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Binding and Coreference in Vietnamese

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BINDING AND COREFERENCE IN VIETNAMESE

A Dissertation Presented

by

THUY BUI

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ABSTRACT

BINDING AND COREFERENCE IN VIETNAMESE

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This dissertation investigates the real-time comprehension and final interpretation of object pronouns in Vietnamese, a language in which reflexive and non-reflexive pronominal forms have overlapping meanings. It addresses the questions of whether and how Principle B is applied as a structural constraint to determine the appropriate antecedent for pronouns in the language. The central argument is that Vietnamese speakers rely on two distinct mechanisms to resolve anaphoric relations: Within a pronoun's local domain, even though coreference is highly permissive, binding is strictly prohibited. Results from three two-alternative forced choice and three self-paced reading experiments show consistent profiles for both the online and offline processes: Non-local subjects are always preferred, and local subjects are only accessible when they are referential, but not quantified, noun

phrases. These patterns align with the key predictions of a pragmatic approach to pronominal competition, supporting the view of characterizing Binding Theory as a competitive model.

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CHAPTER 1

INTRODUCTION

This dissertation addresses a Vietnamese puzzle with both theoretical and experimental approaches. In particular, I investigate in detail two questions about the competition between reflexives and pronouns: *(i)* What roles do competitions play in governing the distribution and interpretation of anaphoric elements?, and *(ii)* How do they influence the processing of coreference? A close examination of an understudied language like Vietnamese will yield valuable insight into the characteristics of the Binding Principles and their underlying cognitive mechanisms. Therefore, the results of this work contribute new theoretical and experimental perspectives to the discussion on linguistic universality and variation.

This chapter is organized as follows. Section 1.1 first briefly presents how the key prediction of Classical Binding Theory is not met in Vietnamese. From there, Section 1.2 provides an overview on the background literature and theoretical motivation for the competitive model as an alternative approach to capturing the distribution and interpretation of pronominal forms. Then, Section 1.3 outlines the structure of the dissertation and summarizes the main takeaways of the subsequent chapters.

1.1 Classical Binding Theory

Linguistic research has sought to advance understanding of how humans construct and comprehend referential relationships. In natural language, there are various linguistic devices that can be used to refer to a given entity, such as proper names like *Tam*, definite descriptions like *that employee*, and pronouns like *he*. The literature on how and why language users choose different referential expressions in different contexts is vast and growing. In particular, many linguists have shown interest in how speakers establish grammatical constraints regarding coreference, such as (1) below:

(1) a. The employee voted for **himself**.

b. The employee voted for **him**.

The reflexive *himself* in (1a) has to refer back to *that employee*, while the non-reflexive pronoun *him* in (1b) cannot. This pattern of coreference possibilities has been characterized as systematic linguistic constraints in Classical Binding Theory (Chomsky, 1981, p. 188):

(2) a. **Principle A**

An anaphor must be locally bound.

b. **Principle B**

A pronoun must not be locally bound.

The goal of these grammatical conditions is to explain the distribution and interpretation of different pronominal forms through the syntactic relations they establish with other referential terms in the sentence. In these definitions, 'locally' could be roughly taken to mean 'within the same clause.' The key prediction yielded from these classical Principles A and B is that reflexives and pronouns in the same position should not yield the same interpretation.

However, these constraints appear not to be strictly enforced in Vietnamese:

(3) a. Thằng nhân viên đó bầu cho **mình**.
3SG.SUB person worker DEM vote for SELF
'That employee voted for himself.'

b. Thằng nhân viên đó bầu cho **nó**.
3SG.M.SUB person worker DEM vote for 3SG.SUB
'That employee voted for him(self).'

Similar to the English judgment in (1a), the Vietnamese reflexive *mình* in (3a) also establishes a local binding relationship with its antecedent *thằng nhân viên đó* 'that employee.' In contrast, as shown in (3b), the Vietnamese counterpart of the English sentence in (1b) can be understood to mean that the employee in question voted for himself. Vietnamese allows the pronoun *nó* to corefer with a subject in the same clause. In this case, the prediction from Classical Binding Theory is not met in Vietnamese, as it appears possible for the same pronominal form to convey both the coreferential and the disjoint reference interpretations in the language. This perplexing observation presents an interesting puzzle for the standard view of Binding Theory and begs for a different analysis to capture the nature of anaphoric relations in natural language.

1.2 Competition-Based Binding Theory

While Classical Binding Theory views Principles A and B as constraints independently applied to reflexives and pronouns, respectively, other approaches posit that the constraints on binding and coreference are a result of pronominal competitions. Under these competition-based theories, Principle A manifests similarly in all languages: Reflexives have to be interpreted as bound variables in their local domain. However, Principle B is not assumed to be an independent principle

targeting the distribution of pronouns. Instead, it is proposed to be an effect derived differently across languages, depending on how the forms available in the pronominal system of each language compete with one another. I will show how this idea provides a straightforward account of the difference between English and Vietnamese.

The early proposals of pronominal competitions were contributed by Reinhart in her book in 1983 and her paper with Grodzinsky in 1993. In her theories, Reinhart proposes that the possibilities of coreference are governed by an economy condition called Rule I. Building on a Gricean (1975) idea that communication should be as informative and as straightforward as possible, Rule I blocks coreference whenever it conveys the same interpretation as binding. Roelofsen (2010) then furthers formulates Rule I as the Coreference Rule, which compares sentences containing different available referential forms in a language. Taken together, these approaches correctly predict the judgment patterns in (1). A pronoun, which can receive either a disjoint or a coreferential reading, is a more ambiguous form than a reflexive, which only signals local binding relationships. Since the intended self-vote meaning can be straightforwardly expressed with the sentence containing the reflexive *himself* in (1a), the one with the pronoun *him* in (1b) cannot be used to yield the same reading. As a result, coreference is ruled out, and (1b) ends up getting the disjoint reference interpretation.

While the Reinhartian analysis is pragmatics-driven, other accounts have extended the pronominal competitions to other linguistic levels, such as syntax (Safir, 2014), semantics (Schlenker, 2005), and morphology (Rooryck & Vanden Wyngaerd, 2011). Despite the different approaches, all of these studies essentially argue that Principle B effects arise when different pronominal forms available in a language compete for the same environment. This core idea yields a key prediction: When reflexives are not available, pronouns can instead appear in the position dedi-

cated for reflexives and express a reflexive meaning. This prediction accurately captures the differences in the distribution and interpretation of possessive pronouns between English and Swedish, as demonstrated below (Rooryck & Vanden Wyngaerd, 2011, p. 38):

(4) She^{1} sees her$_{1/2}$ husband.

(5) a. Hon^{1} ser sin$_{1/*2}$ man.
'She^{1} sees her$_{1/*2}$ husband.'

b. Hon^{1} ser hennes$_{*1/2}$ man.
'She^{1} sees her$_{*1/2}$ husband.'

While English can express both coreferential and disjoint reference readings with the same possessive pronominal form *her* in (4), Swedish distinguishes these two meanings with different forms. As shown in (5a), the reflexive possessive meaning can be achieved with the specialized form *sin*. Meanwhile, the *hennes* version in (5b) only receives a disjoint reference interpretation. These different patterns between the two languages are expected under the view of competition-based accounts. Unlike Swedish, English has no specialized form for reflexive possessives, and the form *herself* is ungrammatical in this morphosyntactic slot. Therefore, the form *her* is used instead to convey the coreferential meaning in possessive sentences.

The current reports on a range of languages further support competition-based Binding Theory accounts. For instance, studies on German (Rooryck & Vanden Wyngaerd, 2011), Khanty (Volkova & Reuland, 2014), Jambi (Cole, Hermon, & Yanti, 2015), French (Reuland, 2017), and Chamorro (Wagers, Chung, & Borja, 2018), among others, offer evidence for the correlation between a lack of dedicated reflexives and an absence of Principle B effects. All of these languages utilize the overt third person pronoun form in cases where no reflexive forms are specified. As illustrated in (6) below, the form *awake dheen* in Jambi can co-refer with a subject in a local domain like a reflexive, but it can also refer to an antecedent in a non-local or discourse domain like a pronoun (Cole, Hermon, & Yanti, 2015, p. 143).

(6) Tono mukul **awake dheen**

Tono N.hit body.3 3SG

'Tono hit him(self).'

This similar pattern also manifests in Khanty: The same accusative pronominal form *łuveł i* can also be used to express both the locally bound and the disjoint reference meanings (Volkova & Reuland, 2014, p. 587):

(7) UtltiteXo **łuveł i** išək-s-əłłe.

teacher he.ACC praise-PST-SG.3SG

'The teacher praises him(self).'

Supporting evidence for pronominal competitions also comes from Chamorro, a language in which reflexives and pronouns have an overlapping form. As demonstrated below, the overt third person pronoun form *gui'* can be bound by the antecedent within the same clause (Wagers, Chung, & Borja, 2018, p. 3):

(8) He gosa **gui'** gi giput.

ARG enjoy 3SG LOC party

'He enjoyed himself at the party.'

Wagers, Chung, & Borja (2018) further contribute experimental results for a picture-matching task in Chamorro. Their findings suggest that Chamorro speakers consider a locally bound meaning by default and process the reflexive interpretation significantly more quickly than any other available disjoint reading. This online comprehension profile aligns with the competition view: When a bound variable and a pronoun can be used in the same context, the former is always preferred over the latter (Reinhart, 1983; Safir, 2014). Fundamentally, novel data from recent work expand the scope of examination for Binding Theory and show that it is not uncommon for pronouns to be interpreted as bound by a clausemate. These studies assert that the lack of Principle B effects is not a grammatical violation.

Rather, it is predictable given how pronouns and reflexives are encoded in a language system. As a result, a language-specific pronominal competition approach is argued to account for the anaphoric relations more effectively than a universal application of Principle B.

1.3 Overview

The rest of the dissertation is structured as follows.

Chapter 2 – *Pronominal Competitions* – discusses in detail how two different competitive models account for the lack of Principle B effects. While Reinhart (1983) examines anaphoric components at a discourse level, Rooryck & Vanden Wyngaerd (2011) relies on morphological features to derive surface forms. The conclusion is that regardless of the linguistic level at which pronominal competitions take place, reflexives are always the default form to express a local binding relationship. It is only when this reflexive form is not available, either to convey particular meanings or to appear in certain constructions, that the pronoun form is utilized instead.

Chapter 3 – *Pronoun Interpretation in Vietnamese* – introduces the Vietnamese anaphoric system and questions whether either of the competition-based Binding Theory analyses can effectively explain the coreference patterns in the language. Results from two different two-alternative forced choice experiments suggest that Vietnamese allows pronouns to corefer with local referential subjects, but prohibits them from being bound by quantified coarguments. These findings align with the Reinhartian view in which discourse coreference should be separated from syntactic binding.

Chapter 4 – *Pronoun Processing in Vietnamese* – investigates the real-time comprehension of object pronouns in Vietnamese through three self-paced reading and one two-alternative forced choice experiments. The results suggest that Vietnamese speakers apply Principle B of Binding Theory as a structural constraint to

filter the interpretation of pronouns in early processing stages. While local referential subjects are still considered in the early stages of online processing, non-local subjects are still the preferred antecedents for pronouns. However, the local subjects are not reactivated at all when they are quantified noun phrases, signaling strict Binding Principle B at play. I argue that an Interactive Model, which incorporates both binding and coreference strategies, can most efficiently account for these online patterns in Vietnamese.

Chapter 5 – *Conclusions* – summarizes the key findings from both the theoretical and experimental viewpoints.

CHAPTER 2

PRONOMINAL COMPETITIONS

This chapter presents the analyses that two competition-based theories implement to explain the distribution and interpretation of different forms in pronominal systems. The first account, discussed in Section 2.1, is that of Reinhart (1983). According to this pragmatic approach, a competition arises when a sentence containing a pronoun yields the same interpretation as a bound variable logical form (LF). A rule – Rule I – is then responsible for making binding the default relationship between two covalued elements in a local domain. Coreference can only be expressed when it carries a different meaning than binding in a given context. Section 2.2 presents the primary arguments from Rooryck & Vanden Wyngaerd (2011), a competitive Binding Theory model that relies on morphological features. Under this view, reflexives and pronouns enter into a competition when they can both appear in the same morphosyntactic position. The Elsewhere Principle (Anderson, 1992) then determines that the spell-out rule for the reflexive form is more specific, and thus blocks the application of the pronoun spell-out rule, which is assumed to be more general.

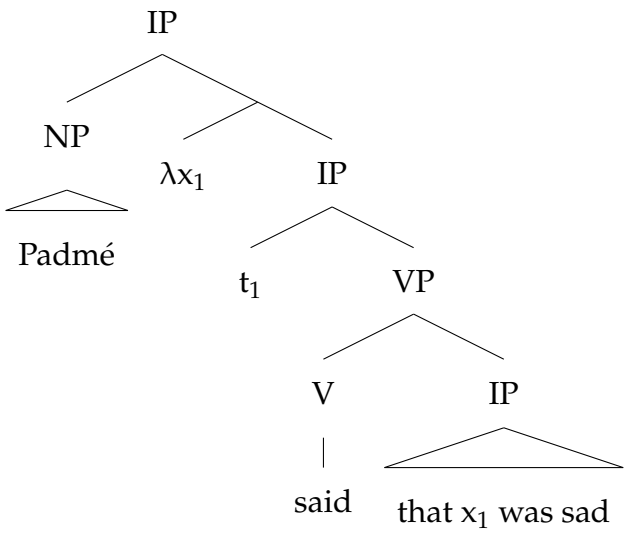
2.1 A Pragmatic Approach

2.1.1 Reinhart's (1983) Assumptions

A novel contribution of Reinhart (1983) is she makes use of the distinction between coreference and binding in anaphoric relations as a way to reformulate the Binding Principles. The different representations of these two meanings can be achieved using referential indices. In particular, pronouns can enter a syntactic derivation with or without an index, and an index can only be interpreted as as a variable. This index appears as a subscript attached to the pronoun (for instance, she_1). The general idea is that pronouns with a referential index have to be interpreted as bound variables, while those without an index receive an interpretation determined by a context. Reinhart (1983) argues that the interpretation of bound variable pronouns is assigned at the syntactic level, while that of referential pronouns is determined at the pragmatic level.

Noun phrases (NPs) can serve as antecedents for pronouns. Following Chomsky (1973) and Heim & Kratzer (1998), I assume that these NPs move out out their base position to take a higher scope, and, as a consequence, receive a binder index. According to Heim (1998), this index is marked as a superscript integer adjoined to the antecedent (for instance, $Padme^1$). For subjects, this movement could be to the Specifier of Inflectional Phrase (IP) from a lower position. It leaves behind a trace (represented as t_1 in the LF) and generates a λ-operator, which allows an encoding of a binding relation between two elements that bear the same index. Crucially, this λ-operator allows for a binding relation between the two variables – t_1 and she_1 – and their coindexed antecedent $Padmé^1$, as demonstrated in (9) below:

(9)



In addition, for a pronoun to be bound by a coindexed antecedent, it has to obey a structural relation called c(onstituent)-command, simplified as follows (Reinhart, 1983, p. 18):

(10) Node A c-commands node B iff the branching node most immediately dominating A also dominates B, and A does not dominate B.

Taking into account both the indexation and c-command requirements, a binding relationship is then defined as follows (Reinhart, 1983, p. 139):

(11) An NP is bound if it is coindexed with a c-commanding NP in argument position.

According to this definition, when a pronoun has a binding index, it has to be interpreted to be bound to an antecedent in a c-commanding position that bears the same index. For instance, in (12a), the NP *Padmé* binds its coindexed pronoun *she* in the same sentence. This bound variable reading is demonstrated in the LF in (12b):

(12) a. Padmé^1 said that **she**$_1$ was sad.

b. Padmé (λx_1. x_1 said that x_1 was sad)

In contrast, when a pronoun has no index, it is treated as referential, and crucially, not bound. The pronoun *she* is assigned to a contextually salient referent in this case (this resolution is represented with the '=' sign between the two NPs):

(13) Padmé said that **she** was sad. *she = Padmé*

The NP *Padmé* has a binder index, and it is also a discourse referent. This allows for anaphoric devices to refer back to *Padmé* as a discourse referent. Reinhart (1983) argues that (13) is an instance of an non-indexed (hence unbound) pronoun such as *she* (accidentally) coreferring with *Padmé*, and, hence, referring to the same antecedent that the bound variable pronoun *she* refers to in (12). Consequently, there are two distinct mechanisms for achieving an anaphoric relationship: syntactic binding and discourse coreference.

Moreover, in cases where the antecedent NP does not determine a particular entity, the interpretation of a bound variable pronoun is sharply different from that of a referential pronoun. For instance, as illustrated in (14) below, the quantified phrase (QP) *every woman* binds the indexed pronoun *she*:

(14) a. Every woman^1 said that **she**$_1$ was sad.

b. every woman (λx_1. x_1 said that x_1 was sad)

Unlike NPs like *the woman*, which pick out a fixed referent in the discourse, the QP *every woman* refers to a set of possible referents. For this reason, the pronoun *she* has to vary with each of the women in the set introduced by *every woman*. In this case, the only mechanism that can give rise to an anaphoric interpretation of *she* is variable binding.

On the other hand, the only interpretation that results from discourse-based coreference is one where *she* refers to another female referent. As discussed earlier, *every woman* introduces a set of women, not an individual female discourse referent. Since a non-indexed pronoun refers to a singular individual in the discourse,

she cannot covary with *every woman* in (15):

(15) a. Every woman said that **she** was sad.

b. every woman (λx_1. x_1 said that she was sad)

As illustrated in (15), the interpretation of the pronoun is not restricted within the sentence. There is no syntactic rule that governs the antecedent choice of a non-indexed pronoun. The resolution of the pronoun in (15) is achieved at the discourse (or pragmatic) level.

Fundamentally, Reinhart's (1983) theory is built on the view that there are two components constituting anaphoric relations in language. One is at the syntactic level (binding), and the other is at the discourse level (coreference). The main argument in her proposal is that there are two independent principles at play in governing binding and coreference. While binding is subject to syntactic rules, the occurrence of coreference is determined by the context.

2.1.2 Rule I

The assumptions in Reinhart's (1983) system described above play a central role in her analysis of disjoint reference effects between a pronoun and an antecedent in a local domain. The general idea stems from the observation that pronouns are typically not interpreted to have either a binding or a coreferential relationship with coarguments. For instance, it is impossible for the pronoun *her* to be bound by the local antecedent *every woman* in (16) below:

(16) Every woman blames **her**.

Likewise, the pronoun *her* in the following sentence also cannot be understood as referring to the subject *Padmé*:

(17) Padmé blames **her**. *her* $\neq$ *Padmé*

Nevertheless, this pattern can be violated in at least four situations. As noted in Grodzinsky & Reinhart (1993, p. 78) and Roelofsen (2010, p.118), the constructions that give rise to such violations often involve focus readings and interclausal relations:

(18) a. Only Max thought that **he** would win. (Adapted from Roelofsen (2010, p.118)). *he = Max*

b. I know what John and Mary have in common. John hates Mary and Mary hates **her** too (Roelofsen, 2010, p.118; adapted from Evans (1980, p. 356)). *her = Mary*

c. Everyone has finally realized that Oscar is incompetent.
Even **he** has finally realized that Oscar is incompetent (Evans, 1980, p. 357). *he = Oscar*

d. (Who is this man over there?) **He** is Colonel Weisskopf (Grodzinsky & Reinhart, 1993, p. 78). *he = Colonel Weisskopf*

To account for the disjoint reference effect perceived in (16) and (17), as well as the lack thereof observed in (18), Reinhart (1983) argues that there are two components at play in pronoun resolution. In this case, the rule imposed on the syntactic relation between a pronoun and a clausemate antecedent is Principle B of Binding Theory (Büring, 2005, p. 55; Roelofsen, 2010, p. 119):

(19) **Principle B**

A pronoun must not be bound by its coargument.

This definition of Principle B is different from that in Chomsky (1981). Chomsky explains locality in terms of 'governing categories,' which can be roughly understood as either the minimal IP or a complex NP that hosts the pronoun. However, the Principle B in (19) is characterized using the notion 'coarguments,' which

has been formulated in various ways. Following Büring (2005, p. 55) and Roelofsen (2010, p. 118), I adopt the following generalization:

(20) Two NPs are coarguments iff their θ-role and/or case are assigned by the same predicate.

Then, besides the locality condition, the antecedent of a pronoun must also satisfy the θ-role and case requirements. In essence, a pronoun cannot be coindexed with an argument NP in its local clause. Since binding is required for a pronoun to establish a dependency with a quantified antecedent, Principle B effectively prohibits instances like (16), in which the QP *every woman* is a coargument of the pronoun *her*.

However, in order to account for the difference in judgment patterns between cases involving referential antecedents like (17) and (18), a second component is needed. Unlike the binding component, coreference is not encoded as part of the syntax, and thus it is not restricted by the same grammatical restrictions. Instead, it is targeted by separate conditions on discourse. To determine whether coreference is available in a given construction, Grodzinsky & Reinhart (1993, p. 79) propose the following economy condition:

(21) **Rule I: Intrasentential Coreference**

NP A cannot corefer with NP B if replacing A with C, C a variable A-bound by B, yields an indistinguishable interpretation.

The reasoning behind Rule I is that in order to minimize misinterpretation in communication, speakers would choose the most direct syntactic means of reference to convey the necessary content. Therefore, speakers would always prefer a bound variable anaphor, which is syntactically encoded, over a referential pronoun, which is contextually resolved. To demonstrate how Rule I works in English

under the Reinhartian approach, cases like (17), where local coreference between a pronoun and a referent is prohibited, are first taken into account:

(22) a. Padmé blames **her**.

b. Padmé (λx_1. x_1 blames x_1)

The two NPs in question establish a syntactic relation in which the higher NP *Padmé* c-commands the lower NP *her*. This c-commanding structure allows bound anaphora, and thus the c-commanded NP *her* can be replaced with a variable A-bounded by the NP *Padmé* via its trace. As illustrated in (22), replacing the pronoun *her* in the sentence in (22a) with an A-bound variable results in an LF representation in (22b). Under Grodzinsky & Reinhart's (1993) view, since the sentence in (22a) and the LF in (22b) contribute identical meanings, there now arises a competition between the former that offers the coreference interpretation and the latter that provides the bound reading. Ultimately, Rule I determines that (22a) cannot convey the exact same meaning that can already be expressed by (22b). As a result, the possibility of coreference in (22a) is ruled out.

Furthermore, Rule I can also account for the special English cases like those in (18) that allow coreference. For instance, when there are focus-sensitive operators like *only* in the same clause, the pronoun *he* can be treated as coreferential with the antecedent *Max*:

(23) a. Only Max thought that **he** would win.

b. only Max (λx_1. x_1 thought that x_1 would win)

Only receives an exhaustive reading such that the focused item to which *only* attaches must pick out the unique entity that has the attribute described in the predicate of the clause. In this case, (23a) denotes that besides Max, there is no other entity that has the property of thinking that Max would win. On the other hand, (23b)

carries the meaning that, besides Max, there is no other entity that has the property of thinking that they themselves would win. This subtle difference between the coreferential reading and the binding interpretation can be further brought forward with these contexts:

(24) The students were electing a new student manager and were discussing whether anyone thought that Max would win.

a. Only Max thought that **he** would win.

b. ✗ only Max (λx_1. x_1 thought that x_1 would win)
$\rightarrow$ Max thought that Max would win, and no one else thought that they themselves would win. *Bad binding interpretation*

c. ✓ Max thought that Max would win, and no one else thought that Max would win. *Good coreferential interpretation*

(25) The students were electing a new student manager and were discussing whether anyone thought that they themselves would win.

a. Only Max thought that **he** would win.

b. ✓ only Max (λx_1. x_1 thought that x_1 would win)
$\rightarrow$ Max thought that Max would win, and no one else thought that they themselves would win. *Good binding interpretation*

c. ✗ Max thought that Max would win, and no one else thought that Max would win. *Bad coreferential interpretation*

The sentence in (24a) and (25a) is ambiguous, as it it can convey either the coreferential or the binding interpretation out of the blue. However, these meanings are distinguishable given the different contexts. As illustrated in (24), the LF with a bound variable in (24b) is not felicitous: The sentence has to be interpreted to be

coreferential in this case. On the other hand, for the context in (25), the pattern of felicity is reversed: The pronoun *he* has to be bound by the antecedent *Max*.

Applying the same reasoning, in (23), Rule I does not prohibit *he* from being coreferential with *Max* because the meaning of coreference in (23a) is different from that of binding in (23b). Unlike (22), replacing the pronoun with a bound variable in (23) leads to distinguishable interpretations between the coreference reading and its binding alternative. As a result, coreference between the unbound pronoun and its local antecedent is allowed in this context.

Moreover, similar to the focus reading constructions involving *only* in (23), when two phrases exhibit parallel structures coreference can also be established between the pronoun and the antecedent in its local domain. The same reasoning presented above then can also be extended to these 'parallelism' cases like (18b), as demonstrated below:

(26) (I know what John and Mary have in common. John hates Mary and)

a. Mary hates **her** too.

b. Mary (λx_1. x_1 hates x_1)

Heim (1998) argues that "Mary hates her" and its bound variable LF in (26b) denote the same proposition. However, taking into account the surrounding discourse, there is a sharp contrast in meaning between (26a) and (26b). Building on Grodzinsky & Reinhart's (1993) reasoning, Heim (1998) further demonstrates that structured meaning plays an important role in separating these expressions in question. In particular, (26a) conveys that Mary has the attribute of hating Mary, and this is the common trait shared by both Mary and John. In contrast, (26b) expresses that Mary manifests self-hatred, but this is crucially not the characteristic that John has. This means that the "Mary hates her" and "Mary (λx_1. x_1 hates x_1)" are semantically distinguishable. As a result, Rule I does not eliminate the coreference interpretation in (26a) in favor of the binding one in (26b).

In previous examples, we have discussed how coreference is permitted. In the next two examples, however, I will present how Rule I can still apply to pronouns and determine the possibility of coreference in cases that violate Binding Principles. Along the same lines as the semantic distinction discussed in the 'parallelism' case above, the 'indistinguishable interpretation' that Rule I targets can also arise from presupposition differences in situations like the one involving 'even' in (18c) above. Following a similar argumentation, we consider both the coreference sentence "Even **he** has finally realized that Oscar is incompetent.", as well as its binding alternative below:

(27) (Everyone has finally realized that Oscar is incompetent.)

a. Even **he** has finally realized that Oscar is incompetent.
   $\rightarrow$ Oscar has finally realized that Oscar is incompetent and no one else is less likely to finally realize that Oscar is incompetent.
   Coreferential interpretation

b. even he (λx_1. x_1 has finally realized that x_1 is incompetent)
   $\rightarrow$ Oscar has finally realized that Oscar is incompetent and no one else is less likely to finally realize that they are incompetent.
   Binding interpretation

Because the name, or R(eferring)-expression, OSCAR, appears within the scope of the pronoun *he*, the utterance in 27a violates Principle C of Classical Binding Theory, which is stated as follows (Chomsky, 1981, p. 188):

(28) **Principle C**

An R-expression must not be bound.

Nevertheless, the Reinhartian Rule I can still account for the availability of coreference in this case. The reason goes as follows. The presupposition that the sentence

in (27a) yields from the coreference is that the referent of *he* is the least likely person to realize that Oscar is incompetent. However, the bound variable LF in (27b) presupposes that the referent of *he* is the least likely person to have the property of realizing that he himself is incompetent. Since the two expressions in (27) generate distinguishable presuppositions, Rule I accurately predicts that it is possible for the pronoun *he* to corefer with *Oscar* when it has the interpretation that does not involve bound variable anaphora.

Furthermore, truth-conditions can also be used to distinguish the interpretation of coreference from that of binding. Similar to the other cases above that allow for local coreference with pronoun, (18d) also has its coreference meaning distinguishable from a binding alternative, as illustrated in (29) below:

(29) a. **He** is Colonel Weisskopf.

b. he (λx_1. x_1 is x_1)

Replacing the pronoun *he* with a bound variable yields a tautology, as indicated in the LF in (29b). In contrast, the coreference reading that this sentence offers in (29a) is not a tautology. Because coreference does not yield the same meaning as binding, it is not ruled out.

Given that there are many ways in which interpretations can be different from one another, one possibility for capturing the notion of "distinguishable" in Rule I is to consider Rule I itself as a derivation of Grice's (1975) Maxim of Quantity, which requires utterances to be as informative as possible, or Maxim of Manner, which requires utterances to be as clear, brief and orderly as possible. Reinhart (1983) takes this concept and suggests that in order to avoid ambiguous communication, a sentence with a pronoun should not express the same meaning as a bound variable LF. A reflexive, which can only be interpreted as bound by its local antecedents, unambiguously conveys a local binding relationship between two covalued NPs. On the other hand, a pronoun is an ambiguous form, as it can receive

either a coreferential or a disjoint reference reading. From a Gricean standpoint, if an utterance should be understood to express local coreference, then the unambiguous reflexive form should always be used instead of the ambiguous pronoun form. This would ensure that Maxim of Quantity and Maxim of Manner are satisfied, because the bound variable anaphor efficiently and straightforwardly conveys the coreferential relationship. A pronoun with two possible readings would not be as informative and may need additional sentences in the context to clarify its use.

However, a Gricean framework operates on comparing two utterances with regards to the meanings they entail. Therefore, formulating Rule I as a competition between underlying logical representations in the way that Reinhart (1983) does does not align with the core systematic pragmatics-driven rules of comparing spoken sentences that Grice (1975) proposed. The LF does not come with the sentence and is not related to what we actually utter. For Rule I to be expressed in a Gricean sense, it should first be re-formulated as a competition between sentences instead of LFs, as proposed by Roelofsen (2010, p. 119):

(30) **Coreference Rule**

A speaker will never use a logical form LF in a context C if LF is semantically indistinguishable from one of its binding alternatives in C.

Connecting to the Gricean Maxims, the Coreference Rule is rooted in the expectation that speaker would always opt for the most informative and straightforward referring device to ensure effective communication. Essentially, this rule determines that the default relationship between two covalued NPs in a local domain is binding. Therefore, speakers should choose the binding alternative to express a local coreferential relationship whenever possible. Coreferential reading is only available when it is different from the interpretation provided by the binding alternative, which is defined as follows Roelofsen (2010, p. 120):

(31) **Binding Alternatives**

Let C be a context, let LF be a logical form, and let A and B be two determiner phrases in LF, such that A and B corefer in C and A c-commands B in LF. Then the structure obtained from LF by:

i. quantifier raising A in case it has not been raised yet, and

ii. replacing B with a (possibly reflexive) pronoun bound by A

is called a binding alternative of LF in C.

According to the definitions provided in (30) and (31), when an English speaker attempts to express the proposition *Padmé blames Padmé*, they would consider all the sentences in which coreference is available. In this case, three of the possible utterances that an English speaker could generate are those in (32). One has the reflexive *herself* (32a), one contains the referential pronoun *her* (32b), and one repeated the name *Padmé* (32c):

(32) a. Padmé blames **herself**.

b. Padmé blames **her**.

c. Padmé blames **Padmé**.

The assumption is that when the intention is to produce a sentence that conveys Padmé blames Padmé, a speaker would take into account various alternatives of the same sentence. These sentences enter into a competition against one another. The Coreference Rule enforces that these alternatives cannot be used to convey the same meaning in the same context. From a Gricean viewpoint, (32a) is a better utterance than the other two, because the reflexive unambiguously expresses the local binding relationship between the two NPs in question. In contrast, the pronoun in (32b) and the repeated name in (32c) are ambiguous: While the former can pick out any singular female entity in the discourse, the latter can select any referent whose name is Padmé. Their antecedents do not need to be in the local

domain. As a result, Maxims of Manner and of Quantity determine that the reflexive sentence conveys the intended self-blame meaning more straightforwardly via binding than the other alternatives does via coreference. Therefore, the pronoun and the repeated name cannot be meant to refer to the same referent (Padmé) as the reflexive. Consequently, coreference is blocked for the alternatives in (32b) and (32c), and disjoint reference is the only possible reading for the pronoun *her* and the repeated name *Padmé*. In essence, Reinhart's (1983) framework and Roelofsen's (2010) adaptation effectively capture both the compliant cases and the so-called violations of Principle B effects observed in English.

2.2 A Morphological Approach

2.2.1 Rooryck & Vanden Wyngaerd's (2011) Assumptions

A major point that drives Rooryck & Vanden Wyngaerd's (2011) theory away from previous Binding approaches is that they do not employ indices to differentiate between reflexives and pronouns. Under their view, Agreement provides a feature valuation system that links an anaphoric element to its antecedent. In other words, they argue that Binding is a product of Agreement. Reinhart (1983), Büring (2005), and Roelofsen (2010), among others, claim that it should be the other way around: the coindexation of pronouns and their antecedent NPs is a necessary step leading to the subsequent matching of ϕ-features.

Rooryck & Vanden Wyngaerd's (2011) theory is based on three key ingredients, namely, the features with which each anaphor enters the syntax, the presence of a valuation process under Agree, and the post-syntactic interface operations. First, they assume that the ϕ-features of pronouns are lexically valued, while those of reflexives are interpretable but are valued in the derivation, along the lines of Kratzer (2009). This highlights the idea that reflexives and pronouns should be treated dif-

ferently from the beginning on the basis of a universal notion like ϕ-valuation, and not due to an involvement of any additional ad-hoc features such as reflexivity like Reinhart & Reuland (1993) propose.

Secondly, based on whether the ϕ-features have been valued beforehand, the syntax then determines whether an Agree mechanism should take place. Since a pronoun already starts off with valued ϕ-features, there is no need for an Agree relationship to be established between this type of pronominal element and an antecedent NP. On the other hand, a reflexive has to act as a probe, looking for a goal that is an antecedent NP, to get its features valued through Agree, a process described as follows (Rooryck & Vanden Wyngaerd, 2011, p. 9):

(33) a. Agree involves a probe α that has one or more unvalued features and a goal β that has matching (i.e. identical) valued features.

b. Agree is an asymmetric feature valuation operation that values the features of α with the features of β at a distance in a local domain.

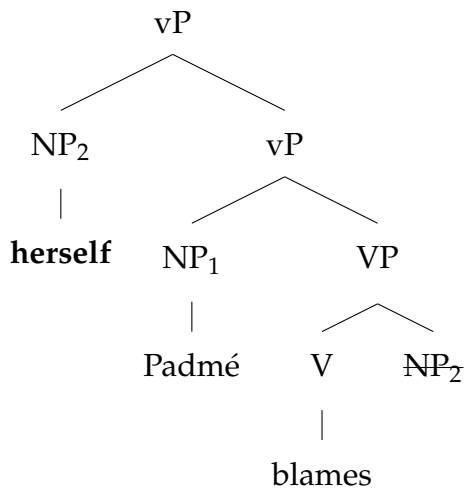
c. A probe, α, Agrees with a goal, β, iff α c-commands β and there is no potential alternative goal γ such that

i. α asymmetrically c-commands γ, and

ii. γ asymmetrically c-commands or dominates β.

A concern with this proposal is that it requires the reflexive to occupy the c-commanding position. To tackle this problem, Rooryck & Vanden Wyngaerd (2011) accompany their proposal with covert movement of the anaphor. The LF tree in (34) below shows the reflexive in its moved position:

(34)



Crucially, anaphors have unvalued features, which are represented by underscores. In this case, a reflexive like *herself* comes with the feature bundle {P: _, N: _, G: _}. These unvalued features must be a probe, and thus they require the (covert) movement. The features on the anaphors are required to share the features of the antecedents via the Agree operation. When an NP has its features shared with another NP in the derivation, this feature valuation is recognized in the syntax. These shared features are marked with a star, and thus the reflexive carry the bundle {P: 3*, N: SG*, G: F*} after Agree. An NP carrying starred features has to be interpreted as coreferential with the NP that shares its features.

On the other hand, pronouns always come with distinctly valued features. These valued features, therefore, are a goal, just like those of regular NPs, and they do not need to undergo Agree for feature valuation. Their features are not shared with any other element in the syntax and thus not marked with any star. In other words, the feature bundle of the pronoun *her* is {P: 3, N: SG, G: F}. As a result, no coreference is established in this case, and pronouns receive a disjoint reference interpretation. Rooryck & Vanden Wyngaerd (2011) account for the clause-bound nature of the disjoint reading by letting the disjoint reference effect emerge from valued features on a phase-by-phase basis. Each phase, therefore, is interpreted independently of the others.

Finally, Rooryck & Vanden Wyngaerd (2011) elaborate on the mechanism that determines the post-syntactic morphological realization of reflexive and pronoun constructions on the basis of the Distributed Morphology framework (Halle & Marantz, 1993; Harley & Noyer, 1999). In particular, the lexical insertion process is governed by the following principle (Halle, 1997, p. 428):

(35) **Subset Principle**

The phonological exponent of a Vocabulary item is inserted into a morpheme in the terminal string if the item matches all or a subset of the grammatical features specified in the terminal morpheme. Insertion does not take place if the Vocabulary item contains features not present in the morpheme. Where several Vocabulary items meet the conditions for insertion, the item matching the greatest number of features specified in the terminal morpheme must be chosen.

This lexical item can also designate the environment at which the insertion of this phonological string may take place, which can be schematized as follows:

(36) morpheme $\leftrightarrow$ exponent / environment

Rooryck & Vanden Wyngaerd (2011) argue that these insertion rules cannot be applied randomly. When there is more than one form that can be used in the same environment to express the same meaning, those forms enter into a competition with one another. Such competitions of lexical insertion rules determines the ordering of rules in a language. Under Rooryck & Vanden Wyngaerd's (2011) view, the lexical insertion rules have to be ordered in accordance with the following principle (Anderson, 1992):

(37) **Elsewhere Principle**

Application of a more specific rule blocks that of a later more general one.

It is this Elsewhere Principle that determines which Spell-Out rule ends up blocking the others. One of the many applications of the Elsewhere Principle involves plural morphological forms in English, as noted by Ackema & Neeleman (2002). Typically, forming the English plural involves an insertion of the morpheme *-s* to the end of a stem. This plural rule can be expressed as follows, in which *X* is a stem, and *Xs* is the resulting plural form:

(38) X + plural $\leftrightarrow$ *Xs*

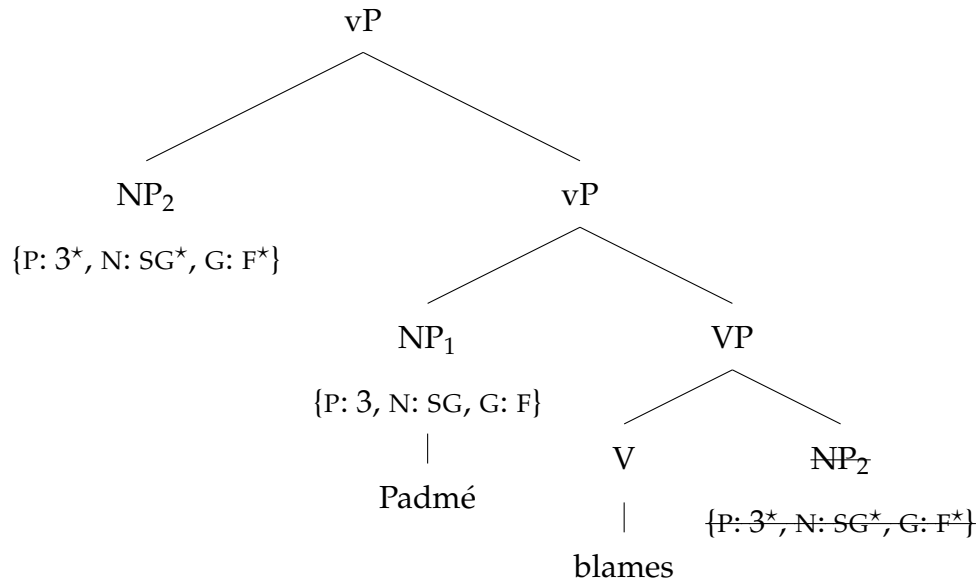
This rule correctly generates the plural form of a stem *cat* as *cats*. However, there are plural forms that do not undergo this *-s* adding rule. For instance, the stem *goose* has the plural form *geese*, instead of the expected form *gooses*. Therefore, a different plural rule like (39) is needed to account for this irregular plural form:

(39) *goose* + plural $\leftrightarrow$ *geese*

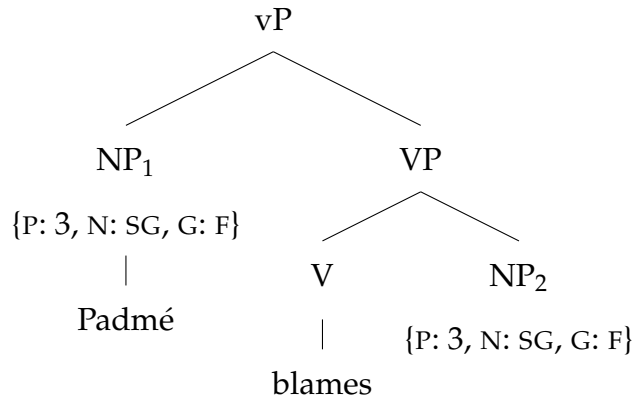
This rule requires the resulting plural form to be *geese* whenever it appears in an environment that has *goose* as a stem. In this case, this special plural formation rule is more specific than the regular one in (38). Then, according to the Elsewhere Principle, (39) blocks the application of (38) to the stem *goose*, preventing *gooses* from existing in English. In other words, the Elsewhere Principle determines that a more specific rule like (39) should be ordered before the general one like (38).

Following this same reasoning, Rooryck & Vanden Wyngaerd (2011) propose that since both reflexives and pronouns can appear in the same direct object slot, they are subject to the same kind of competition. In this case, the reflexive *herself* and the pronoun *her* enter the derivation with a bundle of features. The reflexive comes with unvalued features, and the result of valuing these features via Agree with the NP *Padmé* is shared features, marked with "*," as shown in (40). Meanwhile, the pronoun has its own lexically valued features, which are not marked with any "*," as illustrated in (41).

(40)



(41)



Then, during the lexical insertion process, the shared (hence starred) feature bundle is spelled out as the reflexive:

(42) {P: 3⋆, N: SG⋆, G: F⋆} ↔ *herself*

On the other hand, when the features are unshared (hence unstarred), the insertion rule will spell out the pronoun form:

(43) {P: 3, N: SG, G: F} ↔ *her* / ___ ACC

The Elsewhere Principle then determines that the starred features are to be understood as a more specific Spell-Out than the unstarred ones. In other words, the insertion rules for the reflexives are more specific than the ones that do not. Then,

the reflexive rules block the more general pronoun rules from being applied to the same morphosyntactic position. The Elsewhere Principle, therefore, order the reflexive insertion rules to take place before other pronoun insertion rules. Essentially, Rooryck & Vanden Wyngaerd's (2011) system just relies on morphology to account for the distribution of different pronominal forms in a language. Semantics does not play any role in regulating the final interpretations that reflexives and pronouns receive. The meanings of these forms are a direct consequence of the competition on their morphological features.

One consequence of this system is that when a designated reflexive form is not available to express a particular coreferential relationship, the application of a Spell-Out rule for a pronoun in that case is not blocked. Because a more specialized rule for the reflexive does not exist, the pronoun and the reflexive use the same form. The lack of Principle B effects, therefore, manifests a systematic pattern in which one surface form can receive both coreferential and disjoint interpretations (Rooryck & Vanden Wyngaerd, 2011, p. 19):

(44) **Absence of Principle B Effects**

Pronouns behave like anaphors when a dedicated class of reflexive pronouns is lacking.

In essence, they argue that it is the competition among lexical insertion rules that accounts for both the expected Classical Binding distribution of reflexives and pronouns but also the cases displaying apparent Principle B violations.

2.2.2 German Pronominal Paradigm

Having presented all the ingredients for the morphological approach to pronominal competition, Rooryck & Vanden Wyngaerd (2011) then demonstrate how their system works for a wide range of Indo-European languages. Taking German data

as an example, they show that the competition account governed by the Elsewhere Principle can account for both Principle B compliant and violating cases. Before discussing the application of their system in detail, a paradigm illustrating the distribution of singular pronouns in German is first provided in Table 2.1:

Table 2.1: German singular pronominal paradigm.

<table>
<tr><td></td><td colspan="3">Pronoun</td><td>Reflexive</td></tr>
<tr><td></td><td>Nominative</td><td>Dative</td><td>Accusative</td><td></td></tr>
<tr><td>1SG</td><td>ich</td><td>mir</td><td colspan="2">mich</td></tr>
<tr><td>2SG</td><td>du</td><td>dir</td><td colspan="2">dich</td></tr>
<tr><td>3SG.M</td><td>er</td><td>ihm</td><td>ihn</td><td rowspan="3">sich</td></tr>
<tr><td>3SG.F</td><td>sie</td><td>ihr</td><td>sie</td></tr>
<tr><td>3SG.N</td><td colspan="3">es</td></tr>
</table>

Rooryck & Vanden Wyngaerd (2011) then classify the forms in this paradigm in terms of feature specification and underspecification. In particular, a form is fully specified when it has a value for each of the features. For instance, *er* is a fully specified form because it has the third person (3) value for the Person feature, singular (SG) value for the Number feature, and masculine (M) value for the Gender feature. On the other hand, *es* is underspecified for Case, as it does not have any value for Case. Not having a value does not mean it has a Case feature to be valued. Instead, it means that the form just does not have that feature at all. As a result, the value that the Case feature takes does not change the form of *es*. In other words, regardless of whether it takes the Nominative, Dative, or Accusative Case value, as long as it is a third person neutral pronoun, the surface form will be *es*.

Rooryck & Vanden Wyngaerd (2011) suggest that if a form were to be inter-

preted as an anaphor, it should carry a starred set of features. For instance, for a German sentence that carries the meaning *Padmé blames herself*, the syntax determines that the feature bundle for the lexical item in the target object position should be {3⋆, SG⋆, F⋆}. There is a pronominal form in German that has an unstarred bundle of features {3, SG, F}, which surfaces as *sie* for the Accusative case. There is also the *sich* form, which has the feature 3⋆. While the pronominal form is fully specified in person, number, and gender, the anaphor only has the third person feature.

The current version of the Subset Principle, as stated in (35), would make an incorrect prediction: The pronominal form *sie* would win over the anaphor *sich*, because the former is a larger subset of the target feature bundle. In particular, there are two requirements imposed by the current Subset Principle: The lexical item that is mapped onto a bundle of features (i) when it matches all or part of the feature bundle, and (ii) when it has the maximum proper subset of all competing forms. The first requirement is crucial for the system, because it allows a word to be inserted if the features it has are a subset of the feature bundle of the target position it is inserted into. However, the second requirement of the Subset Principle is problematic for Rooryck & Vanden Wyngaerd's (2011) framework. If this second requirement were to be in effect, it would require the pronoun, which is the largest match of the target features, to be inserted, ruling out the anaphoric form, which has only one feature. This does not yield the right effect, since this system intends for the reflexive to bleed the pronoun. Given that Rooryck & Vanden Wyngaerd's (2011) never explicitly implements this second part of the Subset Principle, I will adopt the version of Subset Principle in which only the first part is active.

Moreover, Rooryck & Vanden Wyngaerd (2011) propose that some pronouns in German are ambiguously valued, as their surface forms do not change depending on its feature valuation. For instance, the forms *mich* and *dich* are underspecified re-

garding their referential information, as their pronoun forms and reflexive forms are the same. These forms are marked with a "(⋆)" which is an optional star. An optionally starred form can enter the derivation with either unvalued features or lexically valued features. Under Rooryck & Vanden Wyngaerd's (2011) view, this means that there are no specialized class of reflexives for the first and second persons in German. In sum, according to this system, there are three different ways that a feature can be on a lexical item: It can be starred (3⋆) for all reflexives, unstarred (3) for some pronouns, or marked with a star in parentheses (3(⋆)) for "underspecified" forms.

Rooryck & Vanden Wyngaerd generalize that if a language has both a lexical item that has feature X and another lexical item that has feature X⋆, the form with the starred feature will get inserted instead of the one with the unstarred feature. However, in their application, they do not provide any case in which there is an X⋆ that prevents a pronominal form, which just has X, from being inserted. Instead, it is always X(⋆), and crucially not X, that X⋆ actually prevents from being inserted into the target position. In this case, the optionally starred features seem to be an ad-hoc implementation with no systematic derivation. Consequently, the proposed Principle B bleeding effect cannot be achieved with this current three-way feature distinction.

I argue that there should not be a lexical item whose features are marked with a "(⋆)," which is can be inserted into a position which has a feature that either has a ⋆ or does not have a ⋆. Instead, for a German pronominal form like *sie*, which is the third person accusative singular feminine form, that lexical item comes with a {3, SG, F} feature bundle. In this case, this form can be inserted wherever the feature bundle of that sort exists, regardless whether that feature bundle comes with a star. In other words, any feature can be inserted into the target position where that feature exists, whether or not it is starred. As a result, I adopt a system in which

there is only a two-way distinction between lexical items: those that come with unstarred features, and those that has starred features.

The "*" feeds the interpretation system a coreference reading. In addition, the starred features should be considered a special kind of the unstarred ones. This invokes the Elsewhere Principle, which in turn automatically make any item that can be inserted into the starred position bleed any item that could be inserted into that position otherwise.

Putting the information encoded in the German singular pronominal forms in Table 2.2 into the Spell-Out schematic characterization in (36) results in a set of ordered insertion rules. Table 2.2 below captures all cases of underspecification in singular pronouns. In particular, to account for the underspecification in Case, Gender, or Number information, the environment criteria in the right-hand side Spell-Out process is left blank.

Table 2.2: German lexical insertion rules.

a.	{P: 1, N: SG}	↔	*ich*	/ ___ NOM
b.	{P: 1, N: SG}	↔	*mir*	/ ___ DAT
c.	{P: 1, N: SG}	↔	*mich*	/ ___ ACC
d.	{P: 2, N: SG}	↔	*du*	/ ___ NOM
e.	{P: 2, N: SG}	↔	*dir*	/ ___ DAT
f.	{P: 2, N: SG}	↔	*dich*	/ ___ ACC
g.	{P: 3*}	↔	*sich*	
h.	{P: 3, N: SG, G: M}	↔	*er*	/ ___ NOM
i.	{P: 3, N: SG, G: M}	↔	*ihn*	/ ___ ACC
j.	{P: 3, N: SG, G: M}	↔	*ihm*	/ ___ DAT
k.	{P: 3, N: SG, G: N}	↔	*es*	
l.	{P: 3}	↔	*sie*	
m.	elsewhere	↔	*ihr*	

First, for a better understanding of how the current theory accounts for Principle B compliant cases, Rooryck & Vanden Wyngaerd (2011) demonstrate how the insertion rules in Table 2.2 works for German third person pronouns, where there are distinguishing forms corresponding to the different reflexive and pronoun uses:

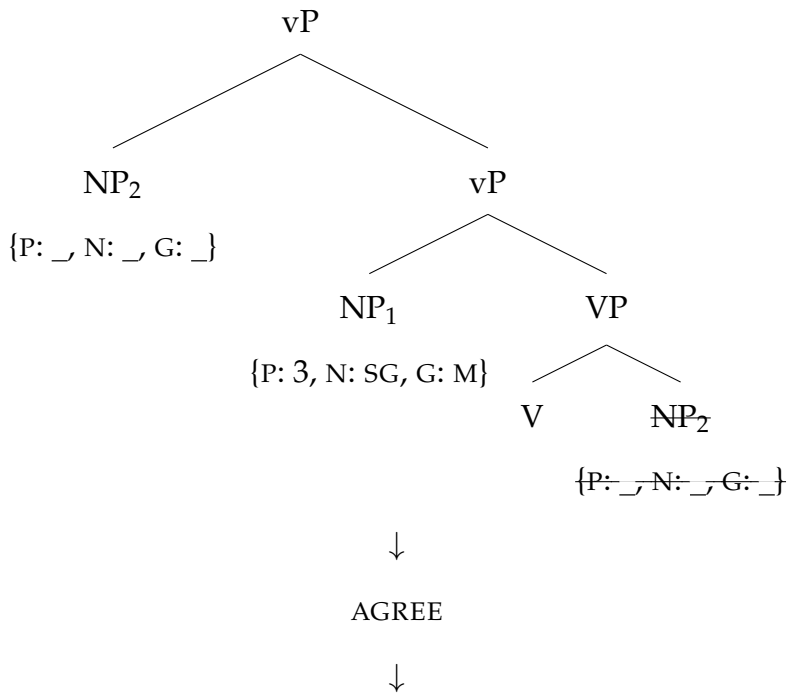
(45) a. Johannes$_i$ liebt **sich**.
Johannes loves himself

b. Johannes$_i$ liebt **ihn**.
Johannes loves him

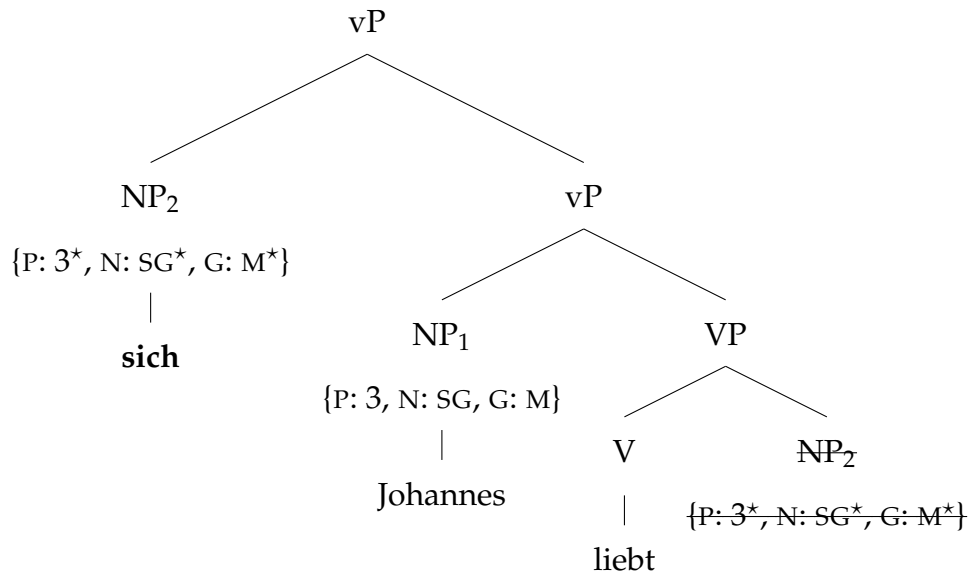
The syntactic structure of the reflexive sentence in (45a) is presented in the following configuration. While (46a) shows the unvalued features before the Agree

operation, (46b) displays the post-Agree feature valuation:

(46) a.



b.



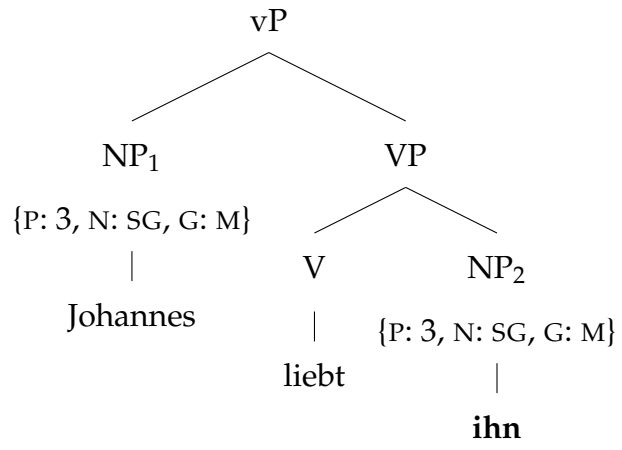
As discussed earlier, reflexives enter a syntactic derivation with unvalued features, and move covertly to have these features valued via the Agree operation, as previously defined in (33). As illustrated in (46a), NP_2 comes with a typical ϕ-feature set with Person, Number, and Gender information included, but none of these features have values yet. NP_2 then undergoes covert movement, triggers

Agree, and has its features shared with the antecedent of the same kind, NP_1. As a result, each of the feature values of NP_2 is marked with a "*."

Once Agree takes place, all of the insertion rules for third person value compete with one another to appear in this NP_2 slot. There are two Spell-Out rules: that of the reflexive form, and that of the pronoun form. The Elsewhere Principle determines that the former is more specific than the latter, and thus rule (g), which spells out starred features, blocks the application of all the other more general 3P rules that spells out unstarred features. If rule (g) went last, NP_2, which carries a third person accusative feature set, may get *ihn* as its surface form. This ordering yields incorrect results. As a result, rule (g) wins the competition, and it inserts the correct reflexive form *sich* into the NP_2 slot.

On the other hand, as shown in the following pronoun construction of the sentence in (45b), the sets of features in NP_1 and NP_2 are independently lexically valued when they enter the derivation. There are no unvalued features in this case, and thus a feature valuation operation like Agree is not triggered:

(47)



All the possible insertion rules for the unshared singular masculine third person accusative feature set compete for the NP_2 slot. Since rule (i) satisfies all the required values, it inserts *ihn* into this slot. So far, this system has effectively captured the patterns of third person pronominal forms in German, where pronouns

and reflexives have distinct surface forms.

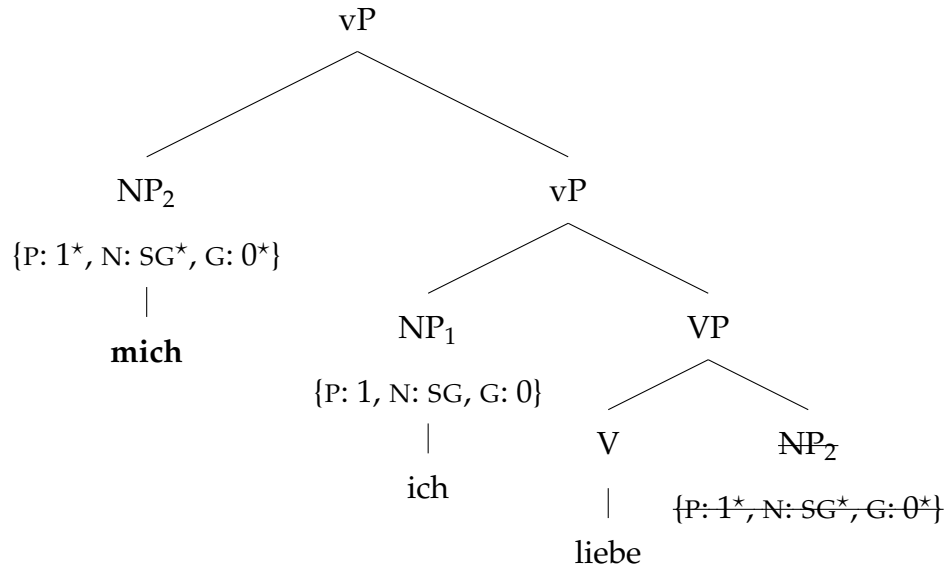
Then, Rooryck & Vanden Wyngaerd address how this set of rules can also explain the systematic lack of Principle B effects with a discussion on the German first person pronominal forms, where the pronoun form *mich* can also be used to establish a reflexive relationship:

(48) a. Ich liebe **mich**.
I love myself

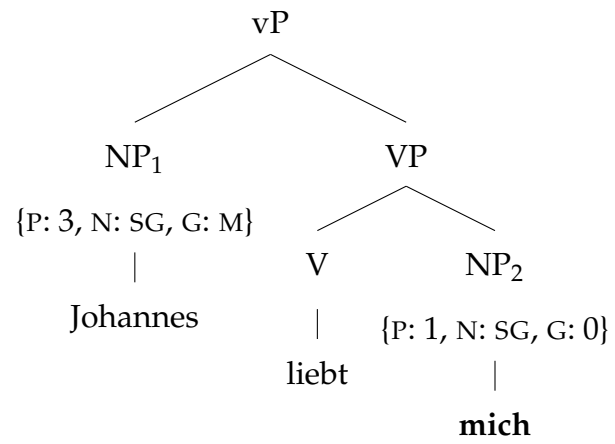
b. Johannes liebt **mich**.
Johannes loves me

The syntactic derivations of the reflexive and pronoun sentences in (48) are shown in (49) and (50), respectively. The pattern appears to be similar to the cases in (46) and (47). The reflexive enters the derivation with unvalued features and then moves from its base position to merge under vP to get its features valued via Agree with another NP, as illustrated in (49). Meanwhile, the pronoun in (50) comes with its own lexically valued features, and thus no feature sharing needs to take place.

(49)



(50)



As shown in Table 2.1, all singular first person pronouns in German are underspecified for Gender. As a result, 0 is used to represent the value for the Gender feature of *ich* (NP_1) in (49). This enables the reflexive (NP_2) to have all of its features, including Gender, valued via Agree with the antecedent *ich*. Since the features of NP_2 are shared with those of NP_1, they should be marked with a "*" in their Spell-Out rule.

However, as discussed earlier, there are no specialized first and second person reflexive forms in German: The forms *mich* and *dich* can both be used as pronouns and reflexives. This means that rule (c) applies to any first person singular pronominal form that bears Accusative case, regardless of whether these feature values are shared or independent. Since there is no specific Spell-Out rule dedicated for the reflexive form only, no competition between the pronoun rules and the reflexive rules arises. The Elsewhere Principle does not prohibit the pronoun rules from applying to the NP_2 slot, because there are no existing rules in German that is more specific than rule (c) for the given feature requirements. As a result, the form *mich* is inserted as the Spelt-Out form for the shared features in the NP_2 slot in (49).

On the other hand, the features of the pronouns in (50) are not shared. As discussed above, rule (c) applies to any shared or unshared forms that satisfy the first person, singular, accusative case requirements. Consequently, rule (c) also inserts

mich for the NP_2 slot in (50), leading to the same surface form for both the pronoun and the reflexive of the first person singular accusative feature set. Therefore, this modified version of Rooryck & Vanden Wyngaerd's (2011) framework effectively accounts for the instances in which the pronoun form grammatically appears in the local object position, resulting in the Absence of Principle B effects.

CHAPTER 3

PRONOUN INTERPRETATION IN VIETNAMESE

This chapter investigates how the pronominal competition approach can account for the nature of the anaphoric elements in Vietnamese. Section 3.1 first describes the differences in ϕ-feature encoding between English and Vietnamese, and then proposes how the different competitive models would apply to the Vietnamese system. I argue that Reinhart's (1983) theory captures coreference patterns in Vietnamese more effectively than Rooryck & Vanden Wyngaerd's (2011). In particular, because the honorificity reading can only be obtained with the pronoun form, but not the reflexive form in Vietnamese, Rule I does not rule out coreference in favor of binding in the language, as expected under Reinhartian view. On the other hand, with the prediction that the spell-out rule for the reflexive form should block the one for the pronoun form whenever possible, the morphological approach fails to account for the availability of both of these forms in the same grammatical construction in Vietnamese. From there, I test the hypothesis derived from Reinhart (1983) that Principle B works in Vietnamese with two two-alternative forced choice tasks. The results from the first experiment examining pronoun interpretation in Vietnamese with different antecedent types suggest that there are two distinct mechanisms at play: While coreference with local referential antecedents is permitted, binding with local QPs is prohibited. The second experiments further investi-

gate this issue with different binding domains. The results are consistent with the Reinhartian theory: Principle B strictly blocks binding between pronouns and their coarguments, but not their non-coarguments. The chapter is then concluded with a summary of the experimental results and a discussion on the cross-experimental differences in Section 3.4.

3.1 Pronominal Competitions in Vietnamese

3.1.1 Pronominal Systems

Before applying the two main competition-based accounts outlined in Chapter 2 to Vietnamese, I will briefly introduce the necessary background regarding the nature of pronominal systems in English and Vietnamese. First, as shown in Table 3.1, both pronouns and reflexives in the English pronominal system for singular forms are sensitive to Person, Number, Case, Gender, and Animacy information.

Table 3.1: English singular pronominal paradigm.

	Pronoun		**Reflexive**
	Nominative	Accusative	
1SG	*I*	*me*	*myself*
2SG	*you*		*yourself*
3SG.F.ANIM	*she*	*her*	*herself*
3SG.M.ANIM	*he*	*him*	*himself*
3SG.IN-ANIM	*it*		*itself*

Meanwhile, Table 3.2 offers an overview of the Vietnamese pronominal system, zooming in on singular pronouns for the sake of simplicity. Unlike English,

Vietnamese does not morphologically distinguish Case: The same forms are used irrespective of Case assignment. Instead, the morphological form of pronouns is sensitive to Person, Number, and Honorificity. While the SUBhonoric pronoun *nó* is not sensitive to Gender information, its HONorific counterparts *ổng* and *bả* do take Gender into account. On the other hand, the reflexive pronoun is morphologically underspecified, as the form *mình* stays invariant across the paradigm.

Table 3.2: Vietnamese singular pronominal paradigm.

	Pronoun		**Reflexive**
	Nominative	Accusative	
1SG	*tôi*		*mình*
2SG	*bạn*		*mình*
3SG.F.HON	*bả*		*mình*
3SG.M.HON	*ổng*		*mình*
3SG.SUB	*nó*		*mình*

One ingredient that plays a major role in the Vietnamese anaphoric system, but which takes no crucial part in the English one, is the honorificity feature. Honorificity is not just encoded in the pronominal paradigm in Vietnamese, but also in a variety of languages in the world. Because it is among the categories involved in predicate-argument agreement, honorificity has been proposed to be a ϕ-feature in a range of morphological, syntactic, semantic, and pragmatic studies (Adger & Harbour, 2008; Bobaljik & Yatsushiro, 2006; Boeckx & Niinuma, 2004; Corbett, 2006; Potts & Kawahara, 2004). In Vietnamese, honorificity is typically determined based on social status and age. For instance, professors hold a higher status than students, and thus a professor would be addressed with an HONorific marker, while a stu-

dent would be associated with a SUBhonorific one. When a person is marked with an HONorific classifier, it conveys the meaning that the person in question holds a higher honorific status than the speaker. In contrast, a SUBhonorific-marked classifier signifies an honorific status that is equal or lower than that of the speaker.

3.1.2 Reinhart's (1983) Predictions

The Vietnamese counterpart of the English sentences containing the reflexive and the pronoun forms in (32) is presented in (51), with the curious observation that the non-reflexive pronoun *nó* can corefer with the local NP, which is *Padmé*:

(51) a. Padmé trách **mình**.
Padmé blames SELF
'Padmé blames herself.'

b. Padmé trách **nó**.
Padmé blame 3SG.SUB
'Padmé blames her(self).'

This pattern of local coreference between the NP and the pronoun would only be problematic to Chomsky's (1981) Classical Binding Theory, in which Principle B is responsible for both binding and coreference. However, Reinhart (1983), Grodzinsky & Reinhart (1993), as well as Roelofsen (2010) make a clear distinction between a bound variable pronoun and a coreferent pronoun. While the former is governed by syntactic and semantic binding Principle B, the resolution of the latter is of a pragmatic nature. In essence, under this view, the availability of a reading where *nó* corefers with a clausemate referential antecedent is subject to Rule I or the Coreference Rule, but crucially, not Principle B.

The Coreference Rule, as stated in (30) above, predicts that the availability of either of the two readings in (51) is dependent on the context. The Vietnamese equivalents of the English scenarios in (24) and (25) are given in (52) and (53) below:

(52) The students were electing a new student manager and were discussing whether anyone thought that Max would win.

a. ✓ Chỉ có Max nghĩ là **nó** sẽ thắng.
only exist Max think that 3SG.SUB FUT win
'Only Max thought that he would win.'

b. ✗ Chỉ có Max nghĩ là **mình** sẽ thắng.
only exist Max think that SELF FUT win
'Only Max thought that he would win.'

(53) The students were electing a new student manager and were discussing whether anyone thought that they themselves would win.

a. ✗ Chỉ có Max nghĩ là **nó** sẽ thắng.

b. ✓ Chỉ có Max nghĩ là **mình** sẽ thắng.

Vietnamese shows the same acceptability pattern as English: The pronoun sentence is compatible with a context in which the property of voting for Max is under discussion, but the reflexive sentence is not. The reverse also applies similarly: When the question under discussion concerns self-voting attributes, the sentence containing *mình* is felicitous, while the one with *nó* is not. This indicates that the Coreference Rule does apply in Vietnamese, and that the unavailability of the third person pronoun in the context in (53) is determined by the competition with binding alternatives. Consequently, the contrast in availability statuses of the two forms in (53a) also suggests that only *mình*, but not *nó*, is a true bound variable pronoun.

Then, implementing Reinhart's and Roelofsen's approaches to pronominal competitions to the cases in (51), if a Vietnamese speaker aims to express the proposition that Padmé blames Padmé, then both the reflexive and non-reflexive alternatives in (51) will be taken into account. The Coreference Rule then predicts that a Vietnamese speaker would not opt for a non-reflexive sentence instead of its binding alternative if both utterances yield identical interpretations. However, while the English non-reflexive sentence (*Padmé blames her*) is ruled out in favor of the

more straightforward reflexive alternative (*Padmé blames herself*), both (51b) and (51a) are considered natural and well-formed utterances to express coreference in Vietnamese. This suggests that the two alternatives in (51) do not convey equivalent interpretations, and that the competition between *mình* and *nó* in Vietnamese is not exactly identical to that between *herself* and *her* in English.

I argue that the pronominal competition changes in Vietnamese because the two forms in question do not draw parallel entailments. As illustrated in Table 3.1, the non-reflexive *her* and the reflexive *herself* in English have the same features and encode the same information, except for their anaphoric nature. However, as shown in Table 3.2, Vietnamese encodes honorificity in its non-reflexive pronouns only. Reflexives are not encoded with any honorificity information. As a result, while (51b) and (51a) can both be understood to mean Padmé displays self-blame, the former is embedded with an additional meaning yielded from the honorificity information, while the latter is not:

(54) Padmé trách **nó**.

  i. Padmé blames Padmé.

  ii. Padmé holds an equal or lower honorific status than the speaker.

(55) Padmé trách **mình**.

  i. Padmé blames Padmé.

Due to this inequivalence in meanings between a reflexive and a non-reflexive expression in Vietnamese, no pronominal competitions between the two forms arise. This failure to prohibit coreference between a pronoun and its local antecedent in Vietnamese was captured by Reinhart's (1983) and Roelofsen's (2010) accounts, which predict that coreference is not ruled out when it yields different meanings from binding.

3.1.3 Rooryck & Vanden Wyngaerd's (2011) Predictions

Contrary to Reinhart (1983), Rooryck & Vanden Wyngaerd (2011) do not incorporate any semantics elements into their system. Under their view, pronominal competition revolves around the morphological features of the reflexive and the pronoun. While reflexives lack all ϕ-features, which only get valued via the Agree relationship with another NP, pronouns are NPs that have an inherent set of ϕ-features. Therefore, reflexives have their features shared with the antecedent NP, but pronouns have independent feature values. Shared feature values are marked with a "⋆," while unshared ones are unstarred. The Spell-Out rules of pronouns and reflexives then compete with each other for the same morphosyntactic slot.

The Elsewhere Principle then determines that the Spell-Out rules for reflexives are more specific, and thus they will rule out the application of the pronoun rules in the same environment. Essentially, Rooryck & Vanden Wyngaerd (2011) predict that whenever a language lacks a specialized reflexive form, there will also be no competition between the pronoun and the reflexive rules. Since there are no rules that can be more specific than the pronoun rule in this case, the same Spell-Out form will be taken into account for both the pronoun and the reflexive. The Absence of Principle B effects, therefore, are argued to be a result of the absence of a specialized reflexive class, as demonstrated in the German first person singular surface forms earlier. Crucially, this means that any language that has a dedicated reflexive form is predicted to establish Principle B effects.

Then, applying this system to Vietnamese, which has a dedicated reflexive form *mình*, we expect Principle B effects to show in the language. Nevertheless, as shown in (51b) above, repeated in (56) below, a pronoun like *nó* in Vietnamese can be used to express local coreference:

(56) Padmé trách **nó**.

Padmé blame 3SG.SUB

'Padmé blames her(self).'

At first sight, this appears to be similar to the German first person singular pronoun, *mich*, discussed in (48) earlier. However, contrary to that German data, Vietnamese does have *mình* as a dedicated reflexive form for the given third person singular feature set, as illustrated in (51a) above, repeated in (57) below:

(57) Padmé trách **mình**.

Padmé blame SELF

'Padmé blames herself.'

Regarding (56), the features that the pronoun *nó* carries are third person, singular, and subhonorific. The Vietnamese form *mình* is underspecified similar to the German *zich*. While the German *zich* has a 3* feature, the Vietnamese *mình* has a SG* feature. This means that *mình* only points to singular entities. *Mình* does not inherently come with any person, gender, or honorificity features, whereas the form *nó* does not only come with 3 and SG for the person and number features, but also SUB for honorificity. Crucially, the features that *mình* has are starred, while those that *nó* has are unstarred.

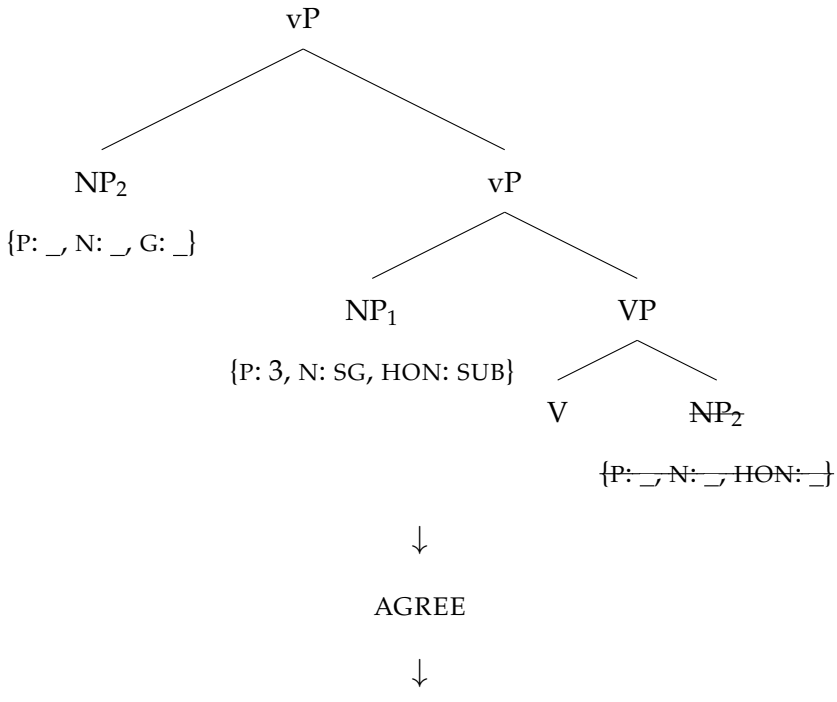
Based on the Vietnamese singular pronominal paradigm in Table 3.2, the ordered set of rules for Vietnamese pronominal system would be as follows:

Table 3.3: Vietnamese lexical insertion rules (with coreferential pronouns).

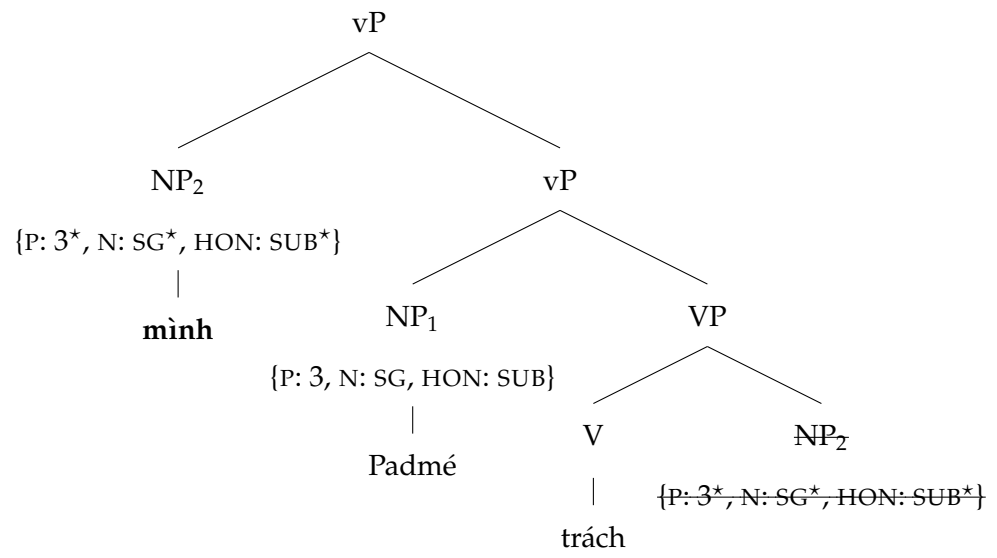
a.	{N: SG*}	↔	*mình*
b.	{P: 1, N: SG}	↔	*tôi*
c.	{P: 2, N: SG}	↔	*bạn*
d.	{P: 3, N: SG, G: M, HON: HON}	↔	*ổng*
e.	{P: 3, N: SG, G: F, HON: HON}	↔	*bả*
f.	{P: 3, N: SG, HON: SUB}	↔	*nó*

The revised Subset Principle states that if there is form that has some subset of features of the target position, that form can be inserted there. As a result, both of the forms *mình* and *nó* are candidates competing for the same direct object position. Then, the syntactic structure of the reflexive sentence in (56) is presented in the following configuration. The syntax puts the unvalued form in the higher position so that it can c-command the antecedent and gets its features valued via Agree:

(58) a.

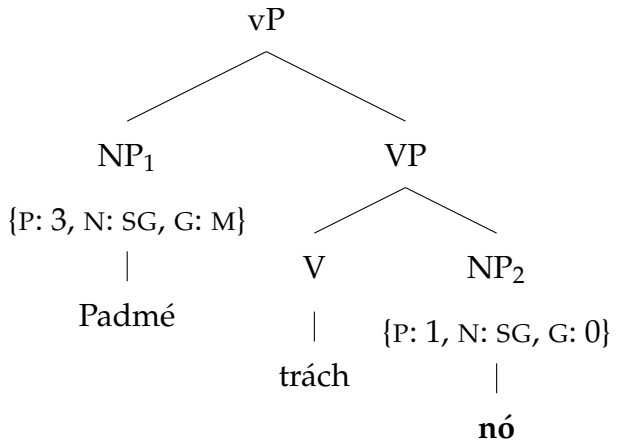


b.



Contrary to *mình*, the form *nó* already has its features independently valued, so it does not undergo any movement to trigger the Agree process:

(59)



The Elsewhere Principle would then determine *mình* to be the more specific form, because the starred feature is a more specific version of the regular unstarred feature. Then, the lexical insertion rule of *mình* is put before that of *nó*. This application of rule would block *nó*, which is a more general rule, from co-occuring with *mình* for the same environment. Essentially, when there exists a rule that spells out a reflexive form, this ordered set of rules prohibit a pronoun form from being used in the same slot. This rule ordering fails to capture the pattern in (56): The pronoun form can still convey local coreference, despite the availability of the reflexive *mình*

for the same construction in (57). Consequently, based on this reliance on reflexives and pronouns as syncretic forms, Rooryck & Vanden Wyngaerd's (2011) morphological approach to pronominal competition does not predict the availability of two distinct anaphoric elements in the same structural context in Vietnamese.

Vietnamese system is not the only exception to Rooryck & Vanden Wyngaerd's (2011) framework: Recent studies on Tamil and Romanian have also argued against the correlation between the lack of a dedicated reflexive class and the lack of Principle B effects. Both of these languages have specialized anaphoric forms, and they still allow pronouns to corefer with the local antecedents. As shown in (60) below, the pronoun form *avan-* in Tamil can be used reflexively, even though the reflexive form *tann-* is available in the same syntactic position (Sundaresan, 2012, p. 85):

(60) a. Raman-ŭkkŭ **avan**-æ-yee pidikka-læ.
Raman[NOM] he-ACC-EMPH like-NEG
'Raman did not like (even) him(self).'

b. Raman **tann**-æ-yee pidikka-læ.
Raman[NOM] SELF-ACC-EMPH like-NEG
'Raman did not like (even) himself.'

In this case, contrary to Rooryck & Vanden Wyngaerd's (2011) prediction, the Absence of Principle B effects are still observed in Tamil, despite the presence of a specialized reflexive form in the paradigm. Similar properties also exhibit in Romanian: Both the pronoun form *el* and the reflexive form *sine* can appear in the same syntactic slot to convey coreference (Ivan, 2018):

(61) Lockhart se iubeşte pe **el** / **sine**.
Lockhart REFL.CL loves ACC him / SELF
'Lockhart loves himself.'

Like Vietnamese and Tamil, Romanian also poses challenges to Rooryck & Van-

den Wyngaerd's (2011) account. Once again, their proposed morphological competition cannot capture the patterns in which constructions associating with two distinct referent forms can coexist within one language. Given that this theory cannot straightforwardly explain the alternate occurrence of a reflexive and a non-reflexive in the same syntactic construction, a pragmatic-based account argued by Reinhart (1983) appears to be a more optimal path towards an analysis on Vietnamese pronominal distribution and interpretation.

3.2 Experiment 1: Antecedent Types

In previous sections, I argue that a pragmatic approach to pronominal competition captures patterns of Vietnamese pronoun interpretation more accurately than a morphological one. In particular, the Reinhartian view on separating coreference from binding predicts that the apparent violations of Principle B effects observed in Vietnamese are actually due to coreference, but not binding. Because of the different honorificity encodings in Vietnamese pronoun system, local coreference is not ruled out by Rule I. Given that Rule I applies in Vietnamese, a natural next step would be to investigate whether Binding Principle B also works in Vietnamese. I explore the hypothesis that even though local coreference is highly permissive, Binding Principle B is still an active grammatical constraint in Vietnamese.

To examine whether Vietnamese does make a distinction between binding and coreference, I manipulate whether the local antecedent is a referential or a QP. This is built on Reinhart's (1983) observation that pronouns can corefer with NPs like *the boy*, but not with QPs like *every boy*, since binding is required for a pronoun to be covalued a quantified antecedent. If Vietnamese distinguishes between the bound variable use and the referential use of pronouns, then the prediction is that QPs should not bind local pronouns, but local NPs should allow for local coreference.

3.2.1 Participants

36 native speakers of Vietnamese, all of whom resided in Ho Chi Minh City, Vietnam at the time of participation, were recruited via social media. 25 of them identified as female, 9 as male, and 2 as other gender. The age range was between 18 and 56, with a mean of 26.53. All participants gave informed consent and had the chance to be entered into a raffle at the end of the experiment for a 20 USD Amazon gift card. The experiment lasted approximately 20 minutes.

3.2.2 Materials

A two-alternative forced-choice experiment was conducted, with two test conditions (NON-LOCAL QP and LOCAL QP) and one control condition (REPEATED NAME). In the test conditions, the quantified antecedent was either in the NON-LOCAL or LOCAL domain of the third person SUBhonorific singular pronoun *nó*. Meanwhile, in the control condition, the QP always stayed in the local position, but the pronoun is replaced with a repeated name. Unlike English, Vietnamese uses repeated names as a natural and unambiguous way to refer back to an entity previously introduced in the discourse. Since the repeated name has to refer back to the antecedent bearing the same name, there should be no disjoint reference effect observed in this case. This design resulted in three conditions exemplified in Table 3.4 below:

Table 3.4: Experimental conditions and sample materials for Experiment 1.

Condition	Sentence									
NON-LOCAL QP	**Mọi**	**thằng**	**nhân**	**viên**	nói	là	**Tâm**	bầu	cho	**nó**.
	every	SUB	person	worker	say	that	Tam	vote	for	SUB
	'Every employee said that Tam voted for him.'									
LOCAL QP	**Tâm**	nói	là	**mọi**	**thằng**	**nhân**	**viên**	bầu	cho	**nó**.
	Tam	say	that	every	SUB	person	worker	vote	for	SUB
	'Tam said that every employee voted for him.'									
REPEATED NAME	**Tâm**	nói	là	**mọi**	**thằng**	**nhân**	**viên**	bầu	cho	**Tâm**.
	Tam	say	that	every	SUB	person	worker	vote	for	Tam
	'Tam said that every employee voted for Tam.'									

The 18 sets of experimental items were intermixed with 48 fillers and distributed across 3 lists in a Latin Square design. All antecedents used in these test items were controlled for gender. In particular, 9 of them had female names for the NPs, and denoted sets of female entities in the QPs. Meanwhile, the other 9 utilized male names and groups of male entities. To ensure that the nature of the matrix verbs does not associate with any biases, I used 4 verbs belong in 3 different types, which are *nói* 'say' for the speech type, *nghĩ* 'think' and *tin* 'believe' for the thought type, as well as *biết* 'know' for the knowledge type.

Furthermore, the filler sentences were also controlled, as they were all grammatical and generally similar to the test items in terms of length and structural complexity. 12 of the fillers were test items from Experiment 2, and 16 of them were unambiguous sentences. To distract participants from noticing the potentially ambiguous nature associated with pronoun interpretation, the rest of the fillers were all ambiguous sentences. 10 of them were prepositional phrase (PP) and the other 10 were relative clause (RC) attachment structures. The order of presentation was randomized.

All test and filler sentences were followed by a comprehension question along with two possible answer choices displayed on the screen. For ambiguous fillers, participants were asked to select one of the two interpretations available for such sentences. For the test items involving pronoun interpretation, participants had to pick one of the two antecedents to resolve the pronoun in question, as illustrated in (62) below:

(62) Ai được bầu cho?
who PASS vote for
'Who was voted for?'

i. Tâm
Tam
'Tam'

ii. Mọi thằng nhân viên
every SUB person worker
'Every employee'

The answer choices were also counterbalanced for each participant.

3.2.3 Procedure

The link to this experiment was distributed on Facebook. When participants clicked on the link, they were first presented with a consent form, describing the nature of the experiment and informing them of the incentives. The experimental trials were preceded by a screen collecting general demographic data and two screens of instructions, each of which had 3 questions to ensure that participants fully understand the task and complete it as directed. Afterwards, participants went through 3 practice sentences to familiarize themselves with the experimental methods.

The experiment was conducted using the online experiment platform Ibex Farm (Drummond, 2013) and employed a two-alternative forced choice comprehension judgment task. Participants had to take this experiment with either a desktop computer or a laptop. Each of the sentences was fully displayed on top of the screen,

with a comprehension question and two answer choices right below it. Most of the sentences each participant read presented some type of syntactic and semantic ambiguity. Participants were instructed to pick the interpretation that fit the sentence best. Participants could either click directly on the options or press the number '1' or '2' on the keyboard to enter their answer selection.

Upon completion, participants were given a number and a link that they could access to participate in the raffle for the 20 USD Amazon gift cards. On that separate website, they had to introduce their e-mail address alongside the random number generated at the end of the experiment. A winner was randomly selected for every 10 participants.

Procedures for this experiment and all the other judgment studies described in this dissertation were approved by the Internal Review Board of the University of Massachusetts Amherst.

3.2.4 Analysis

Participants' accuracy rate on the 16 unambiguous filler comprehension questions was used to assess whether they were actually paying full attention throughout the experiment. Because all participants met the exclusion threshold by answering at least 80% of the questions correctly, all of the collected data were included in the final analyses.

All statistical analyses were carried out in R software environment (R Core Team, 2013), using the `lme4` package (Bates, Maechler, Bolker, & Walker, 2015). Since the dependent variable is categorical, a logistic mixed-effects regression was created to model antecedent selection outcomes (Jaeger, 2008). The model integrated experimental manipulations as fixed effects, with random intercepts and slopes for both participants and items (Baayen, Davidson, & Bates, 2008). In addition, the experimental manipulations were coded using Helmert contrasts (Va-

sishth & Broe, 2011). There were two planned contrasts, as illustrated in the following table:

Table 3.5: Planned Helmert contrasts for Experiment 1.

Condition	Contrast 1	Contrast 2
NON-LOCAL QP	-2/3	0
LOCAL QP	1/3	-1/2
REPEATED NAME	1/3	1/2

The first was to determine whether the rate at which QPs were chosen as antecedents differed between when they were in the NON-LOCAL domain and when they were in the LOCAL domain. The second was to test if a pronoun behaved unambiguously like a REPEATED NAME when the QP was in the LOCAL domain. A fixed effect with an absolute z-value greater than 2 was considered significant (Gelman & Hill, 2007).

3.2.5 Results

The percentage of quantified antecedent selection and standard errors by condition are presented in Figure 3.1, and the results of the statistical analyses are reported in Table 3.6. Participants resolved the pronoun to the QP when it was in the NON-LOCAL domain for almost 60% of the time. However, when the QP was in the LOCAL domain of the pronoun, its selection rate dropped significantly to being less than 8%, which was only less than 2% higher than the unambiguous REPEATED NAME control condition.

The difference between the NON-LOCAL QP, in which the QP was in a non-local domain, and the mean of the LOCAL QP and the REPEATED NAME conditions, in which the QP was in a local domain, was significant. On the contrary, the con-

trast between the latter two conditions (LOCAL QP and REPEATED NAME) was not significant.

Figure 3.1: Percentage of quantified antecedent selection and standard errors by condition in Experiment 1.

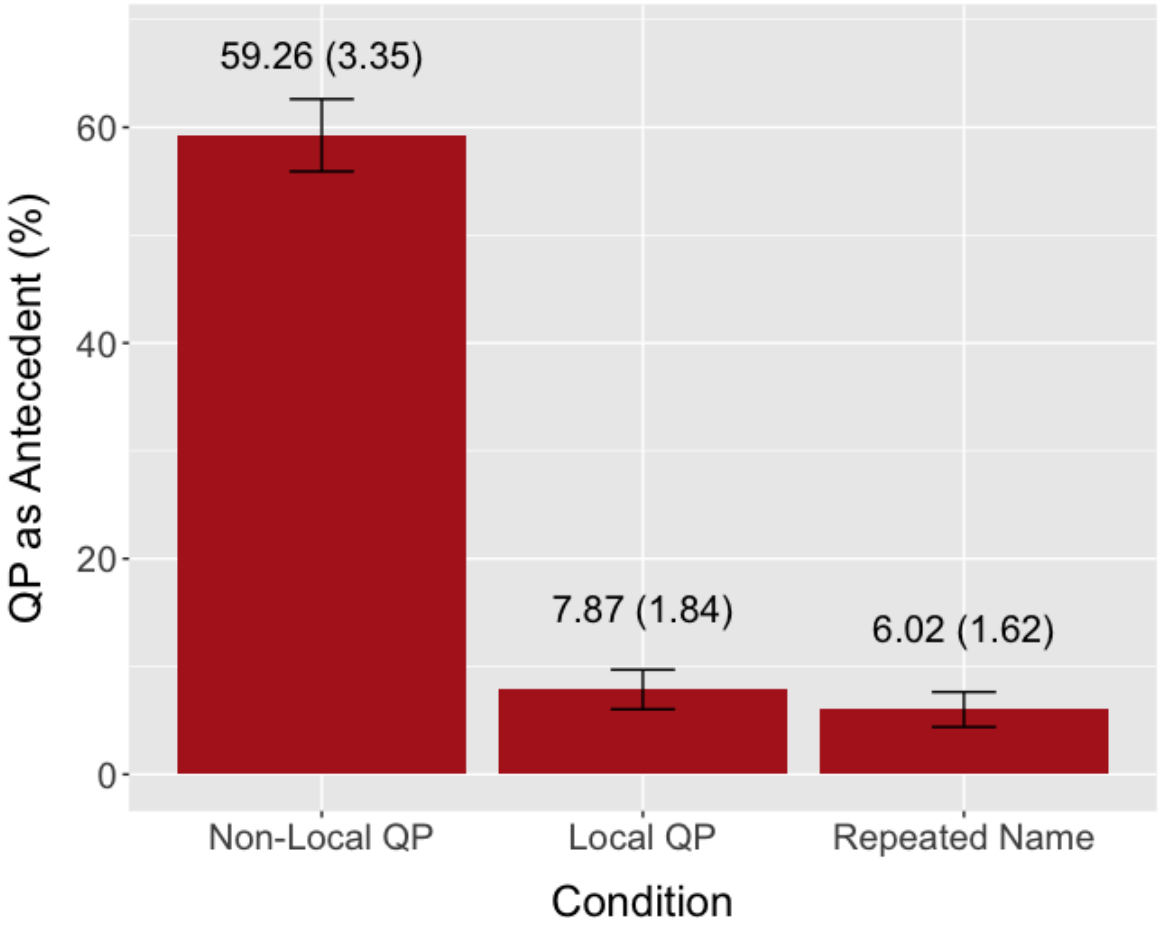


Table 3.6: Logistic regression model fit to proportion responses in Experiment 1. Significant effects ($|z| > 2$) are in boldface.

Fixed Effects	$\hat{\beta}$	*SE*	*z*
INTERCEPT	-1.83	0.25	-7.25
LOCAL QP	**-3.41**	**0.42**	**-8.12**
REPEATED NAME	-0.30	0.45	-0.67

3.2.6 Discussion

The main findings show that participants allowed for coreference with the local antecedent except when it was a QP. As a control condition, the REPEATED NAME condition unambiguously ruled out the local quantified subject as the antecedent for the pronoun. Crucially, the rate at which the QP was chosen as the antecedent for the pronoun in the LOCAL QP condition was as low as what was observed in the REPEATED NAME condition. The blocking of coreference between the pronoun *nó* and its local QP provides strong evidence for our hypothesis that Principle B is at play in restricting binding relations in Vietnamese.

Moreover, while local binding to QPs is not possible, local coreference with NPs is highly allowed. The rate at which the QP was chosen as the antecedent for the pronoun when it was in the non-local domain was significantly higher than when it was in the local domain. Under a Reinhartian approach, a pronoun can refer back to a local NP under special scenarios. However, even with regular contexts, Vietnamese speakers still allowed for local coreference with NPs for almost half of the time, displaying a coreference rate much higher than predicted for English. This further supports our theory that the puzzling lack of Principle B effects in Vietnamese was a failure to prohibit coreference between a pronoun and its local antecedent, which arises because Vietnamese pronominal system encodes honorificity differently for pronouns and reflexives.

In sum, the patterns of judgments observed in this experiment follow the predictions yielded from Reinhart's (1983) and Roelofsen's (2010) proposals: Pronouns in Vietnamese can select the same referent as local antecedents when the anaphoric relation is resolved contextually, but cannot when the anaphoric relation is encoded syntactically. Essentially, these results show evidence of two distinct mechanisms for pronoun interpretation in Vietnamese: while coreference with NPs is possible, binding with QPs is prohibited.

3.3 Experiment 2: Coargumenthood

Previous studies discuss several issues regarding the scope of binding. As noted in (2b) earlier, classic Principle B states that pronouns must not be bound locally, in which 'locally' is a shorthand for 'within its governing category' (Chomsky 1981, p. 188). The 'governing category,' or the local domain for binding, is roughly the minimal clause or the complex NP. Meanwhile, as discussed in (19), other accounts propose that it is coargumenthood that is a key factor in limiting binding scope (Büring, 2005, p. 55; Reinhart, 1983, p. 139; Roelofsen, 2010, p. 119). Regarding the status of Vietnamese binding in this puzzle, the results from Experiment 1 reveal that pronouns cannot be bound by a quantified antecedent in the same clause. This observation begs the question of whether Principle B effects in Vietnamese were attributable to clause-boundedness or coargumenthood. If Vietnamese follows the Reinhartian theory, then QPs should not allow binding when they are coarguments of pronouns.

3.3.1 Participants

The participants in Experiment 2 were the same as the ones in Experiment 1.

3.3.2 Materials

Similar to Experiment 1, Experiment 2 also employed a two-alternative forced choice task, asking participants to select one of the two available interpretations for a given sentence. There were two test conditions, manipulating whether the quantified antecedent was in the COARGUMENT or NON-COARGUMENT domain of the pronoun. The 12 sets of experimental items were intermixed with 48 fillers and distributed across 2 lists in a Latin Square design, as exemplified in Table 3.7 below. All antecedents used in these test items were overtly marked with HONorific status

and controlled for gender. All of the pronouns were of HONorific forms and were gender-matched with their local antecedent.

Table 3.7: Experimental conditions and sample materials for Experiment 2.

Condition	Sentence
NON-COARGUMENT	**Mọi** **ông** **đạo** **diễn** đề cử **bạn** **của** **ổng**. every HON direct act suggest depute friend of HON 'Every director nominated his friend.'
COARGUMENT	**Mọi** **ông** **đạo** **diễn** đề cử **ổng**. every HON direct act suggest depute SUB 'Every director nominated him.'

The filler sentences in this Experiment consisted of the 18 test items and all the other fillers in Experiment 1. The sample comprehension question and answer pair for the test sentences were as follows:

(63) a. Mọi ông đạo diễn đề cử bạn của ai?
every HON direct act suggest deputy friend of who
'Who(se friend) did every director nominate?'

b. Mọi ông đạo diễn đề cử ai?
every HON direct act suggest deputy who
'Who(se friend) did every director nominate?'

i. Chính mình
own self
'His own (self)'

ii. Một ai đó khác
one who that different
'Someone else('s)'

If the sentence represented the NON-COARGUMENT condition, the participant would see the question in (63a). Likewise, If the sentence belonged to the COARGUMENT condition, the corresponding question would be that in (63b). The answers

to these questions were the same, due to Vietnamese's lack of overt case marking. The order of presentation for all the sentences were randomized, and the answer choices were counterbalanced for each participant.

3.3.3 Procedure

Experiment 2 followed the same procedure used in Experiment 1.

3.3.4 Analysis

I used simple coding (NON-COARGUMENT = 0, COARGUMENT = 1) to determine whether the rates of bound interpretation were different between when the quantified antecedent was the COARGUMENT of the pronoun and when it was not. The other data analysis components of this experiment followed the same steps as in Experiment 1.

3.3.5 Results

The percentage of bound interpretation selection and standard errors by condition are presented in Figure 3.2. Participants interpreted the pronoun to be bound to the quantified antecedent almost 81% of the time when these two element established COARGUMENThood. However, this bound reading was only assigned for approximately 23% of the time when the QP was a NON-COARGUMENT of the pronoun. This contrast in bound interpretation was highly significant, as shown in the results of the statistical analyses reported in Table 3.8.

Figure 3.2: Percentage of bound interpretation selection and standard errors by condition in Experiment 2.

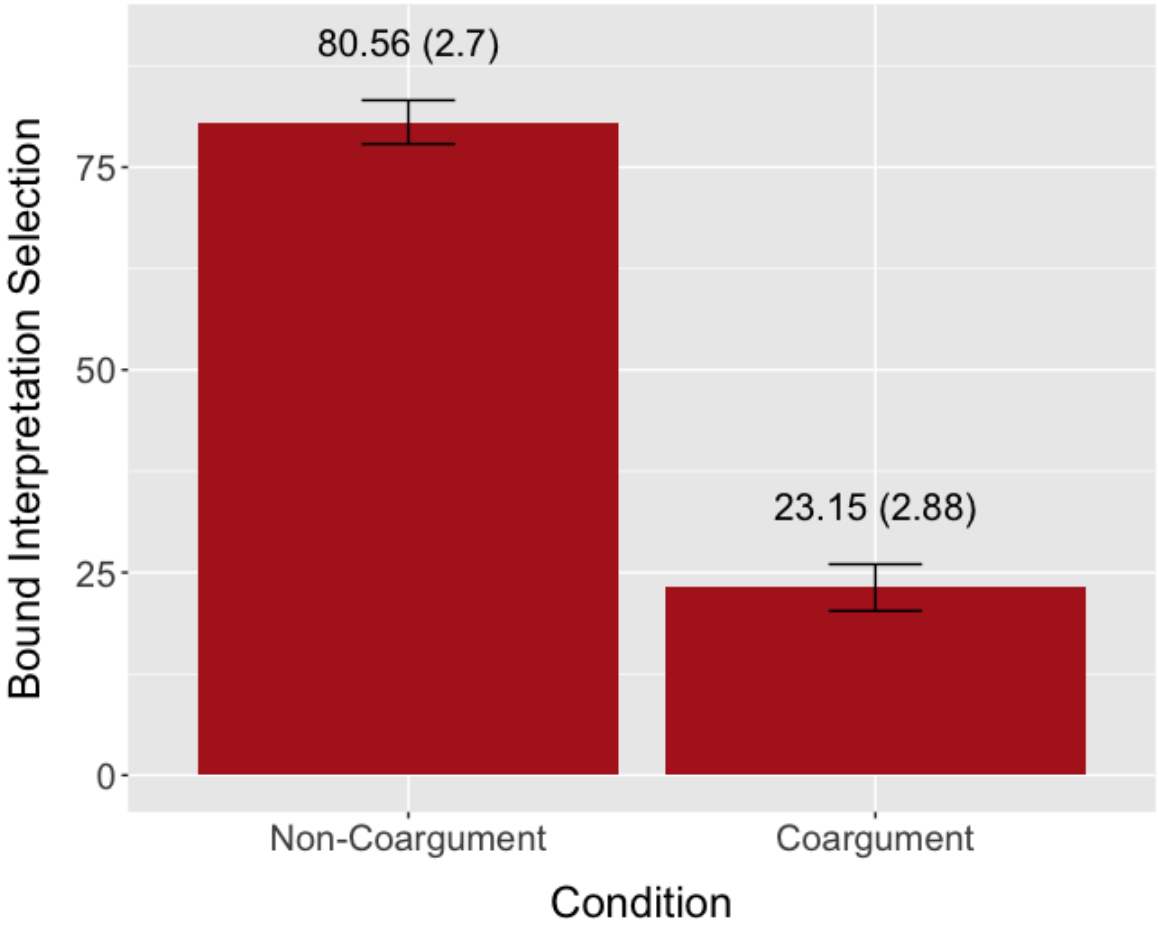


Table 3.8: Logistic regression model fit to proportion responses in Experiment 2. Significant effects ($|z| > 2$) are in boldface.

Fixed Effects	$\hat{\beta}$	SE	z
INTERCEPT	3.42	0.99	3.45
COARGUMENT	**-6.53**	**1.26**	**-5.16**

3.3.6 Discussion

The key finding of this experiment is that pronouns can be bound by their non-coarguments, but not by their coarguments. The high rate for bound interpretation

for the NON-COARGUMENT domain was predicted in the literature: Principle B effects only target COARGUMENT domains, but not NON-COARGUMENT ones (Büring, 2005; Reinhart, 1983; Roelofsen, 2010). The result for the NON-COARGUMENT condition establishes a control environment for the COARGUMENT condition.

For the COARGUMENT condition, the numerical trend is reversed: Disjoint reading received a high selection rate, but only less than a quarter of participants opted for a bound interpretation. This finding suggests that the binding domain in Vietnamese fits the expectations of the Reinhartian theory. This confirms that the Principle B effects observed in Vietnamese did not associate with any possible confounds related to cross-linguistic variations in binding domains.

3.4 General Discussion

3.4.1 Summary

The current goal of this study was to determine whether the Reinhartian theory that pronoun interpretation involves two distinct processes – coreference and binding – applies to Vietnamese. The core hypothesis states that while local coreference between a pronoun and an NP is possible, binding is prohibited when a pronoun an QP are in a coargument relationship. I tested this hypothesis in two two-alternative forced choice experiments, manipulating the syntactic position of the pronoun relative to the quantified antecedent in a sentence.

Experiment 1 compared the rates at which pronouns were resolved to QPs in non-local and local domains. Meanwhile, Experiment 2 compared the rates at which pronouns were interpreted as bound by the QPs in non-coargument and coargument domains. While Experiment 1 showed that Vietnamese allows pronouns to corefer with their local NPs, but not be bound by their local QPs, Experiment 2 further confirmed the theoretical prediction in which Principle B targets

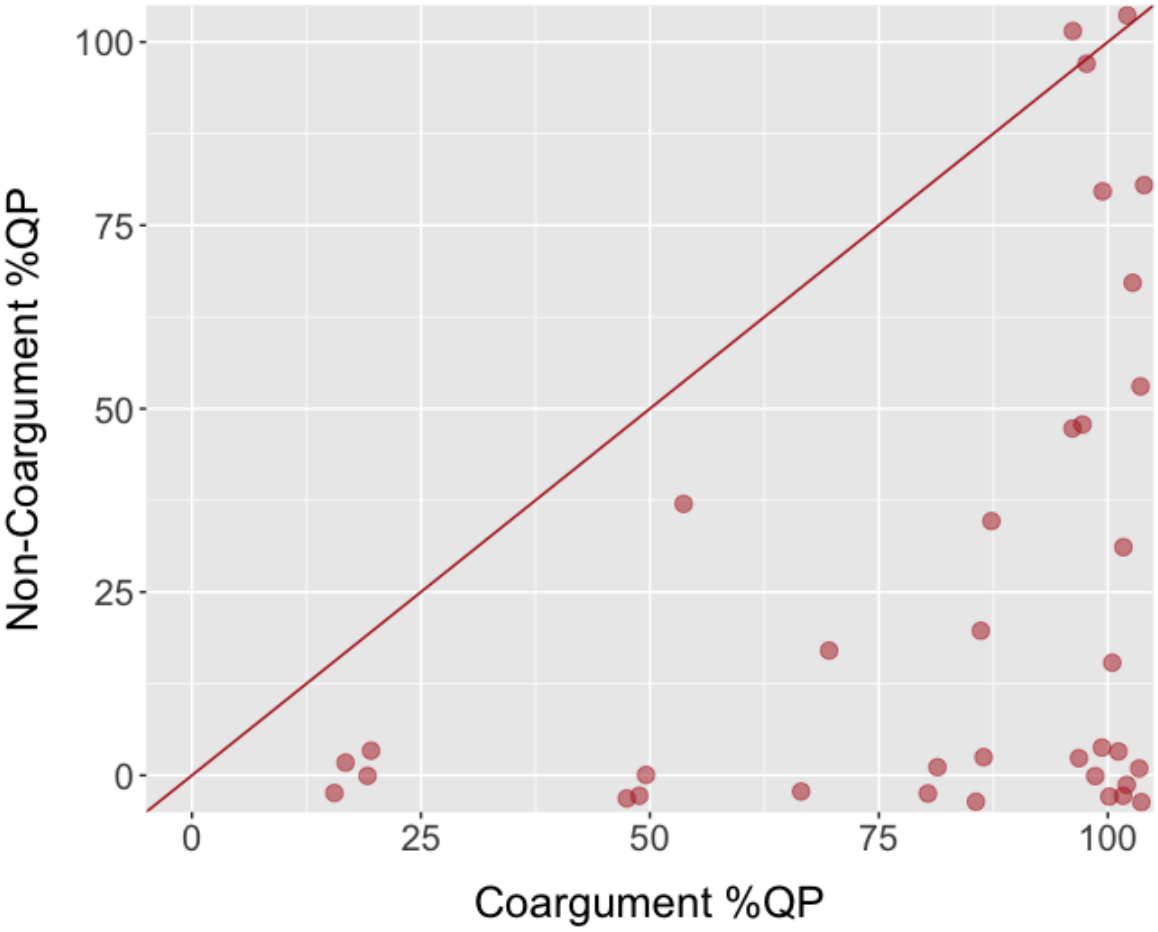
coarguments, but not non-coarguments in the language.

The results reported in these two experiments contribute a new empirical generalization that while local coreference is permitted, local binding is not permitted in Vietnamese. This patterns with the key arguments presented in Section 3.1, which propose that the mechanism that determines coreference is different from that of binding. On the one hand, Vietnamese shows an exceptionally lenient coreference component in pronoun interpretation. Because the sentences containing pronouns and reflexives in Vietnamese yield distinguishable meanings due to different encodings of honorificity information, they do not compete with each other, and thus local coreference is not ruled out. On the other hand, Principle B as a syntactic constraint requires the use of a bound variable in a covarying context. This rule does not get affected by any change regarding the pronominal competition, and thus it is strictly enforced in cases involving local quantifiers. Crucially, these findings suggest that coreference is subject to pronominal competitions, but binding is not.

3.4.2 Cross-Experimental Comparisons

In Experiment 1, the rate at which the local quantified antecedent was selected to be the antecedent of the pronoun in question was 7.87%. However, in Experiment 2, this rate increased to 23.15%. This discrepancy between the results in these two experiments may be due to by-participant variation. Since the same 36 Vietnamese speakers participated in both of these experiments, a closer examination of the participants' results provides more insights on the patterns of pronoun interpretation in Vietnamese. First, the relationship between the two conditions in Experiment 2 is represented in Figure 3.3 below:

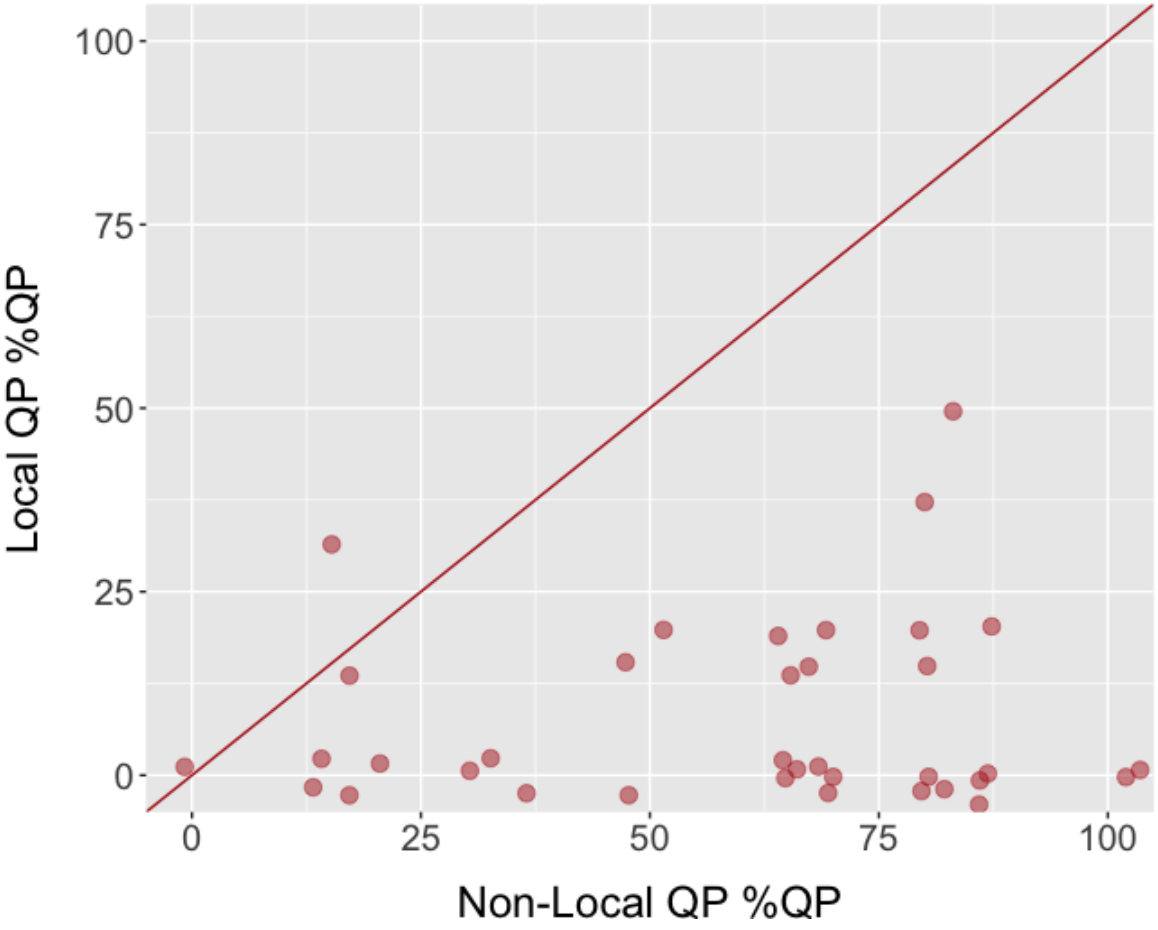
Figure 3.3: The bound interpretation selection of the COARGUMENT condition by the bound interpretation selection of the NON-COARGUMENT condition in Experiment 2.



In Experiment 2, when they were presented with one antecedent in a single clause and asked whether pronouns could be resolved to that one antecedent, 5 out of the 36 participants showed an extreme tendency to bind pronouns to that one available antecedent. In particular, they selected a bound reading for the NON-COARGUMENT condition for 100% of the time, and for the COARGUMENT condition for more than 83% of the time. However, exploratory analysis on these 5 participants' behaviors in Experiment 1 revealed that they did obey Binding Principle B when two antecedents – one grammatical and one ungrammatical – were presented. The representation of the values obtained for the two conditions in Exper-

iment 1 is in Figure 3.4 below:

Figure 3.4: The quantified antecedent selection of the LOCAL QUANTIFIER condition by the quantified antecedent selection of the NON-LOCAL QUANTIFIER condition in Experiment 1.



In the LOCAL QUANTIFIER condition in Experiment 1, the 5 outliers in Experiment 2 chose the Principle B compliant non-local antecedent, ruling out the binding violating local QP for 90% of the time on average. This finding suggests that they could distinguish Principle B compliant and violating antecedents, and did opt for the grammatical option.

Then, the observed cross-experimental difference could be due to these outliers prioritizing resolving the pronouns to the only available antecedent in Experiment 2, even though that antecedent would be deemed ungrammatical otherwise. Given

that accidental coreference is highly permissive in Vietnamese, it is not remarkably surprising that a minority of comprehenders would try to anchor the pronoun and the only established discourse referent, as long as the features of that referent match those of the pronoun. In other words, the increased rate of local QP selection in Experiment 2 may just be an artifact of the task and does not necessarily indicate that the local binding is grammatically possible but not preferred.

Overall, there was undeniably a clear distinction in pronoun interpretation between COARGUMENT and NON-COARGUMENT domains in Experiment 2 and between LOCAL QUANTIFIER and NON-LOCAL QUANTIFIER conditions in Experiment 1. As shown in Figures 3.4 and 3.3 above, participants almost always resolved pronouns to QPs in the NON-COARGUMENT or NON-LOCAL domains significantly more than those in the LOCAL or COARGUMENT domains. As a result, the findings in these two-alternative forced choice judgment studies showed that binding is active in local QP environments in Vietnamese, confirming that the theoretical expectations about Principle B effects are met in the language.

CHAPTER 4

PRONOUN PROCESSING IN VIETNAMESE

Up until now, I have focused on describing and modeling the constraints on interpretation of Vietnamese pronouns. In this chapter, I will ask how and when Vietnamese speakers enforce these constraints during real-time sentence processing. I first report previous findings regarding the role that structural constraints play in guiding the early stages of pronoun resolution in English in Section 4.1. While the results from Nicol & Swinney (1989) and Chow, Lewis, & Phillips (2014) suggest a strict Principle B application in which local antecedents are excluded from the initial set of possible antecedents for pronouns, Badecker & Straub (2002) argues that these local subjects can still be retrieved if their features match with those of the pronoun in question. I then address this question with three self-paced reading experiments in Vietnamese. The first experiment, reported in Section 4.2, examines the processing of pronouns with local referential subjects, and observes that local antecedents are considered but dispreferred initially. Then, with topichood controlled, the results from the second experiment in Section 4.3 replicated this pattern. In Section 4.4, I investigate this process with QPs as the local antecedents. The results show that comprehenders only consider non-local subjects, displaying a robust grammaticality effect. A two-alternative forced choice task in Section 4.4 revealed that the offline interpretation patterns align with the online comprehen-

sion profiles. Section 4.6 summarizes the main takeaways from the experiments and address the differences in pronoun comprehension profiles across the three online self-paced reading tasks.

4.1 Structural Constraints in Pronoun Processing

4.1.1 Evidence from English

As previously noted, Classical Principle B of Binding Theory prohibits binding and coreference between a pronoun and a subject in its local clause (Chomsky, 1981). As illustrated in the following English sentences, neither the NP *that employee* nor the QP *every employee* in the coargument domain is considered to be an accessible antecedent for the pronoun *him*.

(64) a. ✗ That employee voted for **him**.

b. ✗ Every employee voted for **him**.

The question of how quickly binding constraints are used to restrict the interpretation of pronouns was first asked by Nicol & Swinney (1989). In parallel cross-modal priming studies on reflexives and pronouns using stimuli like those in (65) below, they found that only associates of structurally accessible referents received semantic priming.

(65) a. The boxer told the skier that the doctor for the team would blame **himself** for the recent injury.

b. The boxer told the skier that the doctor for the team would blame **him** for the recent injury.

In particular, results of reflexive sentences like that in (65a) revealed significant priming of the local antecedent *the doctor*, but not the non-local ones (*the boxer* and

the skier). However, those of pronoun sentences like that in (65b) showed the opposite effects: Significant priming was observed with the non-local referents *the boxer* and *the skier*, but crucially not the local one (*the doctor*). These findings reflected the prediction that Classical Binding Theory makes for reflexives and pronouns: Pronouns cannot have the same meaning as reflexives in the same position. This suggests that the binding constraints were immediately enforced in comprehension. Interestingly, their results did not seem at first blush compatible with the competitive model described in the previous chapters. A simple interpretation of this model would suggest that speakers first consider, and then reject, the local antecedent. Instead, Nicol & Swinney (1989) found no evidence that this antecedent was reactivated at all.

Badecker & Straub (2002) took issue with this conclusion. They suggested that local antecedents can also be considered in early processing, implicating that Principle B is not applied as a strict constraint that filters out all binding violating subjects initially. To address this concern, they employed a feature-mismatch paradigm and self-paced reading methodology, manipulating whether the two referents under discussion – the NON-LOCAL (Principle B compliant) and the LOCAL (Principle B violating) antecedents – did MATCH or MISMATCH the pronoun in gender, as illustrated in Table 4.1 below:

Table 4.1: Experimental conditions and sample materials in Badecker & Straub (2002).

Condition	Sentence
MULTIPLE MATCH	**John** thought that **Bill** owed **him** another chance to solve the problem.
NON-LOCAL MATCH	**John** thought that **Beth** owed **him** another chance to solve the problem.
LOCAL MATCH	**Jane** thought that **Bill** owed **him** another chance to solve the problem.
NO MATCH	**Jane** thought that **Beth** owed **him** another chance to solve the problem.

First, Badecker & Straub (2002) found that the NO MATCH condition was read the slowest. This finding aligns with the prediction from a cue-based retrieval mechanism in a content-addressable memory system (Lewis & Vasishth, 2005; Lewis, Vasishth, & Van Dyke, 2006). Under this cue-based theory, referents like *Jane* and *Beth* were stored as memory items and had their associated morphological features such as *[+singular]* and *[+feminine]* encoded in memory, as illustrated in (66) below. Then, encountering a pronominal element like *him* triggered a retrieval process targeting previously processed material to find a match for its *[+singular]* and *[+masculine]* cues. Since neither *Jane* nor *Beth* carried information that match these cues, no appropriate antecedent for the pronoun was immediately retrieved in this initial processing stage.

(66) **Jane** thought that **Beth** owed **him** ...
[+SG, +F] [+SG, +F] [+SG, +M]

Even though the sentence in (66) is grammatical, comprehenders have to resolve the pronoun to an antecedent outside the scope of the given sentence. This led to an additional processing cost and thus resulted in a longer online reading time.

Secondly, they observe a grammaticality effect: NON-LOCAL MATCH was read significantly faster than LOCAL MATCH. This indicates that English speakers do rely on Principle B to restrict the set of possible antecedents for the pronoun under discussion. As illustrated in (67) and (68) below, both of these conditions contained one antecedent that matched the pronoun in gender. However, while the matching antecedent in (67) satisfied Binding Theory's structural requirement, that in (68) did not. The contrast in reading times between NON-LOCAL MATCH and LOCAL MATCH, therefore, suggests that comprehenders are sensitive to structural constraints imposed by Principle B of Binding Theory in early pronoun resolution.

(67) **John** thought that **Beth** owed **him** ...

[+SG, +M] [+SG, +F] [+SG, +M]

(68) **Jane** thought that **Bill** owed **him** ...

[+SG, +F] [+SG, +M] [+SG, +M]

Nevertheless, Badecker & Straub (2002) held the view that Principle B does not completely filter out all structurally violating antecedents for the interpretation of pronouns in real-time comprehension. In fact, they argue that structural constraints do not block local antecedents in the initial retrieval, as MULTIPLE MATCH was read significantly slower than NON-LOCAL MATCH. As illustrated in (69) below, as *John* and *Bill* both have their *[+singular]* and *[+masculine]* features encoded in memory, they both provide an exact match for the feature set of the pronoun *him* in question:

(69) **John** thought that **Bill** owed **him** ...

[+SG, +M] [+SG, +M] [+SG, +M]

Badecker & Straub (2002) reason that the longer reading time observed in this condition, as compared to the NON-LOCAL MATCH condition is the result of the additional processing associated with the task of determining the single antecedent to which the pronoun resolves. The difference between the condition in which there is only one accessible match and the one in which there are two possible antecedents showed that comprehenders can and do access both of the feature-matching antecedents, regardless of their syntactic position relative to the pronoun. Since local antecedents were not immediately ruled out, their contents were taken into account during the retrieval process, leading to this multiple match effect.

In an attempt to replicate the findings reported in Badecker & Straub (2002), Chow, Lewis, & Phillips (2014) conducted a series of self-paced reading experiments using the same feature-mismatch paradigm. Like Badecker & Straub (2002),

Chow, Lewis, & Phillips (2014) also observed an immediate sensitivity to morphological features and structural constraints, as NO MATCH was read the slowest, and LOCAL MATCH was read significantly slower than NON-LOCAL MATCH.

However, regarding the multiple match effect, Chow, Lewis, & Phillips (2014) ended up with results different from Badecker & Straub (2002) and thus reached diverging conclusions regarding the strength of structural constraints in the initial stage of pronoun processing. In particular, Chow, Lewis, & Phillip (2014) argue that only non-local antecedents are retrieved initially, suggesting a strong application of Binding Principle B. They found no difference in reading times between the MULTIPLE MATCH and the NON-LOCAL MATCH conditions. In other words, English speakers do not initially evaluate the LOCAL referent, and thus the content of this Principle B violating antecedent does not affect the early antecedent retrieval for pronoun interpretation. Given the conflicting results regarding the role of structural constraints on pronoun resolution with similar methodology and stimuli design in these English studies, I will now investigate this issue in Vietnamese, compare it to English, and ask whether structural constraints guide pronoun resolution similarly across languages.

4.1.2 Predictions for Vietnamese

As previously discussed, the Vietnamese pronominal system works differently than English. Unlike English, Vietnamese allows pronouns to corefer with local subjects, as long as they are NPs:

(70) ✓ Thằng nhân viên đó bầu cho **nó**.
3SG.M.SUB person worker DEM vote for 3SG.SUB
'That employee voted for him(self).'

However, there is still Principle B in Vietnamese, as pronouns cannot be bound by their local quantified subjects:

(71) ✗ Mọi thằng nhân viên bầu cho **nó**.
every 3SG.M.SUB person worker vote for 3SG.SUB
Every employee voted for him.

Pronoun resolution involves two distinct mechanisms: syntactic binding and discourse coreference. The former is subject to the grammatical Principle B of Binding Theory, which prohibits a pronoun from being bound by an antecedent within the local clause (Chomsky, 1981). Meanwhile, the latter is governed by the pragmatic Rule I, which rules out a pronoun in favor of a reflexive that expresses the same meaning in a given context (Reinhart, 1983). Since both Principle B and Rule I are active in English, much psycholinguistic work in pronoun interpretation has not differentiated between these two processes.

The overarching question that the experiments in this chapter address is whether Vietnamese speakers deploy similar structural constraints against local subjects in processing, even though those constraints do not categorically rule out local subjects as referents. Regarding real-time pronoun resolution in Vietnamese, I considered two possibilities:

1. **The Coreference Hypothesis**: Vietnamese speakers could consider all grammatically licit antecedents immediately in real-time processing. They may retrieve any feature-matching antecedent, regardless of its syntactic position, consistent with a cue-based retrieval mechanism in a content-addressable memory system (Lewis & Vasishth, 2005; Lewis, Vasishth, & Van Dyke, 2006).

2. **The Binding Hypothesis**: Alternatively, Vietnamese speakers might still use structural cues to guide retrieval and initially process all pronouns as bound variables. This leads to a bias away from local antecedents even without categorical Principle B effects. For instance, pronouns typically refer to the most prominent discourse referent, which is commonly the highest subject of a

sentence (Ariel, 1990; Kush, Johns, & Van Dyke, 2019). Since non-local antecedents in Badecker & Straub's (2002) and Chow, Lewis, & Phillips's (2014) studies take this position, they may be more easily retrieved (Kush, Johns, & Van Dyke, 2019).

Crucially, the Coreference hypothesis predicts that it would take longer to process a pronoun when no antecedent matches the pronoun's features compared to any sentence in which at least one antecedent does. There would be no difference between the non-local and the local antecedents, as long as they match the pronoun's features. That is, if Vietnamese speakers can access all possible antecedents online, we should only expect a slowdown in the NO MATCH condition only because of the difficulty associated with accessing mismatching subjects.

On the other hand, the Binding hypothesis predicts that comprehenders would encounter processing difficulty only when the non-local (Principle B compliant) antecedent mismatches the pronoun's features. Feature-matching local antecedents would not reduce processing difficulty, since they would not be considered initially. Then, if structural constraints against local subjects are applied, there should be a LOCAL MATCH penalty due to the difficulty in accessing local subject.

The crucial distinction between Vietnamese and English is that both reflexives and pronouns in Vietnamese can corefer with a local referential antecedent, signaling an exceptionally lenient Rule I. Since the effects of binding and coreference can be observed separately, examining real-time comprehension of pronouns in Vietnamese can help identify the roles that different constraints play in determining the antecedent set in the initial stages of pronoun resolution.

From the perspective of Vietnamese grammar, the local antecedent type may play an important role in which strategy Vietnamese speakers rely on during the real-time comprehension process. Since Rule I does not block coreference in Vietnamese, pronouns in principle can refer to any feature-matching referential sub-

jects, regardless of whether they are in the local or non-local domain. Given the lenient coreference condition, it is possible for both the local referential and the non-local antecedents to be immediately retrieved online, reflecting the Coreference strategy.

Nevertheless, based on the results of Experiments 1 and 2, I expect Vietnamese speakers to be more inclined towards adapting the Bound Variable strategy. Even though local NPs are accessible, the non-local subjects are still the preferred antecedents for pronouns. Moreover, local antecedents are completely ruled out when they are QPs, signaling strict Principle B application at play in the final interpretation. As a result, if the online profiles align with the offline ones, then we do have reasons to believe that structural constraints affect the pronominal processing in Vietnamese.

Adapting Badecker & Straub (2002), I tested these predictions in 3 online self-paced reading and one offline interpretation experiments. Experiment 3 examined pronoun resolution when the local antecedent is an NP, while Experiment 4 controlled for topichood to further identify the factors that affected the retrieval process. Experiment 5 then investigated pronoun processing with local QPs, and Experiment 6 provided a comparison on offline interpretation results involving sentences containing local NPs and QPs in Experiments 3 and 5.

4.2 Experiment 3: Local NP

4.2.1 Participants

98 native speakers of Vietnamese who were recruited over social media participated in the experiment. All of the participants resided in Ho Chi Minh City, Vietnam at the time of participation. 63 of them identified as female, 34 as male, and 1 as other gender. The age range was between 19 and 60, with a mean of 33.45 years

old. All participants gave informed consent and had the chance to be entered into a raffle at the end of the experiment for a 20 USD Amazon gift card. The experiment lasted approximately 45 minutes.

4.2.2 Materials

Experimental materials consisted of 36 sets of 4 items like those shown in Table 4.2. Two experimental factors were manipulated, including whether the non-local antecedents matched the pronoun in feature (NON-LOCAL MATCH or NON-LOCAL MISMATCH) and whether the local antecedents matched the pronoun in feature (LOCAL MATCH or LOCAL MISMATCH). In all conditions, honorificity was used to investigate the feature (mis)matching effects (Kwon & Sturt, 2016), since all Vietnamese pronouns are marked with honorific status (either HONorific or SUBhonorific), but not with gender. All referents in this experiment had unambiguous classifiers specifying their honorificity features. All test items consistently have the length of 16 words, which could be characterized as 6 elements in the following order:

1. a name marked with either a HON or SUB status
2. an attitude verb immediately followed by a complementizer *là* 'that'
    - 6 verbs denoting speech, thought, knowledge, or direct perception varied in 6 sets of items.
3. a third person singular NP marked with a SUB status
4. a two-word VP
    - Half of the items include transitive verbs like *đề cử* 'nominate,' while the other half were constituted with one-word verbs followed by one-word prepositions like *bầu cho* 'vote for.'

5. a pronoun marked with with either a HON or SUB status

6. PP(s) that consisted of 5 words in total

Half of the items contained female names and female-marked classifers in the non-local and local antecedents as well as the pronouns, while the other half used male features for names and classifiers. All the NPs were human and similarly plausible across all items.

The 36 experimental sentences, distributed across 4 lists in a Latin Square design, were intermixed with 51 filler sentences. The fillers were of similar length and complexity to the experimental sentences. 15 of the fillers included the reflexive form *mình* 'self,' 30 contained relative clause and PP attachment ambiguity, and 16 were of various unambiguous syntactic structures. All of the sentences were grammatical. Participants read a total of 87 sentences in a randomized and counterbalanced order.

Table 4.2: Experimental conditions and sample materials for Experiment 3.

Condition	Sentence							
MULTIPLE MATCH	**Thằng**	**Tâm**	nói	là	**thằng**	**nhân**	**viên**	**đó**
	SUB	Tam	say	that	SUB	person	worker	DEM
	bầu	cho	**nó**	trong	cuộc	họp	sáng	nay.
	vote	for	SUB	in	session	meeting	morning	this
	'Tam.SUB said that that employee.SUB voted for him.SUB in the meeting this morning.'							
NON-LOCAL MATCH	**Ông**	**Tâm**	nói	là	**thằng**	**nhân**	**viên**	**đó**
	HON	Tam	say	that	SUB	person	worker	DEM
	bầu	cho	**ổng**	trong	cuộc	họp	sáng	nay.
	vote	for	HON	in	session	meeting	morning	this
	'Tam.HON said that that employee.SUB voted for him.HON in the meeting this morning.'							
LOCAL MATCH	**Ông**	**Tâm**	nói	là	**thằng**	**nhân**	**viên**	**đó**
	HON	Tam	say	that	SUB	person	worker	DEM
	bầu	cho	**nó**	trong	cuộc	họp	sáng	nay.
	vote	for	SUB	in	session	meeting	morning	this
	'Tam.HON said that that employee.SUB voted for him.SUB in the meeting this morning.'							
NO MATCH	**Thằng**	**Tâm**	nói	là	**thằng**	**nhân**	**viên**	**đó**
	SUB	Tam	say	that	SUB	person	worker	DEM
	bầu	cho	**ổng**	trong	cuộc	họp	sáng	nay.
	vote	for	HON	in	session	meeting	morning	this
	'Tam.SUB said that that employee.SUB voted for him.HON in the meeting this morning.'							

An alternative forced choice comprehension question was included after every sentence in the experiment. The questions targeted different parts of the sentences to prevent participants from developing reading strategies in which they would only focus on one particular constituent across all sentences. None of the test items asked about the pronouns in question. A sample question and answer pair would appear as follows:

(72) Cuộc họp diễn ra lúc nào?
session meeting play out time which
'When did the meeting take place?'

a. Sáng nay
morning this
'This morning'

b. Trưa nay
noon this
'This noon'

All 87 questions had unambiguous and correct answers, which were used to determine whether participants were paying attention throughout the entire experiment.

4.2.3 Procedure

The link to this experiment was distributed on Facebook. When participants clicked on the link, they would first be presented with a consent form, describing the nature of the experiment and informing them of the incentives. The experimental trials were preceded by a screen collecting general demographic data and two screens of instructions, each of which had three questions to ensure that participants fully understand the task and complete it as directed. Afterwards, participants went through three practice sentences to familiarize themselves with the experimental methods.

The experiment was conducted using the online experiment platform Ibex Farm (Drummond, 2013) and employed both word-by-word self-paced reading and alternative forced choice tasks. Participants had to take this experiment with either a desktop computer or a laptop. Sentences were presented one word at a time. Participants pressed the space bar for the next word to be revealed in the center of the screen, replacing the current word. Repeatedly pressing the space bar after each word enables participants to reach the end of the sentence, after which a binary

choice comprehension question entirely appeared on the screen.

The use of a computer mouse was disabled during the course of the experimental task, and participants could either press 's' on their keyboard to select the answer choice on the left, or 'k' for the one on the right. Participants received on-screen feedback when they provided incorrect answers to the questions, and a cue line to proceed with the task when they answered correctly. After every twelve trials, participants had to take a ten-second break, and could rest for longer if they wanted to. Altogether, the experiment contained seven of these mandatory breaks.

Upon completion, participants were given a number and a link that they could access in order to participate in the raffle for the 20 USD Amazon gift cards. On that separate website, they had to introduce their e-mail address alongside the random number generated at the end of the experiment. A winner was randomly selected for every 10 participants.

Procedures for this experiment and all of the other self-paced reading studies described in this dissertation were approved by the Internal Review Board of the University of Massachusetts Amherst.

4.2.4 Analysis

Only participants who correctly answered at least 60% of the comprehension questions were included in the final analysis. One participant was excluded for an accuracy rate of 54.44%. I observed substantial differences in reading strategies by participants in a pilot study, and so I planned a trimming procedure using 95% quantiles to rule out outliers. The fastest and slowest participants were dropped, as were the most and least variable. Moreover, the final analysis also removed all the instances in which participant spent less than 50 ms and more than 4500 ms reading a word at a region. 80 participants, equally distributed across 4 Latin Squares lists, were included in the final analysis.

Four regions of interest were defined for purposes of analysis: the word immediately preceding the pronoun (pre-critical region), the pronoun (critical region), and the two words immediately following the pronouns (spillover regions 1 and 2, respectively). Previous studies on pronoun resolution that also utilized self-paced reading paradigm (Badecker & Straub, 2002; Chow, Lewis, & Phillips, 2014; Moulton & Han, 2018) have observed effects shortly after participants finished reading the critical pronoun. As a result, effects were predicted to emerge in spillover regions 1 and 2.

All statistical analyses were carried out in R software environment (R Core Team, 2013), using the `lme4` package (Bates, Maechler, Bolker, & Walker, 2015). A maximal linear mixed-effects model was fit to log-transformed reading times for the experimental items. The model integrated experimental manipulations and their interactions as fixed effects, with random intercepts and slopes for both participants and items (Baayen, Davidson, & Bates, 2008). Each of the two-level factors NON-LOCAL and LOCAL was sum coded (*match* = 0.5, *mismatch* = -0.5) to examine the effects of syntactic position and feature match between an antecedent and the critical pronoun as well as their interaction with each other. A fixed effect with an absolute *t*-value greater than 2 was considered significant (Gelman & Hill, 2007).

4.2.5 Results

Mean reading times and standard errors by condition at the regions of interest are provided in Table 4.3 and Figure 4.1, and the results of the statistical analyses and that of pairwise comparisons are reported in Tables 4.4 and 4.5, respectively. There were no significant effects observed in the pre-critical and critical regions. As predicted, the immediately following regions (Spillovers 1 and 2) showed a main effect of NON-LOCAL, as the sentences were read significantly slower when the non-local antecedent and the pronoun mismatched in honorificity than when

they matched. On the other hand, no LOCAL effects were observed, as there was no slowdown associated with the feature mismatch between the local antecedent and the pronoun. Moreover, the interaction between NON-LOCAL and LOCAL was also significant in these spillover regions.

Table 4.3: Mean reading times (ms) by condition at the regions of interest for Experiment 3. Parentheses represent standard error by participants, corrected for between-participant variance (Bakeman & McArthur, 1996).

	Regions			
Condition	**Pre-critical**	**Critical**	**Spillover 1**	**Spillover 2**
MULTIPLE MATCH	482.54 (7.37)	560.00 (15.69)	558.13 (13.15)	484.21 (7.49)
NON-LOCAL MATCH	484.84 (6.49)	528.23 (9.61)	506.56 (9.78)	464.85 (6.82)
LOCAL MATCH	488.94 (7.43)	561.11 (15.18)	570.20 (12.04)	511.91 (8.69)
NO MATCH	489.66 (8.52)	576.45 (16.70)	586.59 (14.22)	535.12 (10.04)

Figure 4.1: Word-by-word reading times (ms) for Experiment 3. Error bars represent standard error by participants, corrected for between-participant variance (Bakeman & McArthur, 1996).

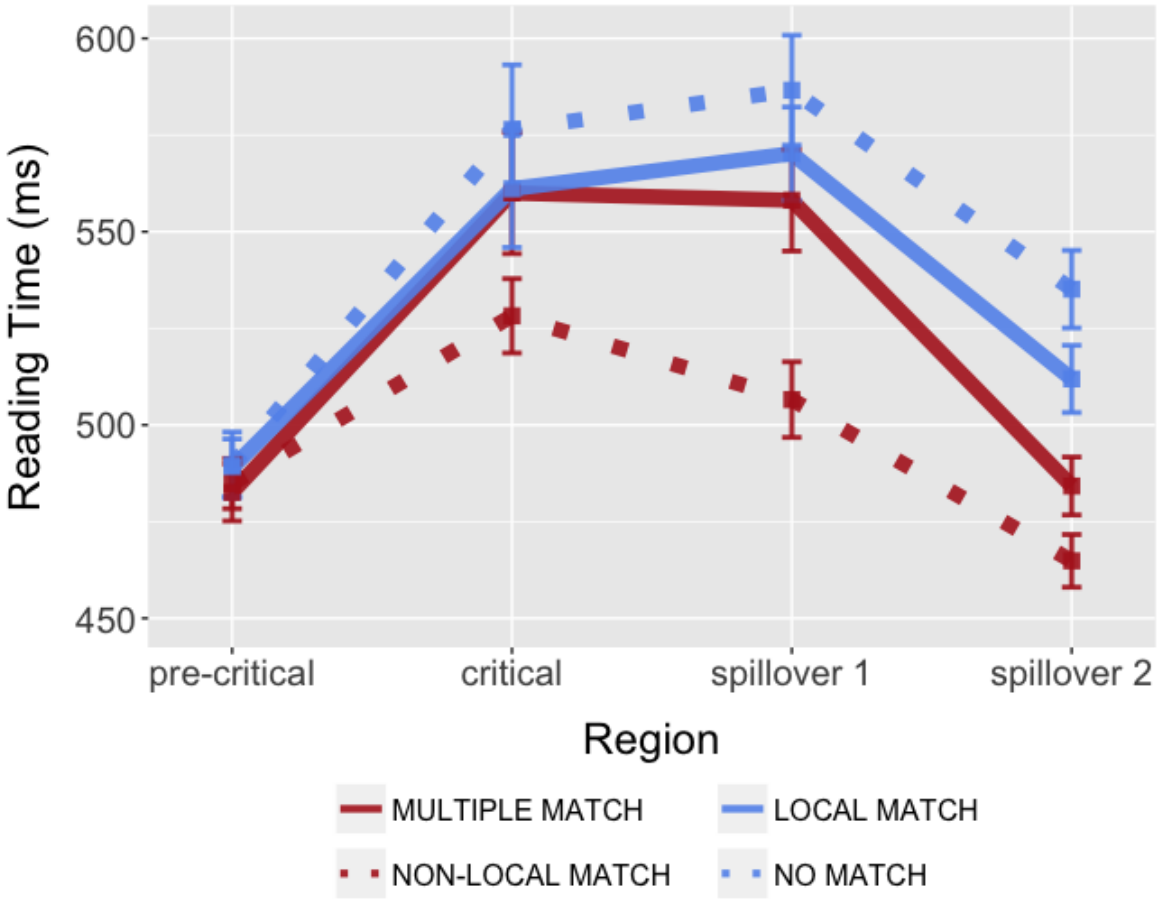


Table 4.4: Maximal linear mixed effects model fit to log-transformed reading times for Experiment 3. Significant effects ($|t| > 2$) are in boldface.

Fixed Effects	Regions											
	Pre-critical			Critical			Spillover 1			Spillover 2		
	$\hat{\beta}$	*SE*	*t*	$\hat{\beta}$	*SE*	*t*	$\hat{\beta}$	*SE*	*t*	$\hat{\beta}$	*SE*	*t*
NON-LOCAL	-0.00	0.01	-0.11	-0.02	0.02	-1.23	**-0.06**	**0.01**	**-4.02**	**-0.06**	**0.01**	**-5.15**
LOCAL	-0.00	0.01	-0.08	0.02	0.02	0.89	0.02	0.02	0.96	0.01	0.01	0.55
NON-LOCAL × LOCAL	-0.00	0.03	-0.00	0.04	0.03	1.40	**0.07**	**0.03**	**2.58**	**0.05**	**0.03**	**2.01**

Table 4.5: Pairwise comparisons for Experiment 3. Significant contrasts ($|t| > 2$) are in boldface.

Contrasts		Regions					
		Spillover 1			Spillover 2		
Condition 1	Condition 2	$\hat{\beta}$	SE	t	$\hat{\beta}$	SE	t
MULTIPLE MATCH	LOCAL MATCH	-0.02	0.02	-1.03	**-0.04**	**0.02**	**-2.19**
MULTIPLE MATCH	NON-LOCAL MATCH	**0.05**	**0.02**	**2.41**	0.03	0.02	1.83
MULTIPLE MATCH	NO MATCH	-0.04	0.02	-1.89	**-0.06**	**0.02**	**-3.29**
LOCAL MATCH	NON-LOCAL MATCH	**0.07**	**0.02**	**3.36**	**0.07**	**0.02**	**4.05**
LOCAL MATCH	NO MATCH	-0.02	0.02	-0.95	-0.02	0.02	-1.06
NON-LOCAL MATCH	NO MATCH	**-0.10**	**0.02**	**-4.66**	**-0.09**	**0.02**	**-5.05**

4.2.6 Discussion

The results collected in this experiment suggest three key findings. First, a preference for non-local antecedents was observed: Participants were immediately sensitive to an honorificity mismatch with non-local antecedents. As shown in Table 4.4, reading times were shorter when the non-local antecedent matched the pronoun than when it did not, replicating the results in a range of previous studies (Badecker & Straub, 2002; Chow, Lewis, & Phillips, 2014; Cunnings & Sturt, 2018; Nicol & Swinney, 1989).

Secondly, a bias against local antecedents was found, as evinced in the longer reading times for a feature matching local antecedent even when the non-local antecedent was unavailable. LOCAL MATCH was read significantly slower than NON-LOCAL MATCH, but was not reliably faster than NO MATCH in immediate spillover regions, as shown in Table 4.5. In other words, a feature matching local antecedent did not ameliorate the longer processing time associated with the lack of a feature

matching non-local antecedent. This pattern was also reported in previous work on pronoun resolution in English (Chow, Lewis, & Phillips, 2014).

Finally, there was evidence of competition for multiple matching antecedents: When both antecedents matched, processing times were slowed, as evidenced in the significant contrast between MULTIPLE MATCH and NON-LOCAL MATCH in Table 4.5. This effect may reflect competition to determine a single antecedent for the pronoun, leading to additional processing time observed in the MULTIPLE MATCH condition. This pattern contrasted with the significantly shorter reading times in the NON-LOCAL MATCH condition, closely replicating the findings in Badecker & Straub (2002).

In sum, even though Vietnamese does not display robust Principle B effects, the pattern of reading times observed in this study replicated Badecker & Straub (2002) closely. The current data suggest that despite the lack of categorical Principle B effects, Vietnamese speakers still prefer non-local antecedents, showing a similar structural bias in processing to that observed in English. Therefore, these results provide evidence for the Binding hypothesis and against the Coreference one.

4.3 Experiment 4: Controlled Topichood

As previously discussed, Vietnamese speakers dispreferred local antecedents. However, the reason for this patterns remain unclear: The effects observed in Experiment 3 could be attributable to either a preference for non-local antecedents or a bias against local antecedents. The former factor was due to the fact that non-local antecedents in previous studies by Badecker & Straub (2002) and Chow, Lewis, & Phillips (2014) as well as in Experiment 3 took the highest subject position, and thus might receive more retrieval advantage for being the topic of the sentence. Meanwhile, the latter factor could be interpreted as an influence from Principle B.

The goal of this experiment is to further examine whether it was a structural

constraint, and not discourse prominence, that influenced the processing patterns of object pronouns in Vietnamese. To address this question, I put the non-local subjects in a non-topical position, eliminating any topichood advantage that might have associated with the highest subject position in Experiment 3. If structural constraints were still at play, then we should observe a significantly longer reading time on average in the LOCAL MATCH, compared to the NON-LOCAL MATCH condition. However, if it was discourse prominence that caused the results in Experiment 3, then there should be no difference in reading times between LOCAL MATCH and NON-LOCAL MATCH in this current study.

4.3.1 Participants

83 undergraduate students at Ly Tu Trong College in Ho Chi Minh City, Vietnam participated in the experiments. All of the participants were native speakers of Vietnamese. 27 of them identified as female, 48 as male, and 8 as other gender. The age range was between 18 and 25, with a mean of 20.63 years old. All participants gave informed consent and received 100,00 VND, which was approximately 4.31 USD at the time of participation, as compensation for their participation. The experiment lasted approximately 45 minutes.

4.3.2 Materials

Experimental materials consisted of 36 sets of 4 items like those shown in Table 4.6. The structure of these test items follow that of those in Experiment 3, except the entire sentence is embedded under another clause, whose subject took the topical position. The highest subjects of these test sentences all denoted first plural pronouns, alternating between 3 different plural markers and 3 different first person pronouns in Vietnamese. These 6 different forms of a first person pronoun topical subject ensured that there would be no interference involved the antecedent

retrieval process of the other third person singular subjects (the NON-LOCAL and LOCAL referents under discussion) in the lower clauses.

These 36 target items were distributed across 4 lists in a Latin square design, and intermixed with the same 51 filler sentences from Experiment 3. Participants read a total of these 87 sentences in randomized and counterbalanced order. All sentences were followed by the same comprehension questions and two answer choices from Experiment 3.

Table 4.6: Experimental conditions and sample materials for Experiment 4.

Condition	Sentence							
	Chúng PL	tôi 1	rất very	vui happy	khi when			
MULTIPLE MATCH	**thằng** SUB	**Tâm** Tam	nói say	là that	**thằng** SUB	**nhân** person	**viên** worker	**đó** DEM
	bầu vote	cho for	**nó** SUB	trong in	cuộc session	họp meeting	sáng morning	nay. this
'We were very happy when Tam.SUB said that that employee.SUB voted for him.SUB in the meeting this morning.'								
	Chúng PL	tôi 1	rất very	vui happy	khi when			
NON-LOCAL MATCH	**ông** HON	**Tâm** Tam	nói say	là that	**thằng** SUB	**nhân** person	**viên** worker	**đó** DEM
	bầu vote	cho for	**ổng** HON	trong in	cuộc session	họp meeting	sáng morning	nay. this
'We were very happy when Tam.HON said that that employee.SUB voted for him.HON in the meeting this morning.'								
	Chúng PL	tôi 1	rất very	vui happy	khi when			
LOCAL MATCH	**ông** HON	**Tâm** Tam	nói say	là that	**thằng** SUB	**nhân** person	**viên** worker	**đó** DEM
	bầu vote	cho for	**nó** SUB	trong in	cuộc session	họp meeting	sáng morning	nay. this
'We were very happy when Tam.HON said that that employee.SUB voted for him.SUB in the meeting this morning.'								
	Chúng PL	tôi 1	rất very	vui happy	khi when			
NO MATCH	**Thằng** SUB	**Tâm** Tam	nói say	là that	**thằng** SUB	**nhân** person	**viên** worker	**đó** DEM
	bầu vote	cho for	**ổng** HON	trong in	cuộc session	họp meeting	sáng morning	nay. this
'We were very happy when Tam.SUB said that that employee.SUB voted for him.HON in the meeting this morning.'								

4.3.3 Procedure

Experiment 4 also employed self-paced reading, following the same procedure used in Experiment 3, except for the steps regarding the data administration and participation incentives. First, while Experiment 3 was conducted online, Experiment 4 was administered in person at Ly Tu Trong College in Ho Chi Minh City, Vietnam. There were a total of 4 experimental sessions scheduled to take place on a Monday in the college's computer lab, with 50 desktops equipped. Undergraduate students signed up for one of these 4 sessions at the school's administrative office. There were either 20 or 21 participants in each session, all of them were asked to sign a hardcopy consent form at the beginning of their experimental session. To further avoid distraction, participants were seated a computer apart from one another, and started the experiment at the same time.

Then, upon completion, participants received 100,00 VND, which was approximately 4.31 USD at the time of participation, and signed the receipt confirming their payment. Participants who finished earlier than others were asked to sit quietly at their seats. Everyone was dismissed from the computer lab at the same time once the last participant completed the task.

4.3.4 Analysis

Experiment 4 followed the same analysis methods used in Experiment 3. One participant was excluded for correctly answering less than 60% of the comprehension questions. Moreover, exclusion criteria for this experiment were defined based on the results collected in Experiment 3. Consistent with the main reading patterns shown in Experiment 3, only participants whose mean reading times ranged between 200 and 1000 ms and whose standard deviations ranged between 50 to 2000 ms were included in the final analysis for Experiment 4. Two other participants were excluded for not meeting these requirements, leaving 80 participants, equally

distributed across 4 Latin Squares lists, for data analysis. Instances in which participants spent less than 50 ms and more than 3000 ms at a region were also removed from the statistical analysis.

4.3.5 Results

Mean reading times and standard errors by condition at the regions of interest are provided in Table 4.7 and Figure 4.2, and the results of the statistical analyses and that of pairwise comparisons are reported in Tables 4.8 and 4.9, respectively. As predicted, there were no significant effects observed in the pre-critical and critical regions. Similar to the patterns observed in Experiment 3, the first and second spillover regions showed a main effect of NON-LOCAL, as participants slowed down when there was a mismatch in honorificity between the non-local antecedent and the pronoun, as opposed to when there was a match between these two elements. On the other hand, participants did not read more slowly when there was a feature mismatch between the local antecedent and the pronoun. This lack of statistical significance of the LOCAL effects is also consistent with Experiment 3 results. However, unlike Experiment 3, the interaction between NON-LOCAL and LOCAL were not significant in the spillover regions of Experiment 4.

Table 4.7: Mean reading times (ms) by condition at the regions of interest for Experiment 4. Parentheses represent standard error by participants, corrected for between-participant variance (Bakeman & McArthur, 1996).

	Regions			
Condition	**Pre-critical**	**Critical**	**Spillover 1**	**Spillover 2**
MULTIPLE MATCH	455.95 (8.47)	494.66 (9.47)	475.38 (8.52)	449.52 (7.31)
NON-LOCAL MATCH	450.52 (7.27)	468.06 (13.36)	453.11 (9.31)	439.19 (7.03)
LOCAL MATCH	451.97 (7.24)	493.61 (12.74)	488.32 (7.93)	462.73 (7.51)
NO MATCH	449.11 (5.62)	501.15 (9.34)	498.09 (8.80)	473.13 (8.28)

Figure 4.2: Word-by-word reading times (ms) for Experiment 4. Error bars represent standard error by participants, corrected for between-participant variance (Bakeman & McArthur, 1996).

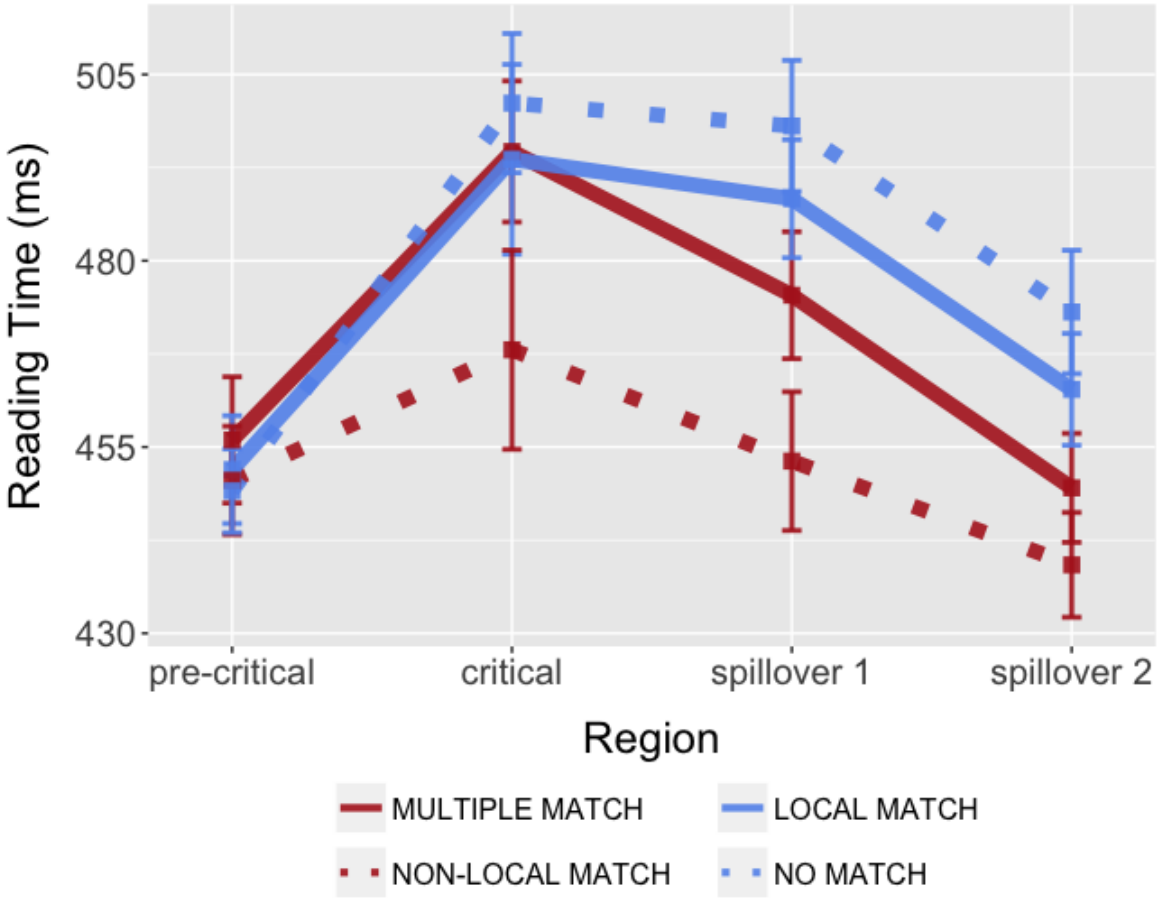


Table 4.8: Maximal linear mixed effects model fit to log-transformed reading times for Experiment 4. Significant effects ($|t| > 2$) are in boldface.

Fixed Effects	Regions											
	Pre-critical			Critical			Spillover 1			Spillover 2		
	$\hat{\beta}$	*SE*	*t*	$\hat{\beta}$	*SE*	*t*	$\hat{\beta}$	*SE*	*t*	$\hat{\beta}$	*SE*	*t*
NON-LOCAL	0.00	0.01	0.13	-0.02	0.02	-1.00	**-0.04**	**0.02**	**-2.35**	**-0.04**	**0.02**	**-2.67**
LOCAL	0.00	0.01	0.26	0.01	0.02	0.78	0.01	0.01	0.61	0.00	0.01	0.29
NON-LOCAL × LOCAL	0.00	0.03	0.03	0.05	0.03	1.62	0.04	0.03	1.24	0.04	0.03	1.42

Table 4.9: Pairwise comparisons for Experiment 4. Significant contrasts ($|t| > 2$) are in boldface.

Contrasts		Regions					
Condition 1	Condition 2	Spillover 1			Spillover 2		
		$\hat{\beta}$	*SE*	*t*	$\hat{\beta}$	*SE*	*t*
MULTIPLE MATCH	LOCAL MATCH	-0.02	0.02	-0.99	-0.02	0.02	-1.14
MULTIPLE MATCH	NON-LOCAL MATCH	0.03	0.02	1.33	0.02	0.02	1.21
MULTIPLE MATCH	NO MATCH	-0.03	0.02	-1.45	-0.04	0.02	-1.86
LOCAL MATCH	NON-LOCAL MATCH	**0.05**	**0.02**	**2.22**	**0.05**	**0.02**	**2.23**
LOCAL MATCH	NO MATCH	-0.01	0.02	-0.49	-0.01	0.02	-0.80
NON-LOCAL MATCH	NO MATCH	**-0.06**	**0.02**	**-2.59**	**-0.10**	**0.02**	**-2.96**

4.3.6 Discussion

The results for this study mostly replicated the key findings in Experiment 3: Even though coreference between a pronoun and a local antecedent was possible in Vietnamese, it was still not preferred. With topichood controlled in this experiment, we still observed a main effect of non-local match only, suggesting that readers did not immediately consider the local subject as an antecedent for the pronoun. These ef-

fects were attributable to structural constraints rather than discourse prominence. Crucially, consistent with Experiment 3, the results of this study still provide evidence supporting the Binding hypothesis instead of the Coreference one.

However, in contrast to Experiment 3, Experiment 4 revealed no multiple match effect, because neither spillover region 1 nor 2 showed a significant contrast between MULTIPLE MATCH and NON-LOCAL MATCH, as presented in Table 4.9. Participants did not show longer reading times when the two antecedents in question matched, and thus there was no evidence supporting the view that both non-local and local antecedents were immediately retrieved and yielded competitive processing. In other words, no clear evidence showing that multiple match was different from the other conditions was found, suggesting that this study was perhaps underpowered to detect the critical effects of interest. This pattern contrasts with the observation in Experiment 3, and thus it did not endorse Badecker & Straub (2002). Rather, the findings Experiment 4 more closely aligned with the view put forward in Chow, Lewis, & Phillips (2014). Nevertheless, these findings also did not report the exact patterns in Chow, Lewis, & Phillips (2014), as MULTIPLE MATCH (a condition with a feature-matching Principle B compliant antecedent) was not read significantly faster than either LOCAL MATCH or NO MATCH (the conditions with no feature-matching Principle B compliant antecedents).

4.4 Experiment 5: Local QP

As discussed in Experiment 1, participants allowed the local antecedent to be the antecedent of the pronoun, as long as it is an NP, but not a QP. Experiments 3 and 4 above show that despite the lenient coreference with local NPs in the final interpretation of pronouns, the real-time comprehension of object pronouns in Vietnamese is still subject to structural constraints even when the local antecedent is an NP. In particular, consistent with the English findings, Vietnamese speakers also slowed

down when the pronoun mismatched the non-local antecedent, as opposed to a significantly shorter processing time when these two elements matched. Besides, the presence of a feature-matching local antecedent did not reduce the longer reading times caused by a mismatching non-local antecedent. However, unlike the patterns reported in most English studies (Chow, Lewis, & Phillips, 2014; Cunnings & Sturt, 2018; Nicol & Swinney, 1989), there was no difference in reading times between MULTIPLE MATCH and LOCAL MATCH or NO MATCH.

In this experiment, I investigate the antecedent retrieval process of pronouns when the local antecedent is a QP, and compare it with the patterns established with the local NP. The final interpretation results from Experiments 1 and 2 show that pronouns are prohibited from being bound by local QPs, signaling a strict Principle B at play. As a result, I hypothesized that Vietnamese speakers should be immediately sensitive to the structural constraints imposed by Principle B on the pronoun and its local quantified antecedent. Then, we should expect to replicate the findings in Chow, Lewis, & Phillips (2014). The key prediction is that the local QPs should not be considered in the initial stages of pronoun resolution, and thus their features should not affect the early antecedent retrieval process. The MULTIPLE MATCH and NON-LOCAL MATCH conditions, therefore, should pattern together with shorter reading times, contrasting the significantly longer processing for the LOCAL MATCH and NO MATCH conditions.

In Experiment 4, we observed no difference in reading times between MULTIPLE MATCH and LOCAL MATCH as well as between MULTIPLE MATCH and NO MATCH. In this experiment, we expect both of these contrasts to be significant. The feature-matching local QPs should not be reactivated at all, and thus they should not ease the processing of the mismatching non-local antecedents. As a result, the patterns in reading times should reflect strict Principle B effects: MULTIPLE MATCH, as a Principle B compliant condition, should be read significantly faster than both LO-

CAL MATCH and NO MATCH, the Principle B violating conditions.

4.4.1 Participants

81 undergraduate students at Ly Tu Trong College in Ho Chi Minh City, Vietnam participated in the experiments. All of the participants were native speakers of Vietnamese. 24 of them identified as female, and 57 as male. The age range was between 18 and 26, with a mean of 20.37 years old. All participants gave informed consent and received 100,00 VND, which was approximately 4.31 USD at the time of participation, as compensation for their participation. The experiment lasted approximately 45 minutes.

4.4.2 Materials

Experimental materials consisted of 36 sets of 4 items like those shown in Table 4.10. The structure of these test items follow that of those in Experiment 3, except the local NPs were replaced with their corresponding QP versions. All filler sentences, comprehension questions, and answer choices in this experiment were identical to those in Experiment 3.

Table 4.10: Experimental conditions and sample materials for Experiment 5.

Condition	Sentence							
MULTIPLE MATCH	**Thằng**	**Tâm**	nói	là	**mọi**	**thằng**	**nhân**	**viên**
	SUB	Tam	say	that	every	SUB	person	worker
	bầu	cho	**nó**	trong	cuộc	họp	sáng	nay.
	vote	for	SUB	in	session	meeting	morning	this
	'Tam.SUB said that every employee.SUB voted for him.SUB in the meeting this morning.'							
NON-LOCAL MATCH	**Ông**	**Tâm**	nói	là	**mọi**	**thằng**	**nhân**	**viên**
	HON	Tam	say	that	every	SUB	person	worker
	bầu	cho	**ổng**	trong	cuộc	họp	sáng	nay.
	vote	for	HON	in	session	meeting	morning	this
	'Tam.HON said that every employee.SUB voted for him.HON in the meeting this morning.'							
LOCAL MATCH	**Ông**	**Tâm**	nói	là	**mọi**	**thằng**	**nhân**	**viên**
	HON	Tam	say	that	every	SUB	person	worker
	bầu	cho	**nó**	trong	cuộc	họp	sáng	nay.
	vote	for	SUB	in	session	meeting	morning	this
	'Tam.HON said that every employee.SUB voted for him.SUB in the meeting this morning.'							
NO MATCH	**Thằng**	**Tâm**	nói	là	**mọi**	**thằng**	**nhân**	**viên**
	SUB	Tam	say	that	every	SUB	person	worker
	bầu	cho	**ổng**	trong	cuộc	họp	sáng	nay.
	vote	for	HON	in	session	meeting	morning	this
	'Tam.SUB said that every employee.SUB voted for him.HON in the meeting this morning.'							

4.4.3 Procedure

Experiment 5 followed the same procedure used in Experiment 4. However, while the experimental sessions of Experiment 4 were scheduled on a Monday, those of Experiment 5 took place on a Tuesday.

4.4.4 Analysis

The data analysis of this experiment followed the same steps as in Experiment 4. All of the participants were included in the final analysis, as they all got an accuracy of at least 80%. One participant was excluded for having an atypically long average reading time, taking over 1000 ms per word. As a result, the statistical analysis includes data from 80 remaining participants, with 20 of them for each of the 4 Latin squares.

4.4.5 Results

Mean reading times and standard errors by condition at the regions of interest are provided in Table 4.11 and Figure 4.3, and the results of the statistical analyses and that of pairwise comparisons are reported in Tables 4.12 and 4.13, respectively. Some of the main patterns replicated the findings in Experiments 3 and 4. First, there were also no significant effects observed in the pre-critical and critical regions. Moreover, in the immediate spillover regions, participants were sensitive to the feature mismatch between pronouns and the NON-LOCAL antecedents, but not the LOCAL ones. Unlike Experiment 3, but consistent with Experiment 4, no significant interaction effects were observed between NON-LOCAL and LOCAL in this experiment.

Table 4.11: Mean reading times (ms) by condition at the regions of interest for Experiment 5. Parentheses represent standard error by participants, corrected for between-participant variance (Bakeman & McArthur, 1996).

	Regions			
Condition	**Pre-critical**	**Critical**	**Spillover 1**	**Spillover 2**
MULTIPLE MATCH	476.22 (7.14)	508.31 (8.48)	478.24 (11.95)	448.27 (6.59)
NON-LOCAL MATCH	487.22 (7.63)	497.38 (6.58)	468.72 (10.29)	449.00 (5.78)
LOCAL MATCH	491.92 (8.66)	512.19 (8.46)	512.78 (9.32)	469.36 (6.59)
NO MATCH	479.45 (8.78)	504.73 (8.66)	521.78 (10.68)	475.56 (6.55)

Figure 4.3: Word-by-word reading times (ms) for Experiment 5. Error bars represent standard error by participants, corrected for between-participant variance (Bakeman & McArthur, 1996).

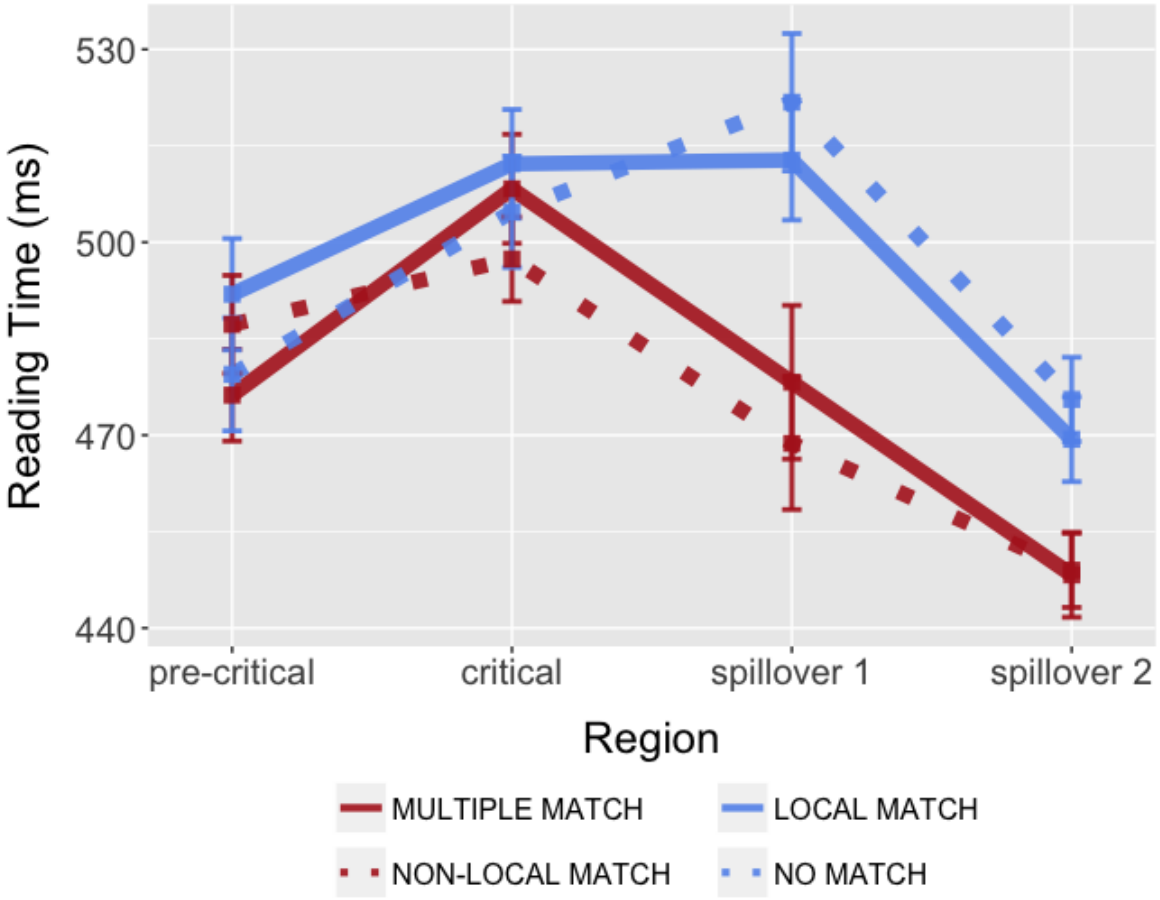


Table 4.12: Maximal linear mixed effects model fit to log-transformed reading times for Experiment 5. Significant effects ($|t| > 2$) are in boldface.

Fixed Effects	Regions											
	Pre-critical			Critical			Spillover 1			Spillover 2		
	$\hat{\beta}$	*SE*	*t*	$\hat{\beta}$	*SE*	*t*	$\hat{\beta}$	*SE*	*t*	$\hat{\beta}$	*SE*	*t*
NON-LOCAL	-0.00	0.01	-0.12	-0.02	0.02	-1.21	**-0.08**	**0.03**	**-3.22**	**-0.06**	**0.02**	**-2.86**
LOCAL	0.01	0.01	0.47	0.00	0.01	0.29	-0.00	0.02	-0.04	-0.01	0.01	-0.62
NON-LOCAL × LOCAL	-0.03	0.03	-0.97	0.02	0.03	0.84	0.02	0.03	0.72	0.01	0.02	0.57

Table 4.13: Pairwise comparisons for Experiment 5. Significant contrasts ($|t| > 2$) are in boldface.

Contrasts		Regions					
Condition 1	Condition 2	Spillover 1			Spillover 2		
		$\hat{\beta}$	*SE*	*t*	$\hat{\beta}$	*SE*	*t*
MULTIPLE MATCH	LOCAL MATCH	**-0.07**	**0.03**	**-2.35**	**-0.06**	**0.03**	**-2.26**
MULTIPLE MATCH	NON-LOCAL MATCH	0.01	0.02	0.48	0.00	0.02	0.01
MULTIPLE MATCH	NO MATCH	**-0.08**	**0.03**	**-2.78**	**-0.07**	**0.03**	**-2.85**
LOCAL MATCH	NON-LOCAL MATCH	**0.08**	**0.03**	**2.73**	**0.06**	**0.03**	**2.31**
LOCAL MATCH	NO MATCH	-0.01	0.02	-0.54	-0.01	0.02	-0.84
NON-LOCAL MATCH	NO MATCH	**-0.09**	**0.03**	**-3.11**	**-0.07**	**0.03**	**-2.80**

4.4.6 Discussion

Consistent with both Experiments 3 and 4, the findings of this experiment argue for the Binding hypothesis, supporting the view that structural constraints play a vital role in pronoun resolution in Vietnamese. In contrast, the Coreference hypothesis, which solely relies on the matching of morphological features, is ruled out, based on the following rationale:

First, a robust categorical Principle B effect was observed, as evidenced not only in the **NON-LOCAL** main effect in Table 4.12, but also in the significant contrasts between NON-LOCAL MATCH and LOCAL MATCH and NO MATCH conditions in Table 4.13. Vietnamese speakers were not sensitive to the content of Principle B violating antecedent, and thus there was no speed up when the local subject matched the pronoun. On the contrary, these findings suggest that Principle B violating antecedents were not initially retrieved, and thus the feature mismatch between a local referent and the pronoun did not lead to any significant slowdown. These results are consistent with previous English studies (Badecker & Straub, 2002; Chow, Lewis, & Phillips, 2014; Cunnings & Sturt, 2018; Nicol & Swinney, 1989), which showed that structural constraints guided the processing of object pronoun in the early antecedent retrieval stages.

Secondly, the results showed no facilitative interference effect, as the contrast between LOCAL MATCH and NO MATCH in Table 4.13 was not significant. The presence of a feature-matching local referent did not ease the processing difficulty associated with the NO MATCH condition, further suggesting that participants did not consider Principle B violating referents in the initial antecedent retrieval process.

Thirdly, contrasting with Experiment 3, but similar to Experiment 4, this experiment showed no multiple match effect in the sense that reading times for NON-LOCAL MATCH were not reliably shorter than MULTIPLE MATCH, as evidenced by their non-significant contrast in Table 4.9. This suggests that the local QP was not considered initially, leaving the non-local antecedent as the only viable option. There was no need for participants to take additional processing time to resolve the pronoun in question to a single feature-matching antecedent, contrasting with the findings reported in Badecker & Straub (2002).

Besides, this was the only experiment in which comparing reading times of MULTIPLE MATCH with those of LOCAL MATCH and of NO MATCH yields signif-

icant contrasts. It was only the local antecedents that were retrieved in memory, as the features of local QPs were not activated during the early processing stages. This suggests that Principle B strictly limits the set of possible antecedents for a pronoun in real-time comprehension in Vietnamese, replicating the exact findings reported in Chow, Lewis, & Phillips (2014).

4.5 Experiment 6: Offline Interpretation

Along with the findings in Experiment 1, these online comprehension results provide supporting evidence for two distinct mechanisms responsible for the processing and intepretation of pronouns in Vietnamese. As shown in both the offline and online results, pronouns are allowed to corefer with local referential antecedents. NPs in the local domain were considered almost half of the time in the final interpretation of pronouns in Experiment 1, and they were retrieved in the initial processing of pronouns, resulting in a multiple match effect in real-time comprehension in Experiment 3. On the other hand, pronouns are prohibited from being bound by their quantified coarguments. In Experiment 1, Vietnamese speakers unambiguously ruled out local QPs as antecedents for pronouns. In Experiment 5, when QPs were in the local domain of pronouns, we observed strong categorical Principle B effects in which local subjects were not reactivated at all during the antecedent retrieval process. Contrasting with Experiment 3, we found no multiple match effects in Experiment 5. These contrasts in both the real-time comprehension and the final interpretation results align with the Reinhartian idea that coreference and binding are separate components within anaphoric relations. Taken together, these experiments advocate for the view in which local coreference is allowed, but binding Principle B is still strictly enforced in Vietnamese.

The goal of this two-alternative forced choice experiment was to investigate the final interpretation patterns of the sentences previously examined for real-time

processing in Experiment 3 and 5, and compare the offline findings with the online data. Moreover, while the items of Experiment 1 were constructed with one plain, unmarked name and one honorificity-marked NP, those of this study involved both antecedents overtly marked with honorificity. The results could determine whether the patterns of pronoun interpretation were similar across designs. If structural constraints guide pronoun interpretation similarly to processing, and if the overtness of honorificity marking does not alter Principle B effects, then we expect Vietnamese speakers to rule out local QPs, but not NPs, as acceptable antecedents for pronouns.

4.5.1 Participants

40 native speakers of Vietnamese, all of whom resided in Ho Chi Minh City, Vietnam at the time of participation, were recruited via social media. 24 of them identified as female, and 16 as male. The age range was between 18 and 62, with a mean of 34.78. All participants gave informed consent and had the chance to be entered into a raffle at the end of the experiment for a 20 USD Amazon gift card. The experiment lasted approximately 20 minutes.

4.5.2 Materials

Experimental materials consisted of 36 sets of 2 items like those shown in Table 4.14. The items for the LOCAL NP and LOCAL QP conditions were identical to those sentences in the MULTIPLE MATCH condition in Experiments 3 and 5, respectively.

Table 4.14: Experimental conditions and sample materials for Experiment 6.

Condition	Sentence							
LOCAL NP	**Thằng**	**Tâm**	nói	là	**thằng**	**nhân**	**viên**	**đó**
	SUB	Tam	say	that	SUB	person	worker	DEM
	bầu	cho	**nó**	trong	cuộc	họp	sáng	nay.
	vote	for	SUB	in	session	meeting	morning	this
	'Tam.SUB said that that employee.SUB voted for him.SUB in the meeting this morning.'							
LOCAL QP	**Thằng**	**Tâm**	nói	là	**mọi**	**thằng**	**nhân**	**viên**
	SUB	Tam	say	that	every	SUB	person	worker
	bầu	cho	**nó**	trong	cuộc	họp	sáng	nay.
	vote	for	SUB	in	session	meeting	morning	this
	'Tam.SUB said that every employee.SUB voted for him.SUB in the meeting this morning.'							

The 36 test items, distributed across 2 Latin square lists, were intermixed with 51 filler sentences, all of which were the same as the ones in Experiments 3, 4, and 5. All of these 87 sentences were followed by a comprehension question along with two possible answer choices displayed on the screen. Like Experiments 1 and 2, to prevent participants from detecting the ambiguity that might arise in pronoun interpretation, we constructed the questions for the 30 filler sentences that included relative clause and PP attachment so that they targeted the ambiguous meanings associated with these structures. Meanwhile, in the test sentences, participants were asked to select one of the two antecedents to resolve the pronoun in question. As illustrated in (73) below, even though the test sentences of the two conditions in question were followed by the same comprehension question, the answer choices were different, depending on the experimental conditions. If participants encountered an item in the LOCAL NP condition, then they would see the answer choices in (73a). If the sentence was of the LOCAL QP condition, then the binary choices in (73b) would appear instead:

(73) Ai được bầu cho?
who PASS vote for
'Who was voted for?'

a. i. Tâm
Tam
'Tam'

ii. Thằng nhân viên đó
SUB person worker that
'That employee'

b. i. Tâm
Tam
'Tam'

ii. Mọi thằng nhân viên
every SUB person worker
'Every employee'

The remaining 31 fillers kept the same unambiguous questions and answer choices like those in Experiments 3, 4, and 5. Participants' answers to these unambiguous filler sentences were used to determine whether they paid full attention to the task.

4.5.3 Procedure

Experiment 6 followed the same procedure used in Experiments 1 and 2.

4.5.4 Analysis

I used simple coding (LOCAL NP = 0, LOCAL QP = 1) to determine whether there is a difference in the local antecedent selection rates between local LOCAL NP and local LOCAL QP NPs. The other data analysis components of this experiment followed the same steps as in Experiment 1.

4.5.5 Results

The percentage of local antecedent selection and standard errors by condition are presented in Figure 4.4. Participants resolved the pronoun to the local NP for around 22% of the time, but to the local NP for only 2.5% of the time. The contrast between these two conditions was highly significant, as shown in the results of the statistical analyses reported in Table 4.15.

Figure 4.4: Percentage of local antecedent selection and standard errors by condition in Experiment 6.

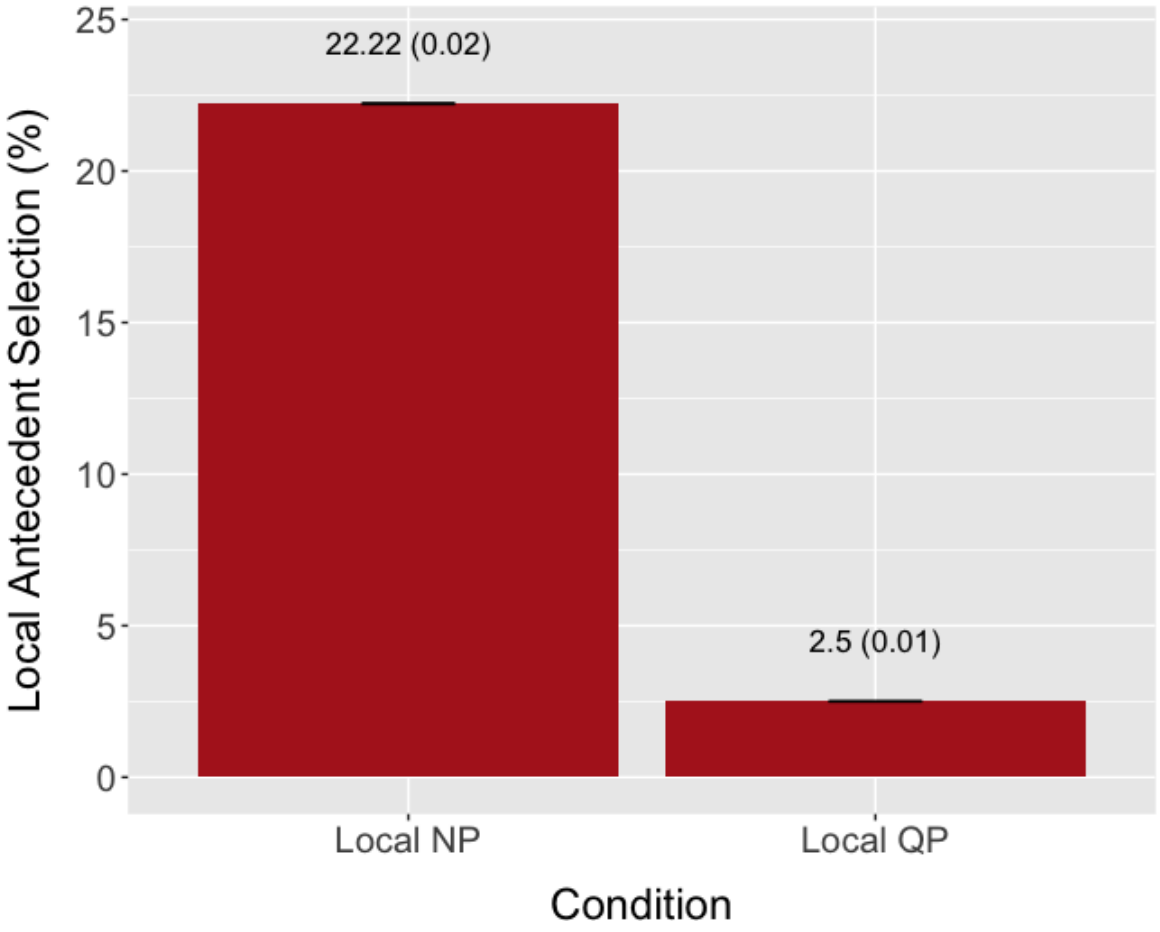


Table 4.15: Logistic regression model fit to proportion responses in Experiment 6. Significant effects ($|z| > 2$) are in boldface.

Fixed Effects	$\hat{\beta}$	*SE*	*z*
INTERCEPT	-1.51	0.20	-7.54
QP	**-3.25**	**0.58**	**-5.61**

4.5.6 Discussion

Consistent with both the offline findings in Experiment 1 and the online results in Experiments 3, 4, and 5, the main takeaway of this study is that Vietnamese speakers considered local subjects as antecedents for pronouns only when they are NPs, but not QPs. The difference between the two conditions in this experiment was proportionally similar to that in Experiment 1, suggesting that the overtness of honorificity markers did not alter the strong Principle B effects at play. Local QPs are always subject to strict binding rules, because binding is required to establish a dependency between a pronominal form and a covarying antecedent. Meanwhile, pronouns can still corefer with local NPs, which pick out a single entity in the discourse. Rule I does not rule out local coreference because pronouns and reflexives in Vietnamese generate different honorificity meanings. Moreover, the patterns observed in the final interpretation align with those in the real-time comprehension, signaling the crucial role structural constraints play in both online and offline components of pronoun resolution. Therefore, the findings of this study further support the Reinhartian view in which binding and coreference as distinct components that govern anaphoric relations across languages. In Vietnamese, binding is strictly enforced, as pronouns cannot be bound by a quantified coargument, but coreference is lenient, because sentences containing pronouns carry different interpretations than those containing reflexives.

4.6 General Discussion

4.6.1 Summary

The goal of this chapter was to determine whether the online comprehension of object pronouns in Vietnamese, a language that does not categorically exclude local antecedents, was subject to structural constraints similarly to English, a language that establishes clear Principle B effects. The core hypothesis across 3 self-paced reading experiments states that the initial stages of real-time pronoun processing in Vietnamese could trigger early retrieval of local referential subjects, but ultimately excluded local quantified subjects from the set of possible antecedents. This was because the final pronoun interpretation results in Experiments 1 and 2 showed that Vietnamese speakers relied on two distinct mechanisms in resolving pronouns: Coreference involving local NPs is exceptionally lenient, but binding with coargumental QPs is strictly prohibited.

Experiment 3 investigated the early pronoun processing with NPs in the local domain of pronouns, while Experiment 4 controlled for the discourse prominence advantage that non-local antecedents may receive for being in the topical subject position. Both of these experiments showed a bias against reference to the local subject in processing, even though it is grammatically licensed. Experiment 5 then examined the antecedent retrieval process for pronouns when the local antecedents were QPs. Results from this experiment suggested robust Principle B effects with no indicative signs of antecedent retrieval for the local subjects in early processing stages. The key difference between the process involving local NPs (Experiments 3 and 4) and that involving local QPs (Experiment 5) is that while it was possible for local antecedents to be considered in the former, that possibility was completely ruled out in the latter. Nevertheless, no clear differences between the effects across these studies were observed: The slowdown in the NON-LOCAL

MATCH condition was similar. Besides, the offline results comparing the final interpretation in cases involving multiple feature-matching antecedents with local NPs and QPs in Experiment 6 aligns with the findings reported in the 3 self-paced reading experiments. While Principle B strictly blocks local QPs, coreference with local NPs is allowed.

Taken together, the patterns observed in these 4 experiments replicate findings in previous English studies (Badecker & Straub, 2002; Chow, Lewis, & Phillips, 2014), providing evidence that structural constraints play a vital role in guiding the real-time processing of object pronouns across languages. These online and offline results also further support the Reinhartian view on separating coreference from binding in pronoun resolution processes. On the one hand, we observed a lenient coreference effect with local NPs, as these NPs were selected to be antecedents of pronouns for almost half of the time in the final interpretation, and were initially considered, causing a multiple match effect during the antecedent retrieval. On the other hand, strong categorical Principle B effects were found when the local antecedents were QPs. quantified subjects in the coargument domain of pronouns were neither chosen in the offline task nor reactivated during the online process.

4.6.2 Combined Analysis

Both Experiments 3 and 4 concern the real-time comprehension of pronouns when the local subject is an NP. An exploratory analysis of these experiments revealed a general similar pattern: There appeared to be a four-way distinction among the conditions. Upon an initial look at Figures 4.1 and 4.2, NON-LOCAL MATCH was read the fastest, MULTIPLE MATCH was the next fastest, which was followed by LOCAL MATCH, and NO MATCH was the slowest. This four-way distinction emerged at the critical pronoun region, for all comparisons except between MULTIPLE MATCH and LOCAL MATCH, and continued for several regions. Nevertheless, this supposed

four-way distinction was not completely apparent in the statistical results reported in Tables 4.5 and 4.9, as LOCAL MATCH and NO MATCH did not significantly differ on either of the immediate spillover regions for both Experiments 3 and 4. However, given that the effects are often spread out over multiple regions in self-paced reading, this region-by-region analysis may have reduced the statistical power to detect an overall effect on reading time. As a result, for a more insightful examination of the patterns, an analysis that combines over all the relevant regions should be conducted. This combined region analysis would also include a third spillover region to further investigate whether any of the effects persisted to the later stages of processing.

Following Cunnings & Sturt's (2018) methodology, this combined region model included REGION as a fixed effect. This fixed effect assumed two levels: (i) the *critical* region, which was the pronoun, and (ii) the *spillover* region, which consisted of the three words immediately following the pronoun. An interaction of REGION with **NON-LOCAL** or **LOCAL** would allow us to determine if the effect regarding the locality of the antecedent change across regions.

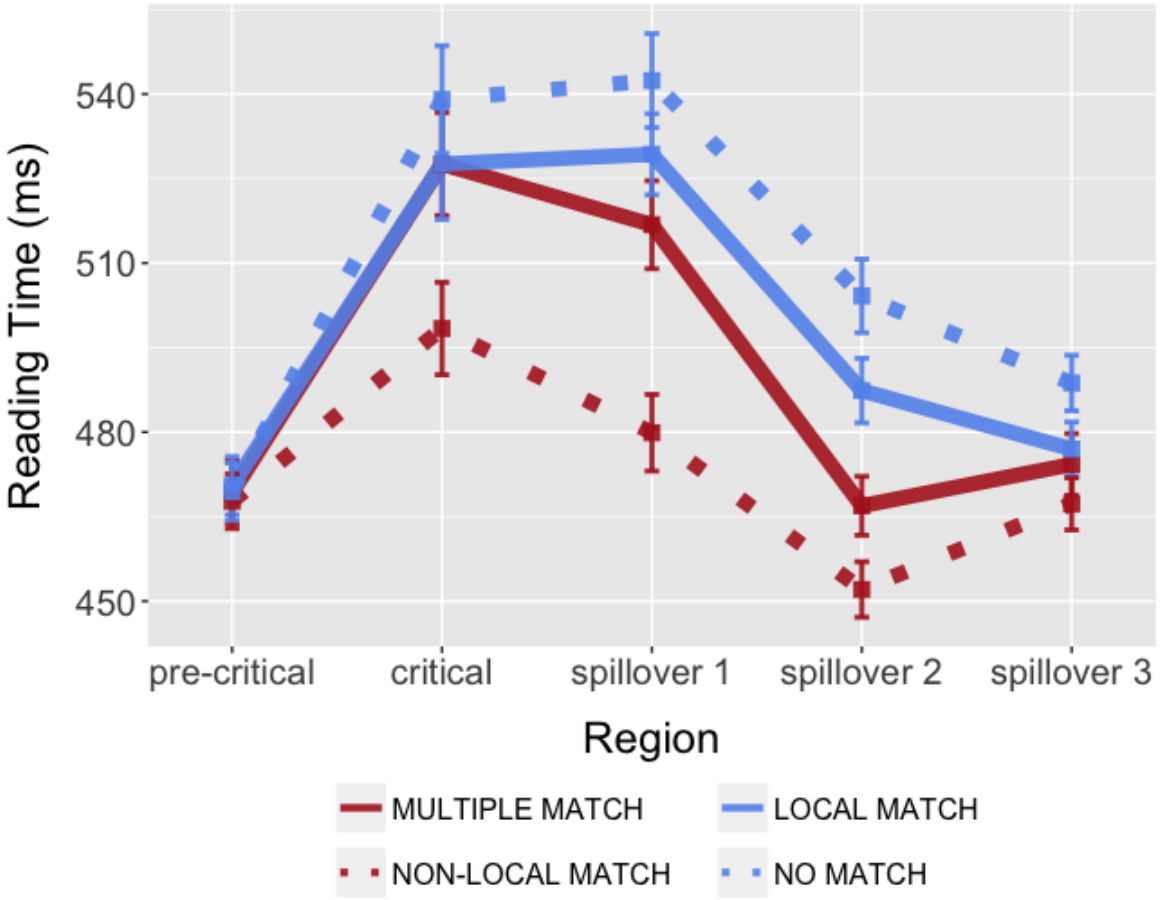
Moreover, given the similar reading time patterns for Experiments 3 and 4, an analysis that combines both of the data sets would determine whether there were reliable differences in the results between these experiments. If there were indeed no relevant interactions with **EXPERIMENT** as a fixed effect, the statistical results yielded from the combination of two data sets in a single analysis would maximize the power to detect the true patterns for pronouns in a local NP environment.

For this combined region and combined data set analysis, mean reading times and standard errors by condition at the regions of interest, consisting of the pre-critical, critical, and three spillover regions, are provided in Table 4.16 and Figure 4.5 below.

Table 4.16: Mean reading times (ms) by condition at the regions of interest for combined Experiments 3 and 4. Parentheses represent standard error by participants, corrected for between-participant variance (Bakeman & McArthur, 1996).

	Regions				
Condition	**Pre-critical**	**Critical**	**Spillover 1**	**Spillover 2**	**Spillover 3**
MULTIPLE MATCH	469.28 (5.61)	527.57 (9.13)	516.81 (7.81)	466.92 (5.23)	474.27 (5.48)
NON-LOCAL MATCH	467.72 (4.86)	498.38 (8.21)	479.89 (6.79)	452.07 (4.93)	467.26 (4.62)
LOCAL MATCH	470.49 (5.17)	527.60 (9.88)	529.31 (7.19)	487.37 (5.73)	476.99 (4.81)
NO MATCH	469.42 (5.09)	539.04 (9.54)	542.39 (8.35)	504.17 (6.53)	488.71 (4.92)

Figure 4.5: Word-by-word reading times (ms) for combined Experiments 3 and 4. Error bars represent standard error by participants, corrected for between-participant variance (Bakeman & McArthur, 1996).



Since no significant differences among the condition were observed in the raw reading time results in the pre-critical region, this region was excluded from the results of the statistical analysis for for the combined Experiments 3 and 4. Similar to Experiments 3-5, this combined model also utilized the `lme4` package (Bates, Maechler, Bolker, & Walker, 2015) in R software (R Core Team, 2013). Since all the data from four regions were combined into a single analysis, the data points in this current combined model within a trial were not independent. Therefore, similar to Cunnings & Sturt's (2018) statistical analyses, I included a random intercept for trial, which is a unique combination of subject numbers and item numbers. Since the subject and item numbers were different across Experiments 3 and 4, each of the trial in the combined analysis received a different number.

A maximal linear mixed-effects model was fit to log-transformed reading times for the experimental items in both Experiments 3 and 4 and for all four regions of analysis, spanning from the critical up to the third spillover region, as reported in Table 4.17. This combined model integrated experimental manipulations, which were NON-LOCAL and LOCAL, as well as EXPERIMENT and REGION, along with their interactions, as fixed effects, with random intercepts and slopes for both participants and items, and a random intercept for trials (Baayen, Davidson, & Bates, 2008). Each of these two-level factors was sum coded: *match* = 0.5 versus *mismatch* = -0.5 for NON-LOCAL and LOCAL, *Experiment 3* = 0.5 versus *Experiment 4* = -0.5 for EXPERIMENT, and *critical* = 0.5 versus *spillover* = -0.5 for REGION. Significant fixed effects were those with an absolute *t*-value greater than 2 (Gelman & Hill, 2007).

Table 4.17: Maximal linear mixed effects model fit to log-transformed reading times for combined relevant regions (critical and three spillover regions) in combined Experiments 3 and 4. Significant effects ($|t| > 2$) are in boldface.

Fixed Effects	$\hat{\beta}$	SE	t
EXPERIMENT	0.08	0.05	1.64
NON-LOCAL	**-0.03**	**0.01**	**-3.52**
LOCAL	0.01	0.01	1.15
REGION	**0.02**	**0.00**	**4.57**
EXPERIMENT × NON-LOCAL	-0.01	0.02	-0.61
EXPERIMENT × LOCAL	0.00	0.01	0.06
NON-LOCAL × LOCAL	**0.04**	**0.02**	**2.73**
EXPERIMENT × REGION	-0.00	0.01	-0.20
NON-LOCAL × REGION	**0.03**	**0.01**	**2.51**
LOCAL × REGION	0.01	0.01	1.20
EXPERIMENT × NON-LOCAL × LOCAL	0.02	0.03	0.61
EXPERIMENT × NON-LOCAL × REGION	0.02	0.02	0.91
EXPERIMENT × LOCAL × REGION	-0.00	0.02	-0.08
NON-LOCAL × LOCAL × REGION	0.01	0.02	0.53
EXPERIMENT × NON-LOCAL × LOCAL × REGION	-0.06	0.03	-1.77

The significant interaction between NON-LOCAL and REGION showed that the reading time patterns changed across regions when non-local antecedents matched or mismatched the pronoun. On the other hand, the effects of local antecedents did not change between the critical and the spillover regions, as the interaction between LOCAL and REGION was not significant.

In addition, the statistical analysis revealed that neither the EXPERIMENT effect nor any associated interactions were significant, signaling that the reading time results did not differ between Experiments 3 and 4. A main NON-LOCAL effect and a

significant interaction between NON-LOCAL and LOCAL were observed. This finding replicated the results of Experiment 3, and addressed the concern regarding the possible statistical underpower of Experiment 4.

In order to further examine this interaction between the NON-LOCAL and the LOCAL effects, a pairwise comparison for the combined relevant regions in this combined data set analysis is presented in Table 4.18 below. Once again, similar to the findings of Experiment 3, a multiple match effect was observed, as the contrast between the NON-LOCAL MATCH and the MULTIPLE MATCH is significant. Moreover, no difference between NO MATCH and LOCAL MATCH is observed, confirming that the lack of a significant contrast between these two conditions was not due to the effects being spread out over many regions. The overall pairwise contrast results provide supporting evidence that there was no facilitative interference effect: The presence of a feature-matching local NP does not reduce the longer RTs associated with NO MATCH.

Table 4.18: Pairwise comparisons for combined relevant regions (critical and three spillover regions) in combined Experiments 3 and 4. Significant contrasts ($|t| > 2$) are in boldface.

Condition 1	**Condition 2**	$\hat{\beta}$	*SE*	*t*
MULTIPLE MATCH	LOCAL MATCH	-0.02	0.01	-1.37
MULTIPLE MATCH	NON-LOCAL MATCH	**0.03**	**0.01**	**2.06**
MULTIPLE MATCH	NO MATCH	**-0.03**	**0.01**	**-2.33**
LOCAL MATCH	NON-LOCAL MATCH	**0.04**	**0.01**	**3.32**
LOCAL MATCH	NO MATCH	-0.01	0.01	-1.02
NON-LOCAL MATCH	NO MATCH	**-0.06**	**0.01**	**-4.37**

Region-by-region pairwise comparisons for the combined data sets of Experiments 3 and 4, reported in Table 4.19 below. The contrasts between (i) NON-LOCAL MATCH and LOCAL MATCH, (ii) NON-LOCAL MATCH and NO MATCH, and (iii) MULTIPLE MATCH and NO MATCH were persistent, as they continued to the third spillover region. Meanwhile, the contrast between NON-LOCAL MATCH and MULTIPLE MATCH was brief, as it stopped at the first spillover region. This showed that all of the effects signaling local noncoreference effects were more long-lasting than the effect related to competitive processing, signaling structural constraints at play during the real-time comprehension of pronouns in Vietnamese.

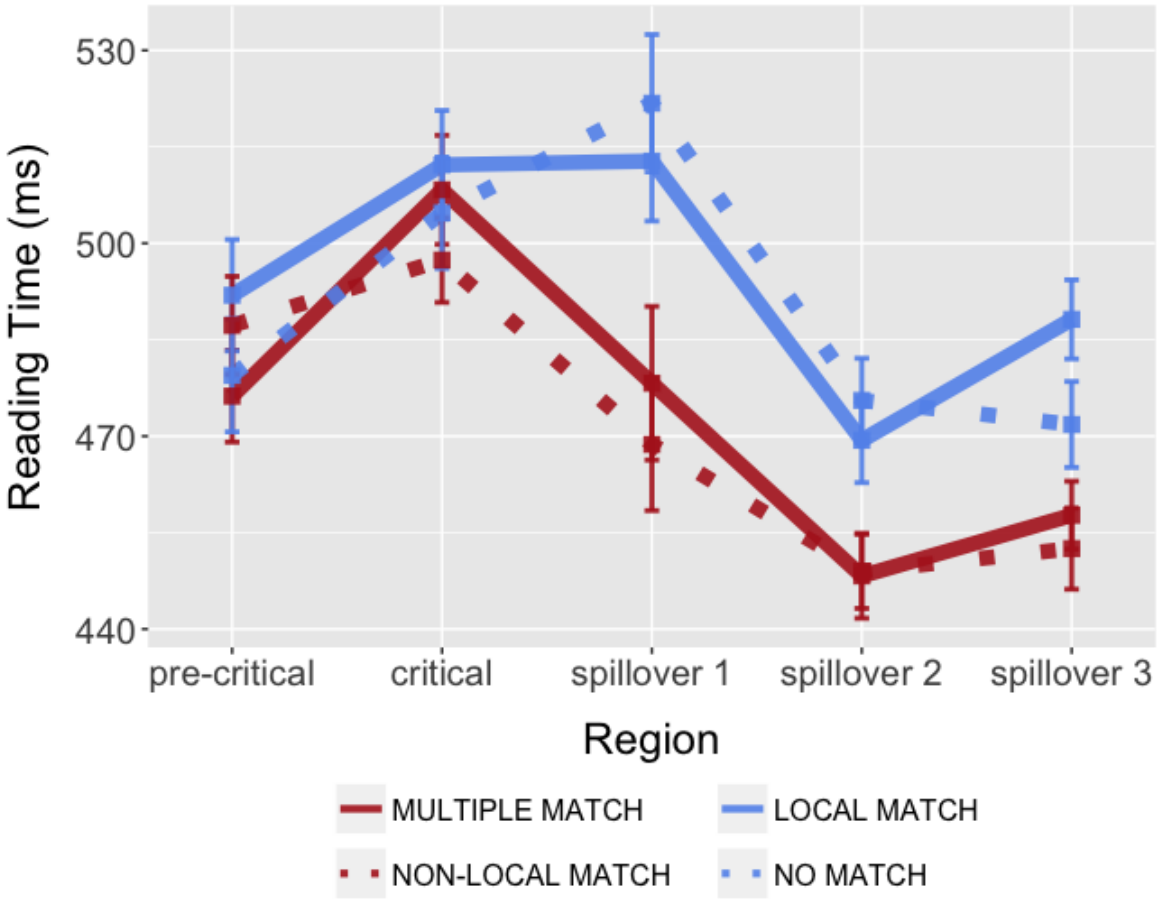
Table 4.19: Pairwise comparisons for each of the relevant regions in combined Experiments 3 and 4. Significant contrasts ($|t| > 2$) are in boldface.

Condition 1	**Condition 2**	**Critical**			**Spillover 1**		
		$\hat{\beta}$	*SE*	*t*	$\hat{\beta}$	*SE*	*t*
MULTIPLE MATCH	LOCAL MATCH	0.00	0.02	0.26	-0.02	0.02	-1.38
MULTIPLE MATCH	NON-LOCAL MATCH	**0.04**	**0.02**	**2.29**	**0.04**	**0.02**	**2.61**
MULTIPLE MATCH	NO MATCH	-0.00	0.02	-0.24	**-0.04**	**0.02**	**-2.17**
LOCAL MATCH	NON-LOCAL MATCH	0.03	0.02	1.88	**0.06**	**0.02**	**3.63**
LOCAL MATCH	NO MATCH	-0.01	0.02	-0.52	-0.02	0.02	-1.00
NON-LOCAL MATCH	NO MATCH	**-0.04**	**0.02**	**-2.55**	**-0.08**	**0.02**	**-4.92**

Condition 1	Condition 2	Spillover 2			Spillover 3		
		$\hat{\beta}$	*SE*	*t*	$\hat{\beta}$	*SE*	*t*
MULTIPLE MATCH	LOCAL MATCH	**-0.03**	**0.01**	**-2.11**	-0.02	0.01	-1.81
MULTIPLE MATCH	NON-LOCAL MATCH	0.03	0.01	1.97	0.00	0.01	0.10
MULTIPLE MATCH	NO MATCH	**-0.05**	**0.01**	**-3.35**	**-0.03**	**0.01**	**-2.91**
LOCAL MATCH	NON-LOCAL MATCH	**0.06**	**0.01**	**4.07**	**0.02**	**0.01**	**2.05**
LOCAL MATCH	NO MATCH	-0.02	0.01	-1.21	-0.01	0.01	-0.88
NON-LOCAL MATCH	NO MATCH	**-0.08**	**0.01**	**-5.11**	**-0.04**	**0.01**	**-2.82**

On the other hand, regarding the processing of pronouns in a local QP environment, mean reading times and standard errors by condition at the regions of interest, with an inclusion of the third spillover region, for Experiment 5 are illustrated in Figure 4.6 below.

Figure 4.6: Word-by-word reading times (ms) for Experiment 5, including the third spillover region. Error bars represent standard error by participants, corrected for between-participant variance (Bakeman & McArthur, 1996).



A combined region analysis for Experiment 5 is presented in Table 4.20. Besides the contrasts between (i) NON-LOCAL MATCH and LOCAL MATCH, (ii) LOCAL MATCH and NO MATCH, that between (iii) MULTIPLE MATCH and LOCAL MATCH was also a long-lasting effect, spanning for 3 regions after the pronoun. This is crucially not the result observed in the combined Experiments 3 and 4 analysis.

Table 4.20: Maximal linear mixed effects model fit to log-transformed reading times for combined relevant regions (critical and three spillover regions) in Experiment 5. Significant effects ($|t| > 2$) are in boldface.

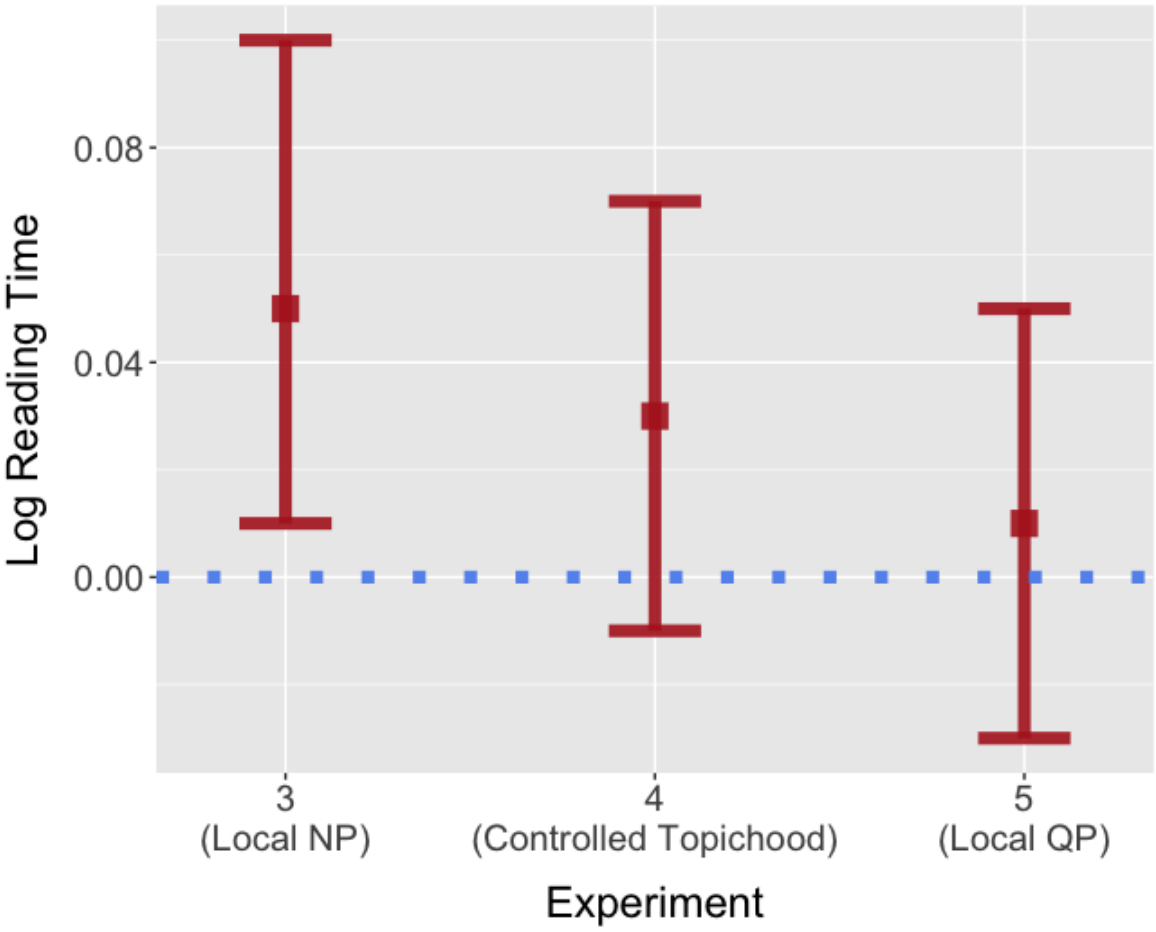
Condition 1	Condition 2	$\hat{\beta}$	*SE*	*t*
MULTIPLE MATCH	LOCAL MATCH	**-0.05**	**0.02**	**-2.18**
MULTIPLE MATCH	NON-LOCAL MATCH	0.01	0.02	0.61
MULTIPLE MATCH	NO MATCH	**-0.05**	**0.02**	**-2.26**
LOCAL MATCH	NON-LOCAL MATCH	**0.06**	**0.02**	**2.59**
LOCAL MATCH	NO MATCH	-0.00	0.02	-0.15
NON-LOCAL MATCH	NO MATCH	**-0.06**	**0.02**	**-2.72**

In essence, there are two main patterns at play. On the one hand, when the local antecedents are NPs, they are considered in early processing, but not preferred. On the other hand, when the local antecedents are QPs, they are just never reactivated. What differs them and essentially what shows strict Binding Principle B effect is whether there was a reliable difference in reading time between the MULTIPLE MATCH condition and the NON-LOCAL MATCH one.

4.6.3 Cross-Experimental Comparisons

We observed different profiles regarding the MULTIPLE MATCH effects in the 3 self-paced reading experiments. As summarized in Figure 4.7 below, that the contrast between MULTIPLE MATCH and NON-LOCAL MATCH in the first spillover region was only significant in Experiment 3, but not 4 and 5. Even though the MULTIPLE MATCH effects appeared to be the most robust for local NPs, competitive processing diminished with local QPs.

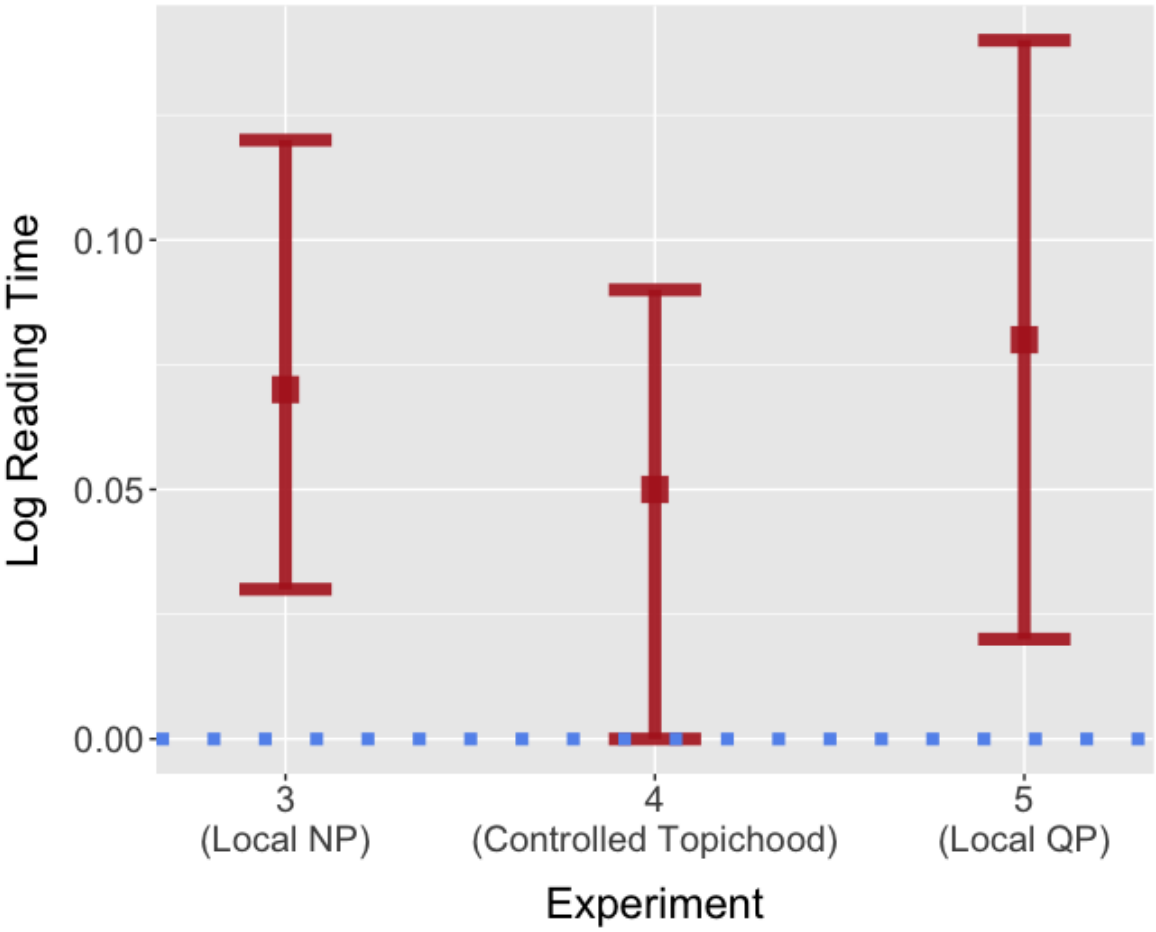
Figure 4.7: Pairwise differences of least squares means between MULTIPLE MATCH and NON-LOCAL MATCH in the first spillover region in Experiments 3, 4, and 5. Error bars represent 95% confidence intervals by participants.



However, there were also consistent patterns across all these 3 experiments. First, the longest reading times were consistently reported in the NO MATCH condition, showing that Vietnamese speakers are sensitive to honorificity match online. Moreover, LOCAL MATCH slowdowns were also observed in all 3 experiments, suggesting that Vietnamese speakers apply a structural constraint against local subject, like English speakers. As demonstrated in Figure 4.8, the pairwise contrasts between NON-LOCAL MATCH, the condition with one feature-matching Principle B compliant antecedent, and LOCAL MATCH, the condition with one feature-matching Principle B violating antecedent, were significant, regardless of the dif-

ferent local antecedent types.

Figure 4.8: Pairwise differences of least squares means between NON-LOCAL MATCH and LOCAL MATCH in the first spillover region in Experiments 3, 4, and 5. Error bars represent 95% confidence intervals by participants.



Regarding this persistent bias against local antecedents in pronoun processing, one assumption could be that Vietnamese speakers initially parse pronouns as bound variables in all cases, and apply Principle B. Coreferential interpretation of pronoun is available only at a delay, and with some difficulty. I will further discuss the possible processing models that Vietnamese speakers may rely on in the early pronoun comprehension stages in the next section.

4.7 Processing Models

4.7.1 Binding Model and Coreference Model

Overall, given the online experimental results, we observe four main patterns for real-time pronoun comprehension in Vietnamese:

1. Local subjects are considered when they are NPs, as evidenced by the MULTIPLE MATCH effect in Experiment 3.

2. Local subjects are not considered when they are QPs, as evidenced by the lack of a MULTIPLE MATCH effect in Experiment 5.

3. LOCAL MATCH is read slower than NON-LOCAL MATCH in all experiments.

4. No difference between LOCAL MATCH and NO MATCH in all experiments.

To account for these key findings, I consider two possible processing models, which propose different assumptions regarding how Vietnamese pronouns are processed in the early antecedent retrieval stages:

1. **Binding Model**: Pronouns are initially parsed as bound variables. Strict Principle B immediately applies, and all feature-matching non-local antecedents are immediately reactivated.

2. **Coreference Model**: Pronouns are initially parsed as ambiguous. All feature-matching antecedents are immediately reactivated, and then Principle B rules out local quantified antecedents, which are subject to binding.

Assuming that agreement constraints have an immediate effect in early processing, the predictions that these two models make on the initial pronoun resolution stages in Vietnamese are presented in Tables 4.21, 4.22, 4.23, and 4.24. First, in the MULTIPLE MATCH condition, the Binding Model instantly rules out local subjects

as possible antecedents, because they violate categorical Principle B. As a result, this model cannot explain the MULTIPLE MATCH effects observed in Experiment 3. On the other hand, the Coreference Model, which initially considers all feature-matching antecedents, predicts that both the non-local and local subjects are retrieved in early processing. Therefore, the additional processing time to determine a singular referent is expected by this model. These predictions are illustrated in Table 4.21 below:

Table 4.21: Predictions of the processing models for MULTIPLE MATCH.

	Binding Model	**Coreference Model**
LOCAL NP (Exp 3)	**Tam.SUB** said that **that employee.SUB** voted for **him.SUB**	
	✓ *Tam* ✗ *that employee*	✓*Tam* ✓ *that employee*
LOCAL QP (Exp 5)	**Tam.SUB** said that **every employee.SUB** voted for **him.SUB**	
	✓ *Tam* ✗ *every employee*	✓ *Tam* ✗ *every employee*

Secondly, these two models predict the same result for NON-LOCAL MATCH: Only non-local antecedents are considered in early processing, as shown in Table 4.22 below. The Binding Model reactivates strict Principle B compliant, hence non-local antecedents only. Meanwhile, the Coreference Model retrieves feature-matching antecedents, which happen to be the non-local subjects in this condition.

Table 4.22: Predictions of the processing models for NON-LOCAL MATCH.

	Binding Model	Coreference Model
LOCAL NP (Exp 3)	**Tam.HON** said that **that employee.SUB** voted for **him.HON**	
	✓ *Tam* ✗ *that employee*	✓ *Tam* ✗ *that employee*
LOCAL QP (Exp 5)	**Tam.HON** said that **every employee.SUB** voted for **him.HON**	
	✓ *Tam* ✗ *every employee*	✓ *Tam* ✗ *every employee*

Thirdly, the predictions for the LOCAL MATCH condition are presented in Table 4.23 below. The Binding Model do not consider any of the antecedents: It rules out local antecedents on the basis of categorical binding constraints, and excludes non-local antecedents because of mismatching features. Consequently, no antecedents are considered for LOCAL MATCH, but non-local antecedents are retrieved for NON-LOCAL MATCH. This model accurately predicts the longer reading times associated with the LOCAL MATCH condition, as opposed to the quick processing observed in NON-LOCAL MATCH.

Meanwhile, the Coreference Model initially considers the local antecedents, because they satisfy the feature agreement constraint. The local quantifcational subjects are then ruled out because they violate Principle B. As a result, this model also captures the pattern shown in Experiment 5: LOCAL MATCH, which has no accessible antecedents, is read significantly slower than NON-LOCAL MATCH, which has a singular referent to which pronouns can anchor. However, with this model, local NPs are expected to be retrieved, because they are not subject to binding in Vietnamese. Then, both NON-LOCAL MATCH and LOCAL MATCH have one antecedent to which the pronoun can be resolved. As a result, this model fails to account for the contrast in reading times between these two conditions in Experiment 3.

Table 4.23: Predictions of the processing models for LOCAL MATCH.

	Binding Model	Coreference Model
LOCAL NP (Exp 3)	Tam.HON said that **that employee.SUB** voted for **him.SUB**	
	✗ *Tam* ✗ *that employee*	✗ *Tam* ✓ *that employee*
LOCAL QP (Exp 5)	Tam.HON said that **every employee.SUB** voted for **him.SUB**	
	✗ *Tam* ✗ *every employee*	✗ *Tam* ✗ *every employee*

Lastly, as illustrated in Table 4.24 below, neither of these models consider any antecedents for NO MATCH. Therefore, both processing models correctly predicts the longest reading time observed in this condition.

Table 4.24: Predictions of the processing models for NO MATCH.

	Binding Model	Coreference Model
LOCAL NP (Exp 3)	Tam.SUB said that **that employee.SUB** voted for **him.HON**	
	✗ *Tam* ✗ *that employee*	✗ *Tam* ✗ *that employee*
LOCAL QP (Exp 5)	Tam.SUB said that **that employee.SUB** voted for **him.HON**	
	✗ *Tam* ✗ *every employee*	✗ *Tam* ✗ *every employee*

Taking into account both the predictions of these processing models and the results of Experiments 3 and 5, Table 4.25 below presents a comparison of the Binding Model and the Coreference Model:

Table 4.25: Comparisons of the processing models.

Finding	Binding Model	Coreference Model
MULTIPLE MATCH with local NPs	✗	✓
No MULTIPLE MATCH with local QPs	✓	✓
LOCAL MATCH < NON-LOCAL MATCH	✓	✗
LOCAL MATCH = NO MATCH	✓	✗

The Binding Model can account for the sensitivity to structural constraints in early processing, as it correctly predicts a significant contrast between the LOCAL MATCH and the NON-LOCAL MATCH conditions as well as the lack thereof between LOCAL MATCH and NO MATCH. It also accurately blocks local QPs in the MULTIPLE MATCH position. However, it fails to explain why the MULTIPLE MATCH effect is observed when the local subjects are NPs.

On the other hand, Coreference Model can capture the patterns regarding the MULTIPLE MATCH effects in Vietnamese perfectly. However, it provides false predictions regarding the LOCAL MATCH condition: NON-LOCAL MATCH is expected to not be consistently faster than LOCAL MATCH, and LOCAL MATCH is expected to be reliably easier to process than NO MATCH.

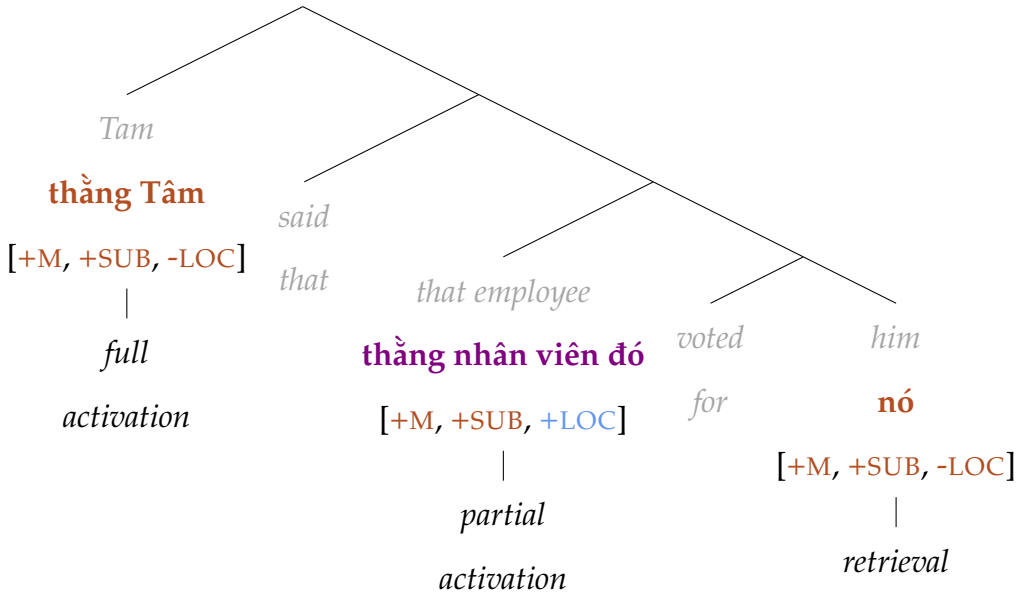
In sum, neither of the processing models can account for the full picture of real-time pronoun resolution in Vietnamese: Their predictions are in complementary distribution of each other. One possible model would be an interactive one, combining elements from both of these models.

4.7.2 Interactive Model

Badecker & Straub (2002) is among the early proposals that support an interactive model for the initial stages of pronoun resolution. Based on the results of 6 self-paced reading experiments, they argue that there are various constraints

that affect the antecedent reactivation at the same time. In other words, both ϕ-feature agreement and structural constraints simultaneously determine the activation level of each of the antecedents in question. Under this view, an interference effect can arise when a Principle B violating antecedent matches the pronoun in gender and number. A multiple match effect is essentially a result of triggering reactivation on both NPs in the local and non-local domains. In this case, the feature-matching non-local subject receives full activation for satisfying both the agreement and structural constraints. On the other hand, the feature-matching local subject is only half activated, because it fits the agreement requirements, but violates binding Principle B. Applying this "interactive-parallel-constraint" model to the MULTIPLE MATCH condition in Vietnamese, we now have an explanation for the MULTIPLE MATCH effect observed when the local antecedent is an NP, as illustrated in (74) below:

(74)

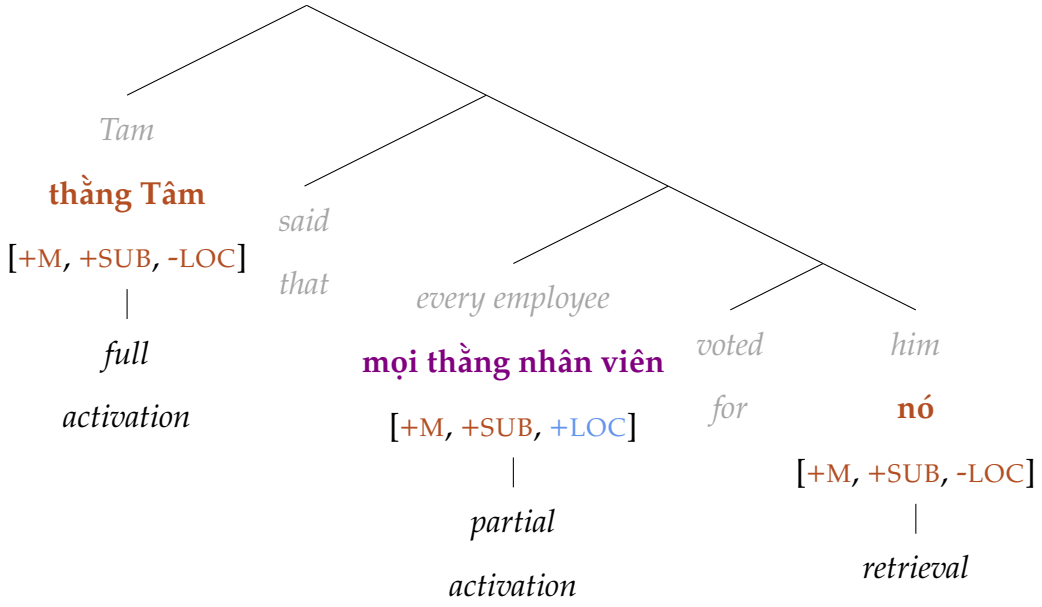


Encountering the pronoun *nó* immediately triggers the retrieval process for all the memory items that match the male and subhonorific feature cues and the non-local structural cues. While *thằng Tâm* 'Tam' is fully reactivated for being a complete match, *thằng nhân viên đó* is partially reactivated for matching some of the

cues. Consequently, the partial reactivation of the local antecedent interferes with the retrieval of the fully matched non-local antecedent, leading to an increased difficulty of resolving the relevant dependency. As a result, due to a similarity-based interference effect, the longer reading times observed in Experiment 3 are expected under Badecker & Straub's (2002) view.

However, this approach on an interactive model cannot account for the absence of a MULTIPLE MATCH effect observed in Experiment 5, where the local antecedents are QPs. In particular, Badecker & Straub's (2002) proposed interactive model would falsely predict that pronoun resolution profiles stay the same, regardless of the antecedent type, as illustrated in (75) below:

(75)



Under this view, the local quantified subject would receive a partial activation, leading to the same processing slowdown in Experiment 3. This fails to capture the patterns in Vietnamese, in which Principle B strictly prohibited pronouns from being bound by local quantified subjects. Therefore, to explain the online Vietnamese results, we need a different take on an interactive model.

I argue for an Interactive Model in which Vietnamese speakers simultaneously rely on both the Binding and the Coreference Models during the early stages of

pronoun resolution. The Binding and the Coreference Models would each make predictions regarding the possible antecedent sets for pronouns during the initial retrieval stages, as previously discussed in Tables 4.21, 4.22, 4.23, and 4.24. The Interactive Model then determines the reactivation level of each of the antecedents by averaging out the activation profiles that the Binding and Coreference strategies predict. The processing results of this Interactive Model for the 4 conditions in both Experiments 3 and 5 are presented in Tables 4.26, 4.27, 4.28, and 4.29 below. A '1' represents a full reactivation level, a '0' signals no reactivation, and a '0.5' indicates a half reactivation level.

First, this Interactive Model can account for both the multiple match effect associated with a feature-matching local NP in Experiment 3 and the lack thereof observed in the feature-matching local QP in Experiment 5, as illustrated in Table 4.26 below:

Table 4.26: Antecedent reactivation for MULTIPLE MATCH.

Antecedent	Binding Model	Coreference Model	Interactive Model
LOCAL NP	**Tam.SUB** said that **that employee.SUB** voted for **him.SUB**		
Tam	1	1	1
that employee	0	1	0.5
LOCAL QP	**Tam.SUB** said that **every employee.SUB** voted for **him.SUB**		
Tam	1	1	1
every employee	0	0	0

The feature-matching non-local antecedents are predicted to be fully reactivated across the experiments, because they are a perfect match for the pronouns' retrieval cues for both the Binding and the Coreference Models. However, according to this Interactive Model, the reactivation levels for the local antecedents differ depending on the NP type. In particular, local NPs are half activated, because it

is supported by the Coreference Model but inhibited by the Binding Model. This means that Vietnamese speakers do consider *Tam*, but they also do not exclude *that employee* from the initial set of possible antecedents for pronouns. Because the different processing strategies do not always immediately select the same antecedents for the pronouns, additional processing is needed to resolve the dependency. On the other hand, local QPs are not reactivated at all, because they are filtered out by both of the processing strategies. Aa a result, this model correctly predicts that the multiple match effect would arise in Experiment 3, but not Experiment 5.

Meanwhile, for the NON-LOCAL MATCH condition, both the Binding and the Coreference Models consistently reactivate only the feature-matching non-local antecedents. The mismatching local subjects are never considered under both of these models, and thus no similarity-based interference effect arises. In other words, while the non-local antecedents receive full activation, the local ones get none. Since both strategies align and immediately picks out a single antecedent for the pronouns, the processing is eased. This results in the significantly shorter reading times of this condition, compared to the others. The contrasting reactivation profiles for the non-local and the local antecedents are as follows:

Table 4.27: Antecedent reactivation for NON-LOCAL MATCH.

Antecedent	Binding Model	Coreference Model	Interactive Model
LOCAL NP	**Tam.HON** said that **that employee.SUB** voted for **him.HON**		
Tam	1	1	1
that employee	0	0	0
LOCAL QP	**Tam.HON** said that **every employee.SUB** voted for **him.HON**		
Tam	1	1	1
every employee	0	0	0

Furthermore, this take on Interactive Model also yields an accurate prediction that the LOCAL MATCH condition is read significantly slower than the NON-LOCAL MATCH. As presented in Table 4.28 below, the mismatching non-local antecedents are not considered at all under both the Binding and the Coreference strategies. The local QPs are also ruled out during early retrieval by both models. However, the local NPs are reactivated by the Coreference Model, because they are not blocked by Principle B, and they satisfy the ϕ-feature agreement constraint.

Table 4.28: Antecedent reactivation for LOCAL MATCH.

Antecedent	Binding Model	Coreference Model	Interactive Model
LOCAL NP	**Tam.HON** said that **that employee.SUB** voted for **him.SUB**		
Tam	0	0	0
that employee	0	1	0.5
LOCAL QP	**Tam.HON** said that **every employee.SUB** voted for **him.SUB**		
Tam	0	0	0
every employee	0	0	0

Consequently, balancing out the activation levels given by both processing models, the NP *that employee* is half reactivated in the Interactive Model. In this case, the one antecedent that gets retrieved (*that employee*) only receives a partial reactivation for satisfying the Coreference Model, but not the Binding Model. Meanwhile, in the NON-LOCAL MATCH condition, the one retrieved antecedent (*Tam*) gets full reactivation for receiving positive support from both strategies. As a result, the processing of NON-LOCAL MATCH is easier, and thus is read much more quickly than LOCAL MATCH.

Lastly, neither the Binding Model nor the Coreference Model consider any antecedents in the NO MATCH condition. Therefore, the Interactive Model also does

not reactivate either the non-local or local subjects, as shown in Table 4.29 below. This explains why the difference in reading times between LOCAL MATCH and NO MATCH is not significant. The retrieval profiles for these two conditions are quite similar, except for the half reactivation level that the local NP *that employee* receives in the LOCAL MATCH. However, given that it is just half a boost, the effect is not as robust, and thus the contrast is not as reliable.

Table 4.29: Antecedent reactivation for NO MATCH.

Antecedent	Binding Model	Coreference Model	Interactive Model
LOCAL NP	**Tam.SUB** said that **that employee.SUB** voted for **him.HON**		
Tam	0	0	0
that employee	0	0	0
LOCAL QP	**Tam.SUB** said that **every employee.SUB** voted for **him.HON**		
Tam	0	0	0
every employee	0	0	0

Overall, the Interactive Model that incorporates both processing strategies from the Binding Model and the Coreference Model can account for all of the 4 key findings in both Experiments 3 and 5, which involves different NP types of local antecedents, as summarized in Table 4.30 below:

Table 4.30: Results of the Interactive Model.

Finding	Interactive Model
MULTIPLE MATCH with local NPs	✓
No MULTIPLE MATCH with local QPs	✓
LOCAL MATCH < NON-LOCAL MATCH	✓
LOCAL MATCH = NO MATCH	✓

In sum, even though Vietnamese is much more lenient with local coreference than English, the processing of pronouns in Vietnamese is remarkably similar to that of English. On the one hand, local NPs are initially reactivated, resulting in a competition for multiple matching subjects. On the other hand, local quantified antecedents are never considered, establishing robust Principle B effects in the early antecedent retrieval stages. This means that pronoun resolution in Vietnamese show two different patterns found in previous English studies: While the processing profile of the local NPs replicated Badecker & Straub (2002), that of the local QPs aligned with Chow, Lewis, & Phillips (2014). While neither a model that always allows for coreference nor one that consistently imposes strict binding constraints can entirely capture the online results in Vietnamese, an interactive model that utilizes both binding and coreference strategies can fully account for real-time comprehension of object pronouns in the language.

CHAPTER 5

CONCLUSIONS

Principle B of Classical Binding Theory (Chomsky, 1981) asserts that a pronoun cannot corefer with an antecedent in the same clause. Vietnamese appears to violate this constraints as it permits local coreference between a pronoun and a referential antecedent. To address this puzzle, I built on the approach that characterizes Binding Theory in terms of competitions between the reflexive and the pronoun in a language. Instead of treating Principles A and B as independent grammatical conditions, competition-based accounts assume Principle A as default and derive Principle B from this pronominal competition, which has been argued to take place at different linguistic levels. In this dissertation, I explored two different views: One distinguishes the meanings of these anaphoric elements at the discourse level (Reinhart, 1983), and the other determines their distribution at the morphosyntax (Rooryck & Vanden Wyngaerd, 2011). The former relies on Rule I, which requires the relationship between two coindexed NPs in a local domain to be reflexive binding, unless coreference contributes a different interpretation from binding. Meanwhile, the latter theory proposes that reflexives and pronouns come with different bundles of ϕ-features. It is the Elsewhere Principle that determines that the more specific lexical insertion rules for reflexives should block the more general application of pronouns.

I argued that Rooryck & Vanden Wyngaerd's (2011) system, which predicts that a pronoun and a reflexive cannot both appear in the same morphosyntactic slot, fails to capture the Vietnamese data in which these two forms can alternate in the direct object position of the same sentence. On the other hand, Reinhart's (1983) pragmatic account, which allows coreference to arise when it is distinguishable from binding, can account for this puzzle. Because Vietnamese only encodes honorificity in pronouns, but not reflexives, these two forms end up yielding different interpretations. Therefore, coreference between a pronoun and its coargument is not ruled out in Vietnamese. Following this reasoning, I explored the hypothesis that there are two distinct mechanisms responsible for pronoun interpretation in Vietnamese: binding and coreference. The results from the first two-alternative forced choice experiment revealed that Vietnamese speakers only consider local antecedents when they are NPs, which are not subject to binding, but not QPs, which is strictly governed by Principle B. The second binary choice study further suggested that pronouns are not interpreted to be bound by their quantified coarguments. Overall, these offline results support the idea that while coreference is remarkably lenient, Binding Principle B is still effectively at play in Vietnamese.

Having discussed how binding and coreference influence the final interpretation, I further examined how these constraints guide the real-time comprehension of object pronouns in Vietnamese through a series of three self-paced reading experiments. The first online study showed that although local NPs were considered, non-local subjects were preferred as antecedents for pronouns in early processing stages. These findings were replicated in the second online experiment, which controlled for retrieval advantages that the non-local antecedents may have received for being in the topical subject position of the sentence. I then tested this issue with local QPs in the third self-paced reading study and found that local antecedents were not initially retrieved. Taken together, the patterns observed in Vietnamese

reflected both of the processing profiles reported in English. On the one hand, when the local antecedents are NPs, they can interfere with the pronouns' retrieval for the non-local antecedents, similar to Badecker & Straub's (2002) results. On the other hand, when the local antecedents are QPs, they were excluded from the initial set of possible antecedents for pronouns, replicating the results from Nicol & Swinney (1989) and Chow, Lewis, & Phillips (2014). Given the mixed profiles, I argued that Vietnamese speakers do not solely rely on either the Binding or the Coreference strategy to resolve pronouns in real time. Instead, an Interactive Model that incorporates both of these processing strategies can most efficiently account for the patterns of reading times established across these experiments.

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