences. This conclusion is unexpected for sentences with finite clause complements with intervening temporal adverbs, since an adverb forces the movement of the complement clause, so that the name is no longer in the c-commanding domain of any co-indexed nominal. At the same time, we observe that in these target items, the name still behaves as if *in situ* with respect to Principle C.

¹⁰The reasons why sentences with finite clause complements reveal overall higher preference for coconstrual with sentence-internal antecedent remain an interesting topic for future research. We consider two possibilities here. First, sentences with finite clause complements were characterized by slightly higher acceptability rankings in the baseline task. This slightly higher acceptability could reflect in higher percentages of acceptable coconstrual with intra-sentential antecedent. Second, finite clause complements are structurally less tightly connected to the matrix clause. They express a fully independent proposition, while object control clauses have a PRO subject that is co-indexed with the pronoun in the matrix clause. This presence of a covert Spec TP binding antecedent for the name, which establishes a syntactic connection with the matrix clause might also exert influence of participants' judgments.

3.3.5.2 A note on reconstruction

Our findings provide evidence for reconstruction of extraposed complements. This raises the question about the nature of movement in case of Heavy NP shift and extraposition. One possibility is that a constituent only moves when there is a trigger for this transformation in the syntax. In standard minimalism (Cecchetto et al. 2009, Chomsky 2000), a probe needs to identify a goal, Agree with it, and if there is an EPP feature on the probe, undergo movement to satisfy this feature. This analysis is problematic for two reasons: first, in the case of extraposition, it is not clear what the probe is; and second, since the movement happens in syntax, an additional assumption is needed to explain why the requirement for reconstruction necessarily has to apply.

An alternative view is that Heavy NP Shift and, more generally, extraposition – are cases of optional movement. Under this view, extraposition does not require an obligatory syntactic/semantic trigger, rather it is a *stylistic* phenomenon that is based on a prosody-weight calculation and implicates focus (Culicover and Rochement 1990, Rochement 1978, Williams 2003). Accordingly, as a stylistic movement taking place in PF only, extraposition does not contribute to the semantics of a given sentence; and the requirement for reconstruction of the extraposed constituent into its base position follows straightforwardly. This view is consistent with the findings of Experiment 3. However, in that case we are faced with another problem, as we are no longer able to account for anti-reconstruction effects observed in cases where Heavy NP Shift creates parasitic gaps, as shown in (133)-(134).

(133) John filed t_i without reading e_i properly [all the books on the third shelf] $_i$.

(134) I offended t_i by not recognizing e_i immediately [my favorite uncle from Cleveland] $_i$.

In (133)-(134), the shifted DPs are realized in the sentence-final position as a result of Heavy NP Shift. In both cases the parasitic gap e_i is properly licensed, which has been used as evidence for the A'-properties of extraposition, as parasitic gaps are only licensed by A'-movement, and not A-movement. (Engdahl 1983, Mikami 2012, Nissenbaum 2000, Safir 1987). Thus again, it is not clear why such movement has to reconstruct.

Still, the findings of Experiment 3 demonstrate that reconstruction of the right-moved complement clauses does take place. These findings are contrary to the proposal by Adger

et al. (2017) and Bruening and Al Khalaf (2019), who claim that arguments do not reconstruct and offer experimental evidence against argument-adjunct distinction in reconstruction for Binding Principle C (Barss 1988, Chomsky et al. 1993, Fox and Nissenbaum 1999, Freidin 1986, Lebeaux 2000, Sauerland 1998, Takahashi and Hulsey 2009).

Adger et al. (2017) and Bruening and Al Khalaf (2019)’s evidence comes mainly from constructions where R-expressions are contained in *wh*-chains, i.e., constructions where a name is embedded in an argument (135) or in an adjunct (136) of a fronted *wh*-phrase.

(135) *Name embedded in an argument of a wh-phrase:*

The chambermaid_j told me [_{CP} which portrait of the **countess_i**] **she_{i/j}** considered *t*_{CP} to be most valuable. (Bruening and Al Khalaf 2019: ex. 16(a)) (22% choice of structurally illicit antecedent in a binary forced choice task)

(136) *Name embedded in an adjunct of a wh-phrase:*

The chambermaid_j told me [_{CP} which portrait in the **countess_i**’s collection] **she_{i/j}** considered *t*_{CP} to be most valuable. (Bruening and Al Khalaf 2019: ex. 16(b)) (31% choice of structurally illicit antecedent in a binary forced choice task)

Bruening and Al Khalaf (2019) instructed their participants to select between two sentence-internal antecedents: one originating above the pronoun (here, *the chambermaid*), and the other base-generated in the c-commanding domain of the pronoun (here, *the countess*). Bruening and Al Khalaf (2019) point out that the reported percentages of choice of illicit antecedent are significantly higher than zero, and take this pattern to indicate that there is no grammatical constraint on coconstrual, i.e., the name is evaluated for Principle C in the post-movement position; and there is no reconstruction. They conclude that since there is no significant difference between sentences of type (135) and (136), there is no argument/adjunct asymmetry, and none of them reconstructs. Similar evidence comes from sentences with *wh*-movement of NPs that have CPs in them: argument CPs, as in (137), or relative clauses, as in (138).

(137) *Name embedded in an argument CP:*

A female staffer_j told everyone [_{CP1} which of [_{NP} the announcements [_{CP2} that **Hilary Clinton_i** was running for president]]] **she_{i/j}** had actually authorized *t*_{CP1}

(Bruening and Al Khalaf 2019: ex. 15(a)) (42% choice of structurally illicit antecedent in a binary forced choice task)

(138) *Name embedded in an adjunct CP:*

A female staffer_j told everyone [_{CP1} which of [_{NP} the announcements [_{CP2} that **Hilary Clinton_i** had tried to take back]]] **she_{i/j}** had actually authorized t_{CP1}. (Bruening and Al Khalaf 2019: ex. 15(b)) (56% choice of structurally illicit antecedent in a binary forced choice task)

Again, Bruening and Al Khalaf (2019) conclude that given such high percentages of choice of referent that is base-generated in the c-commanding domain of the pronoun, there is no Principle C effect, i.e., there is no reconstruction for either arguments or adjuncts¹¹. We will now argue that these percentages of preference for intra-sentential antecedent in a forced choice task are still compatible with the Principle C effect being active.

As the findings of Exp. 3 show, sentences that have the name in the c-commanding domain of a co-indexed nominal at all times (i.e., sentences with object control predicates, where the name is embedded in a complement clause c-commanded by a co-indexed PRO subject) yield about 30% choice of structurally illicit antecedent in a forced choice task. And, since there was no effect of extraposition, we also argued that sentences with finite clause complements also have the name evaluated for Principle C in the base position. There the preference for coconstrual with a structurally illicit referent was even higher – slightly over 40%. Let us now consider the reasons for such unexpectedly high percentages of preference for a structurally illicit referent in the face of a Principle C effect in Bruening and Al Khalaf (2019).

First, Adger et al. (2017) and Bruening and Al Khalaf (2019) had target structures that involve forwards anaphora, i.e., the name linearly preceding the pronoun, as in (135)-(138). In our Exp. 3, we targeted structures with rightward movement, which did not alter the linear relation between the pronoun and the name, i.e., our target items involve backwards

¹¹Safir (1999) offers an alternative view on the apparent absence of Principle C effects with fronted constituents. Safir (1999) proposes that adjunct/argument asymmetry in reconstruction holds, but argues against determining whether or not Principle C is active in such environments, because of the possibility of vehicle change for names (but not quantifiers).

anaphora. We propose here that this difference plays a role in pronominal reference resolution: forwards anaphora is preferred, while backwards anaphora is marked, independent of the structural relation between the pronoun and the name. We will return to this question in Chapter 4, where we will provide experimental evidence for this claim.

Second, as we showed in Chapter 2, plausibility of coconstrual plays a significant role in pronominal reference resolution and leads to much variability in participants' judgments of sentences with Principle C effects. Bruening and Al Khalaf (2019) assume that since both potential referent DPs are mentioned in their target items, in the absence of grammatical constraints on coconstrual participants should behave at chance. However, in their target sentences, the structurally problematic antecedent is often a more plausible referent for a pronoun: the countess is more likely to know the value of paintings in her possession; and it would be quite unexpected for a staffer to authorize campaign announcements bypassing Hilary. As we have seen from Exp. 1 in Chapter 2, manipulating plausibility can lead to a significant difference in participants' judgments (a difference approaching 30% in Exp. 1). If Bruening and Al Khalaf (2019) took this factor into consideration, they would predict a split between the two referents to be skewed towards a more plausible referent, and not distributed equally. If both referents in the sentence are structurally licit, and one of them is a much more plausible referent given the context, why is it selected by participants at 42-56% only?

In Chapter 2, I proposed that while the Principle C effect substantially depresses speakers' preference for intra-sentential coconstrual, it does not bring it down to zero. I argue here that this proposal is consistent with the experimental findings reported for (135)-(138). While the Principle C effect is active (the moved constituent reconstructs, and the name is evaluated for Principle C in its base-generated position), there are no other factors adding to the overall obviation effect, thus we expect to see depressed, but not floor levels of preference for intra-sentential antecedent. First, these examples involve forwards anaphora, i.e., the pronoun linearly follows the name in a sentence. This means that there is no additional markedness associated with backwards anaphora that was characteristic for test items in Exp. 3. Second, in (135)-(138), even though the pronoun is in a Spec TP position, subjecthood does not contribute to the overall obviation effect. Subject pronouns are less preferable

antecedents in backwards anaphora, but they are more preferable in forwards anaphora, so this restriction does not apply to the examples in hand as well. Finally, as I demonstrated above, the plausibility of coconstrual with a structurally illicit referent in (135)-(138) is high, so we expect this to contribute to elevated rate of coconstrual acceptability. All of these factors together lead to high percentages of preference for structurally illicit antecedent observed in the experiments reported in Adger et al. (2017) and Bruening and Al Khalaf (2019).

We can further explain why preference for a structurally problematic antecedent is higher in (137)-(138) than in (135)-(136). Sentences in (137)-(138) are structurally more complex than those in (135)-(136), as the *wh*-phrase also involves an embedded CP. We propose that processing increasingly complex structures may overshadow syntactic constraints on coconstrual, which leads to increased preference for structurally illicit referents: 22%-31% in (137)-(138) vs. 42%-56% in (135)-(136). I will further look into increased processing difficulty as a factor in pronominal reference resolution in Chapter 5, where I reveal a similar effect with subject comparative constructions, which are notorious for being a source of grammaticality illusions (Phillips et al. 2011, Townsend and Bever 2001, Wellwood et al. 2018).

Given all these factors, we argue that when a study reveals preference for structurally illicit referent that is significantly higher than zero, it does not necessarily lead to a conclusion that test sentences bleed Principle C. Principle C is not categorical, and there are multiple potential extenuating factors that increase speakers' preference for coconstrual with structurally marked antecedent. Consequently, there is not enough evidence to argue for the absence of reconstruction based on these findings.

Here we need to make an additional comment about varying theoretical assumptions about the structural relation relevant for binding. Bruening (2014, 2018) assumes that binding must depend on *precede-and-command* rather than *c-command*, a combination of pure linear precedence and phase-command, as stated in (140).

(139) **Phase-command:** X phase-commands Y iff there is no ZP, ZP a phasal node, such that ZP dominates X but does not dominate Y.

(140) **Phasal nodes:** CP, vP, NP (Bruening 2014: p. 343).

According to this definition, a VP-embedded pronoun precede-and-commands and binds all linguistic material that is adjoined to the minimal vP and linearly follows the pronoun. If binding is based on the relation of precede-and-command, it radically changes the predictions with respect to Principle C effects for target items in Experiment 3. We assumed that in our target items extraposition is local, i.e., the extraposing material only crosses a vP-adjoined adverb and merges just above this adverb with the same minimal vP. This takes the extraposing constituent outside the c-commanding domain of the vP-adjoined pronoun, but not out of its precede-and-command domain. Thus, for Bruening (2014, 2018) this type of extraposition is not expected to eliminate the Principle C effect.

On the one hand, this is in line with our findings in Exp. 3: we found no effect of extraposition. However, since the Principle C effect remains active, Bruening and Al Khalaf (2019) would predict for our target items that percentage choice of intra-sentential referent must be close to zero, while our findings reveal these percentages to be over 40%. This discrepancy is another reason why we argue that the Principle C effect is not absolute. Principle C has a strong influence on speakers' judgments, but it does not rule coconstrual out. We will present more evidence to this effect in the following chapter.

Summing up, the findings of Exp. 3 provide evidence that is incompatible with the structural hypothesis, and instead supports the following two claims: (i) movement is not a factor that influences speakers' preference for coconstrual with intra-sentential antecedent; and (ii) the Principle C effect is evaluated in the base position, where the name is in / returns to the c-commanding domain of a co-indexed nominal.

At the same time, even though Principle C is active in all test items in Exp. 3, there is much variability in participant's responses to different groups of test items. Experimental controls with matrix subject pronouns reveal near floor levels of preference for intra-sentential coconstrual, while target sentences display significantly higher preference (about 30%-40%). Thus, we again observe the subject/non-subject asymmetry revealed in Exp. 1 and Exp. 2.

In the General Discussion section of Chapter 2 we suggested that if the structural hypothesis were refuted, two alternatives should be considered: (i) the asymmetry is due to how early in the sentence the pronoun is introduced, i.e., a matrix subject pronoun triggers

binding constraints early on in processing, while a non-subject pronoun is introduced later in the sentence allowing the time for plausibility to build up; and (ii) the asymmetry is due to properties of pronominal positions, Spec TP vs. adjoined to VP, and not to linear order. The analysis of the second set of test items in Exp. 3 steers us towards the second hypothesis. There we manipulated the structural position of the pronoun (TP vs. VP), while having the pronoun appear later in the sentence, not sentence-initially in all test items, cf. (129) vs. (130). The effect of pronominal position was still revealed, thus supporting the second hypothesis. Accordingly, in Chapter 4 I will be concentrating primarily on the properties of pronominal position, not linear order effects, and on the influence that these properties have on pronominal reference resolution.

3.4 Conclusions

In this chapter we tested a structural hypothesis of subject/non-subject asymmetry in pronominal reference resolution in sentences with structurally marked backwards anaphora. We considered structures with forced extraposition of a constituent containing a name that brings this constituent outside the c-commanding domain of a non-subject pronoun, but not subject pronoun.

We presented experimental evidence that rightward movement does not influence speakers' judgments with respect to coconstrual. This lead us to reject the structural hypothesis and propose that increased preference for coconstrual with non-subject pronouns is not linked to a change in the c-commanding relation between the pronoun and the name. The constituent with the name reconstructs; the name is evaluated for the Principle C effect in the base position; and the observed asymmetry is due to factors other than the binding relation between the pronoun and the name. We further argued that while Principle C creates a strong bias against coconstrual, it does not render a sentence fully unacceptable, nor does it bring acceptability to zero. Thus a structural restriction on coconstrual interacts with other factors that exert influence on the overall obviation effect, including, but not limited to plausibility of coconstrual, discourse properties of pronominal position, properties of predicate types, linear order between the pronoun and the name, and structural complexity of test items.

Chapter 4

Backwards Anaphora and Pronominal Salience

In Chapter 3, I presented the findings of a forced choice study demonstrating that extraposition of a constituent containing a name DP above the non-subject pronoun does not influence speakers' judgments with respect to intra-sentential coconstruction. The findings revealed that sentences with extraposed verbal complements yield the same rate of preference for sentence-internal referent as do sentences without forced extraposition. This led us to conclude that subject/non-subject asymmetry in pronominal reference resolution with structurally marked backwards anaphora cannot be attributed to structural transformations. I argued that extraposed complements reconstruct; and significant variation in speakers' judgments persists while the name remains in the c-commanding domain of the pronoun.

So far we have collected and replicated experimental evidence demonstrating that a non-subject pronoun is more likely to be coconstructed with a structurally illicit (c-commanded) referent than a pronoun in subject position. Since this asymmetry is not influenced by the structural relation between the pronoun and the name, we now need to consider properties of subject/non-subject grammatical positions that can influence pronominal reference resolution.

In this chapter, I explore the following hypothesis: the observed subject/non-subject asymmetry in pronominal reference resolution with structurally marked backwards anaphora is independent of Principle C effects. Instead, it is linked to special properties of subject position and is common for all cases of backwards anaphora: structurally marked and structurally neutral ones. Structural position of a discourse antecedent (an overt co-indexed nominal linearly preceding the name) is an independent factor contributing to the overall obviation effect. More specifically, in backwards anaphora, subject pronouns are less likely to be coconstructed with a sentence-internal referent than non-subject pronouns due to their increased salience. In this chapter I will test this hypothesis and discuss which specific

properties of subjecthood contribute to salience and have an effect on pronominal reference resolution.

This chapter is organized as follows: in Section 4.1, I provide an overview of the literature on subjecthood in the context of pronominal reference resolution and relate existing research on this topic to the findings of Exp. 1, Exp. 2 and Exp. 3. In section 4.2, I present the design and the findings of the forced choice task investigating the role of pronominal position during pronominal reference resolution in structurally neutral and structurally marked backwards anaphora. I further discuss the results and propose directions for future research. Section 4.3 concludes the chapter.

4.1 Subjecthood and pronominal reference resolution

In Chapter 3, I presented the findings of a forced choice study that tested the structural hypothesis of subject/non-subject asymmetry with respect to intra-sentential coconstrual in structurally marked backwards anaphora. In Exp. 3, we investigated whether forced extraposition which takes the name outside the c-commanding domain of a non-subject pronoun eliminates Principle C effects and, eventually, leads to increased preference for intra-sentential coconstrual with non-subject pronouns. The findings of Exp. 3 were not consistent with the predictions from the structural hypothesis. Participants were not more likely to allow illicit coconstrual when extraposition was obligatory. We therefore proposed that extraposed complement clauses reconstruct, and that the subject/non-subject asymmetry persists under c-command. I now test the hypothesis that the subject/non-subject asymmetry in intra-sentential coconstrual is independent of the structural relation between the pronoun and the name, but rather stems from the properties of the subject position/status.

In the Government and Binding Theory (GBT), as developed by Chomsky (1981, 1982), *subject* is a term that can be interpreted differently within different subtheories of GBT. In X-bar Theory, the subject is the DP immediately dominated by IP/TP, i.e., a DP in the specifier position of IP/TP. Following McCloskey (1997) and Roberts and Felser (2011) among others, I will refer to these as “structural subjects”. In Theta Theory, the subject is the DP that is assigned an external theta role by the verb. This type of subject is referred to as “thematic’ (Baker 1988, Farrell et al. 1991, Williams 1981, 1987). In Case Theory, the

DP can be labeled the subject if it is assigned Nominative Case.

Often the same DP serves as a structural, thematic and Nominative subject in the clause. However, this is not always the case. In English, the ECM subject that raises from the embedded clause to matrix object is a thematic subject of the clause in which it originates, but it is neither structural subject of that clause, nor is it Nominative. In languages such as Hindi, or Laz, quirky subjects, i.e., subjects with a lexically selected non-nominative Case (Sigurðsson 1992), as shown in (141), can be thematic subjects, but they are not Nominative by definition, and they do not land in Spec TP¹.

- (141) Jóni líkar þessi bók.
 Jón.DAT likes this book.NOM
 “Jón likes this book”. (Pankau 2016: p. 500, ex. 1(a))

In the studies reported in the previous chapters, I targeted several structural types of test items that varied with respect to pronominal position. Table 4.1 summarizes our findings based on which pronominal position revealed statistically significant lower/higher preference for coconstrual with intra-sentential referent.

Table 4.1: Preference for intra-sentential coconstrual with respect to pronominal position for test items with Principle C effects in Exp. 1, Exp. 2 and Exp. 3

	Preference for intra-sentential coconstrual
Experiment 1 and Experiment 2	matrix DO indirect object > matrix subject ECM subject raised to object > matrix subject
Experiment 3 (target items: set 1)	matrix object of control predicate > matrix subject matrix DO indirect object > matrix subject
Experiment 3 (target items: set 2)	ECM subject raised to object > embedded subject matrix object of control predicate > embedded subject

¹Poole (2016) proposes that quirky subjects display distinct structural properties crosslinguistically, as they occupy different structural positions. Hindi-type languages have quirky subjects in Spec VP position, Icelandic-type languages – in Spec TP position, and Laz-type languages have their quirky subjects raising to Spec PrtP (a special projection above the TP in a reduced clause). We will return to this distinction in the discussion section of this chapter.

As Table 4.1 shows, Nominative pronouns in the Spec TP position (matrix and embedded subjects) reveal systematically lower preference for coconstruction with intra-sentential referent as compared to VP-level non-Nominative (Dative or Accusative) pronouns. An important piece of evidence comes from the second set of target items in Exp. 3, where embedded Spec TP subjects yielded significantly lower percentage choice of intra-sentential referent than ECM subject raised to objects (cf. test items (142) vs. (143)).

(142) John believes that **she**_{*i/j*} burned the manuscript of **Kate**_{*i*}'s almost completed book.

(143) John believes **her**_{*i/j*} to have burned the manuscript of **Kate**_{*i*}'s almost completed book.

In both (142) and (143), the pronoun is the thematic subject of the embedded clause. However, only in (142) it is also the structural subject of the clause, and the Nominative subject. This led us to argue that being a structural and a Nominative subject is relevant for the subject/non-subject asymmetry with respect to intra-sentential coconstruction². In fact, English does not allow us to easily tease apart those two, as it does not freely allow for subjects that occupy Spec TP and are non-Nominative. For this reason, for the time being we will assume that structural subjecthood and Nominative case together are linked to the asymmetry, as we observed it based on English data. However, we will return to the discussion of crosslinguistic data that can separate structural subjecthood and Nominative Case, and we will propose related directions for future research later in this chapter.

Structural subjects hold a special status in the grammar as they possess a range of unique properties that make them distinct from argument DPs in other positions. As summarized in McCloskey (1997), structural subjects are more structurally prominent than any other argument of the main verb: (i) they may bind reflexive and reciprocal pronouns in other argument positions, but may not themselves be bound by elements in other argument positions; (ii) subjects can license Negative Polarity Items (NPIs) in other argument positions, but subject NPI cannot be triggered by another argument position within the same minimal clause; (iii) related to the first two, structural subject typically has the widest scope in the

²These findings do not rule out the possibility that thematic subjecthood also has an effect pronominal reference resolution; however, as of now, we do not have positive evidence to that effect, while we do have such evidence for the combination of structural and Nominative subjecthood.

sentence. Structural subjects are also special in the sense that they are the only structural position that is required to be filled: Extended Projection Principle (Chomsky 1981, Lasnik 2003) states that every clause must contain a nominal phrase (overt or covert) in the Spec TP position³. Even despite the discussion of whether or not EPP constitutes a crosslinguistic universal, no similar claim exists for any other argument type or syntactic position (McCloskey 1997).

Structural subjects also reveal special properties with respect to pronominal reference resolution. Corpus and psycholinguistic evidence on intra-sentential and inter-sentential forwards anaphora suggests that name DPs in subject position are preferred as antecedents for subsequent pronouns (typically also in subject position), as compared to name DPs in non-subject positions (Chafe 1976, Crawley and Stevenson 1990, Gordon et al. 1993, Kaiser 2006, 2011, McDonald and MacWhinney 1995, Stevenson and Urbanowicz 1995)⁴. For example, Crawley and Stevenson (1990) report the findings of a sentence completion study where they asked participants to finish sentences similar to (144), which had the subject and the object positions in the first clause occupied by same-gender name DPs, while the subject of the subsequent clause was a same-gender pronoun.

(144) **Shaun**_{*i*} led **Ben**_{*j*} along the path and **he**_{*i/j*}...

As Crawley and Stevenson (1990) report, 58% of proposed sentence completions interpreted pronoun *he* as referring to subject *Shaun*, while 20% provided scenarios where *he* referred to object *Ben*⁵.

A similar effect of subjecthood on pronominal reference resolution was revealed in visual-world eye-tracking studies. Kaiser (2011) reports the findings of an experiment where participants looked at an image (e.g., as shown in Fig. 4.1) and listened to a short pre-recorded scenario that mentioned two same-gender characters as subject and object in the critical

³For exceptions, see data on Welsh (Roberts 2005), for which it is argued that subjects do not raise to Spec TP, but stay in Spec VP; and also McCloskey (1996) for a proposal that VSO languages such as Irish lack EPP, as they don't have expletives and do not display movement typically triggered by EPP.

⁴A number of studies have also shown that a pronoun is generally more biased to select a referent in the same structural position, including pronominal reference resolution in VP ellipsis, and that such structural parallelism facilitates discourse comprehension and discourse coherence (Chambers and Smyth 1998, Kehler 1993, Sheldon 1974, Smyth 1994, Rohde et al. 2007).

⁵The remaining references were 14% ambiguous, 7% referred to both characters, 0.75% – to another character, and 0.25% – unintelligible (Crawley and Stevenson 1990: p. 197).

sentence, followed by a sentence with a subject pronoun, as shown in (145).

(145) *Sample item: subject name / object name condition:*

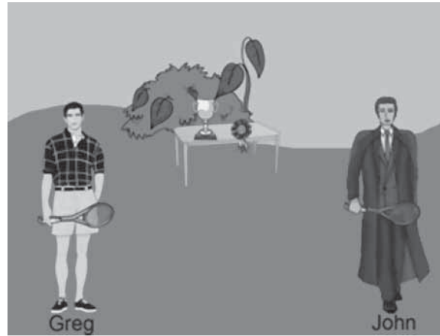
Greg_{*i*} congratulated **John**_{*j*} enthusiastically yesterday. (Critical sentence)

The prizes for the best-ranked tennis players were about to be announced, and

he_{*i/j*} was holding a new yellow tennis racket. (Test sentence)

Everyone was in a good mood that day.

Figure 4.1: Sample visual stimulus from Exp. 1 in Kaiser (2011) corresponding to test scenario (145)



Participants then indicated whether or not they believed that the image stimulus contained an error (e.g., the referent of their choice was holding the racket of the color mentioned), thus covertly resolving pronominal ambiguity. During the time of response eye tracking was performed. Participants displayed a strong subject preference in off-line measures: the subject name was indicated as a referent for the subsequent pronoun in 72% of cases. Eye tracking data also revealed more looks to the character corresponding to the subject than the object. These findings provide further evidence that speakers prefer a subject name DP to be the referent for a subsequent ambiguous pronoun.

Preference for coconstrual with a subject DP has been observed across multiple studies targeting forwards anaphora. However, to our knowledge, there have been no similar studies investigating whether speakers display any kind of preference for coconstrual between a subject pronoun vs. a non-subject pronoun and a subsequent name in backwards anaphora. As we see from the studies reported in this dissertation, there is a consistent effect of subjecthood in structurally marked backwards anaphora; whereby a subject pronoun is a

less likely candidate for intra-sentential coconstrual, as compared to a non-subject pronoun.

The hypothesis that we investigate in this chapter states that the subject/non-subject asymmetry in pronominal reference resolution with structurally marked backwards anaphora is independent of Principle C effects and stems from the properties of subjecthood. The findings from Exp. 1, Exp. 2 and Exp. 3 lead us to focus on pronouns that are structural Nominative subjects, as we have collected empirical evidence that those systematically tend to resist coconstrual with c-commanded intra-sentential antecedent.

This hypothesis makes very specific predictions about speakers' preference for intra-sentential coconstrual with structurally neutral backwards anaphora. Since it views the subject/non-subject asymmetry as unrelated to the structural relation between the pronoun and the name, it predicts that the asymmetry should be observed in cases where the pronoun linearly precedes the name, but does not necessarily c-command it. Specifically, in structurally neutral backwards anaphora environments, just as in structurally marked ones, Nominative structural subject pronouns should yield lower preference for coconstrual with a subsequent name as compared to non-subject pronouns.

I now present a study designed to test the predictions from the non-structural hypothesis and obtain previously unavailable data on the influence of pronominal position on pronominal reference resolution in backwards anaphora.

4.2 Experiment 4

The aim of Experiment 4 was to assess the contribution of pronominal position to participants' preference for intra-sentential coconstrual in backwards anaphora, including cases of structurally marked (pronoun precedes and c-commands the name) and structurally neutral (pronoun precedes, but does not c-command the name) backwards anaphora.

4.2.1 Participants

43 Rutgers University undergraduate students enrolled in a Linguistics or Cognitive Science course participated for course credit. All participants were native speakers of English as determined by a demographic questionnaire.

4.2.2 Materials

4.2.2.1 Target items

All test items in Experiment 4 featured backwards anaphora, i.e., had a pronoun linearly preceding the name. For all test items, the name was in the specifier position of a possessive DP. The position of the pronoun varied between Spec TP and Spec VP, and the pronoun was a constituent either in the matrix clause, or in the embedded subject clause. Thus we preserved the linear order between the pronoun and the name and at the same time manipulated two factors: (i) *pronominal position* (subject vs. non-subject), and (ii) *c-command* (pronoun c-commands vs. does not c-command the name), resulting in a 2×2 design. Each condition had 10 test sentence, for the total number of 40 test sentences. Representative target item is shown in (146).

(146) Sample target item in Experiment 4 with 4 conditions:

- a. *subject pronoun, c-commands*:

What did **she**_{*i/j*} write in that e-mail to **Jane**_{*i*}'s professor?

What_{*k*} did **she**_{*i/j*} write *t_k* in that e-mail to **Jane**_{*i*}'s professor?

- b. *subject pronoun, no c-command*:

What **she**_{*i/j*} wrote in that e-mail bothered **Jane**_{*i*}'s professor a lot.

[_{*CP*} What_{*k*} **she**_{*i/j*} wrote *t_k* in that e-mail] bothered **Jane**_{*i*}'s professor a lot.

- c. *non-subject pronoun, c-commands*:

What persuaded **her**_{*i/j*} to go visit **Jane**_{*i*}'s parents?

What_{*k*} *t_k* persuaded **her**_{*i/j*} to go visit **Jane**_{*i*}'s parents?

- d. *non-subject pronoun, no c-command*:

What persuaded **her**_{*i/j*} to cancel the trip made **Jane**_{*i*}'s parents worried.

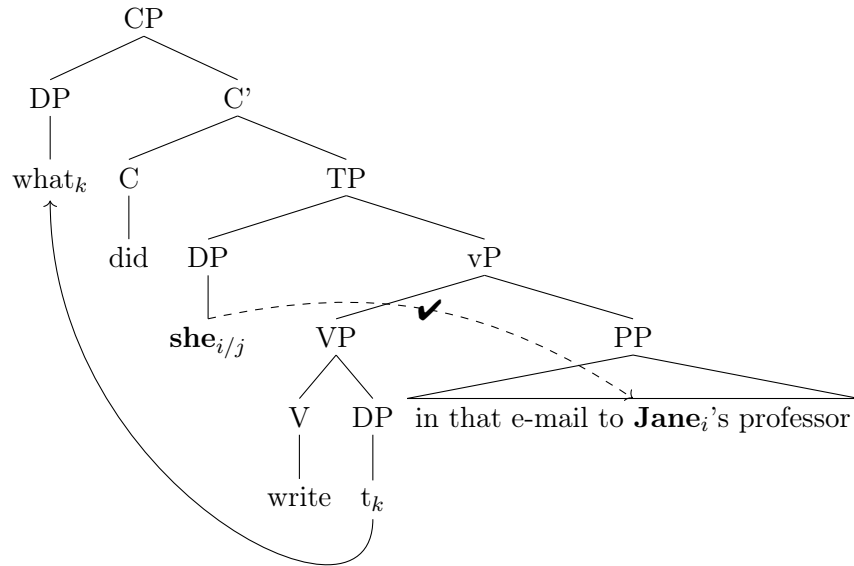
[_{*CP*} What_{*k*} *t_k* persuaded **her**_{*i/j*} to cancel the trip] made **Jane**_{*i*}'s parents worried.

All four sentences involve *wh*-movement, so that on the surface they all look similar because they begin with a *wh*-word. However, the underlying structures are different, which allowed us to achieve the intended difference in the structural relation between the pronoun and the name.

Test items where the pronoun c-commanded the name were interrogative sentences with a *wh*-word in the Spec CP position of the matrix clause ((146a) and (146c)). Test items without c-command were declarative sentences with a *wh*-clause in the matrix Spec TP position, as in (146b) and (146d).

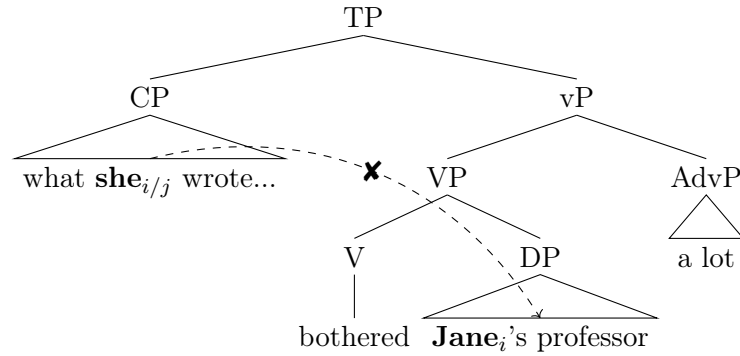
In the *subject pronoun* $\times$ *c-command* condition, the pronoun is the matrix subject c-commanding all other syntactic material in the clause, and the name is embedded in a sentence final prepositional phrase, as shown in Fig. 4.2 for (146a). Given the findings of Exp. 3, we assume that the name is evaluated for Principle C effects in the base position.

Figure 4.2: Syntactic structure for a sample test item in (146a): subject pronoun c-commands the name



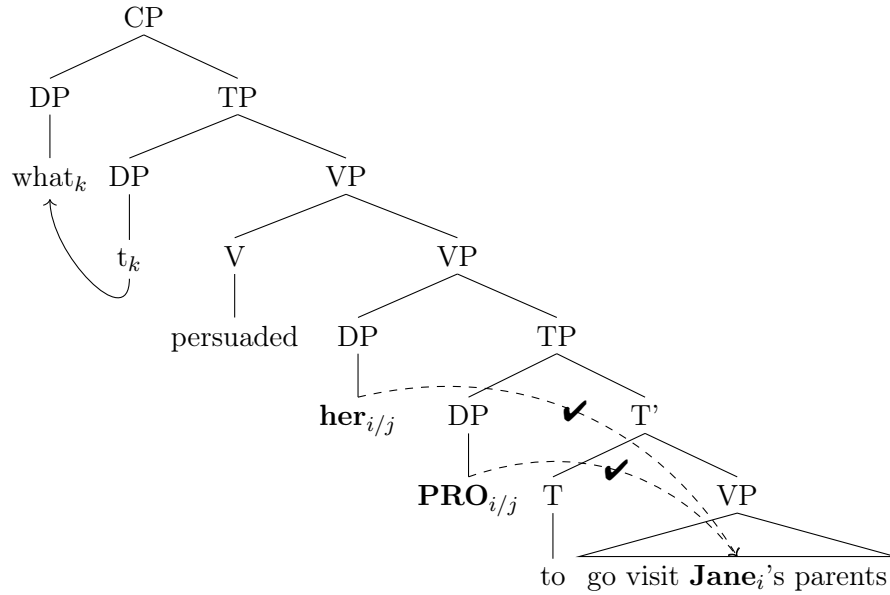
In the *subject pronoun* $\times$ *no c-command* condition, the pronoun is the subject of the *wh*-clause in the matrix Spec TP position, as shown in Fig. 4.3 for (146b). Thus the pronoun only c-commands the subsequent syntactic material inside that *wh*-clause, but does not c-command into the matrix clause, where the name is embedded.

Figure 4.3: Syntactic structure for a sample test item in (146b): subject pronoun does not c-command the name



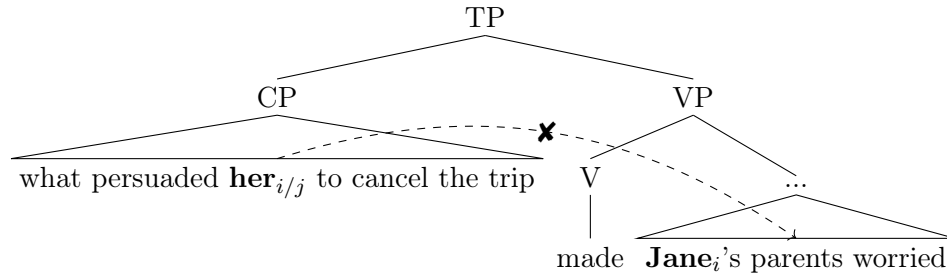
In the *non-subject pronoun* $\times$ *c-command* condition, the pronoun is the matrix object of an object control predicate, so the name in the embedded clause has two binding antecedents: the pronoun and the covert PRO subject, as shown in Fig. 4.4 for (146c).

Figure 4.4: Syntactic structure for a sample test item in (146c): non-subject pronoun c-commands the name



Finally, in the *non-subject pronoun* $\times$ *no c-command* condition, the pronoun is the object of the *wh*-clause in the matrix Spec TP, as shown in Fig. 4.5 for (146d). In this case, similar to (146b), the pronoun does not c-command any syntactic material outside this *wh*-clause.

Figure 4.5: Syntactic structure for a sample test item in (146d): non-subject pronoun does not c-command the name



The first factor, *pronominal position*, was manipulated within subjects, while the second factor *c-command*, was manipulated between subjects, as the test items that were contrastive with respect to factor *c-command* described different scenarios and did not overlap in vocabulary (cf. (146a) and (146c)).

Based on this design, we generate the following predictions. First, as predicted by the Binding Theory, we expect that with target items where the pronoun c-commands the name, such as (146a) and (146c), participants will allow intra-sentential coconstrual significantly less often than for test sentences with syntactically neutral backwards anaphora, such as (146b) and (146d). We have no reasons to doubt that c-command relation between the pronoun and the name creates a strong bias against intra-sentential coconstrual, and we expect to see this reflected in participants' responses during this experiment.

Second, within the c-command condition, we expect to replicate the findings of Exps. 1-3, where participants were more likely to allow coconstrual with non-subject pronouns, as compared to subject pronouns.

Relative to our research question, we consider two hypotheses with respect to factor *pronominal position* in target items with structurally neutral backwards anaphora.

Hypothesis 1: participants will display similar rates of preference for intra-sentential referent with both subject and non-subject pronouns in sentences with structurally neutral backwards anaphora. This finding would suggest that subject/non-subject asymmetry in pronominal reference resolution is only observed in cases where the pronoun c-commands the name and is not generalizable to all backwards anaphora.

Hypothesis 2: participants will display higher rate of preference for intra-sentential referent with non-subject pronouns than with subject pronouns in sentences with structurally neutral backwards anaphora, similarly to the *c-command* condition. This finding would lead us to conclude that subject/non-subject asymmetry in pronominal reference resolution (i) is not limited to cases with Principle C effects, (ii) is generalizable to all backwards anaphora, and (iii) is due to properties of grammatical position of the pronoun, i.e., structural subjecthood and Nominative case.

4.2.2.2 Control and filler items

Control items ($N = 20$) were equally balanced between control constructions with embedded infinitival clauses and transitive double object constructions with embedded finite clause predicates. They all featured backwards anaphora with a pronoun c-commanding an R-expression, which was in the specifier position of a possessive DP embedded in the complement clause, as shown in (147) and (148).

(147) *Subject control infinitival embedded clause:*

She_{*i/j*} tried to find a vegetarian dinner option for **Jane**_{*i*}'s cousin.

(148) *Finite embedded clause:*

She_{*i/j*} agreed that the grades were subpar on **Jane**_{*i*}'s unofficial transcript.

Our prediction with respect to control items was that they would reveal floor levels of preference for intra-sentential referent for a pronoun. This would be consistent with our findings of Exp. 1 where the target items with subject pronouns yielded the selection of the sentence internal referent on average 12% of the time.

All test sentences were designed in such a way that picking either sentence-internal or sentence-external referent for the pronoun would result in a felicitous interpretation. The use of one female name vs. the other (i.e., *Kate* or *Jane*) was balanced across all test items.

Finally, the study included 41 filler items similar to target and control items in terms of structure, but featuring forwards anaphora with different levels of plausibility of coconstrual, as shown in (149)-(150).

(149) What *Kate*_{*i*} always wanted was to take her_{*i/j*} daughter to Paris.

(150) What did she_{*i/j*} write about Kate_{*i*}?

Each participant saw $N = 20$ target items + 20 control items + 41 filler items = 81 sentences during the trial. A full set of test items can be found in Appendix D.

4.2.3 Procedure

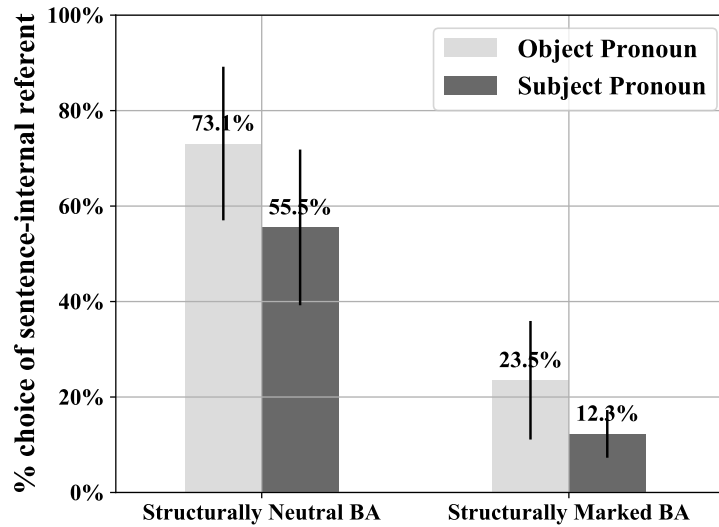
The experiment was designed and administered online using Qualtrics survey software (Qualtrics, Provo, UT). Participants signed up for the study via Rutgers SONA SYSTEMS website (cloud-based participant pool management software), and received a link to the Qualtrics survey through this website. First, each participant was required to indicate their consent to participate in an online study and answer 3 demographic questions about whether or not (i) English was their native language, (ii) the United States were their primary place of residence between their birth and the age of 13, and (iii) both parents spoke English to them during those years. Further, each experimental session included a brief training to acclimate participants to the task. The training involved non-target items that were similar to the ones used in the study proper. Participants responded to training items and received feedback based on their answers. They further proceeded to the experimental session.

Each experimental trial had the same structure. In the middle of the screen participants saw a sentence which had a pronoun (*she* or *her*) and a name (*Kate* or *Jane*) in it. They were asked to read the sentence and then pick the name of the female character which they thought the pronoun referred to (intra-sentential vs. extra-sentential). Each individual experimental session took 15-20 minutes on average. See Appendix D for a full set of instructions to participants.

4.2.4 Results

The results for target items in Exp. 4 are summarized in Fig. 4.6 below.

Figure 4.6: Percentage choice of intra-sentential referent for the pronoun across items and conditions in Exp. 4 (Forced Choice Task)



The dependent measure was the percentage choice of intra-sentential referent for the pronoun in the target sentence. The data were analyzed using a binomial logistic regression model with subjects and items as random intercepts. The statistical analysis revealed a significant effect of factor *c-command* ($\beta = -2.0610$, $SE = 0.3071$, $p < 0.001$), suggesting (as expected) that the presence of the Principle C effect influenced participants' preference for coconstruction.

There was also a significant effect of factor *pronominal position* ($\beta = -0.7073$, $SE = 0.3021$, $p < 0.05$), and this effect was observed for both experimental conditions, with and without *c-command*. Finally, the analysis showed that there was no interaction between the two factors ($\beta = 0.3568$, $SE = 0.4295$, $p = 0.4$). These two findings together suggest that the effect of pronominal position is independent of binding relation between the pronoun and the name.

Control items with matrix subject pronouns *c-commanding* a name DP yielded average percentage choice of intra-sentential referent at 16.3%, which is comparable with the findings of Exp. 3.

We further analyzed the pattern of results from individual participants. Fig. 4.7 presents two histograms of the distribution of individual participants' selection of an intra-sentential

referent for a pronoun with respect to factor *c-command* in target sentences in Exp. 4. Fig. 4.7a corresponds to target items with syntactically neutral backwards anaphora, while Fig. 4.7b corresponds to target items with syntactically marked backwards anaphora.

Figure 4.7: Distribution of selection of intra-sentential referent with respect to factor *c-command* in Exp. 4 (Forced Choice Task)

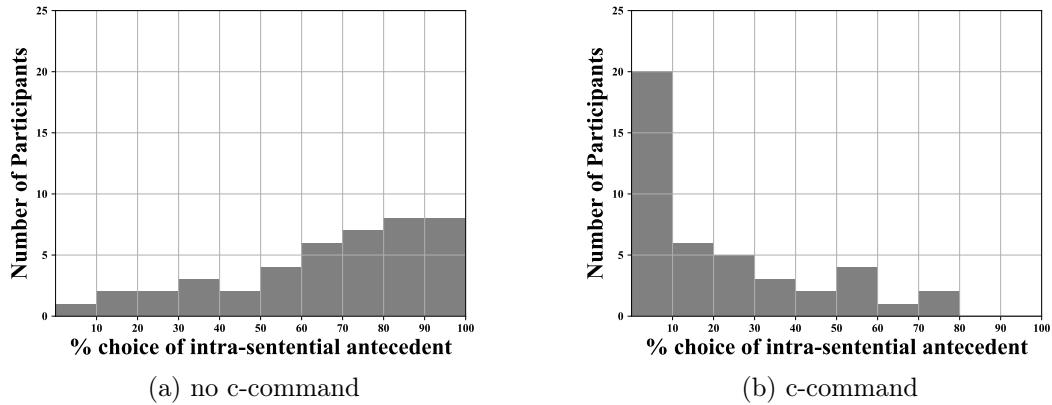
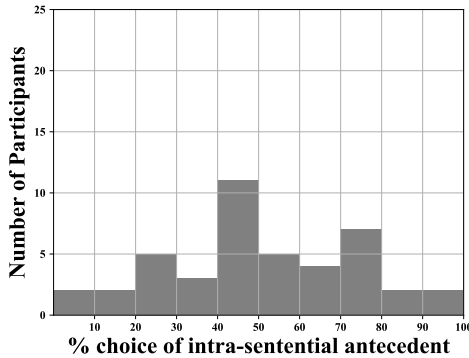


Fig. 4.7a and Fig. 4.7b present a very clear contrast in the distribution of participants' responses depending on the structural relation between the pronoun and the name. When the name is free, as shown in Fig. 4.7a, the distribution is skewed to the left, with the majority of participants (77%, or 33 out of 43) selecting intra-sentential referent more than 50% of the time. In this condition, only about 7% of all participants select intra-sentential referent under 20% of the time.

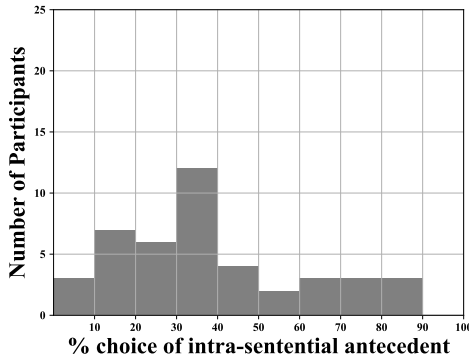
When the pronoun c-commanded the name, as shown in Fig. 4.7b, the distribution is skewed to the right, with the majority of participants (60%, or 26 out of 43) selecting the intra-sentential referent in less than 20% of such target items. The number of participants selecting intra-sentential referent at the rate of 50% and higher (up to 80%) in this condition was only about 16% (7 out of 43).

Finally, we turn to the factor of *pronominal position*. Fig. 4.8a corresponds to target items with a non-subject pronoun, while Fig. 4.8b corresponds to target items with a subject pronoun.

Figure 4.8: Distribution of selection of intra-sentential referent with respect to factor *pronominal position* in Exp. 4 (Forced Choice Task)



(a) Non-subject pronoun



(b) Subject Pronoun

As Fig. 4.8 shows, the key distinction between the two distributions is in the position of the peak of the distribution. When the pronoun was non-subject, 12 participants (28%) selected intra-sentential referent between 0% and 40% of the time. With subject pronoun this number is significantly higher: 28 participants (65%). On the contrary, when the pronoun is non-subject, 27 participants (63%) selected an intra-sentential referent between 40% and 80% of the time, while for test items with subject pronouns only 12 participants (28%) were in this range. In both cases selection of intra-sentential referent at the rate of 80% and higher was observed quite rarely: 4 and 3 participants (9% and 7%), respectively.

4.2.5 Discussion

Experiment 4 was designed to test the non-structural hypothesis of subject/non-subject asymmetry in pronominal reference resolution observed in Exp. 1, Exp. 2, and Exp. 3.

Specifically, we tested whether the asymmetry presented itself only with structurally marked backwards anaphora, or it was characteristic of structurally neutral backwards anaphora as well. To do so, we targeted sentences where pronoun preceded the name and manipulated (i) whether the pronoun was subject or non-subject, and (ii) whether or not the pronoun c-commanded the name. We found the following.

First, target items with Principle C effects yielded a significantly lower preference for intra-sentential coconstrual than target items where the pronoun linearly preceded the name, but did not c-command it. This contrast shows that participants were responding to the task as expected, and leads us to a rather unsurprising conclusion that the Principle C effect is an uncontroversial factor in participants' judgments regarding pronominal reference resolution. Second, consistent with the findings of Exps. 1-3, we observed a subject/non-subject asymmetry in sentences with structurally marked backwards anaphora. In this experiment, we observed the asymmetry in a different structural environment – interrogative sentences with *wh*-movement.

Crucially, we detected the same effect of pronominal position in sentences with structurally neutral backwards anaphora. In *no c-command* condition, we observed higher rate of preference for intra-sentential referent with non-subject pronouns than with subject pronouns. These findings therefore support Hypothesis 2, since in all cases of backwards anaphora subject pronouns resist coconstrual more than non-subject pronouns.

Psycholinguistic evidence suggests that subjecthood matters for pronominal reference resolution in forwards anaphora (Chafe 1976, Crawley and Stevenson 1990, Gordon et al. 1993, Kaiser 2006, 2011, McDonald and MacWhinney 1995, Stevenson and Urbanowicz 1995); and, given the findings of Exp. 4, we can now argue that the effect of subjecthood is also observed with backwards anaphora, but the preference is reversed, since pronoun DPs in subject position are less preferable candidates for coconstrual with a subsequent name. The question now is: what makes subjects different from DPs in non-subject positions when it comes to coconstrual?

4.2.5.1 Salience and repeated name penalty

In the literature on the role of subjecthood in pronominal reference resolution, the structural position of the DP is often analyzed as linked to **salience**. Specifically, it is pointed out that referents of structural subject DPs are more salient than referents of DPs in non-subject positions (Brennan et al. 1987, Crawley and Stevenson 1990, Kaiser 2006, 2011, Matthews and Chodorow 1988, McDonald and MacWhinney 1995, Stevenson and Urbanowicz 1995).

Discourse salience is typically understood as the property of those parts of discourse that are more activated or more accessible in memory than others and thereby determine what is conceived and perceived as being relevant in the course of discourse planning and processing (Falk 2014). Accordingly, salience is operationalized as the sum of factors that influence the degree of accessibility of an entity in the mental model (Burkhardt and Roehm 2007, Burmester et al. 2018).

Subjecthood is recognized as one of the factors contributing to salience, others including topicality (or givenness), pronominalization, first mention, contrastive focus, etc. Salience is typically associated with information that is currently in the focus of attention of the addressee. With respect to pronominal reference resolution, the most salient DPs are ones that have referents that are in the focus of addressee's attention at the given moment (Ariel 1990, Givón 1983, Gundel et al. 1993, Kaiser 2006). In psycholinguistic and psychophysics research, salience can be modulated by linguistic or visual cues that are thought to induce a referent as highly accessible relative to other referents in the mental model (Burkhardt and Roehm 2007, Burmester et al. 2018). An example of a linguistic cue is a context question that indicates one of the entities in the discourse as the topic of the scene; a visual cue can be realized e.g., by a gaze shift of a virtual person to one of the depicted referents in order to draw the participant's attention to this referent.

Most research on the role of salience in pronominal reference resolution targets forwards anaphora, while the role of pronominal position in backwards anaphora remains largely understudied. The closest that it gets is the existing research on processing of repeated names, where a referent is repeatedly referred to by a name DP in the discourse, as opposed to the use of pronoun for repeated reference. Psycholinguistic evidence suggests that with respect

to language comprehension, more informative nominals (e.g., repeated names) are generally understood as referring back to less salient antecedents, while less informative nominals (e.g., pronouns) are more commonly interpreted as references to more salient antecedents (Almor 1999, Ariel 1990, Gelormini-Lezama and Almor 2011, Gordon et al. 1993, Gundel et al. 1993, Kennison and Gordon 1997, de Carvalho Maia et al. 2017).

Strong empirical evidence for this inverse relationship has been provided by Gordon et al. (1993) and Kennison and Gordon (1997), among others. Their studies have revealed that (in English) anaphoric processing is subject to an effect called “repeated-name penalty” (RNP). According to the RNP, repeated names are harder to process than overt pronouns when their antecedents appear in more salient (e.g., subject or first mention), but not in less salient (e.g., object) grammatical positions. Both Gordon et al. (1993) and Kennison and Gordon (1997) link this findings to discourse coherence: if an antecedent DP is already in a salient position, repeated reference is abundant and as such – disrupts discourse coherence.

This bears directly on the findings of Exp. 4. In our study, every target item included a pronoun followed by a name DP referring to one of the characters, as part of backwards anaphora configuration. Thus, if coconstrual was considered, the name DP in the test sentence constituted a repeated reference. According to the RNP, it is less costly to process coconstrual between a repeated name and a preceding DP, when this DP occurs in a less salient position. Thus, with respect to sentences with backwards anaphora, we expect that speakers would be more likely to access a coconstrual interpretation with a less salient pronominal antecedent as well. This is what we observed in Exp. 4: participants in the study displayed increased preference for intra-sentential coconstrual with less salient non-subject pronouns, and not with more salient subject pronouns.

We first observed the effect of subject position in structurally marked backwards anaphora (Exp. 1 and Exp. 2). As we ruled out the possibility that this subject/non-subject asymmetry can be attributed to syntactic movement and demonstrated that it persists under c-command (Exp. 3), our next step was to investigate the hypothesis that the role of subjecthood is common to all backwards anaphora, not just structurally marked cases. Exp. 4 provided us with empirical evidence to that effect. Analyzing the findings of Exp. 4, I argue

here that overall obviation effect in backwards anaphora varies depending on the properties of the most local discourse antecedent, which in our case is the pronoun preceding the name in a sentence. I further propose that the increase in the strength of the overall obviation effect observed with subject pronouns is due to special properties of subjecthood. Structural Nominative subjects typically refer to topical referents which are currently in the focus of attention of the addressee. This effect is even stronger with subject pronouns, which are strong presupposition triggers, as the presence of a pronoun in the sentence instantly signals the presence of a salient referent. This eventually leads me to argue that subjecthood contributes to salience: structural Nominative subject pronouns are more salient than pronouns in other syntactic positions, and that is the reason why in backwards anaphora they resist coconstruction with a subsequent name more than non-subject pronouns.

I propose that this view leads to specific predictions with respect to other factors contributing to salience: topicality (givenness) linked to a non-subject position, first mention, contrastive focus, etc. If increased pronominal salience leads to decreased preference for intra-sentential coconstruction in backwards anaphora, then not just subjecthood, but other factors contributing to salience would result in a stronger overall obviation effect; and we should be able to detect it experimentally. For example, a more salient pronoun in a non-subject position should evoke a stronger overall obviation effect than a less salient pronoun in the same position. We will test this prediction in Chapter 5, where we manipulate contrastive focus on the pronoun. Considering other factors contributing to DP salience and investigating their influence on pronominal reference resolution is definitely an important direction of future research.

4.2.5.2 Deconstructing subjecthood: Position, case and theta role

Subjecthood can manifest itself in multiple ways: through structural position, thematic role assignment or via case. We have argued that subjecthood contributes to increased pronominal salience, which in turn causes decreased preference for intra-sentential coconstruction with a subject pronoun. However, a further question is as follows: which specific factors related to subjecthood contribute to increased salience of the DP in discourse? Does each of the factors (structural subjecthood, Nominative Case, thematic subjecthood) individually lead

to an increase in pronominal salience, and, if yes, do they contribute equally? Alternatively, does it take a combination of two or more factors to increase the salience of a given DP? Or, are there factors that matter for salience, and those that don't?

We have obtained experimental data demonstrating that in English, where structural subjects bear Nominative case, structural subjecthood plus Nominative Case leads to increased pronominal salience, which reflects in participants' preferences during pronominal reference resolution. So far, no information on the role of thematic subjecthood is available. The next question is whether it is the structural subjecthood, the case, or a combination of both that causes the observed effect.

English might provide us with a limited number of structures where structural subjecthood is separate from Nominative case. One of them comes from potential variation in embedded subject position reported for Exceptional Case Marking clauses. Following Postal (1974), Lasnik (1999), we have assumed that in ECM structures, embedded subject undergoes movement from the embedded Spec TP position to an object position in the matrix clause. However, appealing to evidence from the scope of negation in ECM constructions, Chomsky (1995) argues for the optionality of raising to object with ECM subjects, at least when negation is involved, cf. (151) and (152).

(151) The mathematician made *every even number* out **not** to be the sum of two primes.

(152) The mathematician made out *every even number* **not** to be the sum of two primes.

In (151), the word order makes it unambiguous that the embedded subject, which contains a universal quantifier, has raised to the matrix clause position. As a result, the quantifier cannot be interpreted within the scope of negation of the embedded clause. In (152), as noted in Lasnik (2003), the alternative word order, where *every even number* remains in its original position in the embedded clause, narrow scope for the universal is allowed, at least for the majority of those speakers who allow the proposed word order in the first place.

This optionality of movement provides us with structural environment where, again, Nominative case and structural subjecthood may not necessarily go hand in hand. Thus targeting ECM constructions in English could also be informative for the research of factors contributing to DP salience, and eventually, influencing pronominal reference resolution. If we create structural environments where an embedded ECM subject is forced to remain in

the embedded Spec TP position vs. forced to raise to matrix clause position (controlling for acceptability of such structures, as we did for target items in Exp. 4), it would be possible to draw conclusions with respect to the role of structural position, while keeping case constant (non-Nominative). Including Nominative structural subjects as controls, we would be able to formulate three-way predictions of possible outcomes: (i) if Spec TP embedded ECM subjects pattern with Nominative structural subjects, increased salience stems from the structural position, not case; (ii) if they pattern with ECM subjects raised to objects – increased salience stems from case, not structural position, and (iii) if Spec TP embedded ECM subjects yield preference for intra-sentential coconstrual that is lower than for Nominative structural subjects, but higher than for ECM subjects raised to object – both factors (structural subjecthood and Nominative case) have an additive effect and independently contribute to increased salience and affect speakers’ preference for coconstrual in backwards anaphora.

Another syntactic environment in English that potentially allows separating the notion of structural subject from the notion of Nominative subject is *for-to* infinitival clauses. In these, similarly to non-raised ECM subjects, the DP is in the Spec TP position, however it cannot receive Nominative case from a non-finite verb, but has to be assigned Accusative by complementizer *for* (cf. (153) and (154)).

(153) [_{CP} For **her**_{*i/j*} to be on time for dinner with **Kate**_{*i*}’s parents] would mean leaving home at 4pm.

(154) **She**_{*i/j*} was on time for dinner with **Kate**_{*i*}’s parents having left home at 4pm.

Both (153) and (154) involve backwards anaphora; and in both the pronoun c-commands the name. In (153) pronoun *her* is in Spec TP position and bears Accusative case. In (154) pronoun *she* is in Spec TP position as well, but it bears Nominative case. Accordingly, speakers’ judgments of acceptability of coconstrual in cases such as (153) and (154) could also provide us with empirical evidence on the role of case in DP salience and pronominal reference resolution.

At the same time, English lacks environments where a quirky subject appears in the matrix clause without a licensing preposition. To properly tease apart the effect of structural subjecthood from that of Nominative Case in fully parallel structural environments, we need

to turn to languages other than English, allowing us to manipulate case, while keeping the structural position constant. This becomes possible if we consider data from languages with quirky subjects that appear in Spec TP position.

As Poole (2016) argues, languages that have quirky subjects divide into three types: Hindi-type, Icelandic-type and Laz-type, depending on the structural position of the quirky subject in the clause, which manifests itself in structural properties displayed by the subject. Each respective position is responsible for a certain structural property. Spec VoiceP is associated with the ability to bind subject-oriented anaphora. Spec TP position allows a DP to control PRO; and Spec PrtP position (a special projection above the TP in a reduced clause) is linked to the ability of the subject to form a reduced clause. Accordingly, the higher the subject moves, going successive-cyclically through these three positions, the more of described properties it displays.

For the purposes of this research, Icelandic-like languages (Icelandic, Faroese, Tamil, and Telugu, as Poole (2016) proposes) constitute most interest. In these languages quirky subjects raise to Spec TP, as they can bind subject-oriented anaphors, as shown in (155), and control PROs, as shown in (156), but cannot form reduced clauses, as shown in (157).

(155) *Anaphor binding diagnostic:*

Henni_i þykir [bróðir sinn_{i/*j}/hennar_{*i/j} leiðinlegur]
 she.DAT thinks brother.NOM self.POSS/PRON.POSS boring

“She_i thinks her_{i/*j}/her_{*i/j} brother is boring”.

(Zaenen et al. 1985: p. 450)

(156) *PRO diagnostic:*

Ég_i vonast til [PRO_i að vanta ekki peninga]
 I.NOM hope for PRO.ACC to lack not money.ACC

“I hope not to lack money”. (Zaenen et al. 1985: p. 454)

(157) *Reduced Relative Diagnostic:*

*[_____i ekni] bíllinn ...
 _____.DAT driven car.the.NOM ...

Intended: “the driven car ...”

(Poole 2016: p. 11, cited from personal communication with E. F. Sigurðsson)

Given these structural properties, Icelandic-type languages provide us with syntactic environment where a pronoun can occupy Spec TP position in the clause, i.e., be structural subject, but not bear Nominative case. A future research step is to collect empirical data on the presence of subject/non-subject asymmetry in backwards anaphora in one of such languages, targeting both Nominative and quirky subjects. To potentially tease apart the effect of structural subjecthood from the effect of case, it would be relevant to manipulate properties of pronominal position (structural subject Nominative, structural subject quirky, non-subject). We expect to see that, similarly to English, structural subject Nominative pronouns would yield lower preference for coconstrual with a subsequent name than non-subject pronouns. As for quirky structural subject pronouns, there can also be three possible outcomes: (i) quirky structural subjects pattern with Nominative structural subjects, which would lead to a conclusion that increased salience stems from the structural position, not case; (ii) quirky structural subjects pattern with non-subject pronouns, which would lead to a conclusion that increased salience stems from Nominative case, not structural position, and (iii) they yield preference for intra-sentential coconstrual that is lower than for Nominative structural subjects, but higher than for non-subjects, which would mean that both factors – structural subjecthood and Nominative case – contribute to increased salience independently.

Our experimental findings at this point have not given us grounds to argue that being a thematic subject, or being an agent, independently contributes to subjecthood; however, this is a research question that needs to be addressed in the future as well. Existing psycholinguistic research on the effects of subjecthood for non-agentive subjects so far has not lead to a uniform conclusion on the role of agentivity (Di Eugenio 1990, Jarvikivi et al. 2006, Turan 1998), thus comparing agentive and non-agentive subjects (e.g., experiencers) could be informative with respect to whether agentivity contributes to subjecthood, and consequently to salience, and leads to the asymmetry that we observe in pronominal reference resolution.

It is important to note here that the potential effect of *only* case, or *only* structural position on speakers' preference for intra-sentential coconstrual in structurally marked backwards anaphora might be quite small and, for that reason, difficult to detect. Thus splitting subjecthood further in order to test each individual component, though not impossible, may be

problematic. Backwards anaphora, and structurally marked backwards anaphora in particular, already add to the overall obviation effect, thus leaving less room to detect contribution from other factors.

As I argued earlier, subjecthood matters for both forwards and backwards anaphora. In forwards anaphora, increased salience associated with a subject name DP makes it a more likely antecedent for a subsequent pronoun (Almor 1999, Ariel 1990, Gelormini-Lezama and Almor 2011, Gordon et al. 1993, Gundel et al. 1993, Kennison and Gordon 1997, de Carvalho Maia et al. 2017). In backwards anaphora, a more salient subject pronoun is less likely to be coconstrued with a subsequent name. Accordingly, we might predict that other factors contributing to salience might also have an effect on pronominal reference resolution in both forward and backwards anaphora. Thus, targeting both these environments in future research should enrich our understanding of factors commonly affecting pronominal reference resolution.

4.2.5.3 Rethinking the Principle C effect

In Chapter 1, I provided an overview of the literature showing that there is significant variability in participants' judgments with respect to pronominal reference resolution in structurally marked backwards anaphora. In many cases, speakers find sentences with Principle C effects acceptable, and the degree of acceptability may vary significantly. This variability has lead researchers to propose alternative formulations of Principle C, such that these reformulations would account for apparent counterexamples. At the same time, many of these alternative proposals (Bruening and Al Khalaf 2019, Chien and Wexler 1990, Grodzinsky and Reinhart 1993, Heim 1982, Reinhart 1983) kept one assumption constant: when a structural (binding) constraint is violated, this results in a judgment of full unacceptability. If the Principle C effect is deactivated (e.g., by appealing to distinct guises of the same individual or applying contraindexation), then a sentence is expected to be fully acceptable. However, I will now show that the evidence from Exp. 4 allows us to argue for an alternative view.

Exp. 4 demonstrated that Principle C exerts a (consistently) strong bias against intrasentential coconstrual in backwards anaphora. However, it is not absolute: comparing the

conditions with structurally marked and structurally neutral backwards anaphora, we registered a difference in the rate of preference for intra-sentential antecedent varying between 43-50%. Moreover, as we observed across multiple studies presented in this dissertation, the rate of preference for intra-sentential coconstrual in structurally marked backwards anaphora varies substantially even as the c-commanding relation between the pronoun and the name is held constant. Certain factors (e.g., high plausibility) may facilitate coconstrual, while others (e.g., pronominal salience) may further decrease acceptability. These findings support my proposal that Principle C should be viewed as one factor contributing to the overall obviation effect, but it is not singlehandedly responsible for coconstrual failure.

These findings are also in line with Safir's (2014) reformulation of Principle C as Syntax-Induced Obviation, whereby c-command in backwards anaphora creates an *expectation* of non-coconstrual. This structural constraint on binding does not *bar* coconstrual *per se*, but rather marks it as *unexpected*. To account for cases where coconstrual in backwards anaphora with c-command is still available, Safir (2014) proposes that this expectation of obviation can be overridden given the right pragmatic conditions. Our experimental findings now provide evidence which specific factors must be taken into consideration when we discuss acceptability of coconstrual in sentences with structurally marked backwards anaphora, as well as apparent counterexamples to Principle C.

Our findings also lead us to reconsider the status of Principle C as a reliable diagnostic for structure. In many cases, conclusions with respect to whether or not one structural position in the sentence c-commands the other structural position in this sentence are drawn based on whether or not a sentence is acceptable when the former position is occupied by a pronoun, while the latter is occupied by a name DP. The logic is typically such that if coconstrual between the two nominals is judged as acceptable, it indicates the absence of the Principle C effect, and consequently no c-command. On the contrary, if coconstrual is judged as unacceptable, a conclusion is drawn that unacceptability stems from the Principle C effect due to existing c-command relation between the two positions.

As our experimental findings show, factors such as conceptual plausibility of coconstrual, pronominal salience, order of DPs in the sentence, processing difficulty, type of clausal complement – all influence speakers' preference with respect to pronominal reference resolution

and may add up and yield judgments of acceptability, while the name still is in the c-commanding domain of the pronoun. This emphasizes the need to take all these factors into consideration and carefully control for them while using Principle C as a diagnostic for structure.

Our findings also allow us to propose an alternative diagnostic for whether or not decreased acceptability is linked to structural markedness, and consequently – whether or not one structural position in the sentence c-commands the other. In Exps. 1, 3 and 4, we analyzed distributions of individual participants’ responses with respect to test items with structurally marked and structurally neutral backwards anaphora. We repeatedly observed that with structurally marked backwards anaphora, participants typically fell into two distinct categories: one group who always rejected coconstrual with structurally illicit referent; and another who allowed for structurally illicit coconstruals at varying rates. With structurally neutral backwards anaphora, the distribution was skewed to the right and did not have a characteristic peak near zero.

We propose that studying the distribution of speakers’ responses in psycholinguistic studies of sentences with Principle C effects is an effective way to confirm whether or not structural constraint on binding is activated. For example, it would be useful to consider such distribution for the data presented in Bruening and Al Khalaf (2019), where they argue that non-zero percentages of preference for coconstrual with certain referent DPs indicate absence of Principle C effects, and eventually use this as an argument against reconstruction. In the previous chapter we proposed that the observed increased percentages could be detected while the pronoun still c-commands the name due to multiple non-structural factors: replacing backwards anaphora with forwards anaphora, increased plausibility of coconstrual and increased processing difficulty. Bruening and Al Khalaf (2019) do not study the distribution of individual participants’ responses, but we propose that the shape of this distribution and the location of the peak could be informative with respect to structural properties of target items.

4.3 Conclusions

In this chapter we tested a hypothesis that the observed subject/non-subject asymmetry in pronominal reference resolution with structurally marked backwards anaphora is independent of Principle C effects, is common to all cases of backwards anaphora and stems instead from special properties of subjecthood. We considered structures with both structurally marked and structurally neutral backwards anaphora and manipulated pronominal position to investigate whether a similar effect of subjecthood would be observed in both conditions. We presented experimental evidence that the effect of subjecthood is not limited to sentences with Principle C effects. This evidence supports our hypothesis and leads us to propose that decreased preference for coconstrual with subject pronouns is not related to the c-commanding relation between the pronoun and the name, but rather stems from properties specifically associated with the subject position.

We proposed that subjects cause the observed effect as they are more salient than DPs in other structural positions. We argued that being a structural Nominative subject contributes to DP salience and proposed directions for future research to identify other components of subjecthood and their individual contribution to DP salience.

In the next chapter we continue to probe the influence of DP salience on pronominal reference resolution in structurally marked backwards anaphora. My analysis predicts that during pronominal reference resolution salience stemming from prosodic focus would have an effect similar to salience stemming from structural factors. In the following chapter I manipulate contrastive focus on the pronoun to see whether it has a predicted effect on speakers' judgments. I also target environments associated with increased processing difficulty and investigate whether it affects pronominal reference resolution.

Chapter 5

Principle C in Comparatives: Manipulating Structure and Prosody

In Chapter 4, I reported the findings of a study investigating whether subject/non-subject asymmetry observed with pronominal reference resolution in structurally marked backwards anaphora was common to all backwards anaphora. Experiment 4 provided us with experimental evidence that the contribution to the overall obviation effect associated with subjecthood is not limited to cases where the pronoun c-commands the name, but is also observed in structurally neutral environments. These findings, along with the results of Experiment 3 on the possibility of extraposition, provide additional evidence that the subject/non-subject asymmetry in pronominal reference resolution in sentences with Principle C effects is not due to syntactic movement altering the c-command relation between the pronoun and the name. Instead, it stems from varying non-syntactic properties of pronominal positions.

Subjecthood has been known to have an effect on pronominal reference resolution in forwards anaphora, as well as on processing of repeated names in structurally neutral backwards anaphora. Psycholinguistic research provides abundant evidence that subject name DPs are preferred antecedents for subsequent pronouns in forwards anaphora, while subject pronouns make processing of repeated names in backwards anaphora more difficult and promote obviative interpretations (Almor 1999, Ariel 1990, Brennan et al. 1987, Crawley and Stevenson 1990, Gelormini-Lezama and Almor 2011, Gordon et al. 1993, Gundel et al. 1993, Kaiser 2006, 2011, Kennison and Gordon 1997, McDonald and MacWhinney 1995, de Carvalho Maia et al. 2017, Matthews and Chodorow 1988, Stevenson and Urbanowicz 1995). In the literature, this effect of subject position on reference interpretation and processing has been attributed to increased salience associated with subjecthood (Brennan et al. 1987, Crawley and Stevenson 1990, Kaiser 2006, 2011, McDonald and MacWhinney 1995, Matthews and Chodorow 1988, Stevenson and Urbanowicz 1995). In Chapter 4, I argued

that it is the combination of structural subjecthood and Nominative Case that contributes to increased DP salience and affects speakers' interpretations. I further proposed that the effect of salience in backwards anaphora is reversed: while more salient names are preferred antecedents for subsequent pronouns in forwards anaphora, coconstrual with more salient pronouns in backwards anaphora is increasingly problematic.

In the current chapter, I will test this proposal by experimentally investigating the effect of two factors that contribute to DP salience, but do so via distinct linguistic mechanisms. In the studies presented in this chapter, I will manipulate salience stemming from structural factors (i.e., subjecthood), as well as salience due to prosodic prominence (i.e. focus) on the pronoun. My proposal predicts that increased salience resulting from prosodic manipulations will contribute to the overall obviation effect in backwards anaphora similarly to increased salience associated with subjecthood.

This chapter is organized as follows: in Section 5.1 I provide an overview of key theoretical assumptions on the relation between prosodic focus and DP salience. In Section 5.2 I provide brief background of the syntax and semantics of English comparatives and discuss how Principle C effects have been appealed to as part of the argument for the Reduction analysis of English comparatives. In Section 5.3 I present the forced choice task investigating the role of prosodic focus on pronominal reference resolution in comparative constructions with Principle C effects. Section 5.4 provides the findings of the Truth Value Judgment task targeting a broader range of test and control items. Section 5.5 discusses the implications of experimental findings and proposes directions for future research. Section 5.6 concludes the chapter.

5.1 Pronominal salience and prosodic focus

In Chapter 4, I presented the findings of a binary forced choice study that investigated the effect of pronominal position and structural relation between the pronoun and the name in backwards anaphora on speakers' preference for intra-sentential coconstrual. I demonstrated that Principle C is a strong, but not categorical factor in speakers' decisions with respect to pronominal reference resolution with both subject and object pronouns. I further provided experimental evidence that coconstrual with subject pronouns is judged as less

acceptable than coconstrual with object pronouns, and that asymmetry is registered across the board, i.e., with both structurally neutral and structurally marked backwards anaphora. I concluded by proposing that increased difficulty of establishing coconstrual with subject pronouns is not related to the c-commanding relation in backwards anaphora, but rather stems from certain DP properties associated with subjecthood.

The empirical evidence that I have presented so far demonstrates that being a Nominative structural (Spec TP) subject, as opposed to non-Nominative DPs in Spec VP position, makes coconstrual with a subsequent name in backwards anaphora increasingly problematic. To account for these findings, I proposed that the reason behind this effect of pronominal position on interpretation is that being a Nominative structural subject contributes to the salience of the pronoun and, as a result, promotes obviative interpretation in backwards anaphora. This proposal has specific predictions with respect to other factors that contribute to DP salience and their effect on pronominal reference resolution. In particular, if the proposal is correct, other factors contributing to increased salience (besides case and structural position) are expected to also suppress speakers' preference for intra-sentential coconstrual in backwards anaphora. This is the prediction to be tested in the current chapter.

Increased salience of a DP may result from combined influence of several factors that contribute to accessibility of an entity denoted by that DP in the mental model (Burkhardt and Roehm 2007, Burmester et al. 2018). While structural subjecthood is one such factor, it is not the only one. Other properties that are known to contribute to DP salience include topicality (or givenness), pronominalization (pronouns are more salient than name DP), first-mention (i.e., linear precedence), and prosodic prominence (pitch accents, connected with fundamental frequency (F0) movements and syllable overall energy, and stress, which exhibits a strong correlation with syllable nuclei duration and high-frequency emphasis). (Büring 2016, Chiarcos 2011, Chiriacescu 2011, Genzel et al. 2015, Kaiser 2006, 2011, Orita et al. 2014, Rochemont 2016, Sedivy et al. 1995, Tamburini 2003). In this chapter, I investigate whether manipulating pronominal salience through prosodic prominence (more specifically – contrastive focus on the pronoun) influences speakers' preference for coconstrual interpretations with a subsequent c-commanded name.

In the broadest sense, the term *focus* is typically used to refer to the highlighting of information for communicative purposes. Accordingly, the *focus* of a sentence has been defined as the part of meaning that is most prominent (Chomsky 1971, Halliday 1967). Focus may be associated with specific entities in discourse: a DP may become focused through the use of specific syntactic constructions (topicalization, or focus preposing, clefting, dislocation, or by means of focus particles such as *only* or *even* (Kim 2011, Lee 2004)). Focus can be conveyed via intonation alone (Samek-Lodovici 2005, Selkirk 1995), but in many cases structural and prosodic focus are present simultaneously (Steedman 1991): e.g., topicalization requires a particular intonation contour where a focused constituent receives a pitch accent. As for the prominence of individual words, particularly important is the change in the pitch of the speaker's voice, which occurs because of the presence of a pitch accent (Bolinger 1958, Cohan 2000, Ladd 2008).

Newman (1946), Bresnan (1971, 1972) and Chomsky (1986) proposed that accent patterns divide into “normal” and “contrastive”: the former are determined syntactically, while the latter arose independently from “meaningful”, semantic considerations. In these sources, “normal” accent patterns were never properly defined, but the assumption in the literature was that they are the most natural prosodic pattern produced by a speaker reading out a sentence without any supporting context (Gussenhoven 2008). This view was contested in Bolinger (1972) and Schmerling (1974), where the authors argued that all accent placements are meaningful, and it is inaccurate to propose a binary distinction between “normal” and “contrastive” prosodic conditions, rather the differences are gradient and arise from speaker information bias.

Following Ladd (1980), Gussenhoven (1983), Rooth (1992, 1996), Truckenbrodt (1995) and Selkirk (2008), I will use the term “contrastive focus” to denote the status of a constituent in a sentence where the meaning is such that the proposition expressed in a sentence has multiple alternatives. These alternatives stem from propositions identical to the original except for the contrastively focused constituent. Consider, for example, dialogues in (158) - (160).

(158) A: Mary organized a conference.

B: No, JANE (L+H*) organized a conference.

- (159) A: Mary organized a conference.
 B: No, Mary ATTENDED (L+H*) a conference.
- (160) A: Mary organized a conference.
 B: No, Mary organized a WORKSHOP (L+H*).

In (158), the set of alternatives under consideration includes all the people who could be conference organizers; in (159), the set of alternatives includes all actions corresponding to Mary's potential roles at the conference in question; and in (160), the set of alternatives includes all the events that Mary might have organized. In each of the corrective sentences uttered by speaker B, the constituent representing an alternative to speaker A's statement is a "contrastively focused" constituent (indicated by capitalization), and in each case, the contrastively focused lexical item necessarily carries a bitonal L+H* pitch accent (Katz and Selkirk 2011, Pierrehumbert 1980, Pierrehumbert and Hirschberg 1990, Schafer et al. 2000, Selkirk 1984).

As I mentioned earlier, contrastive focus often goes hand in hand with a particular syntactic structure, e.g., it is typically observed in cleft sentences, e.g., *it*-clefts, such as (161), or *wh*-clefts, such as (162).

- (161) It was a TOYOTA (L+H*) that Mary bought.
- (162) What Mary bought was a TOYOTA (L+H*).

In both (161) and (162), *Toyota* is the constituent that is contrastively focused, i.e., the set of alternatives created by these sentence includes all the car makes that Mary might have purchased, while the new information is that Mary indeed became the owner of a Toyota, and not any other make.

There is a substantial body of research demonstrating that meaning associated with constituents that are contrastively focused receives special status during processing. Psycholinguistic evidence suggests that focus enhances memory representations (Birch and Garnsey 1995), as well as the amount of details retained in memory by speakers after comprehension (Sturt et al. 2004), both of which are to be expected with more salient discourse information. A number of studies also provided evidence that focus increases attention. Using a picture-matching task, Hornby (1974) demonstrated that speakers were better at detecting

a mismatch between the image and the auditory stimulus when mismatched information was represented by a contrastively focused constituent rather than by a presupposed one. Hornby (1974) presented listeners with cleft sentences similar to (163), and then showed them an image and asked them to report whether or not the image was an accurate depiction of the sentence.

(163) It is the girl that is petting a cat.

The results showed that speakers were more likely to identify an error with respect to the focused agent (e.g., when a picture showed a boy instead of a girl) than an error with respect to the presupposed object (e.g., when a picture showed a dog instead of a cat).

More recent studies have used a text change detection paradigm (Sanford and Sturt 2002) to demonstrate that the effects of focus are also visible in eye movements during reading. Ward and Sturt (2007) asked their participants to read and then re-read a passage, and then say whether they registered any changes in the contents of the paragraph during the second presentation. Participants were presented with short stories similar to (164)-(165), where a critical word (in bold) was either replaced with a semantically related one, or remained unchanged between the two presentations.

(164) *Focused condition:*

The doctor checked to see which patient was next.

He saw that the patient with the **virus** (*2nd presentation* → **infection**) was at the front of the queue.

A kind but strict-looking nurse brought the boy in.

(165) *Non-focused condition:*

The doctor checked to see how much longer he had to work.

He saw that the patient with the **virus** (*2nd presentation* → **infection**) was at the front of the queue.

A kind but strict-looking nurse brought the boy in.

The critical word was embedded in a noun phrase that either was or was not focused, with focus manipulated via a d-linked *wh*-phrase in the preceding sentence (underlined sequence in the focused condition), as shown in (164), or via clefting. Eye movements were

monitored during reading, and the participants were also asked to state explicitly whether they detected a change between the first and the second presentation of the passage. The findings demonstrated that when a critical word was replaced by a semantically related one, participants were better at detecting the change in the focused condition, such as (164), as compared to the non-focused one, as in (165). Eye movement data also revealed more fixations and longer viewing times on the replaced word as compared to its counterpart in the no-change condition, but only when the critical word was in focus, thus providing additional evidence that focused elements receive special status during processing (Ward and Sturt 2007).

As an instantiation of prosodic prominence, focus contributes to salience of a DP that it is associated with. As we mentioned earlier, it is not the only factor, others being subjecthood, topicality (or givenness), pronominalization, and first-mention. The interaction between these factors, and individual contributions of each one of them during pronominal reference resolution has also been a topic of psycholinguistic research. Kaiser (2011) used the visual-world eye-tracking paradigm combined with a picture verification task to probe the interaction between topicality-related factors (subjecthood, givenness) and the effects of contrastive focus. Specifically, Kaiser (2011) was looking to determine whether contrastive focus influences pronominal reference resolution in inter-sentential forwards anaphora in the presence of other (potentially conflicting) factors contributing to referent salience. A further goal was to assess the strength of the contrastive focus effect relative to the effect of topicality.

The scenarios in the experiment were presented as auditory stimuli that had the form of a dialogue between two speakers, as illustrated in (166). One of the potential antecedents for the target pronoun (shown in bold in the underlined part of the target sentence) was represented by another pronoun *he*, the other – by a prosodically focused name *JOHN*. Kaiser (2011) manipulated the structural position of the focused name (subject vs. object) and probed two distinct structures: unmarked declarative sentence vs. cleft, where prosodic focus was also enhanced syntactically.

(166) A: I heard that Greg congratulated Mike enthusiastically yesterday.

B: No, that's not quite right.

- a. He congratulated JOHN. (*SVO, focused object*)
- b. JOHN congratulated him. (*SVO, focused subject*)
- c. It was JOHN that he congratulated. (*Cleft, focused object*)
- d. It was JOHN who congratulated him. (*Cleft, focused subject*)

The prizes for the best-ranked tennis players were about to be announced, and he was holding a new yellow tennis racket.

Everyone was in a good mood that day.

Kaiser (2011) demonstrates that given a choice between a subject and a non-subject antecedent in inter-sentential forwards anaphora, participants reveal a strong preference for coconstruction with a subject DP, regardless of whether it bore contrastive focus or not. Even when the object DP was assigned increased salience via contrastive focus, as in (166a) and (166c), participants still selected the non-focused subject DP as pronominal antecedent more frequently. This indicates that within the given paradigm subjecthood contributes to salience more than contrastive focus does.

At the same time, these findings leave the door open to the question of whether or not contrastive focus has an effect of its own – that is, whether focus would influence pronominal reference resolution when the conditions are such that the effect of subjecthood is controlled for. Kaiser (2011) did not include conditions where two structures contrasted only in terms of absence/presence of focus on a name. Thus the question remains: if we manipulate focus while holding structural position of the DP constant, will that result in increased preference for a contrastively focused, i.e., more salient, antecedent in forwards anaphora? And conversely, assuming the inverse effect of salience proposed for backwards anaphora, if we manipulate focus on a pronoun in sentences with Principle C effects while keeping structural position of that pronoun constant, will increased prosodic prominence of the pronoun lead to a more expressed overall obviation effect?

In this chapter, I will present two experiments designed to investigate whether pitch accents associated with contrastively focused vs. deaccented pronouns are used by listeners as cues during pronominal reference resolution in backwards anaphora with c-command. My hypothesis is that focusing the pronoun will result in increased preference for obviative interpretation.

The structural environment we identified for the target stimuli in the studies presented

in this chapter is the English comparative construction. There are several reasons for the choice. First, comparative constructions are compatible with syntactic structures that were investigated in the previous chapters. They can be incorporated into sentences with double-object predicates and ECM predicates, and have a pronoun c-commanding the subsequent name DP from either subject or non-subject position. This allows us to manipulate the structural position of the c-commanding pronoun, the same way as we did in the previous studies.

Second, we argued earlier that increased processing load leads to higher acceptability of coconstrual in syntactically marked backwards anaphora; and comparatives provide us with an environment that could be used to test this prediction. Comparative constructions are known to be the source of grammatical illusions (O'Connor 2015, Phillips et al. 2011, Townsend and Bever 2001, Wellwood et al. 2018), which also has specific consequences with respect to judgments of acceptable coconstruals.

Third, comparative constructions are an environment where Principle C effects have been used as a diagnostic for structure: Lechner (2001, 2004), Bhatt and Takahashi (2007), and Bhatt and Takahashi (2011) cited intuitive acceptability judgments of comparatives with Principle C effects as evidence that in English phrasal comparatives are underlyingly clausal. In Chapter 4, I proposed that based on the findings presented in this dissertation, appealing to Principle C effects as a structural diagnostic needs to be done with caution. This is why I will revisit this argument for the reduction analysis of English comparatives in the following section.

Finally, the author of this dissertation has to admit that her interest in the structure of comparative constructions in English preceded, and even fed into her interest in pronominal reference resolution. Thus, the experiments that are discussed further in this chapter have been conceived as a bridge between these two research directions.

5.2 Syntax of English comparatives and grammatical illusions

Over the past decades, linguists have investigated syntactic and semantic structure of English comparatives, and searched for an account of the variability in the syntax and semantics of comparatives cross-linguistically (Beck et al. 2009, Bhatt and Takahashi 2011, Bresnan

1973, Hackl 2001, Kennedy 2004, 2007, Kennedy and Merchant 2000, Lechner 2001, 2004, Merchant 2009, Schwarzschild 2008, Stechow 1984). As Bresnan (1973) succinctly put it, “the comparative clause construction in English is almost notorious for its syntactic complexity”. In this section I will briefly introduce the terminology that is relevant for the structural components of a comparative construction, and then proceed to the discussion of key assumptions from research on syntactic structure and processing of English comparatives relevant to pronominal reference resolution.

The basic structural components of a comparative construction are illustrated in Table 5.1 based on the examples in (167)-(168).

(167) Mary is more optimistic than Jane (is).

(168) Mary is taller than Jane (is).

Table 5.1: Basic structural components of a comparative construction

[	———	main	clause	———]	[	———	comparative	clause	———]
	Mary	is	more	optimistic		than	Jane	(is).	
	<i>associate</i>		<i>comp.</i>	<i>gradable</i>		<i>comparative</i>	<i>standard</i>		
			<i>morpheme</i>	<i>property</i>		<i>marker</i>			
	Mary	is	tall	-er		than	Jane	(is).	
	<i>associate</i>		<i>gradable</i>	<i>comp.</i>		<i>comparative</i>	<i>standard</i>		
			<i>property</i>	<i>morpheme</i>		<i>marker</i>			

The clausal structure (*Mary is more optimistic* or *Mary is taller*) is the main/matrix clause, while the part following it (*than Jane (is)*) is known as the comparative clause or the standard clause. *Than* is referred to as a comparative marker.

Sentences such as (167)-(168) express a comparative relationship between two values/degrees (Bresnan 1973, 1975). The first is provided by the main (matrix) clause, and the second is provided by the comparative (standard) clause. The main clause contains a reference to an entity (individual or object) that is compared (i.e., *Mary*): this entity is referred to as the associate. The main clause also hosts the comparative morpheme, or the degree head, which in English can be instantiated through the use of *-er* or *more* (i.e., *many* + *(-er)*). The comparative clause is introduced by comparative marker *than* and contains reference to a second entity, which is compared to the associate in terms of some

gradable property (the property of being *optimistic*, as in (167), or the property of being tall, as in (168)). This second entity (in this case – *Jane*) is known as the standard of comparison.

Comparative constructions can be either clausal or phrasal comparatives (Bhatt and Takahashi 2007, 2011, Bresnan 1973, 1975, Kennedy 2002, Lechner 2001, 2004, Schwarzschild 2008). In some cases, these terms are used to refer to surface structure: a “clausal comparative” designates a comparative construction that shows clausal syntax following the comparative marker *than*, while “phrasal comparative” refers to sentences that lack an overt subject-verb sequence in the standard, cf. (170)-(170) and (171)-(172). Examples in (169) and (171) both have full clausal structure following the comparative marker, thus making them surface clausal comparatives by definition. Examples in (170) and (172), on the other hand, illustrate comparatives that have surface phrasal structure.

(169) Mary is taller than Jane is.

(170) Mary is taller than Jane.

(171) Mary has more apples than Jane has apples.

(172) Mary has more apples than Jane.

Alternatively, the terms *clausal* and *phrasal* can refer to structures underlying a surface comparative. For example, in case of (169) and (171), the surface structure (and also the underlying structure) of the comparative is clausal. On the other hand, the syntactic status of cases such as (170) and (172) is not as straight-forward and has been a subject of theoretical discussion. In particular, the question is whether such constructions are also underlyingly phrasal (i.e., are subject to Direct Analysis), or they should be analyzed as elliptical versions of underlyingly clausal comparatives (i.e., subject to Reduction Analysis). As the Principle C effect is evaluated at LF, it is the underlying structure that is of primary importance in this chapter; and I will use the latter terminology instead of the former, i.e., I will focus on the underlying structure of comparatives constructions.

Much research has demonstrated that no single account can describe the syntax and semantics of comparatives cross-linguistically (Beck et al. 2004, 2009, Bhatt and Pancheva 2004, Bhatt and Takahashi 2007, 2011, Kennedy and Merchant 2000, Merchant 2009). In

particular, it has been shown that in some, but not all languages, surface phrasal comparatives may also have phrasal underlying structure. For example, Russian and Hungarian have underlyingly phrasal comparatives, as illustrated by the examples in (173)-(174).

(173) **Russian:**

Masha vyshe Dashi.
Masha.NOM taller Dasha.GEN

“Masha is taller than Dasha”.

(174) **Hungarian:**

Mari magasabb Zsuzsánál.
Mary taller Susan.ADE

“Mary is taller than Susan”. (Bacskai-Atkari 2014: p. 4, ex. 4)

As the examples in (173)-(174) show, in Russian and Hungarian, the DP that designates the standard of comparison is inherently marked for case (Genitive in Russian and Adessive in Hungarian). This DP cannot serve as the subject of an elided clause: it would need to bear structural Nominative case for the clause to be recoverable. Consequently, the Reduction Analysis is not applicable to this data.

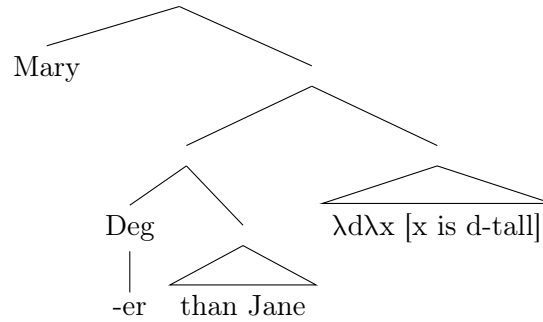
The comparative morpheme *-er* is assumed to have the semantics of a degree quantifier (Hackl 2000, 2001, Heim 1985, Klein 1980, Stechow 1984). In such case, underlyingly phrasal comparatives, such as (173)-(174), require a 3-place degree head, which combines with two individual arguments and a predicate of degrees and individuals, as shown in (175) (Bhatt and Takahashi 2011).

(175) **Three-place degree head:** P is a degree predicate (set of degrees)

Mary is taller than [Jane].

$-er(x)(P)(y) \leftrightarrow \exists d[P(y, d) \wedge \neg P(x, d)]$

Figure 5.1: Three-place degree head



This approach is applicable to Russian and Hungarian phrasal comparatives, as in (173)-(174). At the same time, data from English comparatives proves inconsistent with the Direct Analysis and speaks in favor of the Reduction Analysis. That is, it suggests that in English all comparatives are underlyingly clausal. Accordingly, comparatives that appear phrasal on the surface must have undergone ellipsis of the VP material in the standard clause (Bhatt and Takahashi 2011, Bresnan 1973, 1975, Kennedy 2002, Lechner 2001, 2004, Schwarzschild 2008), as shown in (176).

(176) Mary has more books than Jane ~~has books~~.

Bresnan (1973, 1975) proposed that the underlying structure of the comparative clause in such cases includes constituents identical to the corresponding overt structure in the main clause. The only difference here is that the comparative morpheme is replaced by a variable that ranges over degrees, as shown in (177). Bresnan (1973, 1975) further suggested that an unbounded deletion operation eliminates the repeated lexical material from the standard clause under identity with the respective material in the main clause.

(177) Mary has more books than Jane ~~has d-many books~~.

The Reduction Analysis requires a degree head that takes two arguments that are sets of degrees, as shown in (178). The external argument of a two-place degree head is provided by the main clause, while the internal argument is given by the standard clause. The degree head is then assumed to undergo Quantifier Raising (QR), as shown in Fig. 5.2, to yield interpretable structure, and also in part because quantifier raising is required to resolve

antecedent-contained deletion within the ellipsis site in the *than*-clause (Heim 2000, May 1977, 1985, Syrett and Lidz 2009, Wold 1995). Another syntactic operation is needed for the deletion/recovery of the content of the elided lexical material.

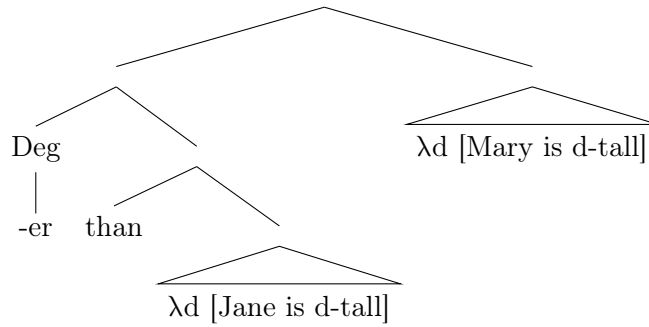
(178) **Two-place degree head:** P, Q are degree predicates (sets of degrees)

Mary is taller than [Jane is].

$\text{-er}(P)(Q) \leftrightarrow \exists d [Q(d) \wedge \neg P(d)]$

$\text{-er} [\lambda d. \text{ Jane is } d\text{-tall}] [\lambda d. \text{ Mary is } d\text{-tall}]$

Figure 5.2: Two-place degree head



Summing up, the 2-place degree head in a clausal comparative combines with a degree description, while the 3-place degree head in a phrasal comparative combines with an individual (Bhatt and Takahashi 2007, 2011, Heim 1985, Lechner 2001, 2004, Merchant 2009, Pancheva 2009) (cf. Fig. 5.1 vs. Fig. 5.2).

Part of the argument for the Reduction Analysis of English comparatives is based on the evidence from scope interaction between the comparative marker *-er* vs. universal quantifier embedded in the standard clause. For example, consider the two scopal interpretations for an English comparative in (179)¹.

(179) More students read every syntax paper than every semantics paper.

(= More students read every syntax paper than read every semantics paper.)

¹This data is cited from Bhatt and Takahashi (2011), ex. 39, p. 602, where authors attribute the example to personal communication with Carl Pollard and the paraphrase to Lisa Travis.

Interpretation 1, based on 2-place degree head semantics:

than-phrase internal scope: **-er** > **every**

$[-er \ [\lambda d. [d\text{-many students read every semantics paper}]]] \ [\lambda d. [d\text{-many students read every syntax paper}]]$

Meaning 1: The number of students who read every syntax paper exceeds the number of students who read every semantics paper.

Interpretation 2, based on 3-place degree head semantics:

than-phrase external scope: **every** > **-er**: ???

$[every \text{ syntax paper}] \ \lambda x. [every \text{ semantics paper}] \ \lambda y. \ [[-er \ [\lambda d. [d\text{-many students read } y]]] \ [\lambda d. [d\text{-many students read } x]]]$

Meaning 2: The least read syntax paper was still read by more people than any semantics paper (paraphraseable as: every syntax paper was read by more students than every semantics paper.)

As Bhatt and Takahashi (2011) argue, if the comparative in (179) was underlyingly phrasal and the Direct Analysis was applicable to English, the 2nd interpretation where the universal quantifier *every* takes scope over the comparative morpheme *-er*, would have been available. However, this is not the case. Bhatt and Takahashi (2011) argue that (179) can only be interpreted so that *-er* takes scope over *every*, which can only be explained based on the 2-place degree head, and is only compatible with the Reduction Analysis.

Lechner (2001, 2004) and Bhatt and Takahashi (2007, 2011) also argue that more evidence for the Reduction Analysis of English comparatives comes from judgments that native speakers have with respect to coconstruction. The Reduction Analysis and Direct Analysis differ in their predictions about binding properties of the standard in a comparative construction. According to the Reduction Analysis, the standard occurs inside a larger clausal structure which is syntactically and semantically parallel to that of the main clause. This also means that within the comparative clause the standard occupies a position that is structurally

identical to the one occupied by the associate in the main clause. This leads to the expectation that the binding domain of the standard is related to the structural position (and also the binding domain) of its associate. Building upon observations from Lechner (2004), Bhatt and Takahashi (2011) further propose the generalization in (180).

- (180) The standard is c-commanded by everything that c-commands the associate. (Bhatt and Takahashi 2011: p. 587, ex. 10)

Accordingly, Lechner (2001, 2004) and Bhatt and Takahashi (2007, 2011) propose that, in line with the Reduction Analysis, the sentence in (181) should be unacceptable with coconstrual, since the pronoun *him* c-commands the associate *Mary* in the main clause, and therefore its elided counterpart c-commands the standard, *Peter's sister*, in the comparative clause. This predicts that the interpretation where *him* is coconstrued with *Peter* should be judged as unacceptable. On the contrary, in (182) coconstrual is expected to be acceptable, as Principle C is observed: the pronoun-noun sequence in the standard clause is reversed, and the pronoun does not c-command the name. Therefore, when the ellipsis is filled in, the pronoun will not c-command the name in the possessor position of the embedded subject DP (i.e., *Peter's sister*) with which it can be coconstrued.

- (181) *More people introduced him_i to Mary than [...] to $Peter_i$'s sister.

More people introduced him_i to Mary than ~~d-many people introduced him_i~~ to $Peter_i$'s sister.

Reduction Analysis LF:

[[er [than d-many people introduced $\underline{him}_i$ to $\underline{Peter}_i$'s sister]] [$\lambda d.\lambda x$. [d-many people introduced him_i to Mary]]]

- (182) Mary introduced more people to him_i than $Peter_i$'s sister [...].

Mary introduced more people to him_i than $Peter_i$'s sister ~~introduced d-many friends to him_i~~ .

Reduction Analysis LF:

[[er [than $\underline{Peter}_i$'s sister introduced d-many people to $\underline{him}_i$]] [$\lambda d.\lambda x$. [Mary introduced d-many people to him_i]]]

As Lechner (2001, 2004) and Bhatt and Takahashi (2007, 2011) note, the Direct Analysis

makes a very different prediction. Under the Direct Analysis, there are no assumptions about a reduced comparative clause or structure parallelism; and consequently there is no expectation that the binding properties of the standard are related to those of the associate. Under the Direct Analysis, the standard has the syntax of a prepositional phrase; and so it will have the binding properties of a PP in the same structural position (Bhatt and Takahashi 2007, 2011, Lechner 2001, 2004). Consequently, under the Direct Analysis, both (183) and (184) should be acceptable with coconstrual. In neither of the LF representations in (183) and (184) does the pronoun in the matrix clause c-command the name in the standard. Hence, these two sentences are not expected to contrast in acceptability of coconstrual.

(183) More people introduced him_i to Mary than [...] to $Peter_i$'s sister.

Direct Analysis LF:

[Mary [[-er [than Peter_i's sister]] $\lambda d.\lambda x$. [d-many people introduced him_i to x]]]

(184) Mary introduced more people to him_i than $Peter_i$'s sister [...].

Direct Analysis LF:

[Mary [[-er [than Peter_i's sister]] $\lambda d.\lambda x$. [x introduced d-many people to him_i]]]

Citing intuitive judgments, Bhatt and Takahashi (2011) state that “there is a clear contrast between” the examples in (181) and (182) in terms of their acceptability with intended coconstrual; they even refer to (181) as “ungrammatical”. They further use this data as a diagnostic for structure and evidence supporting the Reduction Analysis. While this chapter does not question the Reduction Analysis of English comparatives, I will present experimental evidence demonstrating that the proposed contrast in judgments of acceptability is not as clear-cut as Bhatt and Takahashi (2007, 2011) may insist.

The example in (181) is also of particular interest for this research as it is a subject comparative, i.e., here the comparative morpheme “more” is embedded under the subject DP (cf. an object comparative in (182), where the comparative morpheme is embedded under the DP in object position). Note that subject comparatives similar to (181) have c-commanding pronouns in non-subject positions. As I have shown in the previous chapters, the non-subject position of the pronoun leads to more acceptable coconstrual in backwards anaphora. Also, subject comparatives are known to be associated with grammatical illusions, i.e., structures

that seem acceptable to native speakers at first, but then their ill-formedness becomes apparent upon further reflection (O'Connor 2015, Townsend and Bever 2001, Phillips et al. 2011, Wellwood et al. 2018).

Perhaps the most widely-circulated example of a grammatical illusion in a comparative construction is presented in (185)

(185) More people have been to Russia than I have.

The example in (185) was first presented in Montalbetti (1984), where the author attributes it to personal communication with Hermann Schultze and refers to this example as “the most amazing */? sentence I’ve ever heard”. Since then a number of works have addressed the phenomenon in question (Fulst and Phillips 2004, O'Connor et al. 2013, O'Connor 2015, Wellwood et al. 2009, 2018), with Wellwood et al. (2018) being perhaps the first one to offer a formal investigation into the mismatch between the (deceptive) perception of grammaticality and meaningfulness. In two formal acceptability studies, Wellwood et al. (2018) showed that speakers of English are prone to a grammatical illusion in which the main clause supports an event comparison reading (an interpretation where the comparison is between the number of visits to Russia made by the associate “people” vs. the number of visits made by the standard “I”). Wellwood et al. (2018) conclude that upon encountering a comparative in question, speakers predict such an interpretation based on the matrix clause of the sentence, and then fail to notice that this interpretation becomes unavailable in the standard clause.

I hypothesized earlier that increased processing difficulty is associated with a decrease in the overall obviation effect and makes structurally illicit coconstruals more accessible. Subject comparatives present an example of a structural environment that can be used to test this hypothesis. Further in this chapter I present the findings of two experiments that involve object and subject comparatives hosting both structurally marked and structurally neutral backwards anaphora, and investigate whether subject comparatives reveal increased acceptability of structurally illicit coconstruals.

5.3 Experiment 5

Experiment 5 was designed to determine (i) how syntactic structure of a comparative construction influences speakers' preference for coconstrual interpretation between the nominal elements embedded in the comparative; and (ii) which specific factors (e.g. structural position of the pronoun vis-à-vis the R-expression, prosodic cues/focus, increased processing load) influence the possibility of coconstrual in backwards anaphora.

5.3.1 Participants

45 Rutgers University undergraduate students enrolled in a Linguistics or Cognitive Science course participated for course credit. All participants were native speakers of English as determined by a demographic questionnaire.

5.3.2 Materials

Target sentences included a variety of comparative constructions, including but not limited to the structures presented in Lechner (2001, 2004), Bhatt and Takahashi (2007, 2011). Experimental stimuli consisted of two structural types: object and subject comparatives.

Object comparatives. All object comparatives were surface clausal comparatives and had a pronoun in the matrix clause c-commanding an R-expression in the standard clause, and therefore, structurally marked backwards anaphora. Two factors were manipulated: structural position of the pronoun in the matrix clause and focus/deaccenting of the pronoun.

The position of the pronoun in the matrix clause varied between *matrix subject*, as in (186)-(187), and *dative object*, as in (188)-(189). In both cases, the comparative morpheme was hosted by adjectival modifier in the direct object.

Table 5.2: Object comparatives stimuli in Exp. 5

Target sentences	Pronominal Position	Pronominal Prosody
(186) She _{<i>i/j</i>} is eating bigger breakfasts than Jane _{<i>i</i>} did last year.	subject	deaccented
(187) SHE _{<i>i/j</i>} is eating smaller dinners than Mary _{<i>i</i>} did last year.	subject	focused
(188) The manager offered her _{<i>i/j</i>} a greater discount than he offered Jane _{<i>i</i>} last year.	dative object	deaccented
(189) The travel agent offered HER _{<i>i/j</i>} a better deal than he offered Mary _{<i>i</i>} last year.	dative object	focused

The second factor – prosody – was manipulated so that the pronoun was either deaccented, as in (186) and (188), or assigned contrastive focus, as in (187) and (189). Fig. 5.3 and Fig. 5.4 illustrate the prosodic contour and the pitch accenting on the pronoun *her* for two sample experimental items: deaccented condition in (188) and focused condition in (189).

Figure 5.3: Pitch track for a sample object comparative stimulus (188) in Exp. 5: deaccented pronoun

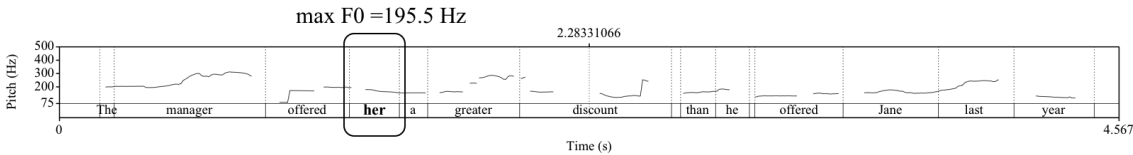
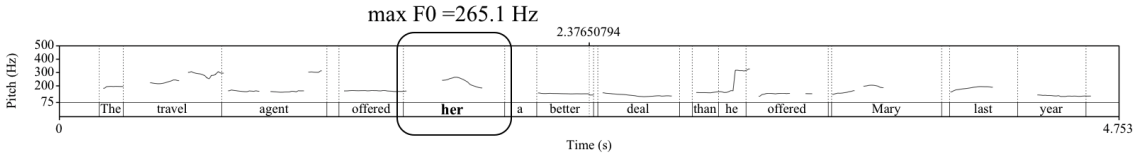


Figure 5.4: Pitch track for a sample object comparative stimulus (189) in Exp. 5: focused pronoun



All test sentences were recorded in a sound-attenuating recording booth by a female native speaker of English. Table 5.3 presents the results of acoustic analysis of recorded stimuli showing average quantitative measures of pronoun production in both prosodic conditions. As Table 5.3 shows, the condition where the pronoun was focused was produced with longer average duration of the pronoun, as well as higher measures of mean, maximum and minimum pitch, and mean and maximum intensity.

Table 5.3: Duration, pitch (mean, min, max), and intensity (mean, min, max) on the pronoun in object comparatives for both experimental conditions in Exp. 5

	Deaccented Pronoun	Focused Pronoun	Average of Increases Between Deaccented and Focused Condition
Duration (s)	0.27	0.46	+77.09%
Mean pitch (Hz)	208.65	269.65	+30.02%
Min pitch (Hz)	188.40	200.05	+5.67%
Max pitch (Hz)	242.75	363.80	+47.54%
Mean intensity (dB)	67.50	70.35	+4.28%
Min intensity (dB)	51.00	47.55	-6.50%
Max intensity (dB)	71.40	74.80	+4.81%

The result of these manipulations was a 2×2 within-subjects design: *structural position of a pronoun in the matrix clause* (matrix subject vs. dative object) $\times$ *prosody* (deaccented vs. focused pronoun). Crossing these factors resulted in 4 different combinations, as shown in Table 5.2.

In object comparatives, varying the structural position of the pronoun did not affect the c-commanding relation between the pronoun and the name. In both cases – where the pronoun was in matrix subject position, as in (186)-(187), and where it was in dative object position, as in (188)-(189), the name remained in the c-commanding domain of the pronoun at all times, as shown in Fig. 5.5 and Fig. 5.6 respectively, therefore always yielding a Principle C effect.

Figure 5.5: Tree structure for a sample object comparative stimulus (186) in Exp. 5

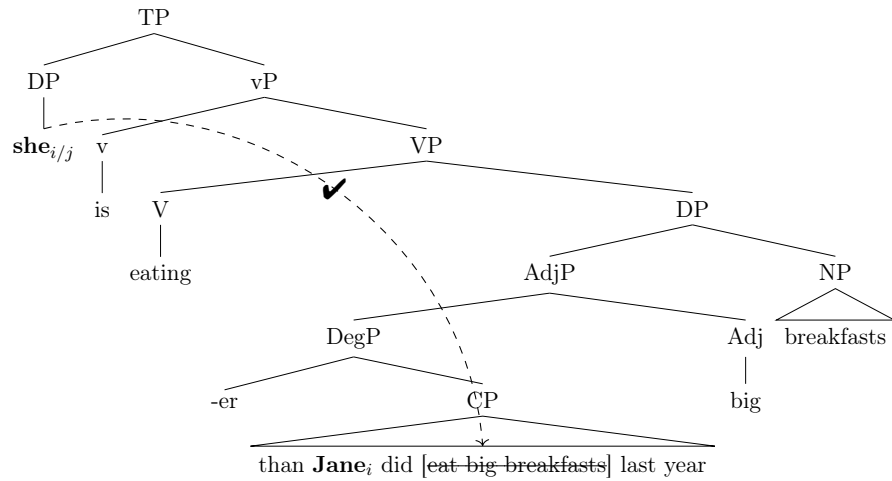
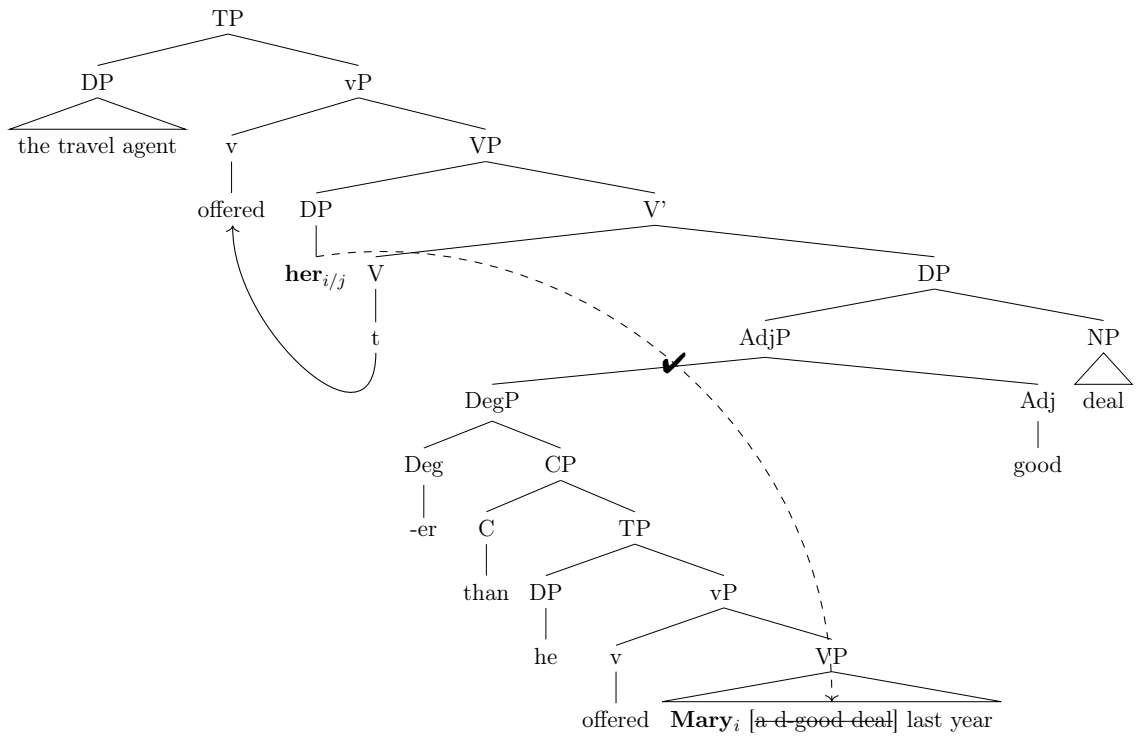


Figure 5.6: Tree structure for object comparative stimulus (189) in Exp. 5



With object comparatives, the surface position of the name is not informative for assessing whether or not we expect to observe a Principle C effect. The standard clause of the comparative extraposes to the right to yield the surface word order (Bresnan 1973).

However, Principle C is evaluated at LF, thus the position of the name post overt movement is irrelevant. As a result, it is covert movement that needs to be considered. Quantificational expressions undergo QR, so the degree quantifier moves to a scope position within the same clause from where it binds the degree variable in argument position (Fox 2000, Heim 2000, Merchant 2000a). Thus for Fig. 5.5, following Fox (2000), Heim (2000), Merchant (2000a), we assume that the degree phrase QRs to a position below the matrix subject. Similarly, for Fig. 5.6, the degree phrase also QRs to a scope-taking position adjoined to the AdjP, the lowest node of type *t* where DegP can be interpreted (Bhatt and Pancheva 2004), which is still below the dative object and in its c-commanding domain, as illustrated by the availability of variable binding in (190).

(190) The travel agent offered [**every girl**]_{*i*} a better deal than he offered **her**_{*i*} last year.

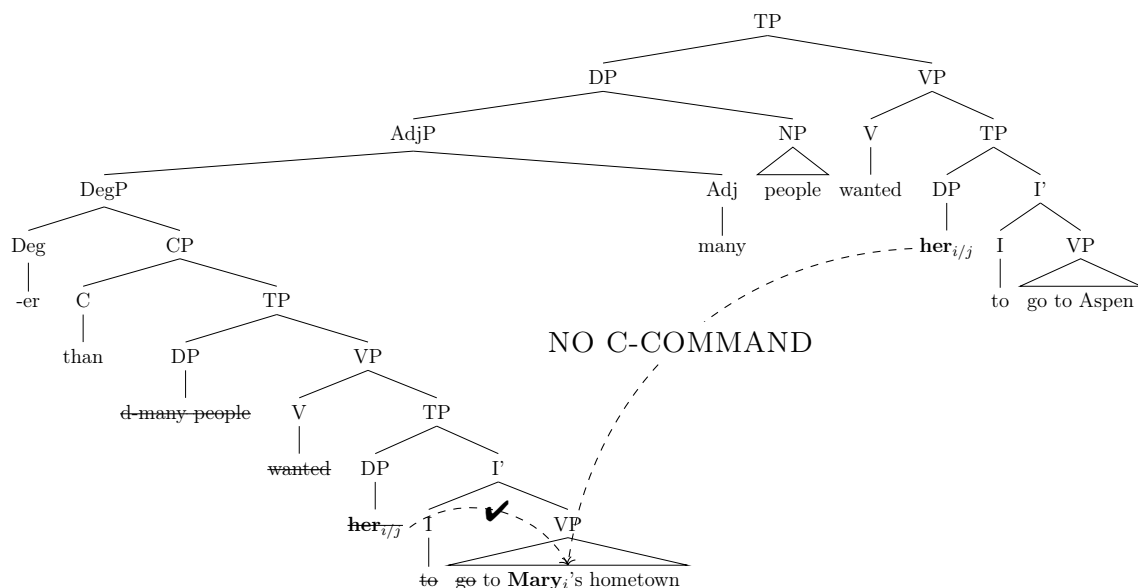
Subject comparatives. The second class of test sentences in Experiment 5 were subject comparatives. These experimental stimuli were structurally parallel to the sentences presented in Lechner (2001, 2004) and Bhatt and Takahashi (2007, 2011) as part of the argument for the Reduction Analysis of English comparatives. Subject comparatives in Experiment 5 included constructions with three-place predicates (V + DP complement + PP complement), as in (191)-(192), sentences with ECM predicates, as in (193)-(194), and sentences with two-place predicates (V + PP complement + PP adjunct), as in (195)-(196). As the subject position in the matrix clause was occupied by a DP hosting the comparative morpheme, all subject comparative stimuli had pronouns in structurally less salient, non-subject positions. Thus we continue to probe the hypothesis formulated in Chapter 4 that speakers more frequently allow for structurally illicit coconstruals with less salient pronouns. With subject comparatives, we manipulated the following two factors: *the position of the pronoun vis-à-vis the R-expression* (pronoun c-commanding vs. not c-commanding the R-expression), and *prosody* (focused vs. deaccented pronoun). The resulting design for all three structural types of sentences is presented in Table 5.4 .

Table 5.4: Surface phrasal subject comparatives stimuli in Exp. 5

Target sentences	Standard Clause	Structure
Three-place predicate (DP + PP)		
(191) More cast members introduced her _{<i>i/j</i>} to the male lead than [...] to Mary _{<i>i</i>} 's understudy	than d-many cast members introduced her _{<i>i/j</i>} to Mary _{<i>i</i>} 's understudy.	pron » name
(192) More photographers recommended their own pictures to her _{<i>i/j</i>} than [...] Jane _{<i>i</i>} 's pictures.	than d-many photographers recommended Jane _{<i>i</i>} 's pictures to her _{<i>i/j</i>}	name » pron
ECM predicate		
(193) More people wanted her _{<i>i/j</i>} to go to Aspen than [...] to Mary _{<i>i</i>} 's hometown.	than d-many people wanted her _{<i>i/j</i>} to go to Mary _{<i>i</i>} 's hometown	pron » name
(194) More classmates wanted Alec to date her _{<i>i/j</i>} than [...] Jane _{<i>i</i>} 's next door neighbor.	than d-many classmates wanted Jane _{<i>i</i>} 's next door neighbor to date her _{<i>i/j</i>}	name » pron
Two-place predicates (PP comp + PP adj)		
(195) More people talked to her _{<i>i/j</i>} about politics than [...] about Mary _{<i>i</i>} 's new haircut.	than d-many people talked to her _{<i>i/j</i>} about Mary _{<i>i</i>} 's new haircut	pron » name
(196) More students talked to the department chair about her _{<i>i/j</i>} than [...] to Jane _{<i>i</i>} 's colleagues.	than d-many students talked to Jane _{<i>i</i>} 's colleagues about her _{<i>i/j</i>}	name » pronoun

An important distinction between the object and subject comparative stimuli in Experiment 5 is that with the latter the pronoun c-commanding the R-expression is not the overt pronoun in the matrix clause. Instead, the pronoun that yields a Principle C effect in subject comparatives is the elided counterpart of the matrix pronoun in the standard clause, as shown in the middle column in Table 5.4, and also in Fig. 5.7 for sample stimulus (193).

Figure 5.7: Tree structure for a sample subject comparative stimulus (193) in Exp. 5



Thus here again we are faced with an environment where a name has a covert binding antecedent (here, a c-commanding elided counterpart of the matrix clause pronoun) and an overt discourse antecedent (here, a linearly preceding matrix pronoun). The former is only associated with the Principle C effect, while the properties of the latter exert influence on the overall obviation effect common to backwards anaphora in general.

Just as object comparatives, all subject comparative stimuli were recorded in a sound-attenuating recording booth by a female native speaker of English. In this case, each stimulus from Table 5.4 was recorded twice: once for each prosody condition. Consequently, factor *position of the pronoun* was manipulated within subjects, while factor *prosody* was manipulated between subjects. When the pronoun was deaccented, the key syllable in the following DP received an H* pitch accent, as shown in Fig. 5.8. In test items where the pronoun was assigned contrastive focus, the following DP was deaccented, as shown in Fig. 5.9.

Figure 5.8: Pitch track for a sample subject comparative stimulus (195) in Exp. 5: deaccented pronoun

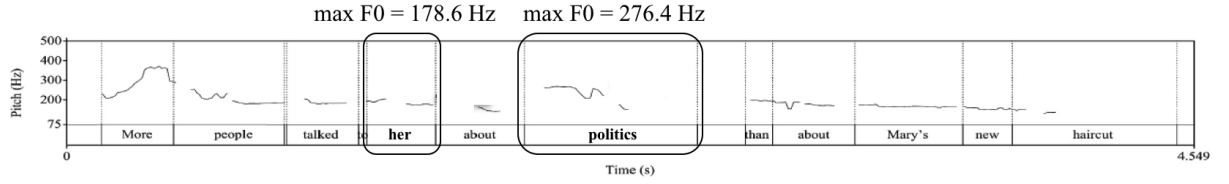


Figure 5.9: Pitch track for a sample object comparative stimulus (195) in Exp. 5: focused pronoun

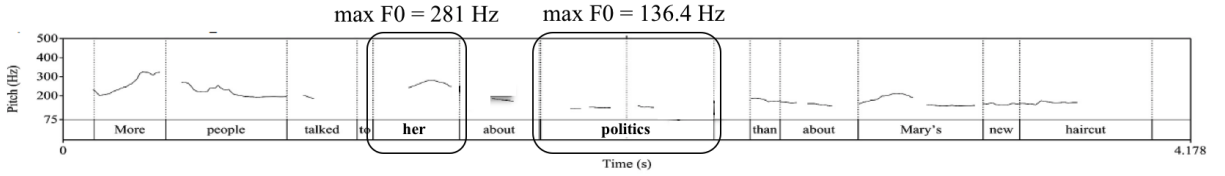


Table 5.5 presents the results of acoustic analysis of recorded stimuli showing average quantitative measures of pronoun production for both prosodic conditions of experimental stimuli. As Table 5.5 shows, the condition where the pronoun was focused had longer average duration of the pronoun, as well as higher measures of mean, minimum and maximum pitch, and mean, minimum and maximum intensity.

Table 5.5: Duration, pitch (mean, min, max), and intensity (mean, min, max) on the pronoun in subject comparatives for both experimental conditions in Exp. 5

	Deaccented Pronoun	Focused Pronoun	Average of Increases Between Deaccented and Focused Condition
Duration (s)	0.18	0.29	+57.70%
Mean pitch (Hz)	152.65	216.42	+41.77%
Min pitch (Hz)	148.62	166.35	+11.93%
Max pitch (Hz)	160.25	263.43	+64.39%
Mean intensity (dB)	57.33	60.95	+6.32%
Min intensity (dB)	44.22	45.84	+3.67%
Max intensity (dB)	65.76	72.29	9.93%

Each participant saw 4 object and 6 subject comparatives. In addition, each experimental session included two control sentences featuring antecedent-contained deletion (ACD), as

shown in (197)-(198) along with QR and verb phrase ellipsis (VPE) resolution.

(197) **She**_{*i/j} visited the same cities as **Mary**_i did last year.

[the same books that Jane_i did [visited *t*] last year][She_{*i/j} [visited *t*]

(198) **She**_{*i/j} is reading the same books as **Jane**_i did last year.

[the same books that Jane_i did [read *t*] last year][She_{*i/j} [is reading *t*]

In this experiment, we chose sentence with ACD as controls since, similar to comparative constructions, those involve raising of the degree phrase and ellipsis of the VP material, as shown in (197)-(198).

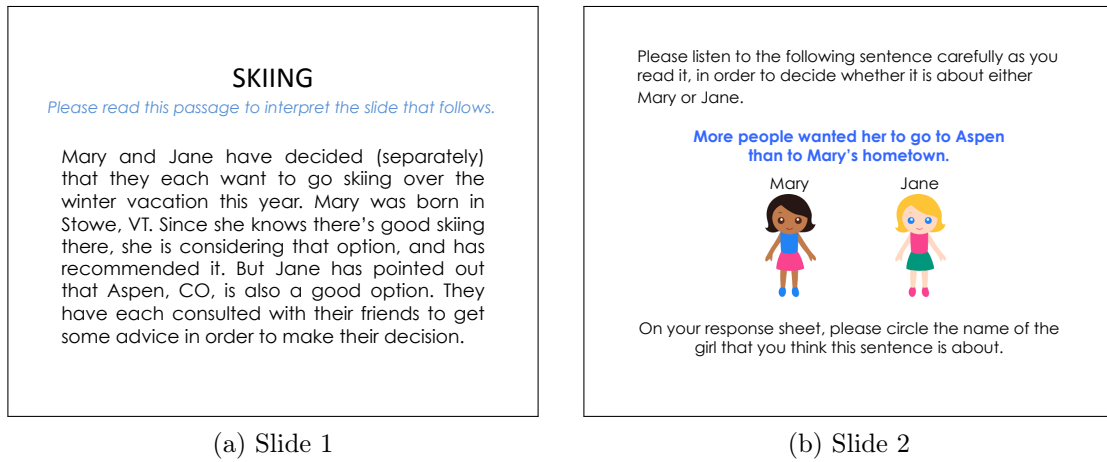
All target and control sentences were presented in a pseudo-randomized order which ensured that not two test items from the same condition appeared consequentially during the study. See Appendix E for a full list of experimental items.

5.3.3 Procedure

The study was conducted in a laboratory setting, where participants were run one or two at a time in a quiet room at individual response stations. Items were presented on an iMac using SuperLab stimulus presentation software (v. 5). Each experimental session began with a brief training with non-target items, to acclimate participants to the task.

Each trial consisted of two slides, as illustrated in Fig. 5.10. Slide 1 featured a scenario involving two same-gender characters (Mary and Jane). This scenario established the context leading up to the target sentence, and presented the female characters as equally salient. After participants had read the scenario on Slide 1, they clicked to advance to Slide 2, in which they encountered a target sentence presented in written form accompanied by the same sentence presented twice consecutively as auditory stimulus. Participants were asked to read and listen to the sentence, and decide which character it was about. They then circled their response (Mary or Jane) for each trial on a paper and pen questionnaire. Participants were instructed not to change their responses after they had been recorded.

Figure 5.10: Slides for a sample experimental trial involving subject comparative (193) in Exp. 5

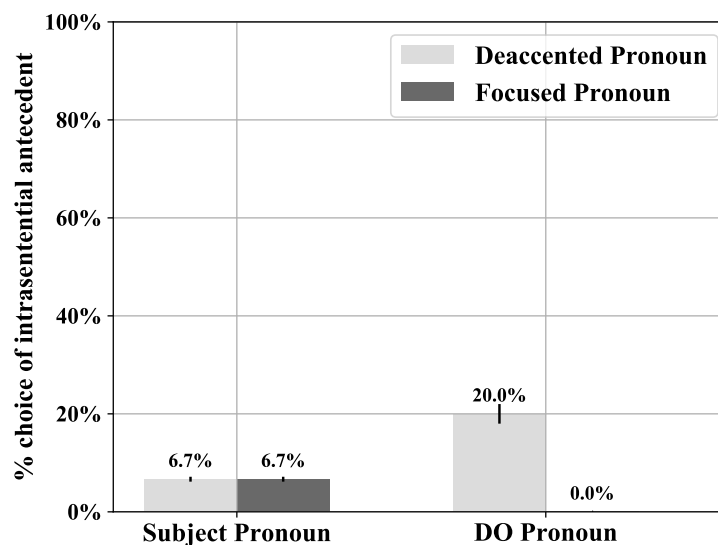


The left vs. right positions of the two female characters remained constant throughout the task. Appearance of the name was balanced across target and control sentences, to vary responses and expectations. Each experimental session lasted approximately 10-15 minutes.

5.3.4 Results

The results for object comparative test items in Exp. 5 are summarized in Fig. 5.11 below.

Figure 5.11: Percentage choice of intra-sentential referent for the pronoun across object comparatives in Exp. 5 (Forced Choice Task)

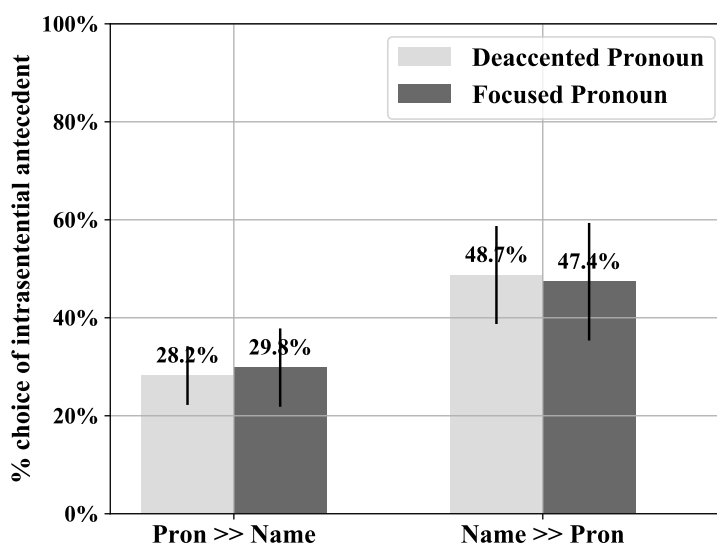


The dependent measure was the percentage choice of intra-sentential referent for the pronoun in the target sentence. Thus Fig. 5.11 indicates that participants showed significant dispreference against coconstrual relations between the pronoun and the name in an object comparative, with slightly higher percentage choice of intra-sentential referent for a deaccented non-subject pronoun.

With deaccented pronouns, we observed that when the pronoun c-commanded the name as matrix subject, preference for intra-sentential coconstrual was lower: 6.7% for subject pronouns vs. 20% for Direct Object pronouns. This is also in agreement with our earlier findings on the effect of pronominal position (i.e., effect of salience) on pronominal reference resolution. It was not possible to conduct fully-fledged statistical analysis for this set of test items, as binomial logistic regression model failed to converge due to floor effect in participants' responses observed in one of the experimental conditions.

The results for subject comparative test items in Exp. 5 are summarized in Fig. 5.12 below.

Figure 5.12: Percentage choice of intra-sentential referent for the pronoun across subject comparatives in Exp. 5 (Forced Choice Task)



The dependent measure was again the percentage choice of intra-sentential referent for the pronoun in the target sentence. Binomial logistic regression model with random intercepts for subjects revealed significant effect of Principle C status on responses indicating

acceptability of coconstrual ($\beta = -1.52599$; $SE = 0.36237$; $p < 0.01$). There was no significant effect of factor *prosody* (focusing/deaccenting the pronoun) in subject comparatives ($\beta = 0.3728$, $SE = 0.4845$ $p = 0.36$).

5.3.5 Discussion

In this binary forced choice task, participants were asked to select one of the two salient referents for the pronoun in the target sentence. Selecting an extra-sentential referent represented preference for obviative interpretation, while choosing an intra-sentential referent reflected preference for coconstrual interpretation between the pronoun and an R-expression in the standard of comparison.

For **object comparatives**, where an overt pronoun in the matrix clause c-commanded an R-expression in the unreduced standard clause, we found that the rate of intra-sentential coconstrual was low (between 0% and 20%). This finding is in line with our predictions for sentences with Principle C effects in the absence of plausibility manipulations.

We also found that in cases where a pronoun carried contrastive focus, rate of intra-sentential coconstrual was particularly low. Despite the fact that the pronoun occupied a less salient position structurally, increased prosodic salience resulted in 0% choice of intra-sentential referent. This provides additional support of our hypothesis that increased pronominal salience enforces obviative interpretations in backwards anaphora, regardless of whether this increased salience is due to structural or prosodic prominence.

For **subject comparatives**, there was a statistically significant effect of structural markedness on speaker's preference for/against intra-sentential coconstrual. We argue that this is the finding that can now be used as reliable evidence for the Reduction Analysis of English comparatives. The overt pronoun in the matrix clause is a discourse antecedent, but not a binding antecedent, i.e., it does not c-command the name in the standard clause. Still, the effect of Principle C is detected in participants' responses. This finding speaks in favor of the analysis under which the structure includes an elided pronoun in the standard clause.

The very fact that the rate of preference for intra-sentential referent in the structurally marked condition was close to 30% is to be expected given the findings of Experiments 3

and 4. Similar to Experiment 5, Experiments 3 and 4 were also based on a forced choice task; they also involved no plausibility manipulations, and included test items where the pronoun c-commanded the name from non-subject position. And in each case the rate of coconstrual with intra-sentential referent was significantly higher than zero (as compared to near-floor effect observed with control items with pronoun in matrix subject position): 30.6% – 40.1% in Exp. 3, 23.5% in Exp. 4, and 20% – 48.7% in Exp. 5. Thus with these findings we provide additional evidence that Principle C alone does not categorically render sentences as unacceptable.

It is important to emphasize here that Experiment 5 featured a forced choice task, which introduces two possible referents for the pronoun in question, while participants are asked to choose one of them. Opting for one over the other, however, does not mean that the female character that was not selected is ruled out as a possible referent. A forced-choice task illustrates preference of one interpretation over another. This means that in cases where participants select an extra-sentential referent, coconstrual interpretation may still be a possibility. To assess more accurately which interpretations speakers find acceptable vs. unacceptable, we conducted Experiment 6 with a Truth Value Judgment Task.

5.4 Experiment 6

5.4.1 Participants

45 Rutgers University undergraduate students enrolled in a Linguistics or Cognitive Science course participated for course credit. All participants were native speakers of English as determined by a demographic questionnaire.

5.4.2 Materials

Experiment 6 was designed to answer questions similar to those in Experiment 5: (i) how syntax of comparatives interacts with embedded backwards anaphoric dependency, and (ii) which specific factors (structural position of the pronoun relative to the R-expression, prosodic prominence, and increased processing load) influence speaker's preference for coconstrual in backwards anaphora. Since Experiment 5 (Forced Choice Task) only revealed participants' preference for/against intra-sentential coconstrual, but did not directly indicate whether

they ruled out the other option as ungrammatical, here we followed up with a modified version of Truth Value Judgment task (Crain and Thornton 1998).

The test sentences in Experiment 6 were the same structural types of object and subject comparatives with backwards anaphora as presented in Experiment 5 (see Table 5.2 and Table 5.4). The difference was that in Experiment 6 prosody was only manipulated for object comparatives, but not for subject comparatives. This condition was excluded, since Experiment 5 showed that manipulating prosody on the overt pronoun in subject comparatives does not influence participants' judgments of coconstrual. Thus in Experiment 6 the pronoun was deaccented for all subject comparative stimuli.

Another difference was that in Experiment 6 stimuli were presented without a scenario preceding the target sentence and establishing a context for it. As a result, the time required to proceed through each trial was decreased, and it became possible to incorporate more test items in each session. Thus Experiment 6 included 6 additional control sentences: four more object comparatives and two more ACD controls with both licit and illicit coconstruals.

In Experiment 6, each object comparative stimulus and ACD control from Experiment 5 was paired up with a structurally parallel control sentence where the c-commanding pronoun *she* or *her* was substituted for a possessive phrase *her sister*, as shown in (199)-(200).

(199) ACD controls:

- a. **She**_{*i/j*} is reading the same books as **Jane**_{*i*} did last year.
- b. **Her**_{*i/j*} **sister** is driving the same car as **Jane**_{*i*} did last year.

(200) Test sentence and matching object comparative control item:

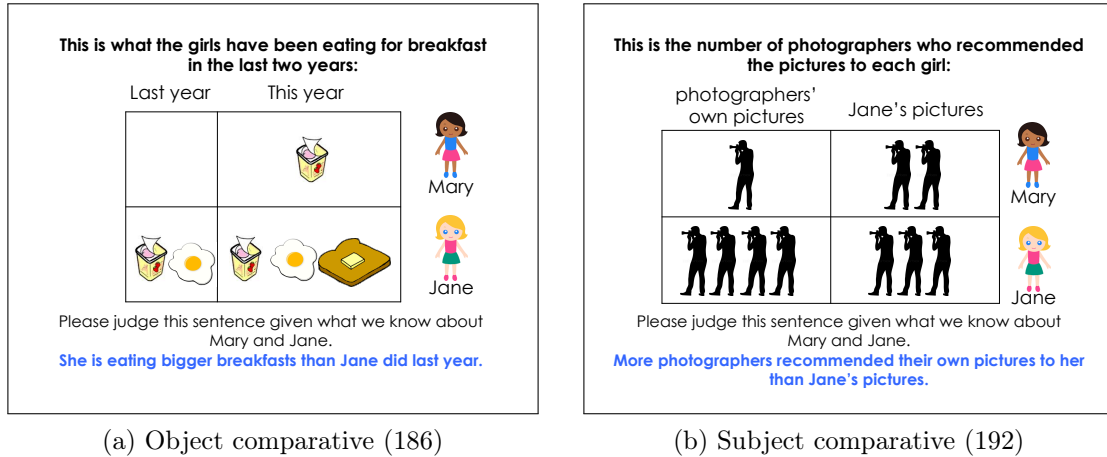
- a. **She**_{*i/j*} is eating bigger breakfasts than **Jane**_{*i*} did last year.
- b. **Her**_{*i/j*} **sister** is taking longer naps than **Jane**_{*i*} did last year.

These control sentences allowed us to preserve the syntactic structure of experimental items keeping the linear order between the pronoun and the name constant. At the same time, we were able to obtain a set of structurally parallel sentences that had structurally neutral backwards anaphora instead of structurally marked to establish a baseline for cases where the Principle C effect is absent.

5.4.3 Procedure

As in a typical TVJT, participants were asked to judge the truth value of a proposition expressed by each test sentence in a certain context. However, instead of being shown a scenario satisfying the truth conditions of the target sentence, participants were presented with a chart with quantitative information that had to be used to make a judgment about the target comparative. As before, stimuli were presented via slides, and participants completed their responses using a paper and pen questionnaire. Each experimental trial consisted of only one slide on which the information was displayed incrementally. The final display for two such trials appears in Fig. 5.13 below.

Figure 5.13: Slides for two sample target trials for object comparative (186) and subject comparative (192) in Exp. 6



In the beginning of each experimental session, participants were introduced to four female characters: Mary, Jane, Mary's sister and Jane's sister. The latter two were not mentioned by name and were only referred to as *Jane's sister* and *Mary's sister* throughout the experiment. Participants were also told that during the experiment they will read and hear some facts about these characters, after which they will be asked to answer questions about what they have learned.

Each experimental trial proceeded as follows. First the participant saw the title slide with the name of the trial (e.g. "BREAKFASTS"), and then clicked on to advance to the main slide for the trial itself. At this point they heard an introductory sentence (sentences in black font at the top of each slide in Fig. 5.13a and Fig. 5.13b), and saw a table with quantitative information about the female characters. An instruction sentence (sentences

in black immediately below the table) appeared that invited them to judge the upcoming utterance as true or false given the information about the female characters that was provided to them. Participants were instructed to study the table in the slide and then click to proceed. As they clicked, a test sentence appeared at the bottom of the screen underneath the table (sentences in bold blue font), and the audio stimulus was presented twice with a two second pause in between. Participants were then given time to judge the truth value of the sentence based on the information presented in the table, and to provide numerical justification for their answer on the response sheet indicating which quantities they were comparing to arrive at the conclusion. This justification was used to confirm that they were interpreting the comparative as intended. An example of how justification needs to be provided was given in the training session.

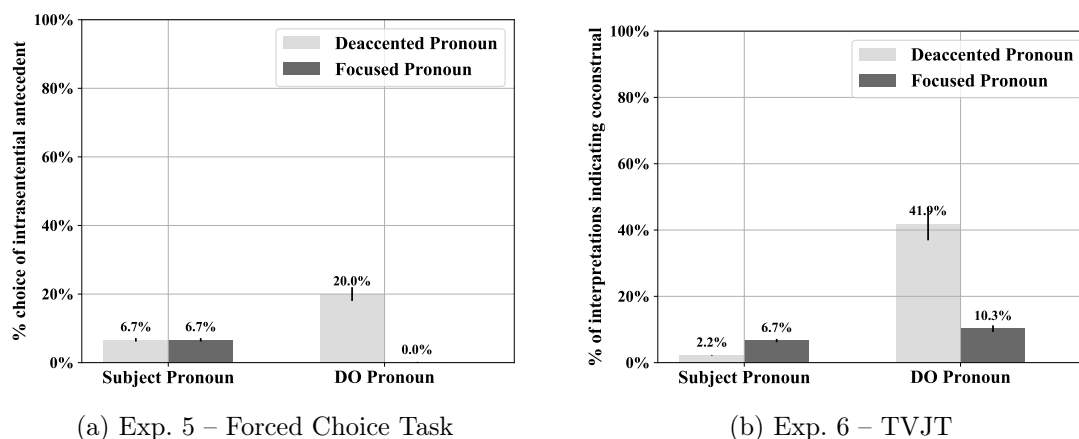
Consistent with the design principles of the Truth Value Judgment task (Crain and Thornton 1998), the scenario supported an interpretation that is ruled out by a structural constraint. Thus for test items in Experiment 6, the quantitative information presented in the chart supported the interpretation where the pronoun referred to a c-commanded intra-sentential antecedent. For example, the chart in Fig. 5.13b shows that four photographers recommended their own pictures to Jane, and only three recommended Jane's pictures (to Jane). This matches the coconstrual interpretation of the target sentence. The reverse was implemented for the obviative reading: the chart shows that only one photographer recommended their own pictures to Mary, and two photographers recommended Jane's pictures to Mary. This contradicts the target sentence, if *her* is interpreted as *Mary*. As a result, participants were expected to judge target sentences as “true”, if they allowed for structurally illicit coconstrual, and judge them as “false”, if they ruled out the possibility of coconstrual in sentences with Principle C effects.

Reference of one female character vs. the other was balanced across target and control sentences. Each participant saw 2 training items, 4 object and 6 subject comparatives, 4 ACD controls, 4 object comparatives controls, and 10 fillers. Experimental session lasted 12-15 minutes on average. Test sentences were presented in a pseudo-randomized order. See Appendix F for a complete list of test items and instructions to participants.

5.4.4 Results

The results for object comparative test items in Exp. 6 are summarized in Fig. 5.14b below. For convenience, we present this bar graph next to the one showing responses to the same test items in Experiment 5 (Fig. 5.14a).

Figure 5.14: Percentage choice of intra-sentential referent for the pronoun across object comparatives in Exp. 5 (Forced Choice Task) vs. percentage of interpretations indicating coconstrual in Exp. 6 (Truth Value Judgment Task)



In the Truth Value Judgment task, the dependent measure was the percentage choice of “True”/“False” answers in response to test sentences. Fig. 5.14b indicates that participants almost never allowed coconstrual between the pronoun and the name in object comparatives in three out of four experimental conditions (subject pronoun and focused DO pronoun).

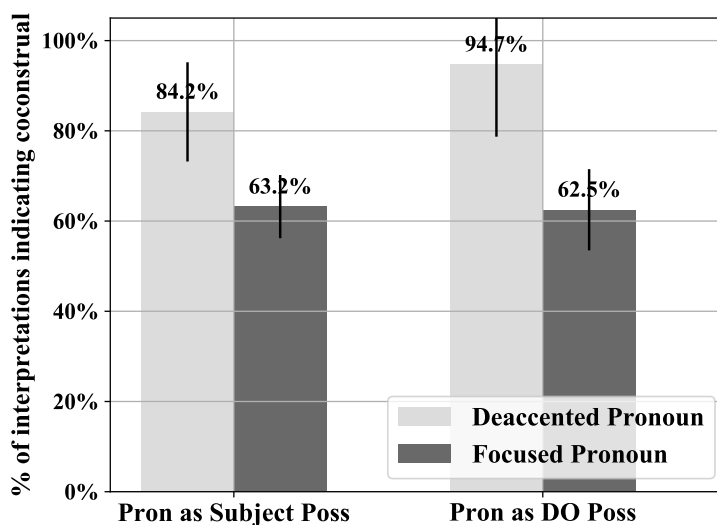
In the fourth condition, where the DO pronoun was deaccented, coconstrual increased significantly. Also, in this condition of Truth Value Judgment Task, percentage of answers indicating coconstrual with intra-sentential antecedent was 41.9%, while in the Forced Choice Task the same test items retrieved 20.0% choice of intra-sentential referent. We attribute this more than two-fold difference to two factors: properties of the experimental task, and increased cognitive load associated with TVJT. On the one hand, we have already mentioned that while Forced Choice Task reveals preference, Truth Value Judgment Task can be a more accurate measure of judgments of acceptability. Thus, it is to be expected that some participants who gave answers indicating obviative interpretations in Exp. 5 did not necessarily rule out coconstrual interpretations for the same sentences. And it became possible to reveal the whole extent of such judgments in Exp. 6. On the other hand, we also believe that analyzing quantitative information before making a judgment on each test

sentence significantly increased the cognitive load associated with the task, as compared to Exp. 5. As a result, participants were more likely to accept structurally marked coconstruals in the absence of other aggravating factors.

Overall, for object comparatives target items, a binomial logistic regression model with random intercepts for subjects revealed significant effect of pronominal position on responses indicating preference for intra-sentential referent ($\beta = -2.9753$; $SE = 1.1336$; $p = 0.00867$). A significant effect of prosody was detected for test items that had pronoun in the object position ($\beta = -1.8405$; $SE = 0.6117$; $p < 0.03$), but not for all test items.

The results for object comparative control items in Exp. 6 are summarized in Fig. 5.15. Recall that these control sentences were structurally parallel to object comparative test sentences, but the pronoun was in the specifier of the possessive DP, as in (200b). As a result, these controls featured structurally neutral backwards anaphora.

Figure 5.15: Percentage of answers indicating coconstrual in object comparative controls in Exp. 6 (Truth Value Judgment Task)



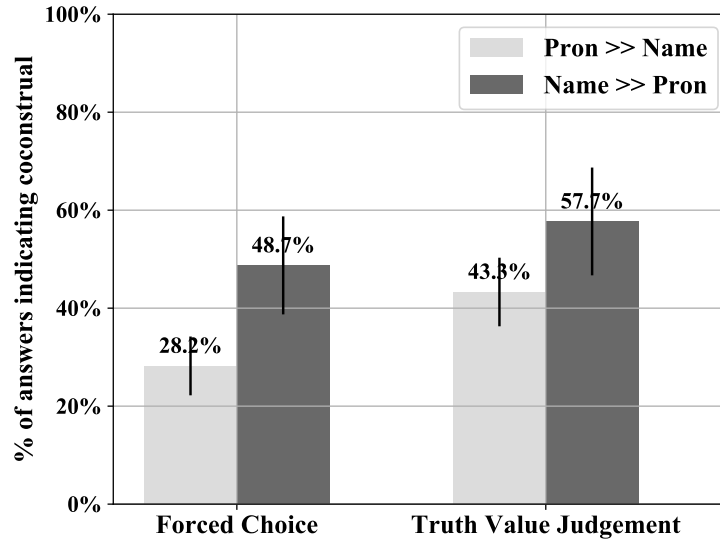
As expected, sentences with structurally neutral backwards anaphora yielded high intra-sentential coconstrual. At the same time, when the pronoun was focused, coconstrual was suppressed. A binomial logistic regression model with random intercepts for subjects revealed significant effect of prosody ($\beta = -6.114$; $SE = 1.739$; $p < 0.0005$). This reflected in a close-to-ceiling effect with sentences that had the pronoun deaccented (84.2%-94.7%) vs. smaller percentages of answers indicating coconstrual with a prosodically salient pronoun

(62.5%-63.2%). Recall that Experiment 4 also included test items with structurally neutral backwards anaphora that varied in terms of structural position of the pronoun: subject vs. non-subject). There we revealed a statistically significant effect of pronominal position: intra-sentential referent was selected in 73.1% of the cases with a non-subject pronoun, and in 55.5% of the cases with a subject pronoun (see. Fig. 4.6). Then we concluded that increased structural salience on the pronoun leads to a stronger overall obviation effect not only with structurally marked, but also with structurally neutral backwards anaphora, i.e., that the effect of structural salience is independent of Principle C. Now control items in Exp. 6 provide us with evidence of a comparable effect caused by prosodic salience.

There was no effect of the position of the possessive DP that had the pronoun as the possessor ($\beta = -0.5058$; $SE = 0.4648$; $p = 0.2777$). In other words, it did not matter for the participants in Exp. 6 whether the DP “her sister” occupied subject or object position in the matrix clause of the comparative. This may seem unexpected at the first glance; however, we believe that the absence of effect is consistent with our earlier findings and has interesting consequences for our understanding of the notion of salience. First, what was manipulated in this set of experimental items, accurately speaking, was not the structural position of the pronoun, but the structural position of the DP “her sister”. I.e., the pronoun *her* in all cases occupied the position of the possessive determiner of the head noun, while it was the structural salience of the *sister* character that varied across the control items, not structural salience of *Mary* or *Jane*. Consequently, it is to be expected that the effect of structural position is not detected. Second, this findings suggests that subjecthood only affects the structural salience of referent denoted by the head noun in the DP in question, not other embedded DPs.

The results for subject comparative test items in Exp. 6 are summarized in the right portion of the bar graph in Fig. 5.16. Since prosody was not manipulated, these items only had two conditions depending on whether or not the pronoun c-commanded the name. The pronoun was deaccented in all cases. For convenience, we present the findings for subject comparatives in Exp. 6 along with the findings for the same set of test items from Exp. 5 (left portion of the bar graph in Fig. 5.14a).

Figure 5.16: Percentage of answers indicating coconstrual across subject comparatives in Exp. 5 (Forced Choice Task) and Exp. 6 (Truth Value Judgment Task)



A binomial logistic regression model with random intercepts for subjects revealed a significant effect of the Principle C effect ($\beta = -1.52599$; $SE = 0.36237$; $p < 0.01$).

5.4.5 Discussion

Experiment 6 was a modified version of the Truth Value Judgment task that required participants to assess the truth value of each test sentence based on the quantitative information provided with each experimental trial. For all test sentences, the comparative stated incorrect facts if obviation was assumed, and it was consistent with the chart under coconstrual reading. As a result, if participants rejected the test sentence with an appropriate quantitative justification, we assumed that they interpret a pronoun as referring to an extra-sentential referent. If they accepted the test sentence providing relevant justification, we interpreted that as evidence of coconstrual interpretation.

The findings of Exp. 6 are in agreement with those of Exp. 5, showing that the observed effects are replicable and not dependent on a specific experimental paradigm.

For **object comparative test items**, where an overt pronoun in the matrix clause commanded a name in the unreduced standard clause, as in (186)-(189), we found that with the exception of one condition, participants' answers indicated obviation interpretation in the

overwhelming majority of cases. In these three conditions, the pronoun was interpreted as coconstrued with an intra-sentential referent in less than 10.3% of all cases. The exceptional condition featured a deaccented pronoun c-commanding the name from non-subject position. This was the same condition that revealed increased rate of coconstrual with intra-sentential referent in the Forced Choice Task in Exp. 5 (see Fig. 5.14).

Again, we observed extremely low rate of coconstrual in the subject pronoun condition for sentences with Principle C effects in the absence of plausibility manipulations. This is consistent with our proposal that when neither interpretation is favored by the context, and coconstrual interpretation is structurally marked (the Principle C effect), plus there is an additional penalty associated with increased salience of pronominal position, this adds to the overall obviation effect, and speakers are most likely to select an extra-sentential referent.

Also similar to Exp. 5, we found very low rate of coconstrual in sentences where a non-subject pronoun carried contrastive focus. Again, this suggests that despite the fact that the pronoun occupied a less salient position structurally, increased prosodic salience of the pronoun strongly enforces obviative interpretation.

Third, when the pronoun was less salient (both prosodically and structurally), the rate of coconstrual increased. This further supports our hypothesis that in structurally marked backwards anaphora, manipulating salience on the pronoun influences speakers decisions with respect to pronominal reference resolution. While the Principle C effect causes significant structural markedness, it does not rule out coconstrual interpretation entirely. Reduced prosodic prominence, i.e., a less salient antecedent, leads to a significant percentages of coconstrual interpretations with structurally illicit antecedent.

For **object comparative control items**, i.e., sentences that featured structurally neutral backwards anaphora, we found significant effect of prosody: when a pronoun was characterised by increased prosodic prominence, preference for intra-sentential coconstrual was suppressed. This is more evidence for our proposal that increased structural salience on the pronoun leads to a stronger overall obviation effect not only with structurally marked, but also with structurally neutral backwards anaphora, i.e., that the effect of structural salience is independent of Principle C.

For **subject comparatives**, similar to Exp. 5, we found a statistically significant effect

of structural markedness on speakers judgments with respect to intra-sentential coconstrual. Again, this speaks in favor of the Reduction Analysis of English comparatives, as the detected Principle C effect may be only attributed to the covert binding antecedent, i.e., the elided pronoun in the standard clause.

As with object comparative target items, the percentages indicating coconstrual interpretations in subject comparatives in Exp. 6 (TVJT) were higher than in Exp. 5 (Forced Choice Task), as shown in Fig. 5.16. This is consistent with our earlier proposal that TVJT reveals more accurate judgments of acceptability, on the one hand, and on the other hand – TVJ version of the task was associated with increased cognitive load that steered participants' attention away from structural markedness.

Finally, the effect of structural markedness was quantitatively small. This again shows that while c-commanding relation between the pronoun and the name inevitably affects speakers' decisions with respect to pronominal reference resolution, the influence of other factors (e.g., less salient (non-subject, deaccented) pronominal position, increased cognitive load associated with the task, processing difficulty in a subject comparative) adjusts judgments of coconstrual significantly.

5.5 General discussion

In this chapter, I have presented the findings from two complementary experiments with comparative constructions investigating two factors that I proposed influence pronominal reference resolution in backwards anaphora with Principle C effects: structural prominence and prosodic prominence on the pronoun. In these experiments I preserved some of the design features that had been implemented in the studies reported in Chapters 2-4. Once again, I manipulated structural position of the pronoun (subject vs. non-subject), and presence/absence of c-command relationship between the pronoun and the name, i.e., structurally marked vs. structurally neutral backwards anaphora. At the same time, two novel design features were introduced: (i) the syntactic environment that hosted backwards anaphora, and (ii) manipulations of prosodic conditions on the pronoun. More specifically, in Experiments 5 and 6 the pronoun-name sequence was embedded in a comparative construction, while the pronoun preceding the name was either deaccented or carried a contrastive

pitch accent.

In both Experiment 5 and Experiment 6 we replicated the findings of our earlier studies with respect to the role of pronominal structural position, this time in a new structural environment. In this chapter, pronominal position was manipulated within the matrix clause of an object comparative construction. The c-commanding pronoun was either matrix subject, or dative object in the main clause of an object comparative, while the name was embedded in the standard clause, which occupied a direct object position. For the deaccented condition, in both studies we found that object pronouns allowed for decreased but nevertheless significant percentages of coconstrual interpretations in the presence of the Principle C effect. Still, deaccented subject pronouns strongly resisted coconstrual. This demonstrates again that we can separate several independent factors that add up to strongly enforce obviative interpretation. One such factor is Principle C (i.e., structural markedness created by the binding antecedent); however alone it does not fully rule out the possibility of coconstrual between the pronoun and the name. It is the structurally/prosodically salient discourse antecedent pronoun that adds to the overall obviation effect of Principle C, which then together result in rejection of coconstrual across the board.

Experiment 6 also showed that when the pronoun did not c-command the name, i.e., it was the possessor rather than the head noun of the DP in question, the structural position of that DP did not matter for pronominal reference resolution. In Experiment 4 we saw that pronominal subjecthood exerted similar influence on both structurally marked and structurally neutral backwards anaphora. However, in Experiment 6, when the possessive DP (e.g., *her sister*) was the matrix subject, participants did not display suppressed preference for coconstrual interpretations as compared to the condition where the same DP was the dative object. This opens up a broader question of the properties of structural salience and its distribution across the syntactic material embedded under the Spec TP position.

On the one hand, these findings suggest that in cases when the DP is the subject, it is only the DP head noun that is marked as structurally salient. Nominals in other structural positions, e.g., possessor DPs, as in control sentences in Exp. 6, do not reveal an effect of pronominal position, which means that their own salience must not be affected by whether or not their host DP is in the subject position. If that is the case, we should expect to see

similar absence of salience effect on nominals embedded under the head NP of the subject DP: *of*-complements (e.g., *a friend of hers*) or adjuncts to the head noun (e.g., *the person in front of her*).

On the other hand, the head nominal of the DP in English is distinct not only in terms of its structural position within the host DP. It is also the only nominal in that DP that bears Nominative Case. This brings us back to the question of the properties of DP salience: does it stem primarily from the structural position, or from case, or a combination of the two? And again, English does not allow us to reliably untangle the effects of these two factors on overall DP salience. However, our findings in this chapter emphasize that further research on the individual roles of these factors is required.

5.5.1 Backwards anaphora and prosodic prominence

Backwards anaphora involves two references to the same individual, where the first reference is a pronoun, and the second reference is a full name DP. While pronoun-name sequences are not necessarily structurally marked, much experimental evidence suggests that speakers avoid using repeated names and definite descriptions, giving preference to name-pronoun or pronoun-pronoun sequences. This preference was revealed in judgment and production studies, and detected with both inter-sentential and intra-sentential backwards anaphora (Almor 1999, Brennan 1995, Chafe 1976, Fletcher 1984, Lezama 2015). At the same time, repeated names were found to be most appropriate when they were used to re-establish a certain referent into a central role in discourse (Marslen-Wilson et al. 1982).

In Chapter 4, I formulated a proposal that Nominative subject pronouns cause a stronger overall obviation effect in backwards anaphora due to their increased salience. On the one hand, this proposal is in agreement with the findings on the role of backwards anaphora in the discourse, which is reestablishing the referent into a center of attention (Gordon et al. 1993, Grosz et al. 1995). When the pronoun in backwards anaphora is characterised by increased salience, e.g., is found in Spec TP or bears contrastive focus, the referent of this pronoun is already accessible in the speaker's mental model (Burkhardt and Roehm 2007, Burmester et al. 2018). Consequently, reestablishing this individual into a central role in discourse via a consequent full DP reference is redundant. As a result, backwards anaphora

with salient pronouns is dispreferred.

On the other hand, this proposal predicts that the overall obviation effect in backwards anaphora will be observed with all factors contributing to DP salience: structural and non-structural. In this chapter I proposed that one such factor is prosodic prominence. Then I tested this prediction experimentally by manipulating prosodic prominence on the pronoun and measuring the effect of this manipulation on the rate of coconstrual between this pronoun and a subsequent name. As a result, in both Experiment 5 and Experiment 6, we found that a focused pronoun reduced coconstrual with a subsequent name, even when the pronoun was not a subject.

In the future, it would be helpful to obtain a clearer baseline for the role of prosodic salience in pronominal reference resolution in backwards anaphora in sentences that do not involve comparative constructions. Manipulating structural position and prosody on the pronoun in test items with simpler syntactic structure would help us better assess independent effect of prosodic salience and compare it more accurately with that of structural salience.

In Chapter 4, I hypothesized that Principle C, while imposing a strong overall obviation effect in backwards anaphora, is only *one* contributing factor. Obviously, it is a negative factor: when the Principle C effect is active, this drastically cuts into speakers' preference for coconstrual in intra-sentential backwards anaphora. As the findings of Exps. 1-6 have shown, Principle C interacts with other factors, and this interaction has a composite effect on interpretation. However, this raises two related questions: (i) what the mechanism of interaction between Principle C and other factors contributing to judgments of intra-sentential coconstrual is, and (ii) how much impact Principle C has on the overall obviation effect in general, i.e., how much of a contribution does it have.

One hypothesis is that Principle C alone brings acceptability of intra-sentential coconstruals close to zero; however, decreased structural and/or prosodic salience act as *mitigating* factors resulting in a noticeable degree of acceptability of structurally illicit coconstruals. The alternative hypothesis is that Principle C suppresses preference for coconstrual in backwards anaphora, but does not rule it out across the board. Then, increased structural and/or

prosodic salience act as *aggravating* factors that add on to the overall obviation effect. As a result, coconstrual is rejected across the board. I will now argue that the findings of Experiments 5 and 6 are only compatible with the latter hypothesis, and the effect of salience needs to be treated as negative, and adding on to the effect of Principle C for a stronger composite overall obviation effect.

The first hypothesis predicts that we should only observe across the board rejection of intra-sentential coconstruals in the *subject pronoun* $\times$ *focus* condition, as it is not associated with any mitigating factors. Then, for *subject pronoun* $\times$ *deaccented* and *object pronoun* $\times$ *focused* conditions, the prediction is that we should register some degree of acceptability, since each of the conditions is associated with one factor that counteracts the negative effect of Principle C. Finally for the *object pronoun* $\times$ *deaccented* condition, acceptability of structurally illicit coconstruals is predicted to be the highest, as it is associated with two mitigating factors at the same time.

These predictions do not agree with the findings of Experiment 5 or Experiment 6. What we observed experimentally was that only in the *object pronoun* $\times$ *deaccented* condition preference for intra-sentential coconstruals was significantly higher than zero. None of the conditions associated with a single mitigating factor revealed increased preference for coconstrual interpretations.

On the other hand, the second hypothesis is compatible with the findings. We observe higher preference for intra-sentential coconstruals in the *object pronoun* $\times$ *deaccented* condition, which is the only condition not associated with any of the factors contributing to salience, i.e., aggravating factors. This condition can be interpreted as showing the pure measure of Principle C contribution to the overall obviation effect. Each of the remaining three conditions are associated with some aggravating factor that increases pronominal salience, which results in strongly suppressed preference for intra-sentential coconstruals.

This composite nature of the overall obviation effect speaks in favor of a model where speakers are charitable, and at first start with a wider set of possible interpretations. In the presence of multiple factors contributing to the overall obviation effect (e.g., backwards anaphora, the Principle C effect, low plausibility of coconstrual, increased salience of the discourse antecedent, etc.), this set is reduced, as the overall obviation effect adds up and

makes intra-sentential coconstruction increasingly problematic.

5.5.2 Ancillary results and issues

Target stimuli in Experiments 5 and 6 were object and subject comparative constructions with structurally marked backwards anaphora. This syntactic environment was chosen for several reasons. One of those reasons was that the syntax of comparatives is fully compatible with a range of structures that were used as target constructions in the studies in the previous chapters. This allowed us to have test items that are structurally similar, but also involve an additional degree of syntactic complexity.

Adding to the structural complexity had a goal of its own. As I noted in the beginning of this chapter, comparative constructions have been long known as a source of grammatical illusions (O'Connor 2015, Phillips et al. 2011, Townsend and Bever 2001, Wellwood et al. 2018), so the question was whether or not we would observe improved acceptability judgments for comparatives with Principle C effects. An additional puzzle motivating this choice of target structures had to do with the fact that intuitive judgments of binding relations in comparatives have been used as evidence for the Reduction Analysis of English comparatives. For this reason, in Chapter 5 my additional goal was to verify those intuitive judgments empirically.

Experiments 5 and 6 did not involve plausibility manipulations, unlike Experiments 1 and 2. At the same time, with both Forced Choice Task and Truth Value Judgment task, subject comparatives yielded unexpectedly high percentages of answers indicating acceptability of structurally illicit coconstructions. I propose that this finding can be explained if we consider how processing of backwards anaphoric dependency interacts with processing of a subject comparative.

When a comparative construction involves a pronoun, both the comparative morpheme and the pronoun signal the existence of a dependency that the processor needs to resolve. Since the parser encounters information incrementally, we might then predict certain differences between object and subject comparatives based on the relative linear order between the comparative morpheme and the pronoun.

When a pronoun is encountered in the structure, the processor is immediately recruited

to search for a potential referent and resolve anaphoric dependency (Aoshima et al. 2004, Crain and Fodor 1985, Kazanina et al. 2007, Lee 2004). As I proposed in Chapter 2, when the pronoun is introduced early in the sentence, e.g., in the matrix subject position, it also triggers the search for a pronominal referent early on. This means that binding constraints that restrict structural positions for licit referent DPs are activated early during processing as well (Kazanina et al. 2007). However, when the pronoun comes later in the sentence, the processor may prioritize another task over complying with binding constraints (e.g., arriving at a plausible interpretation of a given sentence, or resolving a comparative dependency).

In subject comparatives, the comparative morpheme *-er/more* is spelled out in the subject position. As a result, the processor is front-loaded with the task to interpret the comparative relation and predict which material has been elided from the standard clause under identity in order to accurately interpret the comparative. This instantly pulls the attention away from coconstrual relations towards comparative meaning and coherence, and potentially overshadows activation of binding constraints.

As a result, processing difficulty associated with subject comparatives stems rather naturally from the wide scope of the comparative morpheme *-er/more*. This wide scope leads to a significant number of alternatives that the processor needs to consider, and then to retrieve the elided syntactic material. In fact, the wider the scope, the more alternatives there are. Consider, for instance, a partial subject comparative in (201).

(201) More people wanted Mary to go to Paris than...

Having heard the main clause of a subject comparative such as (201), and having reached the comparative marker *than*, the listener can make at least four predictions about how this comparative may unfold further, depending on how much of the standard clause has been elided, and which of the constituents in the scope of the subject comparative are going to be selected as the associate. These possible predictions are illustrated by examples in (202)-(205).

(202) More people wanted Mary to go to Paris than ~~d-many people wanted Mary to go to~~
Rome. (*Associate: Paris, Standard: Rome*)

(203) More people wanted Mary to go to Paris than ~~d-many people wanted John to go to~~

Paris. (*Associate: Mary, Standard: John*)

(204) More people wanted Mary to go to Paris than ~~if many people~~ didn't want her to go to Paris. (*Associate: wanted, Standard: didn't want*)

(205) More people wanted Mary to go to Paris than ~~if many~~ aliens ~~wanted Mary to go to~~ Paris. (*Associate: people, Standard: aliens*)

Wide scope associated with the subject position of the comparative morpheme allows for an increased number of alternatives in the interpretation of the comparative. This leads to increased processing difficulty, unlike with object comparatives where the scope is much narrower. As Wellwood et al. (2018) observed, this processing difficulty may even lead to cases where a nonsensical comparative is perceived as meaningful and acceptable, based on the unfulfilled prediction of how this comparative may unfold. With our test items, increased acceptability of structurally illicit coconstruals could be similarly attributed to the fact that processing comparative alternatives overshadows the structural markedness of coconstrual imposed by Principle C.

Finally, the findings of Experiments 5 and 6 support the Reduction Analysis of English comparatives, i.e., that surface phrasal comparatives are underlyingly clausal and undergo a reduction operation under identity with the syntactic material in the matrix clause (Bhatt and Takahashi 2007, 2011, Bresnan 1973, 1975, Lechner 2001, 2004). In the Forced Choice task and in the Truth Value Judgment task, subject comparatives revealed a statistically significant effect of structural markedness on speaker's preference for/against intra-sentential coconstrual. This effect cannot be accounted for within the framework of the Direct Analysis, as the overt pronoun in the matrix clause is a discourse antecedent, but not a binding antecedent for a name, i.e., it does not c-command the name in the standard clause of the comparative. At the same time, the Reduction Analysis predicts the observed effect: in cases where the elided counterpart of the matrix pronoun, i.e., the binding antecedent, c-commands the name in the standard clause, the participants selected an intra-sentential referent for the pronoun statistically less frequently than in test sentences where the relative order of the pronoun and the name was reversed.

Earlier in this chapter I quoted intuitive judgments of intra-sentential coconstrual in

comparatives from Lechner (2001, 2004) and Bhatt and Takahashi (2007, 2011). Those judgments were used to argue for the Reduction Analysis as well; however, our findings show that such intuitive judgments cannot make a strong argument in the absence of systematically collected experimental data. First, it is highly questionable whether acceptability contrasts such as (181)-(182) can be presented in categorical terms at all, i.e., can be rendered as fully acceptable vs. fully unacceptable with coconstrual. Native speakers find sentences such as (181)-(182) hard to process, and have difficulty offering a polar judgment of coconstrual acceptability (a number of participants in Experiments 5 and 6 pointed this out during the debriefing session following experiment participation).

If categorical acceptability judgments, such as reported in Lechner (2001, 2004) and Bhatt and Takahashi (2007, 2011), were an accurate reflection of native speakers' judgments, in both Experiment 5 and Experiment 6 we should have observed a floor effect for subject comparatives where the pronoun c-commanded the name, but close to 50% choice of intra-sentential referent in cases where Principle C was observed (given that there were no plausibility manipulations in the design). The findings of Experiment 5 and Experiment 6 did reveal preference for intra-sentential referent that was close to 50% in the no-c-command condition; however, the percentage of preference for intra-sentential referent in the structurally marked condition was far from zero (28.2% – 29.8%), which strongly suggests that native speakers do not judge sentences such as (181) as fully unacceptable.

I would like to argue here that in order to make a statement about underlying structure based on Principle C effects in a syntactic environment that is as complex, obtaining quantitative data is crucial. Moreover, as our findings show, if the Principle C effect is used as diagnostic for structure, this needs to be done with caution and one must take into account the influence of multiple factors contributing to the overall obviation effect, such as discussed in this dissertation.

5.6 Conclusions

In this chapter I have continued testing the proposal that increased pronominal salience independently leads to a stronger overall obviation effect in structurally marked backwards

anaphora. Earlier I provided evidence that increased structural salience (structural subjecthood and Nominative Case) add to the Principle C effect and promote obviative interpretations. Here I investigated the effect of increased pronominal salience caused by prosodic focus. In two experiments using two different experimental paradigms, I have shown that focus on the pronoun in backwards anaphora with c-command strongly suppresses preference for intra-sentential coconstruction, similarly to the effect of structural subjecthood. At the same time, structurally illicit coconstructions were sometimes allowed with deaccented pronouns, as was also the case with less structurally salient non-subject pronouns.

In this chapter, the pronoun-name dependencies were embedded in comparative constructions. I have shown that subject comparatives yield unexpectedly high percentages of answers indicating structurally illicit coconstructions. I further proposed that this increased acceptability stems from processing difficulty caused by the higher scope of the comparative morpheme within a subject comparative construction. In such cases multiple comparative alternatives are activated early during processing, while binding constraints are activated later, and consequently exert less influence on acceptability judgments.

I have also provided evidence that Principle C suppresses preference for intra-sentential coconstruction in backwards anaphora, but does not rule it out across the board. In cases when the pronoun is in subject position or carries prosodic focus, increased structural and/or prosodic salience acts as an aggravating factor that adds on to the effect of Principle C leading to a stronger overall obviation effect. As a result, such coconstructions are rejected across the board.

In the next chapter, I continue investigating how processing affects pronominal reference resolution in structurally marked backwards anaphora. I target sentences where structurally illicit anaphoric dependency is introduced as part of At-Issue (AI) vs. Not-At-Issue (NAI) content of the utterance. The studies presented in the following chapter investigate whether the effect of this distinction is reflected in speakers' treatment of illicit intra-sentential coconstructions.

Chapter 6

Not-At-Issuehood and Principle C

In the previous chapters, I have shown that judgments of structurally marked coconstrual are affected by multiple factors beside the c-commanding relation between the pronoun and the name. In Chapter 2, I provided experimental evidence that plausibility of coconstrual plays a role not just for structurally neutral backwards anaphora, but also for cases of backwards anaphora with Principle C effects. In subsequent chapters, I showed that speakers' judgments of backwards anaphora reveal a subject/non-subject asymmetry: in both structurally neutral and structurally marked contexts, coconstrual with subject pronouns is strongly dispreferred. In Chapter 5 I also presented experimental evidence showing that speakers allow for coconstrual when the illicit pronoun-name sequence is embedded in a subject comparative construction.

In light of experimental evidence, I have argued for the role of processing: when the processor encounters a pronoun in sentence-initial position, it immediately activates Principle C, thereby marking coconstrual between a pronoun and a name that follows as illicit. By contrast, when the pronoun is in object position, the processor has already been engaged in processing the initial part of the sentence, leaving the door open for other information relevant to determining coconstrual relations (e.g., plausibility) to play a role. Similarly, when the processor encounters a comparative morpheme sentence-initially, this cues the processor to launch a comparison of alternatives earlier in processing, overshadowing the binding constraints that would otherwise strongly disfavor coconstrual.

In this chapter I continue to probe the influence of plausibility and processing factors on speakers' judgments of structurally marked coconstruals, extending my focus to the (Non)-at-Issue status of the proposition containing the pronoun and name. I have previously argued that Principle C is not a categorical principle of the grammar, but rather a violable restriction on possible coconstruals. If that is the case, we expect that the overall obviation

effect associated with structurally marked coconstruals will vary depending on how much access the processor has to the syntactic form of a proposition embedding the pronoun-name sequence. Not-at-Issue content (e.g., parentheticals or temporal clauses) has been shown to be processed independently of At-Issue content (e.g., Dillon et al. (2014, 2017)) and impede processing less. Thus our goal with this chapter is to investigate whether this distinction has an effect on speakers' judgments of structurally marked coconstruals.

The chapter is organized as follows: in Section 6.1 I provide an overview of key theoretical assumptions and experimental findings related to processing of (Not)-at-Issue content. Section 6.2 presents the findings of a baseline study confirming the robust NAI status of sentence-initial temporal clauses – a target construction for the first experiment of this chapter. In Section 6.3 I present the findings of a forced choice task featuring structurally marked backwards anaphora in NAI temporal clauses and investigating the influence of (N)AI status of a proposition hosting the pronoun-name sequence on speakers' judgments of structurally illicit coconstruals. In Section 6.4 I lay out a forced choice study targeting structurally marked backwards anaphora in a different syntactic environment – NAI appositive relative clauses. Section 6.5 discusses the implications of experimental findings and proposes directions for future research. Section 6.6 concludes the chapter.

6.1 (Not)-at-Issueness and processing: Theory and experiment

At-Issue (AI) content of the utterance can be viewed as the part of the meaning that conveys the *main point* of that utterance. Potts (2005) used the term *At-Issue entailment* as a cover term for “regular asserted content” (“what is said”, in Grice’s terms), and contrasted it with *conventional implicatures*. The view that utterances may incorporate a primary assertion, as well as a number of secondary entailments, has been long established in the semantics and pragmatics literature (Stalnaker 2014). Potts (2005) proposes a further elaboration of this proposal: while the *At-Issue* content introduces the asserted proposition conveyed in an utterance, the *Not-At-Issue* (NAI) content (secondary entailments and presuppositions) guide the listener in integrating and interpreting this asserted proposition.

Tonhauser (2012) defines three features of AI content, as shown in (206) below, which are further matched with three types of diagnostics for identifying the AI status of a sentence

implication.

(206) **Features of At-Issue content** (Tonhauser 2012):

- a. At-Issue content can be directly assented or dissented with.
- b. At-Issue content addresses the Question Under Discussion (QUD).
- c. At-Issue content determines the relevant set of alternatives.

A paradigmatic example of a sentence that illustrates the division between AI and NAI content are sentences with *appositive relative clauses* (ARCs, also referred to as *non-restrictive relative clauses*). Appositives are right-adjoined to their host DP and are similar to coordinated conjuncts with respect to their truth values: truth conditional contributions of appositive relative clauses are assessed on par with those of the matrix clause (Syrett and Koev 2014). At the same time, the proposition delivered by an appositive relative clause presents content that is treated differently from the main clause in that it is Not-At-Issue. Here I use an example from Syrett and Koev (2014) to illustrate the application of the diagnostics for identifying AI vs. NAI content (Potts 2005, 2007, Snider 2018, Tonhauser 2012)¹.

(207) My friend Sophie, **who is a classical violinist**, performed a piece by Mozart.
(Syrett and Koev 2014: p. 1, ex. (1))

- a. *At-Issue content*: My friend Sophie performed a piece by Mozart.
- b. *Not-At-Issue content*: My friend Sophie is a classical violinist.

In (207), the matrix clause conveys the primary assertion (the AI content of the utterance). As such, it displays the typical properties of AI content, while the ARC does not.

Certain diagnostics can distinguish between these two types of content. The first diagnostic is the assent/dissent test (Faller 2002, Von Stechow 2007, Gillies 2007, Matthewson et al. 2007, Murray 2010, Tonhauser 2012, Snider 2018, Syrett and Koev 2014). The diagnostic involves proposing responses that directly agree with or reject parts of the utterance which

¹I set aside the difference between sentence-medial and sentence-final appositives here to focus on the basic NAI/AI distinction. See AnderBois et al. (2013), Gobel (2018), Hunter and Asher (2016), and Syrett and Koev (2014) for further discussion.

contain AI vs. NAI content. As Snider (2018) argues, this diagnostic is anaphora-based, as it relies on propositional anaphors such as *that* or *so*, as shown in (208), as well as response particles like *yes* and *no*, as shown in (209). The assumption is that such responses are acceptable if they target AI content, but not when they target NAI content. To illustrate how this diagnostic is applied, let us again use the example in (207) from Syrett and Koev (2014).

(208) **Assent/dissent diagnostic** (propositional anaphor *that*):

A: My friend Sophie, who is a classical violinist, performed a piece by Mozart.

B: *That* is not true. / *That's* true.

Both responses in (208) are felicitous if propositional anaphor *that* is taken to mean “My friend Sophie performed a piece by Mozart”, which is the AI content of the utterance. On the contrary, both responses are infelicitous if *that* means “My friend Sophie is a classical violinist”, i.e., is proposed as an anaphoric expression replacing the NAI content.

The example in (209) shows another instantiation of an assent/dissent test, where the distinct parts of the content of the utterance are targeted by a direct rejection. Determining which part of the content is targeted in each case is made possible since the matrix clause and the appositive relative clause are mismatched in tense.

(209) **Assent/Dissent diagnostic** (response particle *no*):

A: My friend Sophie, who is a classical violinist, performed a piece by Mozart.

B₁: No, she didn't.

B₂: #No, she isn't.

In (209) the direct rejection can only target the AI content, which is the content of the matrix clause in the sentence, but it is not felicitous to directly reject the content of the utterance-medial appositive relative clause.

The second diagnostic states that only AI content directly addresses the QUD (Amaral et al. 2007, Tonhauser 2012). Again, we can illustrate this with an example from Syrett and Koev (2014).

(210) **The QUD diagnostic:**

a. A: What did your friend Sophie play?

B: My friend Sophie, who is a classical violinist, performed a piece by Mozart.

b. A: Who is your friend Sophie? (or: What does your friend Sophie do?)

B: #My friend Sophie, who is a classical violinist, performed a piece by Mozart.

The response in (210a) appropriately/felicitously addresses the QUD by conveying the answer in the matrix clause, which is AI content. By contrast, (210b) attempts to answer the QUD by presenting the requested information in an appositive relative clause, which is NAI, and is therefore infelicitous².

The third diagnostic test states that when the utterance is turned into an interrogative, it is the AI content that determines the relevant set of alternatives that need to be addressed by the answer. To illustrate this, I present a slightly modified version of (207) that has tenses matching in the matrix and the appositive relative clause, and two alternative responses in (211) below.

(211) **Set of Alternatives diagnostic:**

A: Did your friend Sophie, who played at the festival, perform a piece by Mozart?

B₁: Yes, she performed a piece by Mozart.

B₂: #Yes, she played at the festival.

The relevant set of alternatives conveyed by an interrogative utterance in (211) is the set determined by “whether X” where X is the AI content “that Sophie performed a piece by Mozart”, not the set “whether Y” where Y is the NAI content “that Sophie played at the festival”. The first answer presents a felicitous response to the original question since it narrows down the set of alternatives given by “whether X”, while the second answer is infelicitous since it attempts to narrow down the set of alternatives given by “whether Y”.

This diagnostic falls under a broader set of properties that distinguish AI information from NAI. As proposed in multiple sources (Amaral et al. 2007, Beaver and Geurts 2014, Potts 2005, Simons et al. 2010), AI content differs from NAI content with respect to its

²Syrett and Koev (2014) and Koev (2013) point out that unlike AI content, appositives cannot address *any* QUD. However, the NAI content of sentence-final ARCs can provide an answer to some QUDs, thus showing that appositives *can* be At-Issue.

ability to project past operators (but see Harris and Potts (2009) and Schlenker (2010) for discussion). In all the examples presented in (212), the original Syrett and Koev's (2014) example (207) is embedded under operators of various kinds.

(212) **Projecting past operators diagnostic:**

a. **Negation:**

It's not the case that my friend Sophie, who is a classical violinist, performed a piece by Mozart.

b. **Antecedent of a conditional:**

If my friend Sophie, who is a classical violinist, performed a piece by Mozart, then the public was very lucky.

c. **Possibility modals:**

It's possible that my friend Sophie, who is a classical violinist, performed a piece by Mozart.

d. **Evidentials, probability adverbs:**

Presumably/Probably, my friend Sophie, who is a classical violinist, performed a piece by Mozart.

e. **Belief operator:**

I think/believe that my friend Sophie, who is a classical violinist, performed a piece by Mozart.

The fact that Sophie did perform a piece by Mozart, does not follow from the question in (211), and it does not follow from any of the statements in (212). On the contrary, the NAI content of (207), i.e., the fact that Sophie is a classical violinist, is preserved under all the operators above³, thus showing that NAI content projects.

Not-At-Issue content can be delivered via a range of diverse syntactic structures that do not necessarily establish a uniform category. For example, temporal clauses introduce

³It may be the case that with some operators the inference is stronger than with others: Beaver and Geurts (2014) notice that it is more difficult to project past the belief operator than past negation, but even taking this variability into account, the overall contrast with non-projecting AI content is preserved.

content that is Not-At-Issue, but they also introduce presupposed information, where temporal connectives such as *before*, *while*, *after*, *during*, etc. serve as presupposition triggers (Asher and Lascarides 1998, Heinämäki 1974, Karttunen 1973, Levinson 1983, Lascarides and Oberlander 1993, Sawada and Larson 2004). ARCs, on the other hand, encode conventional implicatures rather than presuppositions.

In fact, all presupposition triggers signal NAI content that projects. Temporal clauses pass the diagnostics of attempting to target the material with a direct rejection (Tonhauser 2012). As shown in (213), the temporal clause fails to provide the basis for a felicitous direct rejection.

(213) After Tom vacuumed the carpet, Anna cleaned the countertops.

a. #No, he didn't!

b. No, she didn't!

Analyzing the observed distinctions between AI and NAI content of the utterance, Potts (2005) argued that there is close to no interaction between the semantic contribution of the two to the entire utterance and proposed a “multidimensional” semantics, such that the semantic contribution of NAI content is evaluated independently of the AI content. This proposal makes a rather strong prediction that the two types of meaning will be separate with respect to all semantic phenomena. However, later research on this topic has provided evidence of the so-called “crossing” phenomena showing that NAI and AI content do in fact interact with one another. One of such examples comes from coconstrual relations that can be established and hold across AI/NAI boundary. Thus anaphoric reference relation can freely exist between At-Issue / Not-At-Issue content (Amaral et al. 2007, AnderBois et al. 2011, Nouwen 2007), as shown in (214)-(215).

(214) a. John, who had been kissed by **Mary_i**, kissed **her_i** too.

b. **John_i** kissed Mary, who kissed **him_i** too.

(215) a. **Every speaker_i**, all of **them_i** PhD students, gave a great talk.

b. Jones, who graded **each student_i**'s final paper, gave **them_i** detailed feedback.

As AnderBois et al. (2011) propose, various types of anaphora exhibit the same kind of bi-directional boundary-crossing behavior. Simple case of forwards anaphora is exemplified in (214a), where the pronoun *her* in the AI content can retrieve an antecedent from NAI content of the appositive. Similarly, in (214b), the pronoun in the NAI content establishes a forward-anaphoric relation with a name in the AI content (the matrix clause). Also binding a variable by a universal quantifier is felicitous, both in the direction from the matrix AI clause to the appositive NAI clause, as shown in (215a), and in the opposite direction, as in (215b). All of this evidence suggests that while there are clearly testable distinctions between the contributions of AI content vs. NAI content to the meaning of the entire utterance, establishing a complete semantic independence between the two is not only problematic, but also unnecessary.

The questions about distinctive properties of AI vs. NAI content that are of particular interest for this dissertation can be formulated as follows: (i) Is there a potential distinction between *syntactic* contributions of the two types of content to the overall judgments of well-formedness/acceptability of the utterance?, and (ii) Do relative processing costs of the two types of content differ from one another?

Addressing both those questions, and operating on the assumption of limited interaction between the two types of content at the level of semantics, Dillon et al. (2014, 2017) proposed a series of experiments designed to target the following question: does the syntactic complexity in Not-At-Issue content contribute to perceived syntactic complexity of the entire sentence in the same way as At-Issue matrix clause content?

Dillon et al. (2014) researched whether the interpretive independence between NAI content and the AI matrix clause in which it is embedded is also reflected in incremental sentence comprehension. An off-line study was designed to test whether syntactically complex material inside NAI content (parentheticals containing a relative clause such as *the one who...* contributed as much intuitive complexity to the entire sentence as did superficially similar material embedded as AI content (restrictive relative clauses). In examples such as (216a)-(216b), Dillon et al. (2014) manipulated syntactic complexity increasing the length and embedding level by adding an object relative clause into sentence-medial position (optional material shown in parenthesis below).

(216) Sample stimuli from Dillon et al. (2014), Experiment 1:

a. *embedded NAI content, parenthetical clause:*

That butcher, the one who was in the busy shop (Amy visited on Third Avenue),
bought his meat from local farmers.

b. *embedded AI content, restrictive relative clause:*

That butcher who was in the busy shop (Amy visited on Third Avenue) bought
his meat from local farmers.

Dillon et al. (2014) discovered that longer versions of target sentences were judged as less acceptable than shorter and less complex sentences, and that sentences with parenthetical structures received higher overall ratings than did sentences with restrictive relative structures of similar length and complexity. Based on this experimental evidence, Dillon et al. (2014) argued that NAI parenthetical structures are processed independently of their embedding (AI) utterance, which in turn suggests that syntactic memory is substantially differentiated.

In another study, Dillon et al. (2014) presented their participants with a series of sentences manipulating two factors: grammaticality and type of content embedding the grammatical/ungrammatical sequence in question. In the critical conditions, a subject-verb agreement match/mismatch was contained within a restrictive relative clause (AI content) or a parenthetical (NAI content), as shown in (217).

(217) Sample stimuli from Dillon et al. (2014), Experiment 2:

a. *parenthetical clause, agreement match:*

That economist, the one who was at the conference Paul attends every year in
Rome, made fun of the banker.

b. *parenthetical clause, agreement mismatch:*

That economist, the one who was at the conference Paul attend every year in
Rome, made fun of the banker

c. *restrictive relative clause, agreement match:*

That economist who was at the conference Paul attends every year in Rome
made fun of the banker.

d. *restrictive relative clause, agreement mismatch:*

That economist who was at the conference Paul attend every year in Rome made fun of the banker.

Here Dillon et al. (2014) found that the perception of the agreement violation was identical in parentheticals and restrictive relative clauses. Thus they concluded that the difference in assessing the level of syntactic complexity of AI vs. NAI content in their Exp. 1 was not due to how much attention was paid to both types on content. Instead Dillon et al. (2014) proposed that the observed distinction is due to the fact that NAI content contributes a “quasi-independent” speech act from that of its host clause (Potts 2005, Syrett and Koev 2014). This speech act is processed independently of the host clause and impedes the processing of the entire structure less than does superficially similar AI content.

Dillon et al. (2014) and Dillon et al. (2017) have also shown experimentally in a series of online and offline studies of sentences with ARCs that NAI content of the utterance is processed differently than AI content. NAI content has been found to impede the processing of complex or lengthy syntactic material less than AI content (in particular, the tracking of *wh*-filler gap dependencies). At the same time, violations of grammatical number agreement, such as (217) were treated similarly across both types of content. This reported contrast is critical for the current research: while syntactic complexity is processed differently in NAI versus AI parts of the utterance, the processor nevertheless does not distinguish between categorical grammatical violations in the two types of content.

The relevant question we pursue here is as follows. Does the NAI status of the proposition affect speakers’ judgments of syntactically disfavored backwards anaphora it contains, elevating acceptability of coconstrual not only above levels predicted by Principle C, but also above levels where the same coconstrual relation is contained in AI content? Here I formulate two competing hypotheses.

Hypothesis 1: no NAI/AI difference. If, following Chomsky (1981)’s formulation of the binding constraints, Principle C is to be interpreted as a categorical principle of the grammar, judged in a vein similar to the obligatoriness of morphosyntactic agreement, then treatment of structurally illicit coconstruals will be on par across AI and NAI content, and we would observe the same rate of rejection in both types of environments.

Hypothesis 2: NAI/AI difference. If, as the evidence presented in earlier chapters suggests, Principle C is not a deterministic enforcer of binding constraints, but rather a factor that interacts with other factors within and outside of the grammar, then participants' treatment of coconstrual will depend on the (N)AI status of the content in which the pronoun-name sequence is embedded. Given differential processing of NAI/NI content (Dillon et al. 2014, 2017), coconstrual will be more likely in NAI content, further depending on the degree of plausibility.

In this chapter, I report the findings of two experiments designed to test these hypotheses. The two experiments target structurally distinct NAI environments: sentence-initial adjunct temporal clauses, and sentence-medial and sentence-final appositive relative clauses.

6.2 Baseline study: Confirming NAI status of adjunct temporal clauses

We turn to sentence-initial temporal clauses for several reasons. First, temporal clauses, unlike attributive appositive relative clauses, can be used sentence-initially, which provides us with an opportunity to test our hypothesis on NAI content in varying sentential positions. Second, the sentence-initial presence of the adverb heading the clause ("after") signals to the processor that it should begin updating the context set and should also trigger the presupposition, thus drawing attention away from the binding conditions. Finally, the syntax of the temporal clause allows us to incorporate our previous stimuli into a sentence-initial adverbial clause in order to contrast the preferences for structurally marked coconstruals embedded as AI vs. NAI content.

While NAI status of appositive relative clauses has received much research attention, temporal clauses have not been discussed in theoretical and experimental literature as widely. For this reason, we began by conducting an independent baseline study with target sentences that have no backwards anaphora, to confirm the robust NAI status of temporal clauses.

6.2.1 Participants

21 Rutgers University undergraduate students enrolled in a Linguistics or Cognitive Science course participated for course credit. All participants were native speakers of English as determined by a demographic questionnaire.

6.2.2 Materials

Test items in the baseline study were designed as short dialogues. For each stimulus, the first statement was a bi-clausal sentence that consisted of a sentence-initial temporal clause supposedly associated with NAI content, followed by a matrix clause, which is known to introduce information with AI status.

The target items were designed to test whether sentence-initial temporal clauses pass two key diagnostics for presenting NAI content: targeting the material in question with a direct rejection (Tonhauser 2012), as in (218), and attempting to access the main assertion with a *Why?* question (Tomioka 2009, Syrett and Koev 2014), as in (219). Accordingly, we had two groups of test items, and each group consisting of 15 stimuli.

(218) After Richard wrapped the presents, Amelia put on the bows.

- a. No, he didn't!
- b. No, she didn't!

(219) After Sarah took some Advil, she fixed herself a sandwich.

Why?

- a. Because she had a headache.
- b. Because she was hungry.

The group of stimuli testing for availability of direct rejection, such as (218), always mentioned two characters: one male and one female. In all cases, both clauses had verbs in the form of past indefinite tense, so that rejection sentences for both would have the same form of the verb and only differ on the pronoun. Following the bi-clausal sentence, two response options were offered: one rejecting the content of the temporal clause, as in (218a), and the other rejecting the content of the matrix clause, as in (218b). The order of matrix-clause vs. temporal-clause rejection answers, as well as the use of male vs. female names in temporal vs. matrix clause was balanced across all test items.

The group of stimuli testing for availability of accessing the main assertion with a *Why?* question, such as (219), only mentioned one character. In all cases, the character was first referred to by a gender-unambiguous name in the sentence-initial temporal clause, and then

– by pronoun *she* or *he* in the subsequent matrix clause. This first sentence was then followed by a one-word question *Why?*, and a choice of two possible answers, as shown in (219). One of the answers offered the reason semantically consistent with the interpretation where the *Why?* question targeted the content of the temporal clause, as shown in (219a). The other answer was designed to address the content of the matrix clause, as shown in (219b). The order of answers relevant to the matrix clause vs. the temporal clause, as well as reference to male vs. female characters was balanced across all test items.

The list of experimental items also included control items that were also structured as short dialogues. These controls had bi-clausal sentences with sentence-medial subject-adjoined appositive relative clauses, as shown in (220). In each case, the appositive relative clause contained reference to a profession of the character conveyed via a present tense copula clause with the verb *to be*. The matrix clause had the verb in the past indefinite tense form, and mentioned an activity performed by the character. The sentence was then followed by two answers: one with the negative form of the verb *to be* rejecting the content of the appositive relative clause, as shown in (220a), and the other – with the negative past tense form of the verb *do*, rejecting the content of the matrix clause, as shown in (220b).

(220) Anthony, who is a history professor, graded papers on the American Revolution.

a. No, he isn't!

b. No, he didn't!

Since NAI status of appositive relative clauses is well established, the purpose of including these control items was to establish a baseline for comparison when it comes to target items with adjunct temporal clauses.

In addition, experimental stimuli included filler items, also structured as short dialogues and offering two alternative continuations. They were similar to test and control items in length and complexity, but offered more variety in the syntactic composition of the lead-in sentence.

Each participant saw 30 test items, 15 control items and 36 filler items. All of those (n=81) were presented in randomized order. The full set of stimuli is presented in Appendix G.

6.2.3 Procedure

The study was conducted in a laboratory setting, where participants were run one or two at a time in a quiet room at individual response stations. Items were presented on an iMac using SuperLab stimulus presentation software (v. 5). Each experimental session began with a brief training with non-target items, to acclimate participants to the task.

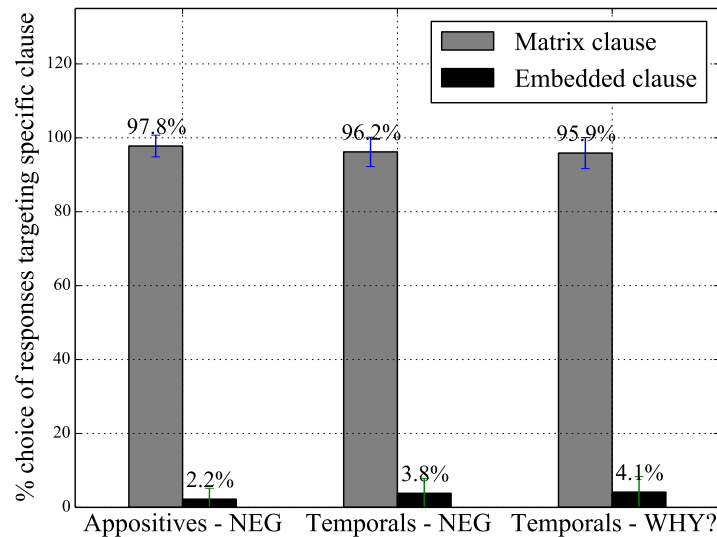
Each experimental trial consisted of a single slide presenting a lead-in sentence followed by two alternative continuations of the dialogue. The participants were instructed to study the dialogue between the two speakers and then pick one of the two lines that they thought was the most natural way to continue the conversation. They were further asked to use the response pad to indicate their answer. After the choice was made, following a 2-second pause, the experiment proceeded automatically to the next test item.

Each experimental session lasted approximately 8-10 minutes. A full set of instructions to participants is presented in Appendix G.

6.2.4 Results

The results for control and target items in the baseline study are summarized in Fig. 6.1 below.

Figure 6.1: Percentage choice of proposition (matrix vs. embedded) targeted by negation and *why*-question in the baseline study



Participants overwhelmingly preferred to target the matrix, not the temporal clause, with a direct rejection (binomial exact test: $p < 0.0001$). The results across control and test items were very close quantitatively: 97.8% of participants chose to reject the matrix clause, rather than the appositive clause in control sentences, vs. 96.2% chose to reject the content of the matrix, not the temporal clause in the target items. Further 95.9% chose not to access the main assertion of the temporal clause with a *Why?* question.

6.2.5 Discussion

As our findings show, the sentence-initial temporal clause fails to provide the basis for a felicitous direct rejection. Here temporal clauses behave very similarly to control items – subject-adjoined appositive relative clauses. Temporal clauses also fail to be linked to a response to the *Why?* question. With both types of target items, we have observed a near-ceiling effect where participants preferred to reject or address the AI content of the matrix clause, and not the content of the embedded clause.

Thus the findings of the baseline study show that a temporal clause passes the standard NAI diagnostics, which supports the NAI status of the proposition expressed in a temporal clause (Tonhauser 2012, Syrett and Koev 2014). Further, this point of commonality between appositives and the presupposition-triggering environment of a temporal clause presents us with an opportunity to investigate the influence of NAI/AI status of the potential coconstrual relation in structurally marked backwards anaphora, while manipulating the type of structural environment hosting the pronoun-name sequence.

6.3 Experiment 7

6.3.1 Participants

82 Rutgers University undergraduates, all native speakers of English (as determined by a demographic questionnaire), participated. All subjects gave informed consent and received course credit for their participation.

6.3.2 Materials

All target sentences included pronoun *she* c-commanding a female name. The name was embedded in a possessive DP (e.g., *Emily's grandfather* or *Pamela's notes*) to allow for the use of predicates that require two distinct individuals/entities as their arguments in the target sentences. In all target stimuli the pronoun therefore not only linearly preceded the name, but also structurally dominated it. The experiment had a 2×2 design with two factors manipulated (each with two levels):

- (a) *AI status* of the proposition hosting the pronoun-name sequence (NAI sentence-initial adjunct temporal clause vs. AI matrix clause), and
- (b) the *plausibility of coconstrual* between the pronoun and the name (low vs. high).

Plausibility was determined by the rankings obtained in a norming study reported in Chapter 2 of this dissertation. The norming study required participants to read sentences with forwards anaphora and judge on a Likert scale (1 to 5) how likely it was that the name and the pronoun in its c-commanding domain referred to the same referent. The sentences with highest and lowest rankings were further transformed into target stimuli for Experiment 7. The position of the pronoun and the name was reversed to yield a Principle C effect, and for the NAI condition the sentences were embedded under a sentence-initial participial temporal clause headed by complementizer *after*. A sample set of target sentences is presented in (221), with the pronoun and name in bold.

(221) Sample target items in Experiment 7 (Forced Choice Task)

- a. *AI, high plausibility:*

The doctors allowed **her_i** to visit **Emily_{i/j}'s** grandfather in the ICU.

- b. *AI, low plausibility:*

Mr. Adams allowed **her_i** to borrow **Emily_{i/j}'s** notes for the exam.

- c. *NAI, high plausibility:*

After allowing **her_i** to visit **Emily_{i/j}'s** grandfather in the ICU, the doctors discussed the case with the radiologist.

- d. *NAI, low plausibility:*

After allowing **her_i** to borrow **Emily_{i/j}'s** notes for the exam, Mr. Adams phoned the library about the new textbook.

For each target sentence, the clause that incorporated structurally marked coconstrual featured either an exceptional case marking (ECM) or a double object (DO) predicate. As previously, this choice of construction was motivated by the fact that both types of predicates allow for an argument position lower than the matrix subject to c-command the remaining linguistic material in the clause, i.e., an embedded subject position in an ECM construction, and an indirect object position in a DO construction. Thus it was made possible for the pronoun to dominate the name from a less salient position in the clause to enhance coconstrual. In the AI versions, this matrix subject was present. In the NAI versions, there was no overt subject DP. However, the structural relation between the pronoun (*her*) and the name (*Emily*) was kept identical across both conditions. Moreover, the distribution of thematic roles was also preserved: in both conditions, the matrix subject DP (e.g., *the doctors*) was the agent (e.g., of the predicate *allow*, as in (221c)); and the pronoun *her* was the benefactor of the same verb, as shown in (221a) and (221c).

All together there were 12 pairs of NAI/AI target items with high plausibility of coconstrual and 10 pairs of NAI/AI target items with low plausibility of coconstrual, yielding a total of 44 target sentences. These sentences were distributed across four lists so that each participant saw only one sentence from each set, and a total of 11 target sentences. There were also 24 control items, all of which involved forwards anaphora with no Principle C effects, as in (222), but featured plausibility manipulations, as illustrated by the contrast between (222a) and (222b).

(222) Sample control items with forwards anaphora

a. *High plausibility:*

Emily's friends were planning a surprise birthday party for **her**.

b. *Low plausibility:*

Pamela was invited to **her** exhibition opening.

These controls were designed to elicit a baseline for the influence of plausibility in the absence of any Principle C effects. The target and control items were pseudorandomized with 45 filler sentences, for a total of 80 items per participant. See Appendix H for a complete set of experimental items.

6.3.3 Procedure

The study was conducted in a laboratory setting, where participants were run one or two at a time in a quiet room at individual response stations. Items were presented on an iMac using SuperLab stimulus presentation software (v. 5). Each experimental session began with a brief training with non-target items, to acclimate participants to the task.

Each trial had the same structure. Participants viewed a screen presenting images of two female characters side by side labeled as *Emily* and *Pamela*, as shown in Fig. 6.2.

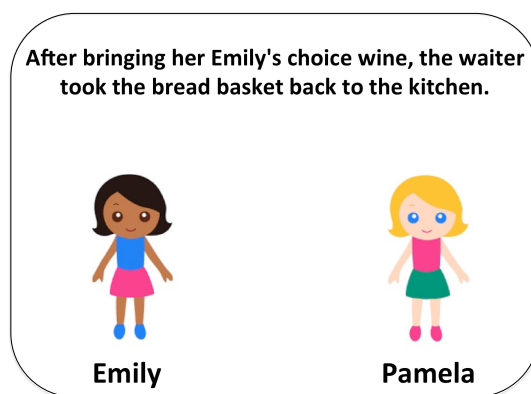


Figure 6.2: Sample stimulus item in Exp. 7

Both female characters were introduced with equal prominence during the training session. The target or control sentence appeared above the images. Participants were asked to read each sentence to themselves, and choose between a sentence-internal or sentence-external same-gender referent for the pronoun by pressing a key marked with a respective name on the response pad. See Appendix H for the full set of instructions to participants.

The use of one or the other female name in the sentence was counterbalanced across all items, but the position of the female referents (left vs. right) remained constant on the screen. Target and control items were randomized within the session. Each session lasted approximately 15-20 minutes.

6.3.4 Results

Results for control items and target items are presented in Fig. 6.3 below. We begin by discussing the results of the controls, which featured forwards anaphora and therefore no Principle C effects. As expected, the choice of referent was primarily guided by plausibility: 98.8% of participants chose an intra-sentential antecedent for a pronoun in sentences when plausibility of coconstrual was high, while the choice of intra-sentential antecedent for low plausibility items was only 10.7%. This pattern is in agreement with the findings of Experiments 1 and 2 reported in Chapter 2, and therefore provides further evidence for the critical role of plausibility in resolving pronominal ambiguity.

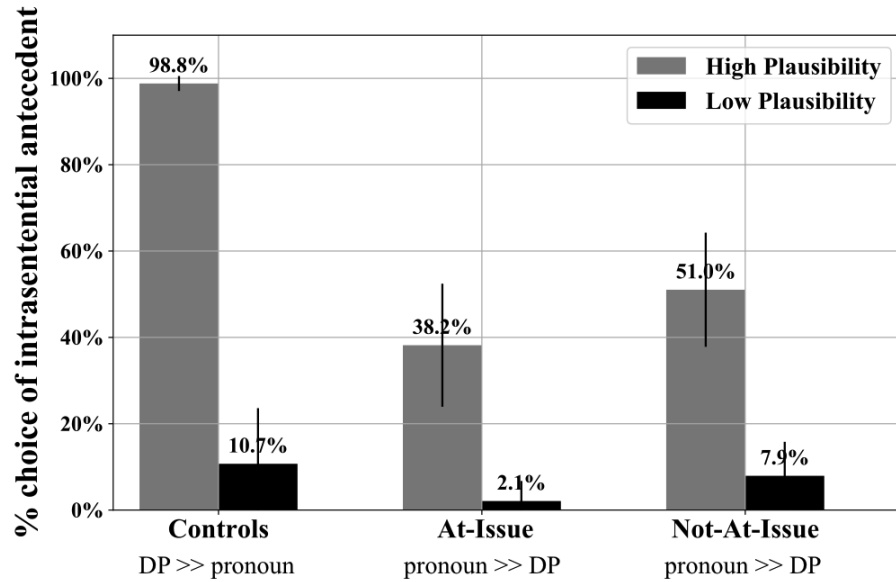


Figure 6.3: Percentage choice of intra-sentential antecedent for the pronoun across conditions in Exp. 7

As for the target items, backwards anaphora sentences with low-ranked plausibility of coconstrual yielded correspondingly low percentages of intra-sentential referent selection (2.09% in AI condition, and 7.93% in NAI condition). By contrast, sentences with a high level of coconstrual plausibility yielded percentages that were higher than predicted solely by the c-command relations between the pronoun and the name. The effect was most pronounced in cases where the pronoun-name sequence was introduced as NAI content in a sentence-initial temporal clause (51.04% in NAI vs. 38.18% AI).

In Experiment 7, the dependent measure was the percentage choice of intra- vs. extra-sentential referent for the pronoun in the target sentence. We performed a binomial logistic regression model with subjects and items as random intercepts. The analysis revealed significant effects of both plausibility ($\beta = 3.6728$, $SE = 0.4920$, $p < 0.001$) and AI/NAI status of the proposition ($\beta = -1.5790$, $SE = 0.6892$, $p < 0.05$). There was no significant interaction between the two factors ($\beta = 0.8044$, $SE = 0.7771$, $p = 0.301$), suggesting that NAI status of the proposition had the same impact of increasing coconstrual across the board.

To probe the results further, we turned to an analysis of participants' responses to individual target items. As shown in Fig. 6.4, for 19 out of 22 target items (86.4%), the percentage of participants choosing an intra-sentential referent for the pronoun in the NAI condition exceeded the respective percentage in the AI condition. This pattern was observed for 100% of target items with low plausibility of coconstrual and 75% of target items with high plausibility of coconstrual (items in the shaded area in Fig. 6.4).

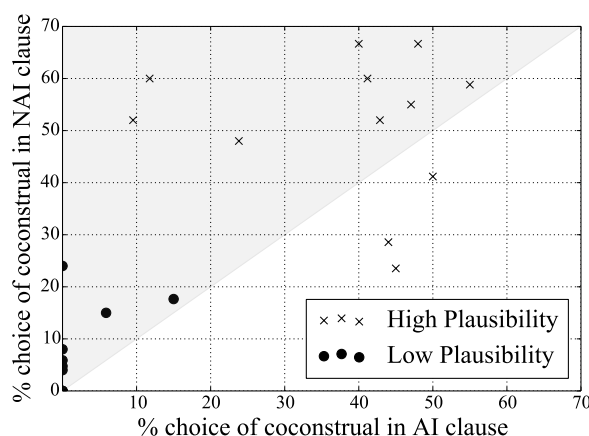


Figure 6.4: Percentage choice of intra-sentential referent for individual test items in AI vs. NAI condition in Exp. 7

The clustering of the low plausibility items in the lower left corner in contrast to the variability observed with the high plausibility items, with most gravitating towards high levels of coconstrual, regardless of (N)AI status, reinforces that role of plausibility in establishing coconstrual despite structural restrictions.

6.3.5 Discussion

Experiment 7 presents consistent evidence that two factors, plausibility and (N)AI status of the proposition hosting the pronoun-name sequence, exert substantial influence on speakers' judgments of possible coconstruals in backwards anaphora with Principle C effects. While the findings on the role of plausibility are not new to this dissertation research (see the discussion in Section 2.6 of Chapter 2), the evidence on the role of (N)AI status is novel. Notably, we observed that when the pronoun and the name in its c-commanding domain are embedded as part of NAI sentence-initial temporal clause, interpretations featuring structurally marked coconstruals are attested more frequently as compared to identical cases of backwards anaphora embedded in AI matrix clauses. This effect cannot be accounted for under Hypothesis 1, which views Principle C as a binary grammatical constraint and predicts that similarly high rates of rejection of structurally marked coconstruals across both AI and NAI content. On the contrary, these results are expected under Hypothesis 2, which suggests that Principle C is not deterministic, but rather one of the multiple factors influencing the possibility of coconstrual between the pronoun and name in backwards anaphora.

At the same time, the results of Exp. 7 raise a number of questions. First, temporal clauses do introduce NAI content, but they also introduce presupposed information, where temporal connectives such as *before*, *while*, *after*, *during*, etc. serve as presupposition triggers (Asher and Lascarides 1998, Heinämäki 1974, Karttunen 1973, Levinson 1983, Lascarides and Oberlander 1993, Sawada and Larson 2004). And it should be noted that there is experimental evidence that presuppositions play a significant role in online sentence comprehension and affect the choice of structural analysis undertaken by speakers in case of multiple possible interpretations (Schwarz 2007, 2015, Schwarz and Tiemann 2017). In other words, the question is whether the effect observed in Experiment 7 stems from special properties of presupposed NAI information specifically, or as part of NAI content in general.

Second, Experiment 7 targeted sentence-initial NAI clauses exclusively, and utterance position has been also observed to matter for discourse prominence (AnderBois et al. 2013, Gobel 2018). Moreover, in the previous chapters of this dissertation, we have argued that linear order feeds into incremental processing and eventually has an effect on pronominal reference resolution: we observed this with both subject/non-subject asymmetry and subject

comparatives. Accordingly, the second question is whether the findings of Experiment 7 are exclusive to sentence-initial position (and perhaps related to incremental processing of content) or would be observed with all NAI content regardless of its position in the sentence.

The third question has to do with the specific syntactic environment, i.e., temporal clauses, and also addresses generalizability of the results of Experiment 7. Would the same effect be detected with other structural types of clauses that convey NAI content, or are they specific to temporal adjuncts? Experiment 8 was designed to answer these three questions.

6.4 Experiment 8

6.4.1 Participants

32 Rutgers university undergraduate students enrolled in an introductory Linguistics or Cognitive Science course, all native speakers of English (as determined by a demographic questionnaire), participated in a binary forced choice task for course credit.

6.4.2 Materials

Experiment 8 was designed to address the questions raised by the findings of Experiment 7 and to test whether the observed effect of increased acceptability of structurally marked coconstruals could be extended to NAI content more generally. To achieve this goal, we embedded backwards anaphora with Principle C effects in an environment substantially distinct from sentence-initial temporal clauses. Here our selected target structures were appositive relative clauses (ARC), which encode NAI content that is not presupposed (Potts 2005, Syrett and Koev 2014), and which can occur in sentence-medial and sentence-final positions.

To construct target items in Experiment 8, we once again used test sentences from the norming study reported in section 2.3 of this dissertation, which were previously ranked on coconstrual plausibility. Keeping those items constant across multiple studies was beneficial, as it allows us to draw direct comparisons between the respective findings.

Each target sentence featured a pronoun c-commanding the name embedded in a possessive DP in one of two conditions: backwards anaphora embedded in a sentence-medial or sentence-final appositive relative clause. The items further varied in terms of conceptual

plausibility of coconstrual. Accordingly, we manipulated two factors: *ARC position* (sentence medial vs. sentence final) and *plausibility* (high vs. low, as determined via plausibility rankings obtained in a norming study), which resulted in a 2×2 design with a sample set of test items shown in (223).

(223) Sample sets of test items (DO predicate = *offer*) in Experiment 8.

a. sentence-medial appositive relative clause/high plausibility of coconstrual:

The waiter, who offered **her_i Pamela_i**'s favorite entrée, brought a pitcher of water to the table.

b. sentence-final appositive relative clause/high plausibility of coconstrual:

Mr. Jones called the waiter, who offered **her_i Pamela_i**'s favorite entrée.

c. sentence-medial appositive relative clause/low plausibility of coconstrual:

Mr. Baum, who offered **her_i Emily_i**'s book to read, put the other volumes back on the library cart.

d. sentence-final appositive relative clause/low plausibility of coconstrual:

The library sent some items to Mr. Baum, who offered **her_i Emily_i**'s book to read.

Similarly to Experiment 7, for each of the test sentences, ARCs featuring structurally marked coconstruals involved either a Dative Object or an Exceptional Case Marking predicate to ensure possibility of c-command from a less salient non-subject position, as well as consistency between syntactic structures across studies. As in Experiment 7, the overt DP referring to the thematic subject of the embedded verb was part of the matrix clause, however the distribution of thematic roles was kept constant across parallel test items, which ensured that plausibility rankings were still applicable. There were 14 pairs of test sentences with high plausibility of coconstrual, and 14 pairs of test sentences with low plausibility of coconstrual, and each participant saw one sentence from each pair.

There were three types of control sentences. Type 1 and Type 2 featured forwards anaphora and varied in their predicted level of plausibility of coconstrual: *high*, as in (224a) and (224b), vs. *low*, as in (225a)-(225b).

(224) **Type 1:** forward anaphora, high plausibility of coconstrual:

- a. **Emily**_{*i*}'s friends were planning a surprise birthday party for **her**_{*i*}.
- b. **Emily**_{*i*}'s coach is really pleased with **her**_{*i*}.

(225) **Type 2:** forward anaphora, low plausibility of coconstrual:

- a. **Pamela**_{*i*} considered **her**_{*i*} manner to be unpleasant.
- b. **Pamela**_{*i*} was curious to read **her**_{*i*} poetry.

(226) **Type 3:** backwards anaphora, low plausibility of coconstrual:

- a. **Her**_{*i*} story brought **Emily**_{*i*} to tears.
- b. **Her**_{*i*} speech was so long that **Emily**_{*i*} started to fall asleep.

These controls ($n = 28$) were designed to obtain a baseline for the influence of plausibility outside cases restricted by Principle C with varying linear orders between the pronoun and the name. The target and control items were pseudorandomized with 54 filler sentences, for a total of 96 items per participant. Appendix I presents a complete set of experimental items in Experiment 8.

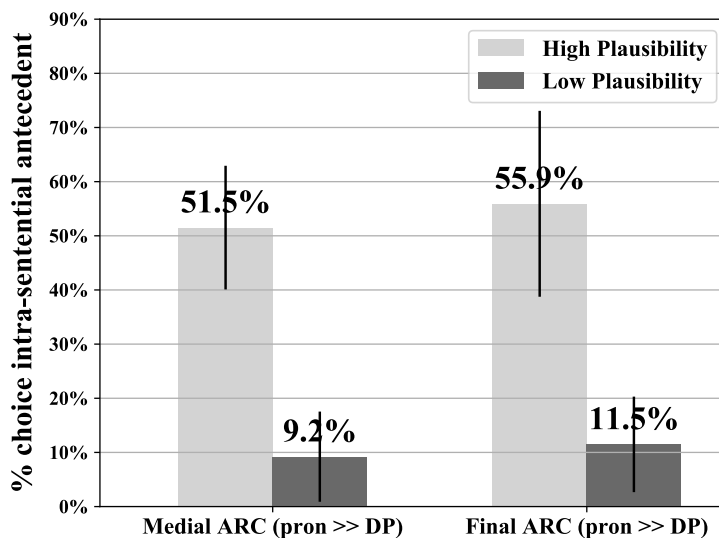
6.4.3 Procedure

The procedure in Experiment 8 was identical to that of Experiment 7 (see Section 6.3.3 for detail). Appendix I presents a full set of instructions to participants.

6.4.4 Results

The results of Experiment 8 are summarized in Figure 6.5.

Figure 6.5: Percentage choice of intra-sentential referent for the pronoun across items and conditions in Exp. 8 (Forced Choice Task)



As expected, test items with low plausibility of coconstrual between the pronoun and the name in its c-commanding domain yielded correspondingly low percentages of selection of intra-sentential referent. For ARCs in both positions (sentence-medial and sentence-final), participants selected interpretations indicating intra-sentential coconstrual only 9.2% and 11.5% of the time respectively. On the contrary, test items with highly plausible coconstruals embedded under ARCs yielded percentages of intra-sentential referent selection that were significantly higher than their low plausibility counterparts: 51.5% for ARCs in sentence-medial and 55.9% for ARCs in sentence-final position.

In Experiment 8, the dependent measure was the percentage choice of intra-sentential referent for the pronoun in the target sentence. The data were analyzed using a binomial logistic regression model with subjects and items as random intercepts. As expected, the statistical analysis revealed a significant effect of factor *plausibility* ($\beta = -2.7225$, $SE = 0.2501$, $p < 0.001$). At the same time, there was no significant effect of factor *ARC position* ($\beta = -0.2615$, $SE = 0.4606$, $p = 0.57023$). There was no significant effect of the type of embedded predicate (DO vs. ECM) in the ARC clause ($\beta = -0.08418$, $SE = 0.46192$, $p = 0.85539$).

6.4.5 Discussion

In Experiment 8, our goal was to test whether the findings from Exp. 7 with respect to temporal adjuncts could be generalized to NAI content more broadly. For this reason, in Experiment 8 we embedded structurally marked backwards anaphora under sentence-medial and sentence-final ARC clauses, which are also NAI, but do not introduce presupposed content.

In Experiment 8, we manipulated two factors: coconstrual plausibility (high vs. low) and ARC position (sentence-medial vs. sentence-final). With low plausibility coconstruals, the percentage choice of intra-sentential referent was very low, which is unsurprising, as we have already seen in multiple studies that low plausibility is a strong factor suppressing coconstrual in both structurally neutral and structurally marked backwards anaphora. Obtaining similarly low levels in Experiment 8 suggests that it is possible to draw a direct comparison between the quantitative findings of Experiment 8 and those of earlier studies reported in this dissertation. An additional factor that allows us to compare the findings across multiple studies is that we used the same set of sentences in Exp. 1, Exp. 7 and Exp. 8. These three studies also were all forced choice tasks, shared the procedure and had identical stimuli presentation. The parallelism between the design of test items in respective studies is illustrated in (227)-(229) below.

(227) Sample test item in Experiment 1.

a. *object antecedent/high plausibility of coconstrual*

The doctors allowed **her_i** to visit **Emily_{i/j}**'s grandfather in the ICU.

(228) Sample set of test items in Experiment 7.

a. *AI/high plausibility:*

The doctors allowed **her_i** to visit **Emily_{i/j}**'s grandfather in the ICU.

b. *NAI temporal clause/high plausibility:*

After allowing **her_i** to visit **Emily_{i/j}**'s grandfather in the ICU, the doctors discussed the case with the radiologist.

(229) Sample sets of test items in Experiment 8.

a. *NAI sentence-medial appositive relative clause/high plausibility of coconstrual:*

The doctors, who allowed **her**_{*i*} to visit **Emily**_{*i/j*}'s grandfather in the ICU, discussed the case with the radiologist.

b. *NAI sentence-final appositive relative clause/high plausibility of coconstrual:*

Mr. Stevens discussed the case with the doctors, who allowed **her**_{*i*} to visit **Emily**_{*i/j*}'s grandfather in the ICU.

Thus the main focus of our investigation in Experiment 8 were test items with high plausibility of coconstrual, and with those we observed levels of selection of intra-sentential referent that were between 51.5% and 55.5% (for sentence-medial and sentence-final ARCs respectively). For comparison, structurally illicit coconstruals embedded under NAI temporal clauses in Experiment 7 were selected at the rate of 51%. By contrast, identical coconstruals in AI content revealed lower percentage choice of intra-sentential antecedent – 38.2% in Experiment 7. In Experiment 1, the respective condition (non-subject pronoun, high plausibility of coconstrual) yielded 30.8% rate of intra-sentential referent selection.

Remarkably, the observed levels are highly consistent across the three studies. This leads us to conclude that speakers systematically demonstrate increased acceptability of coconstrual with structurally marked backwards anaphora when the pronoun-name sequence is embedded under NAI content, as compared to AI content. This finding is independent of the position of the embedded NAI clause in the sentence; and it is observed with varying structural types of embedded NAI clauses.

Finally, the results of Experiment 8 offer additional support to Hypothesis 2, which views Principle C as one of multiple factors contributing to the overall obviation effect and interacting with other factors in the process. As we have seen, the information status of the proposition hosting backwards anaphora serves as another factor alleviating the strength of the overall obviation effect. Combined with increased plausibility of coconstrual and structurally less salient pronominal position, it brings acceptability of structurally marked backwards anaphora above 50%.

6.5 General discussion

In the experiments presented in the previous chapters of this dissertation, we observed significant variability in acceptability of coconstrual relations in structurally marked backwards

anaphora, which strongly suggests that (i) Principle C is only one of the factors considered during pronominal reference resolution, and (ii) Principle C interacts with these other factors that exert their own influence on the overall obviation effect. My goal in this chapter has been to pinpoint one more specific factor that allows for increased acceptability with structurally marked, but pragmatically plausible coconstruals. This factor is the (N)AI status of the proposition hosting structurally marked backwards anaphora.

In this chapter, we have presented evidence that two factors systematically affect speakers' preference: (i) the plausibility of a coconstrual relation, and (ii) the (Not)-At-Issue status of the content in which the pronoun-name sequence occurs. The first factor, plausibility, has been previously reported to exert significant influence on comprehension during sentence processing (Boland et al. 1990, 1995, Clifton 1993, Clifton Jr et al. 2003, Ferreira and Clifton Jr 1986, Garnsey et al. 1997, Kizach et al. 2013, Ni 1996, Pickering and Traxler 1998, Rayner et al. 1983, Tanenhaus et al. 1989, Traxler and Pickering 1996, Trueswell et al. 1994). Earlier within this dissertation, I provided evidence that plausibility systematically affects speakers' judgments during pronominal reference resolution in both structurally neutral and structurally marked backwards anaphora. The results reported in this chapter reinforce these previous findings related to plausibility.

The second factor, (N)AI status, has been also previously shown to have influence on processing and interpretation: NAI content does not answer the QUD and projects, and while it is truth conditionally meaningful, it does not impact processing the same way as AI content (Dillon et al. 2014, 2017, Syrett and Koev 2014). The experiments reported in this chapter have provided additional evidence for the differential treatment of AI vs. NAI content, this time with structurally illicit coconstruals hosted in two distinct types of embedded clauses with varying sentence positions. We have demonstrated that when a pronoun-name sequence is embedded as NAI content (i.e. as part of an adjunct temporal clause or appositive relative clause), coconstrual is significantly more likely.

While these results are consistent with conclusions drawn by Dillon et al. (2014) and Dillon et al. (2017) about the distinction between the contributions of AI vs. NAI content, we expanded the range of structural environments under investigation. Dillon et al. (2014) hypothesized that the observed distinction stems from the fact that Not-At-Issue content

contributes a speech act that is *quasi-independent* from its host clause (Arnold 2007, Frazier et al. 2015, Potts 2005, Syrett and Koev 2014). As a result, this quasi-independence (or *illocutionary independence*) has perceptual consequences for online sentence processing (Dillon et al. 2014). Our empirical evidence allows us to generalize this claim to a wider range of NAI content.

But what makes NAI content special with respect to pronominal reference resolution, and why are speakers more tolerant of structurally marked coconstruals embedded under NAI propositions? I would like to argue that the observed differences between NAI vs. AI propositions may be due to the fact that NAI content contributes a non-negotiable update, i.e., information that is directly added to the common ground (AnderBois et al. 2013, Murray 2010).

Main clauses introduce a proposal to update the context. According to the properties of AI content, this proposal can be negotiated. It can be further felicitously approved or rejected, along with the anaphoric relations embedded in them. On the contrary, clauses that contain NAI content are *imposed* on the context in a non-negotiable way. This property is similarly relevant for appositive relative clauses, as well as for presupposed content (e.g., temporal clauses), which is expected to be taken for granted and not open to discussion (Fintel 2000). In a way, NAI content can be viewed as less salient or deaccented part of the semantic content of the sentence. As a result, a structurally marked coconstrual relation embedded in NAI content has a greater chance of being conceded by the listener as intended by the speaker, as compared to an identical one hosted in AI content, which enters the conversation as *a salient proposal* for the listener. This effect becomes particularly strong in cases where the plausibility of coconstrual is high, and the scenario is consistent with a relevant memory schema of a given scenario. Thus, syntax interacts with pragmatics and draws upon real world knowledge in very specific ways to give rise to coconstrual relations.

A further question is *What do these findings mean for our understanding of the nature of Principle C and its status in the grammar?* This brings us back to the alternative hypotheses entertained in the beginning of this chapter. If Principle C is a categorical principle of the grammar, treatment of structurally illicit coconstruals is expected to be consistent across AI and NAI content. This is not what the results of Experiments 7 and 8 have revealed.

Alternatively, Principle C is viewed a syntactic factor that interacts with other factors within and outside of the grammar: it marks certain coconstruals as unlikely, however, this markedness is weighed against potentially conflicting input from other sources. In this case, participants' rate of acceptance of structurally marked coconstruals is expected to be higher in NAI, non-negotiable content as compared to AI content, *modulo* plausibility, similarly to Dillon et al. (2014), where NAI status mattered for assessing increased syntactic complexity, but not for mismatched morphological agreement. Again, the findings of the experiments presented in this chapter, as well as in earlier chapters, are largely consistent with this second hypothesis, as they demonstrate that both plausibility and (N)AI status of the proposition hosting structurally marked coconstruals contribute to participants' choice of an intra-sentential referent for a pronoun.

6.6 Conclusions

In this chapter I have continued investigating the influence of plausibility and processing on speakers' judgments of structurally marked coconstruals in backwards anaphora, shifting my focus to the information status of the proposition hosting the pronoun-name sequence. I investigated (Not)-At-Issue status and its influence on pronominal reference resolution. Here I considered a range of syntactic structures with varying sentential position of NAI content: the target items in the reported experiments included sentence-initial temporal clauses, and sentence-medial and sentence-final appositive relative clauses.

In two separate studies, I collected experimental evidence showing that the possibility of coconstrual between a pronoun and a name in its c-commanding domain is not determined solely by the structural relation between the two (i.e., by Principle C). Rather, the plausibility of coconstrual and the (Not)-At-Issue status of the content in which the pronoun-name sequence appears also exert a robust influence on interpretation. Based on this evidence, I have again argued that Principle C is not a categorical, inviolable principle of the grammar, but rather an indicator of which coconstrual relations are marked, and one of several factors, whose effect can be modulated.

Chapter 7

General Conclusions

7.1 Overview

Languages often provide us with contexts that include repeated reference to the same individual. Coconstrual relations between such references serve a crucial role in establishing and maintaining discourse coherence. Within a sentence, repeated reference can be made via a combination of two or more nominal expressions: a name, a pronoun and/or an anaphor. The choice of specific types of nominal expressions largely depends on the structural positions of these expressions vis-à-vis one another, but is also influenced by a wide range of nonstructural factors diverse in their linguistic nature. In this dissertation, I experimentally investigated speakers' judgments of coconstrual between a pronoun and a name in syntactic environments where establishing such coconstrual is restricted by the binding Principle C. The empirical evidence I presented has lead us to reevaluate the role of this structural restriction and reassess its contribution to the overall obviation effect between the two nominal expressions.

As originally formulated by Chomsky (1981), binding relations between a pronoun and a name are categorically constrained by syntax: if a name is c-commanded by a co-indexed pronoun, coconstrual between the two is ruled out. In more recent years, linguistic literature has accumulated a wide range of counterexamples demonstrating that pragmatics and discourse pressures conspire to allow coconstrual in instances where it is disfavored by structural relations (Bolinger 1977, Büring 2005, Chien and Wexler 1990, Evans 1980, Grodzinsky and Reinhart 1993, Harris and Bates 2002, Higginbotham 1985, McCray 1980, Reinhart 1983, Safir 2004, 2014, Sag 2000). While a few theoretical proposals have been presented to account for these exceptions, they fail to explicitly identify the specific conditions that give rise to these judgments on a systematic basis or generate accurate predictions of

acceptability.

In this dissertation, I have studied a range of factors that influence the possibility of coconstrual in backwards anaphora with Principle C effects. In my research I primarily focused on Principle C as a universal constraint (Lasnik 1989), i.e., I targeted environments where a name DP is c-commanded by a pronominal antecedent.

The term “Principle C effect” is typically used to refer to unavailability (or unacceptability) of coconstrual in cases where a pronoun c-commands a name (Bruening 2014, Cecchetto and Donati 2010, Conroy et al. 2009, Johnson 2012, Lust et al. 1992, Merchant 2000b, Rizzi 2004, Safir 1999, Sportiche 1998). The obviation effect observed in such syntactic environments has been attributed in its entirety to the structural relation between the pronoun and the name. At the same time, judgments of coconstrual acceptability in sentences with Principle C effects vary substantially, even when the c-commanding relation between the pronoun and the name is held constant.

The experimental evidence I collected indicates that failure of coconstrual in structurally marked backwards anaphora traditionally referred to as “*the Principle C effect*” in the literature is, in fact, a more complex phenomenon. I argue that a more accurate term is *overall obviation effect*; and I propose that it is broader and more complex than just “*the Principle C effect*”.

In line with Chomsky (1981), I assume that the Principle C effect is invariable: whenever a name is c-commanded by an overt or a covert coindexed nominal expression, i.e., whenever a name has a *binding antecedent*, acceptability of coconstrual is suppressed substantially. At the same time, unlike Chomsky (1981), I propose that the Principle C effect alone does not completely rule out coconstrual. Instead, following Safir (2004, 2014), I argue that such structurally disfavored coconstruals are marked as *unexpected*, which means that acceptability is decreased, but it is not at the floor level.

I propose that the overall obviation effect in structurally marked backwards anaphora is composite and quantitatively gradable. It includes the contribution from the Principle C effect; but its overall magnitude further varies depending on a wide range of factors common to pronominal reference resolution in backwards anaphora in general. The overall obviation effect varies with the salience of *the discourse antecedent*, i.e., it is dependent on the

subjecthood, topicality, prosodic prominence of the co-indexed overt nominal linearly preceding the name. Further factors influencing the magnitude of the overall obviation effect are of diverse linguistic nature and include, but are not limited to, plausibility of coconstrual (Not)-At-Issue status of the proposition containing the two nominals, and processing difficulty.

In my dissertation, I presented experimental evidence demonstrating that each of these factors exert substantial influence on speakers' judgments of coconstrual acceptability in backwards anaphora. In Chapter 2, I have shown that while participants allow coconstrual in sentences where Principle C would prohibit it, they do not allow it haphazardly or across the board. Instead, the findings of Experiment 1 and Experiment 2 show that acceptability of coconstrual in structurally marked backwards anaphora varies depending on conceptual plausibility, the same way as it does with cases of pronominal reference resolution not subject to syntactic restrictions on coconstrual. Experiment 1 and Experiment 2 have also revealed an effect of structural position of the c-commanding pronoun on speakers' preference for intra-sentential coconstrual: whenever a pronoun c-commands a name from non-subject position, acceptability of coconstrual increases. I have eventually argued that these two factors – plausibility and structural position of the pronoun – interact with one another and yield a systematic additive effect. Non-subject position of the pronominal antecedent implicates information structure and incremental processing of content, which allows for plausibility to exert significant influence on coconstrual acceptability. These findings override accounts that only appeal to syntactic Principle C, and substantially complement theoretical approaches that appeal to pragmatic expectations.

In Chapter 3, I investigated a possible reason behind the subject/non-subject asymmetry revealed in Chapter 2 and experimentally tested a hypothesis that this asymmetry is in part due to syntactic movement. I hypothesized that when plausibility of coconstrual is high, charitable speakers may attempt to accommodate a plausible interpretation via structural reanalysis where a constituent containing a name is moved outside the c-commanding domain of the pronoun. Assuming locality of movement (Baltin 1981, 1983, 2006, Bruening 2018, Guéron 1980, Overfelt 2015), such syntactic transformation could bleed Principle C for Spec vP, but not Spec TP pronouns, which would contribute to the observed asymmetry. However,

the findings of Experiment 3 demonstrated that rightward movement of the constituent containing the name does not influence speakers' judgments with respect to the choice of pronominal referent. Moreover, the obtained empirical evidence showed that the moved constituent reconstructs; and Principle C is evaluated with the name in its base-generated position. Therefore, I argued that increased acceptability of coconstrual with non-subject pronouns persists under c-command and is due to factors other than the binding relation between the pronoun and the name.

I refined these observations in Chapter 4 showing that a stronger overall obviation effect with subject pronouns is not restricted to backwards anaphora with Principle C effects, but is common to all cases of backwards anaphora, including structurally neutral ones. Based on the findings of Experiment 4, I proposed that depressed rate of preference for coconstrual with a subject pronoun stems from increased salience associated with subject position. I further argued that increased salience, a factor which makes a DP a more likely antecedent during pronominal reference resolution in forwards anaphora (Ariel 1990, Almor 1999, Gelormini-Lezama and Almor 2011, Gordon et al. 1993, Gundel et al. 1993, Kennison and Gordon 1997, de Carvalho Maia et al. 2017), has a reverse effect when it comes to backwards anaphora, where increased pronominal salience leads to lower acceptability of coconstrual. In structurally marked backwards anaphora, where the Principle C effect is active, pronominal salience further adds to the overall obviation effect, which leads to a near-floor preference for intra-sentential coconstrual with subject, but not with object pronouns.

This proposal on the role of antecedent salience during pronominal reference resolution in backwards anaphora has a specific prediction that a stronger overall obviation effect will be observed not only with subject pronouns, which are structurally salient, but also with focused pronouns, whose salience is prosodic. In Chapter 5, I tested this prediction. Experiments 5 and 6 provided us with evidence that focus on a non-subject pronoun in structurally marked backwards anaphora suppresses preference for intra-sentential coconstrual, similarly to the effect of structural subjecthood. These findings offered further support to the proposal on the role of pronominal salience in pronominal reference resolution in backwards anaphora. In addition, the results of Experiments 5 and 6 showed that increased processing difficulty also has an effect on speakers' judgments of coconstrual acceptability leading to a weaker

overall obviation effect.

Finally, in Chapter 6 I revisited two factors – plausibility and the course of incremental processing – to demonstrate that the overall obviation effect further varies based on the information status of the proposition hosting the pronoun-name sequence. The findings of Experiments 7 and 8 provided additional support to my proposal on the status of the Principle C effect: again, we observed that the acceptability of coconstrual between a pronoun and a name in its c-commanding domain is not determined solely by the structural relation between the two (i.e., by Principle C). Instead I demonstrated that (Not)-At-Issue status of the proposition hosting a structurally marked coconstrual exerts a robust influence on interpretation.

7.2 Final remarks

The experimental evidence and the analysis presented in this dissertation demonstrate that comprehenders can overcome strong syntactic markedness when other factors support an interpretation otherwise disfavored by the grammar. These findings raise questions that are central to both the theory of the grammar and the theory of language processing. Even more importantly, they provide us with novel knowledge that deepens our understanding of the relationship between the two. How do we process linguistic input while taking into consideration multiple grammar-internal and grammar-external factors? How do we arrive at an interpretation when such factors are in conflict with each other? And, more generally, what is the relationship between core grammar and processing architecture?

The Cooperative Principle (Grice 1975) states that both the speaker and the comprehender have effective communication as a goal. For the speaker, this means producing an utterance in a way that maximizes the chance that the comprehender will access the intended message. For the comprehender, it means taking into account multiple factors associated with the speaker's utterance: the choice of vocabulary, prosodic contour, both linguistic and extra-linguistic contexts, as well as background knowledge shared by the speaker and the comprehender. Further, based on their knowledge of the *grammar*, the comprehender needs to parse this sentence and assign it an interpretation that is most compatible with the combination of these factors.

Access to the grammar is central to both production and comprehension. The speaker accesses Universal Grammar, a cognitive system responsible for the human innate language capacity, when planning and producing an utterance; the comprehender accesses Universal Grammar during parsing. A further question concerns what this access to the grammar means for the application of The Cooperative Principle, i.e., what the role of UG is in establishing efficient information exchange.

The default setting for a cooperative linguistic interaction is that the speaker complies with the principles of the grammar when planning and producing an utterance, while the comprehender parses each sentence on assumption that the speaker has adhered to the grammar. In the special case of dependency formation and anaphoric relations, using the grammar *cooperatively* would mean that during production the speaker observes Binding Theory; and the comprehender parses the output also assuming that it is compliant with BT principles. In certain cases, these default settings may be overridden: the comprehender may encounter a structurally marked coconstrual and still favor an anaphoric interpretation disregarding the fact that it is ruled out by the principles of the grammar. Such cases are of particular interest, as they provide us with a unique insight into the role of the grammar during linguistic processing and, most importantly, they allow us to investigate and assess the *limitations* of the grammar's influence in this domain.

Principle C has been originally introduced as a categorical, binary principle of the grammar (Chomsky 1981); and much subsequent research has continued to view it as such (Bruening 2014, Chien and Wexler 1990, Grodzinsky and Reinhart 1993, Heim 1982, Kazanina et al. 2007, Reinhart 1983, Sag 2000). Consequently, the dominant solution to the aberrant cases where speakers can still access a coconstrual interpretation despite structural markedness has been to label such cases as exceptions to Principle C (e.g., as statements of *guises*, as in Heim (1982), “identity statements”, as in Grodzinsky and Reinhart (1993) and Levinson (2000), or “instantiation contexts” as in Evans (1980), Grodzinsky and Reinhart (1993) and Safir (2004)). In other words, these problematic data points have been discussed as special environments where Principle C simply does not apply. Moreover, an overwhelming portion of earlier research based their theoretical arguments on individual and largely non-uniform linguistic examples, while broad-scale experimental data collected in a controlled setting was

missing.

The findings presented in this dissertation are not consistent with the “exceptional environments” approach. I have demonstrated that there is no dichotomy between pronominal dependencies subject to Principle C where coconstrual is fully unacceptable vs. pronominal dependencies exempt from Principle C with fully acceptable coconstruals. Instead, I have presented previously unavailable experimental evidence that both structurally neutral and structurally marked coconstruals vary substantially in the degree of their acceptability.

To account for these findings within the framework of a categorical approach to Principle C, one would need to propose that varying acceptability judgments result from different sources of noise in the processing system, e.g., varying structural complexity of individual examples, their potential structural or semantic ambiguity, or the variations in required memory resources. However, this is not what we observe experimentally: the acceptability of structurally marked coconstruals predictably and systematically varies across cases of equal syntactic complexity, and when ambiguity and sentence length are also controlled for, i.e., across cases that are expected to be associated with similar degrees of processing difficulty. Moreover, I have pinpointed specific factors that cause this variability and demonstrated that manipulating these factors has a sustained effect on acceptability while processing difficulty is held constant.

Principle C is a part of the grammar; however, as I have demonstrated, it is not a categorical principle of the grammar, nor does it unequivocally rule out dependency relations between nominal expressions. Accordingly, cases where comprehenders can access a coconstrual interpretation despite structural markedness should not be viewed as exemptions to Principle C. Instead, I have argued that Principle C applies fully to a substantial portion of problematic data; but it does so in a non-categorical way. Given the c-command relation between the pronoun and the name, Principle C marks the two DPs in question as *obviative*, i.e., the grammar signals to the parser that the DPs in question are *not expected* to establish an anaphoric dependency, but it still remains a possibility.

Thus, my proposal assumes that Principle C is posited as a grammatical constraint on the parser, i.e., the parser has access to Principle C while building representations. At the same time, it is important to emphasize that during the course of language processing

the comprehender does not access merely Principle C, or the Binding Principles in general. Rather, the comprehender has constant access to the entire grammar. The principles and constraints governing dependency relations between nominal expressions do not exist as an isolated component of Universal Grammar. They are intrinsically connected to and present a manifestation of UG architectural properties. Further investigating these principles can therefore lead us to a deeper understanding of UG internal architecture.

Appendix A

Chapter 2: Norming Study, Experiment 1, Experiment 2

A.1 Experimental Stimuli

A.1.1 Test Items: DO constructions

(1) Norming Study:

- a. Emily gave Tommy her phone number.
- b. Mr. Barker gave Emily her report card.
- c. Richard gave Emily her contact information.

Experiments 1 and 2:

- a. She gave Tommy Emily's phone number.
- b. Mr. Barker gave her Emily's report card.
- c. Richard gave her Emily's contact information.

(2) Norming Study:

- a. Emily brought Ted her homemade brownies.
- b. The waiter brought Emily her choice wine.
- c. Jeff bought Emily her oil painting.

Experiments 1 and 2:

- a. She brought Ted Pamela's homemade brownies.
- b. The waiter brought her Pamela's choice wine.
- c. Jeff bought her Pamela's oil painting.

(3) Norming Study:

- a. Emily offered Jack her class notes.

- b. The waiter offered Emily her favorite entrée.
- c. Mark offered Emily her book to read.

Experiments 1 and 2:

- a. She offered Jack Pamela's class notes.
- b. The waiter offered her Pamela's favorite entrée.
- c. Mark offered her Pamela's book to read.

(4) Norming Study:

- a. Emily sent Grandfather her oatmeal cookies.
- b. The consulate sent Emily her visa.
- c. Jason sent Emily her new paper for review.

Experiments 1 and 2: excluded

(5) Norming Study:

- a. Emily showed Max her diary.
- b. Mr. Tomkins showed Emily her new desk.
- c. Ben showed Emily her live broadcast.

Experiments 1 and 2:

- a. She showed Max Emily's diary.
- b. Mr. Tomkins showed her Emily's new desk.
- c. Ben showed her Emily's live broadcast.

A.1.2 Test Items: ECM constructions

(6) Norming Study:

- a. Emily believed the doctors to have her scan results.
- b. The classmates believed Emily to have finished writing her essay.
- c. The gallery owners believed Emily to admire her painting.

Experiments 1 and 2:

- a. She believed the doctors to have Emily's scan results.

- b. The classmates believed her to have finished writing Emily's essay.
- c. The gallery owners believed her to admire Emily's painting.

(7) Norming Study:

- a. Emily believed the medicine to have helped her father.
- b. Grandpa Nick believed Emily to be visiting her twin sister.
- c. Steven believed Emily to have never met her best friend.

Experiments 1 and 2:

- a. She believed the medicine to have helped Pamela's father.
- b. Grandpa Nick believed her to be visiting Pamela's twin sister.
- c. Steven believed her to have never met Pamela's best friend.

(8) Norming Study:

- a. Emily allowed the social workers to speak with her daughter.
- b. The doctors allowed Emily to visit her grandfather in ICU.
- c. Mom and Dad allowed Emily to go on a date with her older brother.

Experiments 1 and 2:

- a. She allowed the social workers to speak with Pamela's daughter.
- b. The doctors allowed her to visit Pamela's grandfather in ICU.
- c. Mom and Dad allowed her to go on a date with Pamela's older brother.

(9) Norming Study:

- a. Emily allowed James to read her personal correspondence.
- b. Mr. Mathews allowed Emily to resubmit her paper.
- c. Mr. Adams allowed Emily to borrow her notes for the exam.

Experiments 1 and 2:

- a. She allowed James to read Emily's personal correspondence.
- b. Mr. Mathews allowed her to resubmit Emily's paper.
- c. Mr. Adams allowed her to borrow Emily's notes for the exam.

(10) Norming Study:

- a. Emily expected the detectives to find her birth mother.
- b. Mr. Schulz expected Emily to explain the project to her colleagues.
- c. Mr. Gordon expected Emily to invite her brother to the prom.

Experiments 1 and 2: excluded

(11) Norming Study:

- a. Emily expected the nurses to understand her condition.
- b. Tod expected Emily to be at her desk.
- c. Mark expected Emily to enjoy her book.

Experiments 1 and 2: excluded

(12) Norming Study:

- a. Emily needed the police to protect her family.
- b. The dentists needed Emily to bring her daughter in.
- c. The girls needed Emily to steal her boyfriend.

Experiments 1 and 2:

- a. She needed the police to protect Pamela's family.
- b. The dentists needed her to bring Pamela's daughter in.
- c. The girls needed her to steal Pamela's boyfriend.

(13) Norming Study:

- a. Emily needed the HR department to seal her personal file.
- b. The parents needed Emily to sell her car.
- c. Jack needed Emily to buy out her share of the company.

Experiments 1 and 2: excluded

(14) Norming Study:

- a. Emily wanted the doctors to cure her mother.
- b. The grandparents wanted Emily to share a room with her sister.

- c. Tim wanted Emily to meet her cousin.

Experiments 1 and 2:

- a. She wanted the doctors to cure Emily's mother.
- b. The grandparents wanted her to share a room with Emily's sister.
- c. Tim wanted her to meet Emily's cousin.

(15) Norming Study:

- a. Emily wanted Tim to watch her favorite movie.
- b. Mr. Richards wanted Emily to submit her homework.
- c. Mr. Clark wanted Emily to borrow her laptop for the presentation.

Experiments 1 and 2:

- a. She wanted Tim to watch Pamela's favorite movie.
- b. Mr. Richards wanted her to submit Pamela's homework.
- c. Mr. Clark wanted her to borrow Pamela's laptop for the presentation.

A.1.3 Control Items: Forward anaphora, high plausibility of co-construal

- (16) Emily's coach is really pleased with her.
- (17) Pamela's dad took her to Six Flags last weekend.
- (18) Emily's dog bit her yesterday.
- (19) Pamela's mom took her to a day spa over the weekend.
- (20) Emily's car let her down again last week.
- (21) Pamela's friends were planning a surprise birthday party for her.
- (22) Emily's classmates enjoyed her presentation a lot.

A.1.4 Control Items: Forward anaphora, low plausibility of coconstrual

- (23) Emily's story brought her to tears.

- (24) Pamela's outburst surprised her a lot.
- (25) Pamela's car drove by so quickly that she jumped. ex Emily's dancing was so captivating that she could not look away from the stage.
- (26) At the next table was Emily's fiancé, whom she had never met before.
- (27) Pamela's talk was so interesting that she forgot she needed to leave early.
- (28) Emily's speech was so long that she started to fall asleep.

A.1.5 Instructions to Participants

During this study you will read some sentences. Each sentence will report a fact about one of the two girls: **Emily** or **Pamela**. You will also see the images of the two girls on the screen. After you have read the sentence you will be asked to select the girl you think the sentence was about. In other words, your job is to figure out whether the "she" or the "her" in the sentence was about Emily or Pamela. To make your selection, press **E** or **P** on the response pad. Once you respond, the experiment will automatically move on to the next sentence.

Appendix B

Chapter 3: Acceptability Ranking Task

B.1 Test Items

TYPE: V + DP (LIGHT)

- (1)
 - a. Sarah bought a used Toyota Corolla.
 - b. Sarah bought yesterday a used Toyota Corolla.
 - c. Sarah bought happily a used Toyota Corolla.
 - d. Sarah bought surprisingly a used Toyota Corolla.
- (2)
 - a. Amy built a tall sandcastle.
 - b. Amy built yesterday a tall sandcastle.
 - c. Amy built quickly a tall sandcastle.
 - d. Amy built surprisingly a tall sandcastle.
- (3)
 - a. Lucas fixed a broken lamp.
 - b. Lucas fixed yesterday a broken lamp.
 - c. Lucas fixed easily a broken lamp.
 - d. Lucas fixed surprisingly a broken lamp.
- (4)
 - a. Jason baked a delicious cake.
 - b. Jason baked yesterday a delicious cake.
 - c. Jason baked quickly a delicious cake.
 - d. Jason baked surprisingly a delicious cake.

TYPE: V + DP (HEAVY)

- (5)
 - a. Sarah ordered an extremely delicious battered and spiced Tandoori Chicken.

- b. Sarah ordered yesterday an extremely delicious battered and spiced Tandoori Chicken.
 - c. Sarah ordered hastily an extremely delicious battered and spiced Tandoori Chicken.
 - d. Sarah ordered fortunately an extremely delicious battered and spiced Tandoori Chicken.
- (6)
- a. Amy purchased a brand-new mahogany dining room table from Ethan Allen.
 - b. Amy purchased yesterday a brand-new mahogany dining room table from Ethan Allen.
 - c. Amy purchased happily a brand-new mahogany dining room table from Ethan Allen.
 - d. Amy purchased fortunately a brand-new mahogany dining room table from Ethan Allen.
- (7)
- a. Lucas bought a very large bright green designer snakeskin handbag.
 - b. Lucas bought yesterday a very large bright green designer snakeskin handbag.
 - c. Lucas bought promptly a very large bright green designer snakeskin handbag.
 - d. Lucas bought fortunately a very large bright green designer snakeskin handbag.
- (8)
- a. Jason designed a rather elaborate early language acquisition study.
 - b. Jason designed yesterday a rather elaborate early language acquisition study.
 - c. Jason designed beautifully a rather elaborate early language acquisition study.
 - d. Jason designed fortunately a rather elaborate early language acquisition study.

TYPE: V + DP + PP (LIGHT)

- (9)
- a. Sarah showed a house to Amy.
 - b. Sarah showed a house yesterday to Amy.
 - c. Sarah showed a house swiftly to Amy.
 - d. Sarah showed a house unexpectedly to Amy.
- (10)
- a. Amy gave an award to Robert.
 - b. Amy gave an award yesterday to Robert.

- c. Amy gave an award promptly to Robert.
 - d. Amy gave an award unexpectedly to Robert.
- (11)
- a. Lucas delivered a parcel to Nina.
 - b. Lucas delivered a parcel yesterday to Nina.
 - c. Lucas delivered a parcel promptly to Nina.
 - d. Lucas delivered a parcel unexpectedly to Nina.
- (12)
- a. Jason offered a job to Robert.
 - b. Jason offered a job yesterday to Robert.
 - c. Jason offered a job promptly to Robert.
 - d. Jason offered a job unexpectedly to Robert.

TYPE: V + DP + PP (HEAVY)

- (13)
- a. Sarah sent a complaint to the Macy's customer service and support department.
 - b. Sarah sent a complaint yesterday to the Macy's customer service and support department.
 - c. Sarah sent a complaint distractedly to the Macy's customer service and support department.
 - d. Sarah sent a complaint interestingly to the Macy's customer service and support department.
- (14)
- a. Amy presented a talk to the 10th graders from the Montgomery school district.
 - b. Amy presented a talk yesterday to the 10th graders from the Montgomery school district.
 - c. Amy presented a talk distractedly to the 10th graders from the Montgomery school district.
 - d. Amy presented a talk interestingly to the 10th graders from the Montgomery school district.
- (15)
- a. Lucas gave a check to the Rutgers Linguistics Department administrative assistant.

- b. Lucas gave a check yesterday to the Rutgers Linguistics Department administrative assistant.
 - c. Lucas gave a check distractedly to the Rutgers Linguistics Department administrative assistant.
 - d. Lucas gave a check interestingly to the Rutgers Linguistics Department administrative assistant.
- (16)
- a. Jason offered a position to the most experienced candidate in the applicant pool.
 - b. Jason offered a position yesterday to the most experienced candidate in the applicant pool.
 - c. Jason offered a position formally to the most experienced candidate in the applicant pool.
 - d. Jason offered a position interestingly to the most experienced candidate in the applicant pool.

TYPE: V + PP + DP (LIGHT)

- (17)
- a. Sarah gave to Robert a blueberry muffin.
 - b. Sarah gave to Robert yesterday a blueberry muffin.
 - c. Sarah gave to Robert shyly a blueberry muffin.
 - d. Sarah gave to Robert oddly a blueberry muffin.
- (18)
- a. Amy sent to Brandon a heartfelt letter.
 - b. Amy sent to Brandon yesterday a heartfelt letter.
 - c. Amy sent to Brandon shyly a heartfelt letter.
 - d. Amy sent to Brandon oddly a heartfelt letter.
- (19)
- a. Lucas donated to the church a warm coat.
 - b. Lucas donated to the church yesterday a warm coat.
 - c. Lucas donated to the church reluctantly a warm coat.
 - d. Lucas donated to the church oddly a warm coat.
- (20)
- a. Jason offered to Ellen a cold drink.

- b. Jason offered to Ellen yesterday a cold drink.
- c. Jason offered to Ellen quietly a cold drink.
- d. Jason offered to Ellen oddly a cold drink.

TYPE: V + PP + DP (HEAVY)

- (21) a. Sarah transferred to Brandon earnings from her investments and assets in the past quarter.
- b. Sarah transferred to Brandon yesterday earnings from her investments and assets in the past quarter.
- c. Sarah transferred to Brandon promptly earnings from her investments and assets in the past quarter.
- d. Sarah transferred to Brandon luckily earnings from her investments and assets in the past quarter.
- (22) a. Amy gave to Nina a brand-new navy blue suit from the local menswear department store.
- b. Amy gave to Nina yesterday a brand-new navy blue suit from the local menswear department store.
- c. Amy gave to Nina reluctantly a brand-new navy blue suit from the local menswear department store.
- d. Amy gave to Nina luckily a brand-new navy blue suit from the local menswear department store.
- (23) a. Lucas offered to Amy a clean warm bed in his newly founded Bed and Breakfast in Vermont.
- b. Lucas offered to Amy yesterday a clean warm bed in his newly founded Bed and Breakfast in Vermont.
- c. Lucas offered to Amy reluctantly a clean warm bed in his newly founded Bed and Breakfast in Vermont.
- d. Lucas offered to Amy luckily a clean warm bed in his newly founded Bed and Breakfast in Vermont.

- (24) a. Jason brought to Amy a basket of poppy seed muffins from the local organic bakery.
- b. Jason brought to Amy yesterday a basket of poppy seed muffins from the local organic bakery.
- c. Jason brought to Amy shyly a basket of poppy seed muffins from the local organic bakery.
- d. Jason brought to Amy luckily a basket of poppy seed muffins from the local organic bakery.

TYPE: V + DP + DP (LIGHT)

- (25) a. Sarah sent Amy a check.
- b. Sarah sent Amy yesterday a check.
- c. Sarah sent Amy reluctantly a check.
- d. Sarah sent Amy conveniently a check.
- (26) a. Amy offered Robert a drink.
- b. Amy offered Robert yesterday a drink.
- c. Amy offered Robert reluctantly a drink.
- d. Amy offered Robert conveniently a drink.
- (27) a. Lucas brought Brandon a pizza.
- b. Lucas brought Brandon yesterday a pizza.
- c. Lucas brought Brandon quickly a pizza.
- d. Lucas brought Brandon conveniently a pizza.
- (28) a. Jason bought Nina a watch.
- b. Jason bought Nina yesterday a watch.
- c. Jason bought Nina happily a watch.
- d. Jason bought Nina conveniently a watch.

TYPE: V + DP + DP (HEAVY)

- (29) a. Nina sent Robert a bill for the medical services from November of last year.

- b. Nina sent Robert yesterday a bill for the medical services from November of last year.
 - c. Nina sent Robert hastily a bill for the medical services from November of last year.
 - d. Nina sent Robert surprisingly a bill for the medical services from November of last year.
- (30)
- a. Ellen showed Brandon a secret garden hidden in the grounds of the royal palace.
 - b. Ellen showed Brandon yesterday a secret garden hidden in the grounds of the royal palace.
 - c. Ellen showed Brandon happily a secret garden hidden in the grounds of the royal palace.
 - d. Ellen showed Brandon surprisingly a secret garden hidden in the grounds of the royal palace.
- (31)
- a. Brandon offered Nina a seat at the dinner table next to his yesterday divorced cousin.
 - b. Brandon offered Nina yesterday a seat at the dinner table next to his yesterday divorced cousin.
 - c. Brandon offered Nina gracefully a seat at the dinner table next to his yesterday divorced cousin.
 - d. Brandon offered Nina surprisingly a seat at the dinner table next to his yesterday divorced cousin.
- (32)
- a. Robert brought Lucas a pie from Melbourne's most talked about baking company.
 - b. Robert brought Lucas yesterday a pie from Melbourne's most talked about baking company.
 - c. Robert brought Lucas reluctantly a pie from Melbourne's most talked about baking company.
 - d. Robert brought Lucas surprisingly a pie from Melbourne's most talked about baking company.

TYPE: V + ECM (LIGHT)

- (33) a. Nina wanted Brandon to come to the meeting.
- b. Nina wanted Brandon yesterday to come to the meeting.
- c. Nina wanted Brandon genuinely to come to the meeting.
- d. Nina wanted Brandon fortunately to come to the meeting.
- (34) a. Ellen needed Nina to find the money.
- b. Ellen needed Nina yesterday to find the money.
- c. Ellen needed Nina sorely to find the money.
- d. Ellen needed Nina fortunately to find the money.
- (35) a. Brandon believed Amy to have a dog.
- b. Brandon believed Amy yesterday to have a dog.
- c. Brandon believed Amy mistakenly to have a dog.
- d. Brandon believed Amy fortunately to have a dog.
- (36) a. Robert expected Ellen to pay the rent.
- b. Robert expected Ellen yesterday to pay the rent.
- c. Robert expected Ellen optimistically to pay the rent.
- d. Robert expected Ellen fortunately to pay the rent.

TYPE: V + ECM (HEAVY)

- (37) a. Nina allowed Jason to borrow her pickup truck to move the furniture to his new apartment in Brooklyn.
- b. Nina allowed Jason yesterday to borrow her pickup truck to move the furniture to his new apartment in Brooklyn.
- c. Nina allowed Jason reluctantly to borrow her pickup truck to move the furniture to his new apartment in Brooklyn.
- d. Nina allowed Jason unexpectedly to borrow her pickup truck to move the furniture to his new apartment in Brooklyn.

- (38) a. Ellen believed Robert to have some cash hidden under the mattress in his dorm room.
- b. Ellen believed Robert yesterday to have some cash hidden under the mattress in his dorm room.
- c. Ellen believed Robert fully to have some cash hidden under the mattress in his dorm room.
- d. Ellen believed Robert unexpectedly to have some cash hidden under the mattress in his dorm room.
- (39) a. Brandon expected Jason to be on time for his audition for the dancing part in the new school musical.
- b. Brandon expected Jason yesterday to be on time for his audition for the dancing part in the new school musical.
- c. Brandon expected Jason optimistically to be on time for his audition for the dancing part in the new school musical.
- d. Brandon expected Jason surprisingly to be on time for his audition for the dancing part in the new school musical.
- (40) a. Robert wanted Lucas to pick up an undelivered package from the post office on the way home.
- b. Robert wanted Lucas yesterday to pick up an undelivered package from the post office on the way home.
- c. Robert wanted Lucas truly to pick up an undelivered package from the post office on the way home.
- d. Robert wanted Lucas unexpectedly to pick up an undelivered package from the post office on the way home.

TYPE: V + CONTROL (LIGHT)

- (41) a. Nina asked Lucas to get some gooseberries.
- b. Nina asked Lucas yesterday to get some gooseberries.
- c. Nina asked Lucas quietly to get some gooseberries.

- d. Nina asked Lucas interestingly to get some gooseberries.
- (42) a. Ellen persuaded Jason to buy a Roomba.
- b. Ellen persuaded Jason yesterday to buy a Roomba.
- c. Ellen persuaded Jason quietly to buy a Roomba.
- d. Ellen persuaded Jason interestingly to buy a Roomba.
- (43) a. Brandon convinced Sarah to go skydiving.
- b. Brandon convinced Sarah yesterday to go skydiving.
- c. Brandon convinced Sarah quietly to go skydiving.
- d. Brandon convinced Sarah interestingly to go skydiving.
- (44) a. Robert reminded Sarah to buy pine nuts.
- b. Robert reminded Sarah yesterday to buy pine nuts.
- c. Robert reminded Sarah quietly to buy pine nuts.
- d. Robert reminded Sarah interestingly to buy pine nuts.

TYPE: V + CONTROL (HEAVY)

- (45) a. Nina told Jason to go through a stack of mail to see whether any of the missing bills were there.
- b. Nina told Jason yesterday to go through a stack of mail to see whether any of the missing bills were there.
- c. Nina told Jason loudly to go through a stack of mail to see whether any of the missing bills were there.
- d. Nina told Jason oddly to go through a stack of mail to see whether any of the missing bills were there.
- (46) a. Ellen persuaded Sarah to get coffee from a better coffee shop all the way across Central Park.
- b. Ellen persuaded Sarah yesterday to get coffee from a better coffee shop all the way across Central Park.
- c. Ellen persuaded Sarah loudly to get coffee from a better coffee shop all the way across Central Park.

- d. Ellen persuaded Sarah oddly to get coffee from a better coffee shop all the way across Central Park.
- (47) a. Brandon asked Ellen to read a history essay to check for any spelling or grammatical errors.
- b. Brandon asked Ellen yesterday to read a history essay to check for any spelling or grammatical errors.
- c. Brandon asked Ellen loudly to read a history essay to check for any spelling or grammatical errors.
- d. Brandon asked Ellen oddly to read a history essay to check for any spelling or grammatical errors.
- (48) a. Robert reminded Ellen to pick up her little brother from the elementary school around the corner.
- b. Robert reminded Ellen yesterday to pick up her little brother from the elementary school around the corner.
- c. Robert reminded Ellen loudly to pick up her little brother from the elementary school around the corner.
- d. Robert reminded Ellen oddly to pick up her little brother from the elementary school around the corner.

TYPE: V + FINITE (LIGHT)

- (49) a. Nina told Ellen that dinner was ready.
- b. Nina told Ellen yesterday that dinner was ready.
- c. Nina told Ellen politely that dinner was ready.
- d. Nina told Ellen luckily that dinner was ready.
- (50) a. Ellen persuaded Lucas that a deal was made.
- b. Ellen persuaded Lucas yesterday that a deal was made.
- c. Ellen persuaded Lucas easily that a deal was made.
- d. Ellen persuaded Lucas luckily that a deal was made.
- (51) a. Brandon convinced Jason that a new plan would fail.

- b. Brandon convinced Jason yesterday that a new plan would fail.
 - c. Brandon convinced Jason easily that a new plan would fail.
 - d. Brandon convinced Jason luckily that a new plan would fail.
- (52)
- a. Robert reminded Lucas that a new episode was on.
 - b. Robert reminded Lucas yesterday that a new episode was on.
 - c. Robert reminded Lucas sharply that a new episode was on.
 - d. Robert reminded Lucas luckily that a new episode was on.

TYPE: V + FINITE (HEAVY)

- (53)
- a. Nina persuaded Lucas that going to see “Mamma Mia II” was a complete and utter waste of time.
 - b. Nina persuaded Lucas yesterday that going to see “Mamma Mia II” was a complete and utter waste of time.
 - c. Nina persuaded Lucas quickly that going to see “Mamma Mia II” was a complete and utter waste of time.
 - d. Nina persuaded Lucas conveniently that going to see “Mamma Mia II” was a complete and utter waste of time.
- (54)
- a. Ellen told Jason that a new Steven King novel would be the greatest thriller written in the past 10 years.
 - b. Ellen told Jason yesterday that a new Steven King novel would be the greatest thriller written in the past 10 years.
 - c. Ellen told Jason quietly that a new Steven King novel would be the greatest thriller written in the past 10 years.
 - d. Ellen told Jason conveniently a new Steven King novel would be the greatest thriller written in the past 10 years.
- (55)
- a. Brandon convinced Robert that a new Rolex watch would be too expensive and flashy for his interview.
 - b. Brandon convinced Robert yesterday that a new Rolex watch would be too expensive and flashy for his interview.

- c. Brandon convinced Robert quickly that a new Rolex watch would be too expensive and flashy for his interview.
 - d. Brandon convinced Robert conveniently that a new Rolex watch would be too expensive and flashy for his interview.
- (56)
- a. Robert reminded Sarah that any money he put away for safekeeping would be in the cookie jar on top of the pantry.
 - b. Robert reminded Sarah yesterday that any money he put away for safekeeping would be in the cookie jar on top of the pantry.
 - c. Robert reminded Sarah gently that any money he put away for safekeeping would be in the cookie jar on top of the pantry.
 - d. Robert reminded Sarah conveniently that any money he put away for safekeeping would be in the cookie jar on top of the pantry.

B.1.1 Control Items

- (57) A man walked into the room who looked very much like Robert's younger brother.
- (58) A woman arrived who asked if she could talk to Ellen about a new insurance plan.
- (59) A book appeared in the stores that was written by Amy's advisor from Columbia.
- (60) A letter arrived in the mail that was addressed to Robert's younger brother Jason.
- (61) Jason read an article yesterday that discussed the rising student tuition in the United States.
- (62) Nina watched a movie last Friday that reminded her very much of Kubrick's early work.
- (63) Lucas bought a suit last week that makes him look very much like a mortician.
- (64) Ellen found a ring yesterday that she had lost over six months ago while spring cleaning.

B.1.2 Filler Items

- (65) Sarah masterfully designed a new performance arts building.

- (66) Amy generously donated two thousand dollars to the Breast Cancer Institute of New Jersey.
- (67) Nina proudly showed Robert her gold award certificate.
- (68) Ellen graciously offered Brandon two tickets for orchestra seats to the London's hottest show of the season.
- (69) Ms. Williams kindly allowed Jason to retake the test.
- (70) Lucas simply gave Ellen an apple.
- (71) Amy apologetically asked Jason if he remembered to bring the expensive glass bowl she had forgotten at his house.
- (72) Last weekend, Sarah baked her scrumptious double chocolate chip oatmeal cookies for the kids.
- (73) Two weeks ago, Ellen sent a postcard to Jason.
- (74) In the evening, Nina showed Brandon her newborn Basset Hound rescue puppy from the local shelter.
- (75) Later that day, Nina needed Jason to clean up the house before her parents returned from their trip to Russia.
- (76) After the class on Tuesday, Mr. Brody told Brandon to resubmit the paper.
- (77) Late in the evening on Friday, Sarah convinced Robert to pick up the dry cleaning before he came home from work.
- (78) In the morning, Brandon asked Nina if she had the money for gas.
- (79) Unfortunately, Ellen had to take her work home for the weekend.
- (80) Surprisingly, Sarah became so involved in the task that she did not notice that the class was over.
- (81) Interestingly, Robert was not required to undergo a background check before he received an appointment letter.
- (82) Unexpectedly, Jason found himself defending Lucas.
- (83) Oddly, Brandon was not surprised when her heard that the job was offered to another candidate.

- (84) Fortunately, Nina arrived to the office just in time for the staff meeting.
- (85) Luckily, Amy found a publisher who was interested in her book.
- (86) Nina wanted to invite Ellen for dinner last Friday.
- (87) Robert asked Jason to get him tickets for the game last Tuesday.
- (88) Lucas convinced Amy to trade in her old car yesterday.
- (89) Ellen bought a new Kindle Fire tablet yesterday.
- (90) Jason announced the date of his wedding almost six months ago.
- (91) Nina won a conference travel award from the Graduate Student Association yesterday.
- (92) Brandon has been acting rather strangely recently.
- (93) a. Nina gave to Robert a full gallon of apple cider from her cellar.
b. Nina gave a full gallon of apple cider from her cellar to Robert.
- (94) a. Lucas sent to Amy a neatly packed Christmas gift wrapped in bright red paper.
b. Lucas sent a neatly packed Christmas gift-wrapped in bright red paper to Amy.
- (95) a. Ellen offered to Robert a very interesting autobiography of an Italian soccer coach.
b. Ellen offered a very interesting autobiography of an Italian soccer coach to Robert.
- (96) a. Jason handed to Brandon a carefully sealed official-looking package with a blue stamp.
b. Jason handed a carefully sealed official-looking package with a blue stamp to Brandon.
- (97) a. Sarah showed to Lucas a rather ominous abandoned building in her neighborhood.
b. Sarah showed a rather ominous abandoned building in her neighborhood to Lucas.
- (98) a. Brandon presented to Nina a rather simple four-year plan to pay off her debts.

- b. Brandon presented a rather simple four-year plan to pay off her debts to Nina.
- (99) a. Amy gave to Ellen a very simple recipe for moist carrot cake recipe with cream cheese frosting.
- b. Amy gave a very simple recipe for moist carrot cake with cream cheese frosting to Ellen.
- (100) a. Robert sent to Jason a rather comprehensive draft of the paper with preliminary results.
- b. Robert sent a rather comprehensive draft of the paper with preliminary results to Jason.

B.1.3 Instructions to Participants

Welcome to the experiment!

Please make sure that your phone is turned off and nothing can distract you from the task. We are kindly asking you to maintain your concentration throughout the study.

You need to read every question carefully before you respond. The study includes some items that are used to determine whether you are paying attention to the task.

During this study you will be presented with a number of sentences. Some of them will be natural, grammatical sentences of English. Some of them will be ungrammatical. That is, they do not sound like something a native speaker would say. Still other sentences will be somewhat awkward – not entirely natural, but also not entirely ungrammatical either.

In each case, we would like you to consider the sentence and assign it with a ranking from 1 to 5 indicating how acceptable the sentence sounds to you.

1 indicates that a sentence is completely **unacceptable**: it is something that a native speaker will not say, and if you heard someone utter this sentence, you would think they are **not** a native speaker of English.

5 indicates that it is a perfectly **acceptable** sentence of English. A native speaker of English might indeed utter this sentence. If you heard someone utter this sentence, you would have no reason to think they are not a native speaker of English.

Full Likert Scale:

1 - fully unacceptable 2 - rather unacceptable 3 - in between 4 - rather acceptable 5 -
fully acceptable

Appendix C

Chapter 3, Experiment 3: Forced Choice Task

C.1 Test Items: Main set

- (1)
 - a. John told her yesterday to treat everyone at the party to a very large batch of Jane's homemade brownies.
 - b. John told her yesterday that everyone at the party would be counting on a very large batch of Jane's homemade brownies.
 - c. John told her to treat everyone at the party to a very large batch of Jane's homemade brownies.
 - d. John told her that everyone at the party would be counting on a very large batch of Jane's homemade brownies.
- (2)
 - a. John told her yesterday to talk to the on-call emergency physician about Kate's test results.
 - b. John told her yesterday that the on-call emergency physician should be contacted about Kate's test results.
 - c. John told her to talk to the on-call emergency physician about Kate's test results.
 - d. John told her that the on-call emergency physician should be contacted about Kate's test results.
- (3)
 - a. John told her yesterday to order one more slice of buffalo chicken pizza with extra cheese for Jane's twin sister.
 - b. John told her yesterday that one more slice of buffalo chicken pizza with extra cheese should be ordered for Jane's twin sister.
 - c. John told her to order one more slice of buffalo chicken pizza with extra cheese for Jane's twin sister.

- d. John told her that one more slice of buffalo chicken pizza with extra cheese should be ordered for Jane's twin sister.
- (4)
- a. John told her yesterday to watch the morning news for a surprising announcement about Kate's next-door neighbor.
 - b. John told her yesterday that there would be a surprising announcement on the morning news about Kate's next-door neighbor.
 - c. John told her to watch the morning news for a surprising announcement about Kate's next-door neighbor.
 - d. John told her that there would be a surprising announcement on the morning news about Kate's next-door neighbor.
- (5)
- a. John told her yesterday to clean all of the takeout boxes and paper bags out of Jane's dorm room.
 - b. John told her yesterday that all the takeout boxes and paper bags should be cleaned out of Jane's dorm room.
 - c. John told her to clean all of the takeout boxes and paper bags out of Jane's dorm room.
 - d. John told her that all the takeout boxes and paper bags should be cleaned out of Jane's dorm room.
- (6)
- a. John reminded her yesterday to confirm the date of delivery for the online order for three large cases of Kate's choice wine.
 - b. John reminded her yesterday that a delivery man would drop off the online order for three large cases of Kate's choice wine.
 - c. John reminded her to confirm the date of delivery for the online order for three large cases of Kate's choice wine.
 - d. John reminded her that a delivery man would drop off the online order for three large cases of Kate's choice wine.
- (7)
- a. John reminded her yesterday to fix the most prominent spelling mistakes and grammatical errors in Jane's personal correspondence.

- b. John reminded her yesterday that the most prominent spelling mistakes and grammatical errors should be fixed in Jane's personal correspondence.
 - c. John reminded her to fix the most prominent spelling mistakes and grammatical errors in Jane's personal correspondence.
 - d. John reminded her that the most prominent spelling mistakes and grammatical errors should be fixed in Jane's personal correspondence.
- (8)
- a. John reminded her yesterday to send a handmade birthday card and a birthday cake to Kate's grandfather.
 - b. John reminded her yesterday that a handmade birthday card and a birthday cake would be a great treat for Kate's grandfather.
 - c. John reminded her to send a handmade birthday card and a birthday cake to Kate's grandfather.
 - d. John reminded her that a handmade birthday card and a birthday cake would be a great treat for Kate's grandfather.
- (9)
- a. John reminded her yesterday to send the kids' latest report cards and other school updates to Jane's ex-husband.
 - b. John reminded her yesterday that the kids' latest report cards and other school updates should be sent to Jane's ex-husband.
 - c. John reminded her to send the kids' latest report cards and other school updates to Jane's ex-husband.
 - d. John reminded her that the kids' latest report cards and other school updates should be sent to Jane's ex-husband.
- (10)
- a. John reminded her yesterday to retrieve the old box of vintage jazz records from the basement in Kate's parents' house.
 - b. John reminded her yesterday that the old box of vintage jazz records should be retrieved from the basement in Kate's parents' house.
 - c. John reminded her to retrieve the old box of vintage jazz records from the basement in Kate's parents' house.

- d. John reminded her that the old box of vintage jazz records should be retrieved from the basement in Kate's parents' house.
- (11)
- a. John persuaded her yesterday to invite all the members of the film club to a special screening of Jane's favorite movie.
 - b. John persuaded her yesterday that all the members of the film club should be invited to a special screening of Jane's favorite movie.
 - c. John persuaded her to invite all the members of the film club to a special screening of Jane's favorite movie.
 - d. John persuaded her that all the members of the film club should be invited to a special screening of Jane's favorite movie.
- (12)
- a. John persuaded her yesterday to discuss the matters surrounding the unexpectedly low grades on Kate's report card.
 - b. John persuaded her yesterday that there should be a discussion of the unexpectedly low grades on Kate's report card.
 - c. John persuaded her to discuss the matters surrounding the unexpectedly low grades on Kate's report card.
 - d. John persuaded her that there should be a discussion of the unexpectedly low grades on Kate's report card.
- (13)
- a. John persuaded her yesterday to pass down the priceless family heirloom ring and necklace to Jane's daughter.
 - b. John persuaded her yesterday that the priceless family heirloom ring and necklace should be passed down to Jane's daughter.
 - c. John persuaded her to pass down the priceless family heirloom ring and necklace to Jane's daughter.
 - d. John persuaded her that the priceless family heirloom ring and necklace should be passed down to Jane's daughter.
- (14)
- a. John persuaded her yesterday to make a Tuesday morning appointment for a new workout session with Kate's personal trainer.

- b. John persuaded her yesterday that a new workout session on Tuesday morning required an appointment with Kate's personal trainer.
 - c. John persuaded her to make a Tuesday morning appointment for a new workout session with Kate's personal trainer.
 - d. John persuaded her that a new workout session on Tuesday morning required an appointment with Kate's personal trainer.
- (15)
- a. John persuaded her yesterday to buy a few new inspirational posters and statues for the space above Jane's new desk.
 - b. John persuaded her yesterday that a few new inspirational posters and statues would nicely fit the space above Jane's new desk.
 - c. John persuaded her to buy a few new inspirational posters and statues for the space above Jane's new desk.
 - d. John persuaded her that a few new inspirational posters and statues would nicely fit the space above Jane's new desk.
- (16)
- a. John convinced her yesterday to inquire with the cheerful French waiter about the ingredients in Kate's favorite entrée.
 - b. John convinced her yesterday that the cheerful French waiter should know about the ingredients in Kate's favorite entrée.
 - c. John convinced her to inquire with the cheerful French waiter about the ingredients in Kate's favorite entrée.
 - d. John convinced her that the cheerful French waiter should know about the ingredients in Kate's favorite entrée.
- (17)
- a. John convinced her yesterday to keep social media like Facebook and Instagram free of the details of Jane's private life.
 - b. John convinced her yesterday that social media like Facebook and Instagram were not the place for the details of Jane's private life.
 - c. John convinced her to keep social media like Facebook and Instagram free of the details of Jane's private life.

- d. John convinced her that social media like Facebook and Instagram were not the place for the details of Jane's private life.
- (18)
- a. John convinced her yesterday to go for dinner at the new Italian restaurant on Hamilton Ave with Kate's father.
 - b. John convinced her yesterday that the new Italian restaurant on Hamilton Ave would be great for dinner with Kate's father.
 - c. John convinced her to go for dinner at the new Italian restaurant on Hamilton Ave with Kate's father.
 - d. John convinced her that the new Italian restaurant on Hamilton Ave would be great for dinner with Kate's father.
- (19)
- a. John convinced her yesterday to send a short apologetic text message after an argument with Jane's best friend.
 - b. John convinced her yesterday that a short apologetic text message was necessary after an argument with Jane's best friend.
 - c. John convinced her to send a short apologetic text message after an argument with Jane's best friend.
 - d. John convinced her that a short apologetic text message was necessary after an argument with Jane's best friend.
- (20)
- a. John convinced her yesterday to donate a new state-of-the-art set of dumbbells and weights to Kate's local gym.
 - b. John convinced her yesterday that a new state-of-the-art set of dumbbells and weights would help out Kate's local gym.
 - c. John convinced her to donate a new state-of-the-art set of dumbbells and weights to Kate's local gym.
 - d. John convinced her that a new state-of-the-art set of dumbbells and weights would help out Kate's local gym.

C.2 Test items: secondary set

- (21)
- a. John believes that she burned the manuscript of Kate's almost completed book.

- b. John believes her to have burned the manuscript of Kate's almost completed book.
- (22) a. John asked that she allow the social workers to speak with Jane's daughter.
b. John asked her to allow the social workers to speak with Jane's daughter.
- (23) a. John believed that she encouraged everyone to watch Kate's favorite movie.
b. John believed her to have encouraged everyone to watch Kate's favorite movie.
- (24) a. John believed that she asked the police to protect Jane's family.
b. John believed her to have asked the police to protect Jane's family.
- (25) a. John asked that she allow the parents to read Kate's personal correspondence.
b. John asked her to allow the parents to read Kate's personal correspondence.
- (26) a. John asked that she postponed visiting Jane's grandfather in the ICU.
b. John asked her to postpone visiting Jane's grandfather in the ICU that morning.

C.3 Control Items

Subject control infinitival embedded clause:

- (27) She promised John to read aloud a passage from Jane's favorite book.
- (28) She hoped to uncover the ripped out pages of Kate's diary.
- (29) She tried to find a vegetarian dinner option for Jane's cousin.
- (30) She managed to conceal the disastrous soda spill from Kate's roommate.
- (31) She was eager to volunteer at a fundraiser at Jane's local library.
- (32) She promised John to not tell anyone in the office about Kate's job interview.
- (33) She hoped to finally find Jane's long-lost medical records.
- (34) She tried to explain the overly complicated movie plot to Kate's uncle.
- (35) She managed to thoroughly follow the diet advice from Jane's yoga instructor.
- (36) She was eager to replace all the old appliances in Kate's apartment.

Finite embedded clause:

- (37) She said that there was a lot of misunderstanding at Jane's last place of work.
- (38) She agreed that the cellphone picture was not suitable for Kate's travel passport.
- (39) She insisted that the tax attorney should promptly contact Jane's stepmother.
- (40) She argued that the Social Studies teacher constantly favored Kate's classmate.
- (41) She decided that it was not safe enough on Jane's street.
- (42) She said that the entire office should support Kate's preferred candidate.
- (43) She agreed that the grades were subpar on Jane's unofficial transcript.
- (44) She insisted that all the inheritance go to Kate's brother.
- (45) She argued that \$100 was too high a price for a class with Jane's Italian tutor.
- (46) She suggested that John should purchase fruit from Kate's local market.

C.4 Filler Items

- (47) Jane asked John last night to raise the volume of the radio during her favorite song.
- (48) Kate forced John right after the meeting to use his connections to find a publisher for her unfinished novel.
- (49) Jane told John before dinner to stop bringing up politics with her parents.
- (50) Kate reminded John in the morning to bring an extra water bottle for her running buddy.
- (51) Jane convinced John to take her usual route on their way to the office.
- (52) Kate asked John repeatedly to stop bringing up her biggest worry.
- (53) Jane asked John to return to the classroom and look for her lecture notes.
- (54) Kate told John to cut out swearing around her children.
- (55) Jane reminded John to send the check for tutoring to her Algebra teacher.
- (56) Kate convinced John to stop by the dinner party at her friend's house.
- (57) John asked Jane on Friday to call the vet and make an appointment for her cat.
- (58) John asked Kate later in the evening to rehearse the songs for her musical performance.

- (59) John forced Jane to transfer to him the earnings from all her investments.
- (60) John reminded Kate after dinner to take out the trash and clean her room.
- (61) John convinced Jane today to study more for her exam.
- (62) John asked Kate to take tons of pictures on her vacation.
- (63) John reminded Jane in the morning to throw some extra napkins into her picnic basket.
- (64) John convinced Kate to postpone the book club meeting at her house.
- (65) John asked Jane to share with him the recipe of her pumpkin pie.
- (66) John convinced Kate to reconsider giving the family heirloom to her boyfriend.
- (67) John reminded Jane in the morning to fill out the field trip permission form for her children.
- (68) John told Kate to think of a topic for her senior thesis.
- (69) John reminded Jane to put out the Halloween decorations on her lawn.
- (70) John asked Kate to buy a new couch for her office.
- (71) John reminded Jane to promptly submit her resume.
- (72) John convinced Kate to plan a surprise birthday party for her sister.
- (73) John asked Jane to take on another shift at her job.
- (74) After the failed attempt at baking a cake from scratch, Kate forced her to look up a recipe.
- (75) Even with the warmer weather, Jane persuaded her to take a coat to work just in case it got cold later.
- (76) When it rained, Kate wanted her to leave any muddy shoes by the front door instead of walking inside.
- (77) Before the birthday party, Jane expected her to buy a birthday cake, decorations, and presents.
- (78) After the swimming practice, Kate told her to pick up some fresh fruits and vegetables on the way home.

- (79) Jane reminded her to submit any final assignments before going away on vacation for winter break.
- (80) After the break-in, Kate let her install new security cameras and locks at all the entrances.
- (81) Last Saturday, Jane convinced her to take a bus into the city instead of taking the train.
- (82) Kate's story brought her to tears yesterday.
- (83) Jane's outburst surprised her a lot last night.
- (84) Kate's decision to quit the job did not surprise her at all.
- (85) Jane's friendship was the one thing that helped her through high school.
- (86) Kate's gift was a complete surprise for her.
- (87) Yesterday Jane was looking for a study partner, and she was happy to help out.
- (88) Last night Kate asked for more ketchup during dinner, and she brought the bottle from the fridge.
- (89) In the evening Jane looked so happy, that she could not help but ask what the good news was.
- (90) Before the trip, Kate wanted to find someone to share a room with, and she agreed to split the costs.
- (91) Jane asked if there was any coffee left, and she brought the pot from the kitchen.
- (92) Kate needed to find a strong candidate for this position, and she seemed to be a perfect choice.
- (93) Jane has always liked horror movies, and she has always hated them.
- (94) Kate's favorite author is Ray Bradbury, and she loves books by Hemingway.
- (95) To proofread Kate's draft, she would have to have better glasses.
- (96) For her to proofread Kate's draft would take at least two days.
- (97) To submit Jane's assignment on time, she would have to get up really early.
- (98) For her to submit Jane's assignment on time would be really difficult.

- (99) To ask James to read Kate's paper, she would need to offer him something in return.
- (100) For her to ask James to read Kate's paper would be surprising.

Appendix D

Chapter 4, Experiment 4: Forced Choice Task

D.1 Test Items

Subject Pronoun ((a) – no c-command / (b) – c-command)

- (1) a. What she wrote in that e-mail bothered Jane's professor a lot.
b. What did she write in that e-mail to Jane's professor?
- (2) a. What she said after the meeting surprised Kate's colleagues a lot.
b. What did she say after the meeting with Kate's colleagues?
- (3) a. What she found in the attic belonged to Jane's dad.
b. What did she find in the attic of Jane's dad's house?
- (4) a. What she brought home from the store could feed Kate's family for a week.
b. What did she bring home from the store for Kate's family?
- (5) a. What she learned working at ETS really helped impress Jane's new colleagues.
b. What did she learn working at ETS with Jane's new colleagues?
- (6) a. What she said just before dinner upset Kate's father a lot.
b. What did she say just before dinner with Kate's father?
- (7) a. What she was selling at the silent auction used to belong to Jane's mother.
b. What was she selling at the silent auction organized by Jane's mother?
- (8) a. What she cooked for the party made all of Kate's friends quite pleased.
b. What did she cook for the party for all of Kate's friends?
- (9) a. What she offered as a solution impressed Jane's Thermodynamics professor very much.

- b. What did she offer as a solution to Jane's Thermodynamics professor?
- (10) a. What she explained about Labov's gender paradox impressed Kate's classmates.
- b. What did she explain about Labov's gender paradox to Kate's classmates?

Non-Subject Pronoun: ((a) – no c-command / (b) – c-command)

- (11) a. What made her stay at home came as a surprise to Jane's cousin.
- b. What made her stay with Jane's cousin for a couple of weeks?
- (12) a. What forced her to drop out of college came as a complete surprise to Kate's parents.
- b. What forced her to drop out of college and move in with Kate's parents?
- (13) a. What helped her also helped Jane's brother.
- b. What helped her to stop fighting with Jane's brother?
- (14) a. What seemed encouraging to her did the exact opposite for Kate's roommate.
- b. What encouraged her to help out Kate's roommate?
- (15) a. What persuaded her to cancel the trip made Jane's parents worried.
- b. What persuaded her to go visit Jane's parents?
- (16) a. What helped her better prepare for the conference incentivized Kate's classmates as well.
- b. What made her present at the conference and invite Kate's classmates to the talk?
- (17) a. What helped her cope with the loss exhausted most of Jane's savings.
- b. What helped her cope with the loss of Jane's savings?
- (18) a. What forced her to quit worried Kate's employer very much.
- b. What forced her to talk about quitting with Kate's employer?
- (19) a. What encouraged her not to give up also helped Jane's friends stay more positive.
- b. What encouraged her not to give up when Jane's friends were so unsupportive?
- (20) a. What persuaded her to halt the project made Kate's architect furious.
- b. What persuaded her to halt the project proposed by Kate's architect?

D.2 Control Items

Subject control infinitival embedded clause:

- (21) She promised John to read aloud a passage from Jane's favorite book.
- (22) She hoped to uncover the ripped out pages of Kate's diary.
- (23) She tried to find a vegetarian dinner option for Jane's cousin.
- (24) She managed to conceal the disastrous soda spill from Kate's roommate.
- (25) She was eager to volunteer at a fundraiser at Jane's local library.
- (26) She promised John to not tell anyone in the office about Kate's job interview.
- (27) She hoped to finally find Jane's long-lost medical records.
- (28) She tried to explain the overly complicated movie plot to Kate's uncle.
- (29) She managed to thoroughly follow the diet advice from Jane's yoga instructor.
- (30) She was eager to replace all the old appliances in Kate's apartment.

Finite embedded clause:

- (31) She said that there was a lot of misunderstanding at Jane's last place of work.
- (32) She agreed that the cellphone picture was not suitable for Kate's travel passport.
- (33) She insisted that the tax attorney should promptly contact Jane's stepmother.
- (34) She argued that the Social Studies teacher constantly favored Kate's classmate.
- (35) She decided that it was not safe enough on Jane's street.
- (36) She said that the entire office should support Kate's preferred candidate.
- (37) She agreed that the grades were subpar on Jane's unofficial transcript.
- (38) She insisted that all the inheritance go to Kate's brother.
- (39) She argued that \$100 was too high a price for a class with Jane's Italian tutor.
- (40) She suggested that John should purchase fruit from Kate's local market.

D.2.1 Filler Items

- (41) What Kate always wanted was to take her daughter to Paris.
- (42) What Jane did that day really made her parents proud.
- (43) What Kate managed to achieve remained unnoticed by her family.
- (44) What Jane tried to do seemed unnecessary to her brother.
- (45) What really terrified Kate was the prospect of having to sell her house.
- (46) What really helped Jane pass the test was the notes Ted gave her.
- (47) What bothered Kate most was her neighbor being so rude.
- (48) What caused Jane to cancel the trip was how sick her dog was.
- (49) Kate asked Ted repeatedly to stop bringing up her biggest worry.
- (50) Jane asked Ted to return to the classroom and look for her lecture notes.
- (51) Kate told Ted to cut out swearing around her children.
- (52) Jane reminded Ted to send the check for tutoring to her Algebra teacher.
- (53) Kate convinced Ted to stop by the dinner party at her friend's house.
- (54) Ted forced Jane to transfer to him the earnings from all her investments.
- (55) Ted asked Kate to take tons of pictures on her vacation.
- (56) Ted convinced Kate to postpone the book club meeting at her house.
- (57) Ted asked Jane to share with him the recipe of her pumpkin pie.
- (58) Ted convinced Kate to reconsider giving the family heirloom to her boyfriend.
- (59) Ted told Kate to think of a topic for her senior thesis.
- (60) Ted reminded Jane to put out the Halloween decorations on her lawn.
- (61) Ted asked Kate to buy a new couch for her office.
- (62) Ted reminded Jane to promptly submit her resume.
- (63) Ted convinced Kate to plan a surprise birthday party for her sister.
- (64) Ted asked Jane to take on another shift at her job.

- (65) After the failed attempt at baking a cake from scratch, Kate forced her to look up a recipe.
- (66) Even with the warmer weather, Jane persuaded her to take a coat to work just in case it got cold later.
- (67) When it rained, Kate wanted her to leave any muddy shoes by the front door instead of walking inside.
- (68) Before the birthday party, Jane expected her to buy a birthday cake, decorations, and presents.
- (69) After the swimming practice, Kate told her to pick up some fresh fruits and vegetables on the way home.
- (70) Jane reminded her to submit any final assignments before going away on vacation for winter break.
- (71) After the break-in, Kate let her install new security cameras and locks at all the entrances.
- (72) Last Saturday, Jane convinced her to take a bus into the city instead of taking the train.
- (73) Kate's story brought her to tears yesterday.
- (74) Jane's outburst surprised her a lot last night.
- (75) Kate's decision to quit the job did not surprise her at all.
- (76) Jane's friendship was the one thing that helped her through high school.
- (77) Kate's gift was a complete surprise for her.
- (78) What she wrote bothers Jane now.
- (79) What did she write about Kate?
- (80) What used to amuse her bothers Jane now.
- (81) What made her write about Kate?

Appendix E

Chapter 5, Experiment 5: Forced Choice Task

E.1 Experimental Stimuli

E.1.1 Test Items: Object Comparatives

- (1) She is eating bigger breakfasts than Jane did last year.
- (2) She is eating smaller dinners than Mary did last year.
- (3) The manager offered her a greater discount than he offered Jane last year.
- (4) The travel agent offered her a better deal than he offered Mary last year.

E.1.2 Test Items: Subject Comparatives

- (5) More people wanted her to go to Aspen than to Mary's hometown.
- (6) More classmates wanted Alec to date her than Jane's next door neighbor.
- (7) More cast members introduced her to the male lead than to Mary's understudy.
- (8) More photographers recommended their own pictures to her than Jane's pictures.
- (9) More people talked to her about politics than about Mary's new haircut
- (10) More students talked to the department chair about her than to Jane's colleagues.

E.1.3 Control Items: ACD sentences

- (11) She is reading the same books as Jane did last year.
- (12) She visited the same cities as Mary did last year.

E.2 Instructions to Participants and Visual Stimuli

Please click on the right arrow to advance through the next few slides at a comfortable pace, as you read the instructions for the experiment.

Click  on the keyboard now.



This is Mary.

And this is Jane.



We will now share some facts with you about these girls. We will then ask you to answer some questions about what you've learned.

Each trial will have the same structure:

1. You will **see** the title slide, and you will click on  to advance to the following slide.
2. You will **see** the introduction slide and read it carefully. You will then click on  to advance to the main slide of the trial.
3. You will see the task presented on the screen. Once you have read the task, you will click on  to **see** and **hear** the target sentence (in blue) repeated twice.
4. You will **respond** to the target sentence on your answer sheet, then click  to move on.

Let's begin!

The first two scenarios will introduce you to the task. There will be no recorded sentences in those two: you will need to read the sentence (**in blue**) to yourself. The actual test session will have the sentences read out to you.

Click  on the keyboard now.

CATS

Please read this passage to interpret the slide that follows.

Mary and Jane both have cats.

Please read the following sentence carefully, in order to decide whether it is about either Mary or Jane.

She has more cats than Jane does.



On your response sheet, please circle the name of the girl that you think this sentence is about.

FLOWERS

Please read this passage to interpret the slide that follows.

Mary and Jane both have gardens with beautiful flowers in them.

Please read the following sentence carefully, in order to decide whether it is about either Mary or Jane.

She has more flowers in her garden than Jane does.

Mary



Jane



On your response sheet, please circle the name of the girl that you think this sentence is about.

BOOKS

Please read this passage to interpret the slide that follows.

Mary and Jane both enjoy reading. Sometimes they recommend the books they have already read to each other. In the last two years both girls have read a lot of new books.

Please listen to the following sentence carefully as you read it, in order to decide whether it is about either Mary or Jane.

She is reading the same books as Jane did last year.

Mary



Jane



On your response sheet, please circle the name of the girl that you think this sentence is about.

CITIES

Please read this passage to interpret the slide that follows.

Mary and Jane both enjoy traveling and visiting new places. The girls do not travel together, since they cannot take their vacations at the same time, but they often recommend their destinations to each other. In the last two years both girls have visited several beautiful European capitals during their trips.

Please listen to the following sentence carefully as you read it, in order to decide whether it is about either Mary or Jane.

She visited the same cities as Mary did last year.

Mary



Jane



On your response sheet, please circle the name of the girl that you think this sentence is about.

BREAKFASTS

Please read this passage to interpret the slide that follows.

Mary and Jane enjoy eating healthy food. Besides, over the last two years they both came to think that breakfast is one of the most important meals of the day.

Please listen to the following sentence carefully as you read it, in order to decide whether it is about either Mary or Jane.

She is eating bigger breakfasts than Jane did last year.

Mary



Jane



On your response sheet, please circle the name of the girl that you think this sentence is about.

DINNERS

Please read this passage to interpret the slide that follows.

Mary and Jane both believe that it might be healthier not to eat too much before you go to bed. Both girls have adjusted their diets in the last two years.

Please listen to the following sentence carefully as you read it, in order to decide whether it is about either Mary or Jane.

She is eating smaller dinners than Mary did last year.

Mary



Jane



On your response sheet, please circle the name of the girl that you think this sentence is about.

DISCOUNTS

Please read this passage to interpret the slide that follows.

Mary and Jane both bought new laptops this year and new e-readers last year. For each purchase, each girl received a discount.

Please listen to the following sentence carefully as you read it, in order to decide whether it is about either Mary or Jane.

The manager offered her a greater discount than he offered Jane last year.

Mary



Jane



On your response sheet, please circle the name of the girl that you think this sentence is about.

DEALS

Please read this passage to interpret the slide that follows.

Mary and Jane have both buy their vacation packages at the same travel agency. Each girl has purchased one trip there last year, and another one this year.

Please listen to the following sentence carefully as you read it, in order to decide whether it is about either Mary or Jane.

The travel agent offered her a better deal than he offered Mary last year.

Mary



Jane



On your response sheet, please circle the name of the girl that you think this sentence is about.

CAST

Please read this passage to interpret the slide that follows.

Mary and Jane were recently given roles in an upcoming performance, and were invited to a cast party. Both Mary and Jane wanted to meet everyone in the cast. One of the people at the party that they wanted to meet was Mary's understudy. At the party, the other cast members spent time introducing them to various people.

Please listen to the following sentence carefully as you read it, in order to decide whether it is about either Mary or Jane.

More cast members introduced her to the male lead than to Mary's understudy.

Mary



Jane



On your response sheet, please circle the name of the girl that you think this sentence is about.

PHOTOS

Please read this passage to interpret the slide that follows.

Jane and Mary aspire to become professional photographers. Recently they both had their work displayed at a show for potential customers. Both Mary and Jane went to the show posing as potential customers to see if the other photographers who were there would recommend pictures those photographers had taken or pictures by Mary or Jane.

Please listen to the following sentence carefully as you read it, in order to decide whether it is about either Mary or Jane.

More photographers recommended their own pictures to her than Jane's pictures.

Mary



Jane



On your response sheet, please circle the name of the girl that you think this sentence is about.

SKIING

Please read this passage to interpret the slide that follows.

Mary and Jane have decided (separately) that they each want to go skiing over the winter vacation this year. Mary was born in Stowe, VT. Since she knows there's good skiing there, she is considering that option, and has recommended it. But Jane has pointed out that Aspen, CO, is also a good option. They have each consulted with their friends to get some advice in order to make their decision.

Please listen to the following sentence carefully as you read it, in order to decide whether it is about either Mary or Jane.

More people wanted her to go to Aspen than to Mary's hometown.

Mary



Jane



On your response sheet, please circle the name of the girl that you think this sentence is about.

Neighbor

Please read this passage to interpret the slide that follows.

Last semester, Mary and Jane were both taking a psychology course. One day before the midterm, they and some other classmates got together for a study group at their friend Alec's house. While there, they found out that Alec was friends with Jane's cute next door neighbor Tim. While they were all taking a break from studying, they started talking about how Mary and Jane were planning on attending an upcoming formal event, and the classmates ended up discussing whether they should consider Alec or Tim as a potential date.

Please listen to the following sentence carefully as you read it, in order to decide whether it is about either Mary or Jane.

More classmates wanted Alec to date her than Jane's next door neighbor.

Mary



Jane



On your response sheet, please circle the name of the girl that you think this sentence is about.

Haircut

Please read this passage to interpret the slide that follows.

Mary and Jane were invited to a holiday party for their office recently. Each of them got a new haircut and a new dress in preparation for the event, but of course, with their own styles. While there, they mingled with people, who wanted to talk with them about a wide range of different topics—some serious, some not.

Please listen to the following sentence carefully as you read it, in order to decide whether it is about either Mary or Jane.

More people talked to her about politics than about Mary's new haircut.

Mary



Jane



On your response sheet, please circle the name of the girl that you think this sentence is about.

Department

Please read this passage to interpret the slide that follows.

Mary and Jane are faculty members at a university. At a recent department potluck event, the students and the faculty were gathering together and chatting about different topics. The students in particular wanted to make sure they talked to various faculty members about the teaching abilities of these two women.

Please listen to the following sentence carefully as you read it, in order to decide whether it is about either Mary or Jane.

More students talked to the department chair about her than to Jane's colleagues.

Mary



Jane



On your response sheet, please circle the name of the girl that you think this sentence is about.

Appendix F

Chapter 5, Experiment 6: Truth Value Judgment Task

F.1 Experimental Stimuli

F.1.1 Test Items: Object Comparatives

- (1) She is eating bigger breakfasts than Jane did last year.
- (2) She is eating smaller dinners than Mary did last year.
- (3) Her sister is taking longer naps than Jane did last year.
- (4) Her sister is taking longer walks than Mary did last year.
- (5) The manager offered her a greater discount than he offered Jane last year.
- (6) The travel agent offered her a better deal than he offered Mary last year.
- (7) They sent her sister a longer wish list than they sent Jane last year.
- (8) They gave her sister a smaller fellowship than they gave Mary last year.

F.1.2 Test Items: Subject Comparatives

- (9) More people wanted her to go to Aspen than to Mary's hometown.
- (10) More classmates wanted Alec to date her than Jane's next door neighbor.
- (11) More cast members introduced her to the male lead than to Mary's understudy.
- (12) More photographers recommended their own pictures to her than Jane's pictures.
- (13) More people talked to her about politics than about Mary's new haircut
- (14) More students talked to the department chair about her than to Jane's colleagues.

F.1.3 Control Items: ACD sentences

- (15) She is reading the same books as Jane did last year.

- (16) She visited the same cities as Mary did last year.
- (17) Her sister is driving the same car that Jane did last year.
- (18) Her sister is taking the same classes as Mary did last year.

F.2 Instructions to Participants and Visual Stimuli

Please click on the right arrow to advance through the next few slides at a comfortable pace, as you read the instructions for the experiment.

Click  on the keyboard now.



This is Mary.

And this is Jane.



This is
Mary's sister.

And this is
Jane's sister.



We will now share some facts with you about these girls. We will then ask you to answer some questions about what you've learned.

Each trial will have the same structure:

1. You will **see** the title slide, and you will click on  to advance to the main slide for the trial.
2. You will **hear** an introductory sentence and **see** the sentence at the top of the slide.
3. You will **inspect** the grid on the slide. Do not click!
4. You will then **see** text appear at the bottom of the screen underneath the grid. It will read, *Please judge this sentence given what we know about Mary and Jane.* Do not click!
5. You will then **hear** a target sentence (**in blue**) repeated twice. Do not click! Just listen.
6. You will **respond** to the target sentence on your answer sheet, then click  to move on.

Let's begin!

Click  on the keyboard now.

CATS

Both girls have cats:



Mary



Jane

Please judge this sentence given what we know about Mary and Jane.

Jane has more cats than Mary does.

FLOWERS



These are the flowers in the girls' gardens:



Mary



Jane



Please judge this sentence given what we know about Mary and Jane.

Jane has more flowers in her garden than Mary does.

HOUSES



These are the houses the girls live in:



Mary's sister



Mary



Jane



Jane's sister



Please judge this sentence given what we know about Mary and Jane.

Mary's sister lives in a bigger house than Jane does.

CANDY



This is how many candy bars the girls ate yesterday:



Mary's sister



Mary



Jane



Jane's sister



Please judge this sentence given what we know about Mary and Jane.

Jane's sister ate as many candy bars as Mary did.

SHOES

This is how many pairs of shoes the girls bought yesterday:



Mary's sister



Mary



Jane



Jane's sister



Please judge this sentence given what we know about Mary and Jane.

Mary bought more pairs of shoes than Jane did.

ESSAYS

These are the essays that the girls submitted last night:



Mary's sister



Mary



Jane



Jane's sister



Please judge this sentence given what we know about Mary and Jane.

Mary submitted a longer essay than Jane's sister did.

CUPCAKES

This is how many cupcakes the girls baked last weekend:



Mary's sister



Mary



Jane



Jane's sister



Please judge this sentence given what we know about Mary and Jane.

Jane baked as many cupcakes as Mary's sister did.

CLOCKS

This is when the girls wake up in the mornings:



6:30 am



Mary's sister

9:00 am



Mary

7:30 am



Jane

8:00 am



Jane's sister



Please judge this sentence given what we know about Mary and Jane.

Mary wakes up earlier than Jane does.

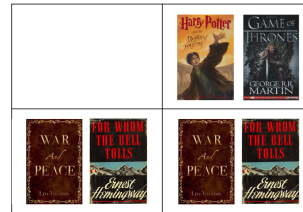
BOOKS

These are the books that the girls have read in the last two years:



Last year

This year



Mary

Jane



Please judge this sentence given what we know about Mary and Jane.

She is reading the same books as Jane did last year.

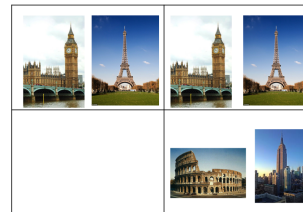
CITIES

These are the cities the girls have visited in the last two years:



Last year

This year



Mary

Jane



Please judge this sentence given what we know about Mary and Jane.

She visited the same cities as Mary did last year.

CARS

These are the cars that the girls drove for the last two years:

Last year	This year
	
	
	

Please judge this sentence given what we know about Mary and Jane.
Her sister is driving the same car that Jane did last year.

CLASSES

These are the classes that the girls took during the last two years:

Last year	This year
	Chemistry, Biology, Physics
Chemistry, Biology, Physics	
Cognition, French, Education	
	Math, English, Syntax

Please judge this sentence given what we know about Mary and Jane.
Her sister is taking the same classes as Mary did last year.

BREAKFASTS

This is what the girls have been eating for breakfast in the last two years:

Last year	This year
	
 	  

Please judge this sentence given what we know about Mary and Jane.
She is eating bigger breakfasts than Jane did last year.

DINNERS

This is what the girls have eaten for dinner each day in the last two years:



Last year

This year


Mary


Jane

Please judge this sentence given what we know about Mary and Jane.

She is eating smaller dinners than Mary did last year.

NAPS

This is how long the girls have napped each day in the last two years:  = 15 minutes



Last year

This year


Mary's sister


Mary


Jane


Jane's sister

Please judge this sentence given what we know about Mary and Jane.

Her sister is taking longer naps than Jane did last year.

WALKS

This is the length of the daily walks the girls have taken in the last two years:



Last year

This year

	5 mile
2 miles	
2 miles	
	1 miles


Mary's sister


Mary


Jane


Jane's sister

Please judge this sentence given what we know about Mary and Jane.

Her sister takes longer walks than Mary did last year.

DISCOUNTS

These are the discounts that the girls were offered by a manager when shopping the last two years:

	Last year	This year	
		10% off	 Mary
	20% off	30% off	 Jane

Please judge this sentence given what we know about Mary and Jane.

The manager offered her a greater discount than he offered Jane last year.

DEALS

The girls buy their vacation packages at the same travel agency. This is how much they paid for their vacation the last two years:

	Last year	This year	
	\$2000	\$1500	 Mary
		\$2500	 Jane

Please judge this sentence given what we know about Mary and Jane.

The travel agent offered her a better deal than he offered Mary last year.

WISH LISTS

In the last two years, the Morgan family has had two baby showers. They sent wish lists to their friends. This is how long the lists were the last two years:

	Last year	This year	
			 Mary's sister
			 Mary
			 Jane
			 Jane's sister

Please judge this sentence given what we know about Mary and Jane

They sent her sister a longer wish list than they sent Jane last year.

FELLOWSHIPS

This is how much each of the girls received for a fellowship to attend a conference the last two years:



Last year This year

	\$350
\$450	
\$400	
	\$600



Mary's sister



Mary



Jane



Jane's sister



Please judge this sentence given what we know about Mary and Jane.

They gave her sister a smaller fellowship than they gave Mary last year.

CAST

This is the number of people who introduced each girl to the male lead and Mary's understudy:



male lead

Mary's understudy



Mary



Jane

Please judge this sentence given what we know about Mary and Jane.

More cast members introduced her to the male lead than to Mary's understudy.

PHOTOS

This is the number of photographers who recommended the pictures to each girl:



photographers' own pictures

Jane's pictures



Mary



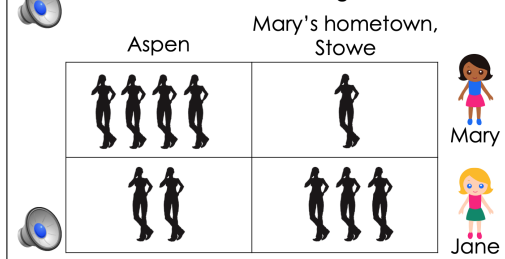
Jane

Please judge this sentence given what we know about Mary and Jane.

More photographers recommended their own pictures to her than Jane's pictures.

SKIING

This is the number of people who recommended Aspen or Stowe to each girl:



Please judge this sentence given what we know about Mary and Jane.

More people wanted her to go to Aspen than to Mary's hometown.

NEIGHBOR

This is the number of classmates who suggested dating Alec or Tim to each girl:

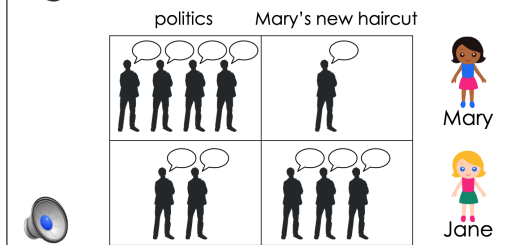


Please judge this sentence given what we know about Mary and Jane.

More classmates wanted Alec to date her than Jane's next door neighbor.

HAIRCUT

This is the number of people who were talking about different topics to each girl:

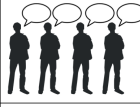


Please judge this sentence given what we know about Mary and Jane.

More people talked to her about politics than about Mary's new haircut.

DEPARTMENT

This is the number of students who talked to the department chair and Jane's colleagues about each girl:

department chair	Jane's colleagues	
		 Mary
		 Jane

Please judge this sentence given what we know about Mary and Jane.

More students talked to the department chair about her than to Jane's colleagues.

Appendix G

Chapter 6, Baseline Study

G.1 Experimental Stimuli

G.1.1 Test Items: Group 1

- (1) After John wrapped the gifts, Mary put on the bows.
– No, he didn't.
– No, she didn't.
- (2) After Angela found the keys, Kevin unlocked the doors.
– No, he didn't.
No, she didn't.
- (3) After Michael poured soup in the bowl, Janice started eating.
No, she didn't.
No, he didn't.
- (4) After Pamela bought a new car, Will began commuting to work.
No, she didn't.
No, he didn't.
- (5) After Tim planted the tree, Amy watered the flowers.
No, he didn't.
No, she didn't.
- (6) After Christina finished the quiz, Thomas checked the answers. No, he didn't.
No, she didn't.
- (7) After Stephen filled the glasses with water, Rachel served dinner.
No, she didn't.
No, he didn't.

- (8) After Monica got the promotion, Jacob threw a party.
No, she didn't.
No, he didn't.
- (9) After William changed the tire, Samantha drove home.
No, he didn't.
No, she didn't.
- (10) After Emily finished breakfast, Joseph washed the dishes.
No, he didn't.
No, she didn't.
- (11) After Bruce painted a picture, Sara called the frame store.
No, she didn't.
No, he didn't.
- (12) After Lisa picked the song, Matt performed karaoke.
No, she didn't.
No, he didn't.
- (13) After Mike built the shed, Jennifer cleaned the garage.
No, he didn't.
No, she didn't.
- (14) After Anna vacuumed the carpet, Alfred cleaned the countertops.
No, he didn't.
No, she didn't.
- (15) After Eric drank all of the milk, Amy went to the grocery store.
No, she didn't.
No, he didn't.

G.1.2 Test Items: Group 2

- (16) After Sarah took some Advil, she fixed herself a sandwich. Why?
Because she had a headache.
Because she was hungry.

- (17) After Jim greeted his neighbor, he drove to the Post Office. Why?
Because he had to mail a letter.
Because he was being polite.
- (18) After Emily called the doctor, she put on a sweater. Why?
Because she needed to make an appointment.
Because the heater wasn't working.
- (19) After Tim changed the locks, he hung up a picture. Why?
Because the walls were bare.
Because he needed to feel safe.
- (20) After Sally asked the teacher for an extension, she reached into her bag for a new pen. Why?
Because she needed more time on the exam.
Because the pen she was using had run out of ink.
- (21) After John brushed his hair, he bought a bottle of iced tea. Why?
Because he was thirsty.
Because his hair was messy.
- (22) After Mary filed a complaint, she wrote an apology letter. Why?
Because she was angry.
Because she was sorry.
- (23) After John sold his car on Craig's list, he spent a week in Florida. Why?
Because he needed the vacation.
Because he needed the money.
- (24) After Trudy got off the bus, she opened an umbrella. Why?
Because it was her stop.
Because it was raining.
- (25) After Chris walked into Starbucks, he went straight to the bathroom. Why?
Because he needed to wash his hands.
Because he needed coffee.
- (26) After Mindy returned to the office, she changed her shoes. Why?

Because her lunch break was over.

Because sneakers are not appropriate for the workplace.

- (27) After Don took his tennis racket to get repaired, he ordered brand new shoes. Why?

Because the soles on his old shoes were worn down.

Because the strings on the racket were loose.

- (28) After Sasha delivered food to the senior citizen's center, she visited the dentist's office. Why?

Because she does community outreach for her church.

Because she realized one of her fillings was loose.

- (29) After Simon had a garage sale, he binge watched shows on Netflix. Why?

Because he wanted to catch up on last season.

Because he wanted to sell his old stuff.

- (30) After Susan got on the plane, she asked for an ice pack. Why?

Because she was flying to Rio.

Because she had hurt her knee.

G.1.3 Control Items

- (31) Michael, who is a personal trainer, helped the Lacrosse team achieve their fitness goals.

No, he isn't.

No, he didn't.

- (32) Michelle, who is a police officer, arrested a criminal last night.

No, she isn't.

No, she didn't.

- (33) Anthony, who is a history professor, graded papers on the American Revolution.

No, he didn't.

No, he isn't.

- (34) Kate, who is a pilot for Delta, flew a plane from Hawaii to China last week.
No, she didn't.
No, she isn't.
- (35) Christopher, who is a chef, cooked a five-star meal for the governor on Friday.
No, he isn't.
No, he didn't.
- (36) Alexandra, who is a family doctor, treated a patient with the swine flu.
No, she isn't.
No, she didn't.
- (37) Gregory, who is a postmodernist artist, painted a mural for the new library.
No, he didn't.
No, he isn't.
- (38) Elizabeth, who is a photographer, took pictures at the city hall's grand opening.
No, she didn't.
No, she isn't.
- (39) Jack, who is a professional baseball player, practiced in the Yankees Stadium yesterday.
No, he isn't.
No, he didn't.
- (40) Tanya, who is a communications major at Rutgers, applied for an internship with Jimmy Fallon.
No, she isn't.
No, she didn't.
- (41) Frederick, who is a professional dancer, performed at the annual showcase in New York.
No, he didn't.
No, he isn't.
- (42) Deena, who is a stand-up comedian, complained about last night's audience.
No, she didn't.

No, she isn't.

- (43) Peter, who is a mechanical engineer, decided to pursue his dream of becoming a veterinarian.

No, he isn't.

No, he didn't.

- (44) Mary, who is a classical pianist, gave a concert at Carnegie Hall last month.

No, she isn't.

No, she didn't.

- (45) Alexander, who is a kindergarten teacher, took his class on a field trip to the zoo.

No, he didn't.

No, he isn't.

G.1.4 Filler Items

- (46) Danny is at a film festival in Berlin now.

Are you sure? I thought he was in Cannes.

Are you sure? I thought he was much younger.

- (47) Samantha is working on her Masters degree at Cornell.

Are you sure? I thought she was much taller.

Are you sure? I thought she was at Yale.

- (48) Troy is writing a book about the history of the civil rights movement.

Are you sure? I thought he was writing about the Civil War.

Are you sure? I thought he was allergic to gluten.

- (49) Linda is organizing a student conference at the Geology Department.

Are you sure? I thought her favorite color was purple.

Are you sure? I thought it was an event for faculty.

- (50) Rob drives to New York every day for work.

Are you sure? I thought he took the train.

Are you sure? I thought he was left-handed.

- (51) Olga knows very little about TV shows.

Are you sure? I thought she was upset.

Are you sure? I thought she watches TV all the time.

- (52) Sue lent James the money for a car, and he bought it.

No, she didn't.

No, he didn't.

- (53) Daniel bought Jenny ingredients for a cake and she baked it.

No, he didn't.

No, she didn't.

- (54) Andrea told Harold a joke, and he laughed at it.

No, he didn't.

No, she didn't.

- (55) Mark asked Catherine a question, and she answered him.

No, she didn't.

No, he didn't.

- (56) Elianna saw Jaques at the store, and he smiled at her.

No, she didn't.

No, he didn't.

- (57) Roger paid Jenny for the food, and she thanked him.

No, he didn't.

No, she didn't.

- (58) Patricia offered Ian a job, and he accepted it.

No, he didn't.

No, she didn't.

- (59) Austin loaned Carlie the car, and she drove it.

No, she didn't.

No, he didn't.

- (60) Mary sold Alex the comic book, and he paid her for it.

No, she didn't.

No, he didn't.

- (61) Ronald handed Gabriela the gift, and she unwrapped it.
No, he didn't.
No, she didn't.
- (62) When John entered the room, Nancy was watching *The Walking Dead*.
You're right! He did come in.
You're right! That's what she was watching.
- (63) While Bill was cooking dinner, Anna was playing *Minecraft*.
You're right! That's her favorite game.
You're right! He is a great cook.
- (64) When Ronald dropped a plate, Jenna tried to catch it.
Yes, he is so clumsy.
Yes, but she could not.
- (65) When Anna saw a crack in the vase, Steven fixed it.
Yes, he's really handy.
Yes, that was her grandmother's vase.
- (66) When Alexander finished writing his novel, Faith published it.
You're right! He wrote a novel about Napoleon.
You're right! She owns a publishing company.
- (67) When Jen came home late, Roger was sleeping on the couch.
That's right. He likes to fall asleep watching TV.
That's right. She had a yoga class that night.
- (68) When Martha arrived early to work on Friday, Jason told her she was getting a promotion.
That's right. She took a shortcut that morning.
That's right. He's the regional manager in charge of hiring and promotions.
- (69) When Kathy finished the flower arrangement, Andre reminded her about the upcoming gala.
That's right. He has been involved in organizing the event for months now.
That's right. She loves to find creative ways to decorate the hallway.

- (70) When Savanna was at a conference in Orlando, Tyler applied for a number of new jobs.

That's right. She was giving a talk about DNA chains.

That's right. He lost his job last month.

- (71) When Sabrina resigned from her most recent position, Robert asked if she wanted to start a business together.

That's right. He wants to team up with someone with the right expertise.

That's right. She decided it was time for a change.

- (72) Nina was thinking about college and decided to apply to Rutgers.

No, she wasn't.

No, she didn't.

- (73) Joshua was watching TV and changed the channel.

No, he wasn't.

No, he didn't.

- (74) Helen was walking down the street and saw a stray cat.

No, she didn't.

No, she wasn't.

- (75) Samuel was pouring a cup a coffee and spilled it all over the table.

No, he didn't.

No, he wasn't.

- (76) Lauren was driving and stopped at the traffic light.

No, she wasn't.

No, she didn't.

- (77) Benjamin was buying tickets for a concert and realized they were sold out.

No, he wasn't.

No, he didn't.

- (78) Jeff cooked his wife a romantic dinner and was waiting for her to come home.

No, he didn't.

No, he wasn't.

- (79) Aaron practiced hard for his auditions and was looking for more work.
 No, he didn't.
 No, he wasn't.
- (80) Dana submitted an essay and was hoping to get an A.
 No, she didn't.
 No, she wasn't.
- (81) Paul watched a scary movie and was looking for another one to watch.
 No, he wasn't.
 No, he didn't.

G.1.5 Instructions to Participants and Training Session

Slide 1

Welcome to the experiment!

Please, make sure that your phone is turned off and nothing can distract you from the task. We are kindly asking you to maintain your concentration throughout the study.

Press the green button to proceed to the next screen.

Slide 2

You need to read every question carefully before you respond. You will not be granted credit, if you respond at random. The study includes a few control questions that are used to assess whether you are paying attention to the task.

Press the green button to proceed to the next screen.

Slide 3

During this study you will be presented with a number of short dialogues between two speakers. For every dialogue, you will be asked to pick one of the two lines that you think is the most natural way to continue the conversation.

Press the green button to proceed to the next screen.

Slide 4

We will start with a short training session to get you comfortable with the task.

Press the green button to proceed to the next screen.

Slide 5

Consider the following dialogue:

A: Samantha is in Cleveland now.

B: (1) No, she isn't. She is in Detroit.

B: (2) No, she isn't. She is a dentist.

Which of the two options, (1) or (2) is a more natural response?

Use the response pad to indicate your answer.

Slide 6, if answer (1) was chosen

You are right! The majority of native speakers we asked agreed that it is the best way to continue this conversation.

Press the green button to proceed to the next screen.

Slide 6, if answer (2) was chosen

This is not the answer native speakers typically choose. Please, try again.

(timed interval, training item repeated)

Slide 7

Consider the following dialogue:

A: When Mary saw Richard, she looked the other way.

B: When was that?

A: (1) Last Friday.

A: (2) Near the Metropolitan Museum.

Which of the two options, (1) or (2) is a more natural response?

Use the response pad to indicate your answer.

Slide 8, if answer (1) was chosen

You are right! The majority of native speakers we asked agreed that it is the best way to continue this conversation.

Press the green button to proceed to the next screen.

Slide 8, if answer (2) was chosen

This is not the answer native speakers typically choose. Please, try again.

(timed interval, training item repeated)

Slide 9

Consider the following dialogue:

A: James loves the Beatles.

B: (1) No, he loves the Beatles.

B: (2) Oh, yes, he sure does.

Which of the two options, (1) or (2) is a more natural response?

Use the response pad to indicate your answer.

Slide 10, if answer (1) was chosen

You are right! The majority of native speakers we asked agreed that it is the best way to continue this conversation.

Press the green button to proceed to the next screen.

Slide 10, if answer (2) was chosen

This is not the answer native speakers typically choose. Please, try again.

(timed interval, training item repeated)

Slide 11

Consider the following dialogue:

A: Ella met Ted's friend at a conference in Ithaca.

B: Who did she meet?

A: (1) Steve, his college roommate.

A: (2) Jane, his mother.

Which of the two options, (1) or (2) is a more natural response?

Use the response pad to indicate your answer.

Slide 12, if answer (1) was chosen

You are right! The majority of native speakers we asked agreed that it is the best way to continue this conversation.

Press the green button to proceed to the next screen.

Slide 12, if answer (2) was chosen

This is not the answer native speakers typically choose. Please, try again.

(timed interval, training item repeated)

Slide 13

Good job! You are now ready to start the experiment.

Press the green button to proceed to the next screen.

Appendix H

Chapter 6, Experiment 7: Forced Choice Task

H.1 Experimental Stimuli

H.1.1 Test Items

- (1)
 - a. The doctors allowed her to visit Emily's grandfather in the ICU.
 - b. After allowing her to visit Emily's grandfather in the ICU, the doctors discussed the case with the radiologist.
- (2)
 - a. The consulate sent her Pamela's visa.
 - b. After sending her Pamela's visa, the consulate issued an invoice for their services.
- (3)
 - a. Mr. Matthews allowed her to resubmit Emily's paper.
 - b. After allowing her to resubmit Emily's paper, Mr. Matthews made an announcement about a field trip.
- (4)
 - a. Mr. Barker gave her Pamela's report card.
 - b. After giving her Pamela's report card, Mr. Barker wrote the homework down on the whiteboard.
- (5)
 - a. Mr. Tomkins showed her Emily's new desk.
 - b. After showing her Emily's new desk, Mr. Tomkins called the office manager about the paperwork.
- (6)
 - a. The waiter offered her Pamela's favorite entrée.
 - b. After offering her Pamela's favorite entrée, the waiter brought a pitcher of water.
- (7)
 - a. The waiter brought her Emily's choice wine.
 - b. After bringing her Emily's choice wine, the waiter took the bread basket back to the kitchen.

- (8) a. Richard gave her Pamela's contact information.
b. After giving her Pamela's contact information, Richard sent an e-mail to the partners about the merger.
- (9) a. Mark offered her Emily's book to read.
b. After offering her Emily's book to read, Mark put other volumes back on the library cart.
- (10) a. Ben showed her Pamela's live broadcast.
b. After showing her Pamela's live broadcast, Ben switched off the screens in the studio.
- (11) a. Mom and Dad allowed her to go on a date with Emily's older brother.
b. After allowing her to go on a date with Emily's older brother, Mom and Dad drove to the supermarket to get groceries.
- (12) a. Mr. Addams allowed her to borrow Pamela's notes for the exam.
b. After allowing her to borrow Pamela's notes for the exam, Mr. Addams phoned the library about the new textbook.
- (13) a. The doctors allowed her to visit Emily's grandmother in the hospital.
b. After allowing her to visit Emily's grandmother in the hospital, the doctors discussed the case with the radiologist.
- (14) a. The consulate sent her Pamela's passport.
b. After sending her Pamela's passport, the consulate issued an invoice for their services.
- (15) a. Mr. Matthews allowed her to redo Emily's homework assignment.
b. After allowing her to redo Emily's homework assignment, Mr. Matthews made an announcement about a field trip.
- (16) a. Mr. Barker gave her Pamela's midterm evaluation.
b. After giving her Pamela's midterm evaluation, Mr. Barker wrote the homework down on the whiteboard.
- (17) a. Mr. Tomkins showed her Emily's new office.

- b. After showing her Emily's new office Mr. Tomkins sent an e-mail to the legal department.
- (18) a. The waiter offered her Pamela's favorite dessert.
- b. After offering her Pamela's favorite dessert, the waiter brought a pitcher of water.
- (19) a. The waiter brought her Emily's choice cocktail.
- b. After bringing her Emily's choice cocktail, the waiter took the bread basket back to the kitchen.
- (20) a. Richard gave her Pamela's phone number.
- b. After giving her Pamela's phone number, Richard sent an e-mail to the partners about the merger.
- (21) a. Mark offered her Emily's paper to review.
- b. After offering her Emily's paper to review, Mark put other volumes back on the library cart.
- (22) a. Ben showed her Pamela's live performance on TV.
- b. After showing her Pamela's live performance on TV, Ben switched off the screens in the studio.
- (23) a. Mom and Dad allowed her to go to the prom with Emily's cousin.
- b. After allowing her to go to the prom with Emily's cousin, Mom and Dad drove to the supermarket to get groceries.
- (24) a. Mr. Addams allowed her to borrow Pamela's textbook for the quiz.
- b. After allowing her to borrow Pamela's textbook for the quiz, Mr. Addams phoned the library about the new textbook.

H.1.2 Control Items: Group 1

- (25) Emily's friends were planning a surprise birthday party for her.
- (26) Pamela's classmates enjoyed her presentation a lot.
- (27) Emily's parrot woke her up this morning.
- (28) Pamela's mood got better when she finished the sandwich.

- (29) Emily's little sister made her really proud.
- (30) Pamela's dog bit her yesterday.
- (31) Emily's coach is really pleased with her.
- (32) Pamela's aunt is visiting her over the weekend.
- (33) Emily's mom took her to a day spa over the weekend.
- (34) Pamela's car let her down again last week.
- (35) Emily's tutor helped her with her calculus homework.
- (36) Pamela's attitude causes her more harm than good.
- (37) Emily's desire to win makes her a valuable asset.
- (38) Pamela's temper is her biggest weakness.
- (39) Emily's persistence is her most admirable quality.
- (40) Pamela's bike took her everywhere she wanted.
- (41) Emily's pictures made her look more mature.
- (42) Pamela's dad took her to Six Flags last weekend.
- (43) Emily was invited to her exhibition opening.
- (44) Pamela considered her manner to be unpleasant.
- (45) Emily has always envied her looks.
- (46) Pamela found her paper boring.
- (47) Emily asked to wear her shoes to the party.
- (48) Pamela was curious to read her poetry.
- (49) Emily suggested her attitude should change.

H.1.3 Control Items: Group 2

- (50) Her story brought Pamela to tears.
- (51) Her car drove by so quickly, Emily jumped.
- (52) Her dancing was so captivating that Pamela could not look away from the stage.

- (53) Her talk was so interesting that Emily forgot about her appointment.
- (54) Her plans for the next year were the exact opposite of what Pamela wanted to do.
- (55) Her speech was so long that Emily started to fall asleep.
- (56) All of a sudden, her dog got off the leash, crossed the street, and bit Pamela.

H.1.4 Filler Items

- (57) Pamela left her swimsuit in the locker room, and she found it.
- (58) She left her swimsuit in the locker room, and Pamela found it.
- (59) Emily forgot her book on the bus stop, and then she picked it up.
- (60) She forgot her book on the bus stop, and then Emily picked it up.
- (61) Pamela lost her money, and then she found it again.
- (62) She lost her money, and then Pamela found it again.
- (63) Emily has a lot of money, so she should not worry about the bills.
- (64) She has a lot of money, so Emily should not worry about the bills.
- (65) Pamela wanted to go skiing over the winter break, so she looked for a cheap air ticket to Aspen.
- (66) She wanted to go skiing over the winter break, so Pamela looked for a cheap air ticket to Aspen.
- (67) Emily is incredibly organized, but she never makes the bed in the mornings.
- (68) She is incredibly organized, but Emily never makes the bed in the mornings.
- (69) Pamela is really gifted, but she always gives up at the first sight of difficulty.
- (70) She is really gifted, but Pamela always gives up at the first sight of difficulty.
- (71) Emily has a lot of talent, and she should go far.
- (72) She has a lot of talent, and Emily should go far.
- (73) Pamela is interested in Renaissance literature, and she is considering taking a course in Shakespeare.

- (74) She is interested in Renaissance literature, and Pamela is considering taking a course in Shakespeare.
- (75) When she entered the room, Emily went straight to the window.
- (76) When she opened the window, Pamela heard the garbage truck passing by.
- (77) When she came to visit her parents for Thanksgiving, Emily brought some French cheese and wine.
- (78) When she applied for the fellowship, Pamela was sure the application would be a success.
- (79) When she presented at a conference last week, Emily felt confident about her talk.
- (80) When she took the Statistics II exam, Pamela was able to answer all the questions in the first two hours.
- (81) Emily was looking for a study partner, and she was happy to help out.
- (82) Pamela asked for more ketchup, and she brought the bottle from the fridge.
- (83) Emily looked so happy, that she could not help but ask what the good news was.
- (84) Pamela wanted to find someone to share a room with, and she agreed to split the costs.
- (85) Emily asked if there was any coffee left, and she brought the pot from the kitchen.
- (86) Pamela needed to find a strong candidate for this position, and she seemed to be a perfect choice.
- (87) Emily has always liked horror movies, and she has always hated them.
- (88) Pamela's favorite author is Ray Bradbury, and she loves books by Hemingway.
- (89) The classmates believed her to have finished writing Pamela's essay.
- (90) Mr. Smith knew that the classmates believed her to have finished writing Pamela's essay.
- (91) The dentists needed her to bring Emily's daughter in.
- (92) The parents knew that the dentists needed her to bring Emily's daughter in.
- (93) Mr. Richards wanted her to submit Pamela's homework.

- (94) The parents knew that Mr. Richards wanted her to submit Pamela's homework.
- (95) The grandparents wanted her to share a room with Emily's sister.
- (96) Mom and Dad knew that the grandparents wanted her to share a room with Emily's sister.
- (97) Grandpa Nick believed her to be visiting Pamela's twin sister.
- (98) Frank knew that Grandpa Nick believed her to be visiting Pamela's twin sister.
- (99) The parents needed her to sell Emily's car.
- (100) Troy knew that the parents needed her to sell Emily's car.
- (101) Mr. Schulz expected her to explain the project to Pamela's colleagues.
- (102) The board of trustees knew that Mr. Schulz expected her to explain the project to Pamela's colleagues.
- (103) Tod expected her to be at Emily's desk.
- (104) The office staff knew that Tod expected her to be at Emily's desk.
- (105) The gallery owners believed her to admire Emily's painting.
- (106) Mr. Stamper knew that the gallery owners believed her to admire Emily's painting.
- (107) Steven believed her to have never met Pamela's best friend.
- (108) Ted knew that Steven believed her to have never met Pamela's best friend.
- (109) The girls needed her to steal Emily's boyfriend.
- (110) The teachers knew that the girls needed her to steal Emily's boyfriend.
- (111) Tim wanted her to meet Pamela's cousin.
- (112) The family knew that Tim wanted her to meet Pamela's cousin.
- (113) Mr. Clark wanted her to borrow Emily's laptop for the presentation.
- (114) The students knew that Mr. Clark wanted her to borrow Emily's laptop for the presentation.

H.1.5 Instructions to Participants

During this study you will read some sentences. Each sentence will report a fact about one of the two girls: **Emily** or **Pamela**. You will also see the images of the two girls on the screen. After you have read the sentence you will be asked to select the girl you think the sentence was about. In other words, your job is to figure out whether the “she” or the “her” in the sentence was about Emily or Pamela. To make your selection, press **E** or **P** on the response pad. Once you respond, the experiment will automatically move on to the next sentence.

Appendix I

Chapter 6, Experiment 8: Forced Choice Task

I.1 Experimental Stimuli

I.1.1 Test Items

- (1)
 - a. The doctors, who allowed her to visit Emily's grandfather in the ICU, discussed the case with the radiologist.
 - b. Mr. Stevens discussed the case with the doctors, who allowed her to visit Emily's grandfather in the ICU.
- (2)
 - a. The doctors, who allowed her to visit Pamela's sister in the hospital, requested minimal disturbance.
 - b. Mr. Roberts consulted the doctors, who allowed her to visit Pamela's sister in the hospital.
- (3)
 - a. The dentists, who needed her to bring Emily's daughter in, put the bill in the mail.
 - b. Mr. Lee called the dentists, who needed her to bring Emily's daughter in.
- (4)
 - a. Mr. Riley, who allowed her to resubmit Pamela's paper, made an announcement about a field trip.
 - b. The father thanked Mr. Riley, who allowed her to resubmit Pamela's paper.
- (5)
 - a. Mr. Matthews, who allowed her to redo Emily's homework assignment, graded midterms in his office.
 - b. The parents had a conference with Mr. Matthews, who allowed her to redo Emily's homework assignment.
- (6)
 - a. The classmates, who believed her to have finished writing Pamela's essay, went to the cafeteria.

- b. Mr. Scott gave a task to the classmates, who believed her to have finished writing Pamela's essay.
- (7) a. The potential buyer, who needed her to sell Emily's car, submitted the forms online.
- b. Mr. Trevor spoke with the potential buyer, who needed her to sell Emily's car.
- (8) a. Mr. Tomkins, who showed her Pamela's new desk, sent an e-mail to the legal department.
- b. The boss e-mailed Mr. Tomkins, who showed her Pamela's new desk.
- (9) a. Mr. Cooper, who showed her Emily's new office, made an appointment with the HR rep.
- b. The HR rep e-mailed Mr. Cooper, who showed her Emily's new office.
- (10) a. The waiter, who offered her Pamela's favorite entrée, brought a pitcher of water to the table.
- b. Mr. Jones called the waiter, who offered her Pamela's favorite entrée.
- (11) a. The server, who brought her Emily's choice wine, took the bread basket back to the kitchen.
- b. Mr. Richardson motioned to the server, who brought her Emily's choice wine.
- (12) a. The consulate, who sent her Pamela's visa, issued an invoice for their services.
- b. Mr. Travis phoned the consulate, who sent her Pamela's visa.
- (13) a. Mr. Barker, who gave her Emily's report card, wrote the homework down on the whiteboard.
- b. The headmaster spoke to Mr. Barker, who gave her Emily's report card.
- (14) a. Mr. Martinez, who gave her Pamela's midterm evaluation, assigned a new project to the class.
- b. The main office forwarded the request to Mr. Martinez, who gave her Pamela's midterm evaluation.
- (15) a. Mr. Green, who allowed her to borrow Emily's notes for the exam, phoned the library about the new textbook.

- b. The disabilities rep talked to Mr. Green, who allowed her to borrow Emily's notes for the exam.
- (16)
- a. Mr. Adams, who allowed her to borrow Pamela's textbook for the quiz, projected the slides onto the board.
 - b. The headmaster talked to Mr. Adams, who allowed her to borrow Pamela's textbook for the quiz.
- (17)
- a. Mr. Watson, who allowed her to go on a date with Emily's older brother, greeted the mailman.
 - b. The mailman greeted Mr. Watson, who allowed her to go on a date with Emily's older brother.
- (18)
- a. Mr. Rivera, who allowed her to go to the prom with Pamela's cousin, put the roastbeef in the oven.
 - b. The repairman greeted Mr. Rivera, who allowed her to go to the prom with Pamela's cousin.
- (19)
- a. Mr. Clark, who wanted her to meet Emily's cousin, opened the doors into the sunroom.
 - b. The host welcomed Mr. Clark, who wanted her to meet Emily's cousin.
- (20)
- a. Mr. Young, who believed her to have never met Pamela's best friend, opened a new bottle of wine.
 - b. The busboy brought water for Mr. Young, who believed her to have never met Pamela's best friend.
- (21)
- a. The girls, who needed her to screen Emily's boyfriend, rented a beachhouse for spring break.
 - b. The landlord showed the beachhouse to the girls, who needed her to screen Emily's boyfriend.
- (22)
- a. Mr. Lopez, who gave her Pamela's phone number, sent the claim to the insurance company.
 - b. The insurance company mentioned the claim to Mr. Lopez, who gave her Pamela's phone number.

- (23) a. Mr. Baum, who offered her Emily's book to read, put the other volumes back on the library cart.
- b. The library sent some items to Mr. Baum, who offered her Emily's book to read.
- (24) a. Mr. Reed, who sent her Pamela's paper to review, arranged a conference call with the regional editors.
- b. The deliveryman handed the journal to Mr. Reed, who offered her Pamela's paper to review.
- (25) a. Mr. Evans, who showed her Emily's live broadcast, switched off the screens in the studio.
- b. The cameraman recorded Mr. Evans, who showed her Emily's live broadcast.
- (26) a. Mr. Miller, who bought her Pamela's oil painting, called for his car from the valet.
- b. The valet parked the car for Mr. Miller, who bought her Pamela's oil painting.
- (27) a. Mr. Garcia, who bought her Emily's handmade soap, wrote his name on the birthday card.
- b. The salesman held the door for Mr. Garcia, who bought her Emily's handmade soap.
- (28) a. Mr. McCarthy, who gave her Pamela's contact information, alerted the police about a possible fraud.
- b. The policeman followed up on a phone call from Mr. McCarthy, who gave her Pamela's contact information.

I.1.2 Control Items: Group 1

- (29) Emily's friends were planning a surprise birthday party for her.
- (30) Pamela's classmates enjoyed her presentation a lot.
- (31) Emily's parrot woke her up this morning.
- (32) Pamela's mood got better when she finished the sandwich.
- (33) Emily's little sister made her really proud.

- (34) Pamela's dog bit her yesterday.
- (35) Emily's coach is really pleased with her.
- (36) Pamela's aunt is visiting her over the weekend.
- (37) Emily's mom took her to a day spa over the weekend.
- (38) Pamela's car let her down again last week.
- (39) Emily's tutor helped her with her calculus homework.
- (40) Pamela's attitude causes her more harm than good.
- (41) Emily's desire to win makes her a valuable asset.
- (42) Pamela's temper is her biggest weakness.
- (43) Emily's persistence is her most admirable quality.
- (44) Pamela's bike took her everywhere she wanted.
- (45) Emily's pictures made her look more mature.
- (46) Pamela's dad took her to Six Flags last weekend.

I.1.3 Control Items: Group 2

- (47) Emily was invited to her exhibition opening.
- (48) Pamela considered her manner to be unpleasant.
- (49) Emily has always envied her looks.
- (50) Pamela was curious to read her poetry.
- (51) Emily suggested her attitude should change.

I.1.4 Control Items: Group 3

- (52) Her story brought Pamela to tears.
- (53) Her car drove by so quickly, Emily jumped.
- (54) Her dancing was so captivating that Pamela could not look away from the stage.
- (55) Her plans for the next year were the exact opposite of what Pamela wanted to do.
- (56) Her speech was so long that Emily started to fall asleep.

I.1.5 Filler Items

- (57) Mr. Truman, who saw Emily just outside her house, said hello to the doorman.
- (58) The reporters interviewed Mr. Dixon, who praised Pamela on her singing.
- (59) Mr. Foster, who recommended Emily to her new boss, scheduled a meeting with the financial department.
- (60) The tax attorney processed all the paperwork for Mr. Graham, who called Pamela at her office.
- (61) Mr. Cole, who knew that Emily needed to pay for her parking, took a stack of quarters out of the glove compartment.
- (62) The nurse dialed Mr. Hayes, who wanted to know if Pamela had her blood work done.
- (63) The headmaster talked to Mr. Adams, who allowed her to borrow Pamela's textbook for the quiz.
- (64) The landlord told Emily that the door was fixed, when she was just about to leave the house.
- (65) The CEO hired Pamela, when the company needed her most.
- (66) The graphic designer sent Emily the link to the company's new webpage, which she had not seen yet.
- (67) The fitness instructor scheduled Pamela for her next training session, which was supposed to be in a week.
- (68) The lifeguard warned Emily not to approach the pier, which was where she was planning to paint.
- (69) The conference organizers awarded Pamela with a travel grant, which pleased her very much.
- (70) Pamela found her paper boring.
- (71) Emily asked to wear her shoes to the party.
- (72) Her talk was so interesting that Emily forgot about her appointment.

- (73) Pamela left her swimsuit in the locker room, and she found it.
- (74) She left her swimsuit in the locker room, and Pamela found it.
- (75) Emily forgot her book on the bus stop, and then she picked it up.
- (76) She forgot her book on the bus stop, and then Emily picked it up.
- (77) Pamela lost her money, and then she found it again.
- (78) She lost her money, and then Pamela found it again.
- (79) Emily has a lot of money, so she should not worry about the bills.
- (80) She has a lot of money, so Emily should not worry about the bills.
- (81) Pamela wanted to go skiing over the winter break, so she looked for a cheap air ticket to Aspen.
- (82) She wanted to go skiing over the winter break, so Pamela looked for a cheap air ticket to Aspen.
- (83) Emily is incredibly organized, but she never makes the bed in the mornings.
- (84) She is incredibly organized, but Emily never makes the bed in the mornings.
- (85) Pamela is really gifted, but she always gives up at the first sight of difficulty.
- (86) She is really gifted, but Pamela always gives up at the first sight of difficulty.
- (87) Emily has a lot of talent, and she should go far.
- (88) She has a lot of talent, and Emily should go far.
- (89) Pamela is interested in Renaissance literature, and she is considering taking a course in Shakespeare.
- (90) She is interested in Renaissance literature, and Pamela is considering taking a course in Shakespeare.
- (91) When she entered the room, Emily went straight to the window.
- (92) When she opened the window, Pamela heard the garbage truck passing by.
- (93) When she came to visit her parents for Thanksgiving, Emily brought some French cheese and wine.

- (94) When she applied for the fellowship, Pamela was sure the application would be a success.
- (95) When she presented at a conference last week, Emily felt confident about her talk.
- (96) When she took the Statistics II exam, Pamela was able to answer all the questions in the first two hours.
- (97) Emily was looking for a study partner, and she was happy to help out.
- (98) Pamela asked for more ketchup, and she brought the bottle from the fridge.
- (99) Emily looked so happy, that she could not help but ask what the good news was.
- (100) Pamela wanted to find someone to share a room with, and she agreed to split the costs.
- (101) Emily asked if there was any coffee left, and she brought the pot from the kitchen.
- (102) Pamela needed to find a strong candidate for this position, and she seemed to be a perfect choice.
- (103) Emily has always liked horror movies, and she has always hated them.
- (104) Pamela's favorite author is Ray Bradbury, and she loves books by Hemingway.
- (105) The doorman said hello to Mr. Truman, who saw Emily just outside her house.
- (106) Mr. Dixon, who praised Pamela on her singing, spoke to the reporters.
- (107) The financial department scheduled an interview with Mr. Foster, who recommended Emily to her new boss.
- (108) Mr. Graham, who called Pamela at her office, decided to consult a tax attorney.
- (109) The cashier gave a stack of quarters to Mr. Cole, who knew that Emily needed to pay for her parking.
- (110) Mr. Hayes, who wanted to know if Pamela had her bloodwork done, dialed the nurse.

I.1.6 Instructions to Participants

During this study you will read some sentences. Each sentence will report a fact about one of the two girls: **Emily** or **Pamela**. You will also see the images of the two girls on the screen. After you have read the sentence you will be asked to select the girl you think the

sentence was about. In other words, your job is to figure out whether the “she” or the “her” in the sentence was about Emily or Pamela. To make your selection, press **E** or **P** on the response pad. Once you respond, the experiment will automatically move on to the next sentence.

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