

Modal Adjectives and the Grammar of Non-local Modification

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To Eva Picardi

Abstract

This thesis is concerned with the topic of *non-local modification* (Schwarz 2006), namely the phenomenon in which an adjective’s interpretation makes reference to material external to its hosting DP. The focus is on the natural class of modal adjectives that participate in non-locality, including *possible*, *conceivable* and *imaginable* (Larson 2000). For instance, *Mary interviewed every candidate possible* is equivalent in meaning to *Mary interviewed every candidate that (it) was possible for her to interview*.

It is proposed that non-local adjectives participate in reduced relatives (e.g. Bhatt 2000) formed via *tough*-movement, defined here as movement of a null operator (e.g. Chomsky 1977) to the highest specifier available in the modification structure, Spec,AP. Further Quantifier Raising of the DP that hosts a non-local structure allows for the adjective’s infinitival complement to undergo Null Complement Anaphora (NCA) – analyzed here as ellipsis under syntactic identity with the matrix clause. It is shown that the main advantage of this analysis is that it explains the restriction that only certain adjectives come with a non-local reading (Larson 2000, Leffel 2014).

The question of whether there is independent evidence for positing a *tough*-syntax is scrutinized and the relation to the class of ordinary *tough*-adjectives is examined. It is argued that ordinary *tough*-adjectives (e.g. *hard*, *easy*, etc.) do not allow for a non-local reading, because their argument structure differs from that of non-local adjectives: while non-local adjectives select infinitival complements introduced by the complementizer *for*, ordinary *tough*-adjectives select bare infinitives and also *for*-PPs (Chomsky 1973, Faraci 1974, Jacobson 1992, Hartmann 2011). It is further argued that this distinction has an effect on the derivational step involving NCA; in particular, ordinary *tough*-adjectives do not allow for NCA in this environment, insofar as the *for*-PP does not match with the matrix clause and, thus, the identity condition necessary for NCA is not met.

Finally, this thesis investigates the truth-conditions of sentences with non-local modifiers. A novel observation is discussed: whenever a sentence with a non-local modifier such as *I brought every tool possible* is true, a corresponding equative construction (i.e. *I brought as many tools as possible*) is also true. The observation, which is dubbed “the equative effect,” is potentially in conflict with the intersective analysis proposed in this work. Two alternative analyses of non-locality based on degree quantification are examined: one posits

an equative syntax, while the other, due to Leffel (2014), appeals to degree relativization (Carlson 1977, Heim 1987, Grosu and Landman 1998). It is argued that only the analysis based on an equative syntax captures the equative effect. However, neither analysis does justice to the determiner restriction that has been observed in relation to non-local modifiers (Larson 2000): namely, the restriction that non-local adjectives occur, in general, in the presence of universal quantifiers and never in the presence of existentials. It is proposed that a semantics for modals along the lines of Kratzer (2012), supplemented with a temporal dimension, also explains the equative effect, while keeping the main advantages of the intersective approach. Finally, it is conjectured that the determiner restriction is the reflex of a more general pathological condition that a class of certain sentences suffers: triviality due to necessary blocking (Gajewski 2002, Schwarz et al. 2019).

Résumé

Cette thèse porte sur le sujet de la *modification non locale* (Schwarz 2006), c'est-à-dire le phénomène dans lequel l'interprétation d'un adjectif fait référence à des éléments extérieurs à son DP hôte. L'accent est mis sur la classe naturelle d'adjectifs modaux qui participent à cette forme de non-localité, y compris *possible*, *conceivable* et *imaginable* (Larson 2000). Par exemple, *Mary interviewed every candidate possible* est équivalent à *Mary interviewed every candidate possible for her to interview*.

On suggère que les adjectifs non locaux participent à des propositions relatives réduites (par exemple, Bhatt 2000) formés par mouvement *tough*, qui est défini ici comme le mouvement d'un opérateur nul (par exemple Chomsky 1977) vers le spécificateur le plus élevé disponible dans la structure de modification, Spec,AP. La montée des quantificateurs du DP qui héberge une structure non locale permet au complément infinitival de l'adjectif de se soumettre à l'Anaphore à Complément Nul (ACN) – analysée ici sous forme de ellipse sous identité syntaxique avec la proposition principale. On démontre que le principal avantage de cette analyse est qu'elle explique la restriction selon laquelle seuls certains adjectifs ont une interprétation non locale (Larson 2000, Leffel 2014).

La question de savoir s'il existe des preuves indépendantes permettant de postuler une syntax *tough* est examinée, aussi bien que la relation avec la classe des adjectifs *tough* ordinaires. On avance que les adjectifs *tough* ordinaires (par exemple, *hard*, *easy*, etc.) ne permettent pas une interprétation non locale, car leur structure argumentale diffère de celle des adjectifs non locaux: tandis que les adjectifs non locaux sélectionnent des compléments infinitivaux introduits par le complémenteur *for*, les adjectifs *tough* ordinaires sélectionnent des infinitifs simplex ainsi que des PP's introduits par *for* (Chomsky 1973, Faraci 1974, Jacobson 1992, Hartmann 2011). On avance en outre que cette distinction a un effet sur l'étape de la dérivation impliquant l'ACN; en particulier, les adjectifs *tough* ordinaires ne permettent pas l'ACN dans cet environnement, dans la mesure où le PP introduit par *for* ne correspond pas à la proposition principale et que, par conséquent, la condition d'identité nécessaire pour l'ACN n'est pas satisfaite.

Enfin, cette thèse examine les conditions de vérité des propositions avec des modificateurs non locaux. Une observation nouvelle est discutée: chaque fois qu'une proposition avec un modificateur non local tel que *I brought every tool possible* est vraie, une construc-

tion équative équivalente (c'est-à-dire *I brought as many tools as possible*) est également vraie. L'observation, appelée « effet équatif », est potentiellement en contradiction avec l'analyse intersective proposée dans ce travail. Deux analyses alternatives de non-localité basées sur la quantification des degrés sont examinées: l'une pose une syntaxe équative, pendant que l'autre, proposée par Leffel (2014), fait appel à la relativisation des degrés (Carlson 1977, Heim 1987, Grosu et Landman 1998). On avance que seule l'analyse basée sur une syntaxe équative capture l'effet équatif. Cependant, aucune analyse ne tient compte de la restriction des déterminants observée avec les modificateurs non locaux (Larson 2000): à savoir la restriction selon laquelle les adjectifs non locaux apparaissent en général en présence de quantificateurs universels et jamais en présence d'existentiels. On suggère qu'une sémantique pour les modaux inspirée de Kratzer (2012), complétée par une dimension temporelle, explique également l'effet équatif, tout en conservant les principaux avantages de l'approche intersective. Enfin, on suppose que la restriction des déterminants est le réflexe d'une condition pathologique plus générale que subit une classe de certaines phrases: la trivialité due au blocage nécessaire (Gajewski, 2002, Schwarz et al. 2019).

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Chapter 1

Introduction

1.1 What this thesis is about

This dissertation investigates the nature of a grammatical phenomenon that goes under the name of NON-LOCAL MODIFICATION (Schwarz 2006). Non-local modification occurs when an adjective's interpretation makes reference to material that is external to the determiner phrase in which the adjective is hosted. Our focus will be on the class of modal adjectives which, as Larson (2000) first reported, bear the hallmarks of non-local modification. This class includes the adjectives *possible*, *imaginable* and *conceivable*.

To illustrate the phenomenon of non-local modification, consider the most salient reading of the adjectives in (1), which is best paraphrased as in (2), where the adjectives take an infinitival clause and are themselves embedded in a finite relative clause.

(1) Ann talked to every $\left\{ \begin{array}{c} \text{conceivable} \\ \text{possible} \\ \text{imaginable} \end{array} \right\}$ professor.

(2) Ann talked to every professor that it was $\left\{ \begin{array}{c} \text{conceivable} \\ \text{possible} \\ \text{imaginable} \end{array} \right\}$ for her to talk to.

One key feature of this reading is that the content of the embedded infinitive is tightly connected to the matrix predicate. In this respect, it is worth noting that (1) could never possibly receive a more liberal interpretation such as (3):

(3) Ann talked to every professor that it was $\left\{ \begin{array}{c} \text{conceivable} \\ \text{possible} \\ \text{imaginable} \end{array} \right\}$ for her to work with.

Moreover, the term “non-local” immediately evokes a contrast with the adjective “local.” (1) also has a LOCAL reading, by which we simply mean that no reference to material external to the determiner phrase is made. We could render this local reading in the following way:

- (4) Ann talked to every individual that was, $\left\{ \begin{array}{c} \text{conceivably} \\ \text{possibly} \\ \text{imaginably} \end{array} \right\}$, a professor.

How can the two readings be distinguished? Suppose Ann went to a party attended by many professors. At the party she talked to every actual professor that, given the circumstances, she could possibly talk to. Suppose there were five professors, and she talked to four of them, as the fifth spent the whole party talking with someone else. In this scenario, (1) would be true under the non-local reading, but false under the local one. It would be true even if Ann had no opinion whatsoever as to whether any of the people she talked to were professors. On the other hand, suppose Ann went to a party thinking that a number of professors would attend, but also architects and doctors. Suppose she talked to every individual who she could imagine or guess were profs. Further suppose that, in fact, only one professor attended the party, although many seemed to be stereotypical professors. Then, (1) would be true under (4), but false under (2).

These first observations lead us to formulate the following research questions: what are the conditions under which a non-local reading can arise (and how come non-local readings are so constrained in what they can express) and what exactly characterizes their truth-conditions?

Chapters 2 to Chapter 4 of this dissertation will deal with the first question. Our goal in these chapters is to develop precise syntactic constraints that will allow us to provide empirically adequate hypotheses on how these modal adjectives express their non-local meanings and, also, on why only such a small class of adjectives seems to allow for non-locality.

The last chapter will tackle the second question. After having established a fully compositional theory of non-locality in Chapter 2, we will have to sharpen our assumptions about modality in order to adequately model the truth-conditions associated with sentences containing non-local modification structures. To illustrate the complexity of our task, consider the following sentence uttered against the scenario described below:

- (5) I brought every tool possible.
- (6) Scenario: There were eleven tools available but the speaker’s bag had space only for ten. In the end, the speaker of (5) brought ten tools.

In this scenario, (5) is intuitively judged to be true, even though each tool could be individually brought. We dub this observation THE EQUATIVE EFFECT, as we observe that what (5) conveys could be expressed by means of an EQUATIVE construction:

- (7) I brought as many tools as possible.

We shall defend the view that a simple extension of Kratzer's (2012) semantics for modals, which includes times as a parameter, can account for this effect. We provide both empirical and more conceptual reasons to prefer this account over Leffel's (2014) semantics for non-local readings, which, in analogy with so-called DEGREE RELATIVES, makes use of degree quantification.

Non-local adjectives have been studied especially in relation to so-called MODAL SUPERLATIVES (Schwarz 2005, Romero 2013, Leffel 2014). For example, (8a) has (8b) as its most salient reading.

- (8) a. John climbed the highest mountain possible.
b. John climbed the highest mountain that it was possible for him to climb.

We will not be concerned with modal superlatives in this dissertation, as these would require us to extend our formal apparatus beyond what is reasonable for a dissertation. However, what we shall say here is clearly relevant for a proper treatment of these constructions as well, since, presumably, the same mechanisms that we introduce to derive non-local readings are in force there, modulo obvious syntactic differences.

1.2 Non-local readings in context

In recent work, Morzycki (2015, 2016) has brought the attention of the semantics community to semantic commonalities among a number of adjectives. Here are some of the adjectives that Morzycki is interested in (we refer to his work for detailed references on each of these adjectives):

- (9) a. An occasional sailor strolled by.
b. An average American has 2.3 children.
c. He gave the wrong answer.
d. A whole ship was submerged.
e. Solange is staying at an unknown hotel.
f. Floyd and Clyde read the same book.

According to Morzycki, these adjectives form a unitary class, insofar as they share a number of properties that other adjectives do not:

- A. They involve similar kinds of ambiguities as the non-local adjectives;
- B. They impose constraints on the choice of the determiner.

Property A is, for instance, instantiated in the following way by the adjective *occasional*: under an INTERNAL reading, the adjective modify the noun, while on an EXTERNAL or ADVERBIAL reading the adjective actually seems to modify the main predicate.

- (10) An occasional sailor strolled by.
- a. ‘A sailor who occasionally sails strolled by.’
 - b. ‘Occasionally, a sailor strolled by.’

As Morzycki himself recognizes, property B is, actually, more complex to exactly characterize, as there seem to be different sub-classes of adjectives among the ones in (9) that impose different constraints on the type of determiners they can combine with. However, Morzycki posits that the following generalization covers all these examples:

- (11) Strong Quantifier Generalization
Strong, inherently quantificational determiners (*every*, *most*, *no*) are incompatible with nonlocal readings. (Morzycki 2016)

Interestingly, Morzycki notes that his generalization does not apply to non-local modal adjectives, as these are fine only with *every*, *any* and with superlative forms.

- (12) a. Liz interviewed $\left\{ \begin{array}{c} \text{every} \\ \text{any} \\ \text{the only} \\ \text{the brightest} \end{array} \right\}$ student(s) possible.
- b. *Liz interviewed $\left\{ \begin{array}{c} \text{some} \\ \text{the} \\ \text{most} \end{array} \right\}$ students possible.

Moreover, Morzycki further observes that the non-local modal adjectives differ from the other adverbial ones, insofar as ellipsis is a central factor for these, but for none of the others.

For all these reasons, the theory Morzycki develops, in which these adjectives on their adverbial readings behave as quantifiers that need to QR in order for the composition to go through, does not apply to the non-local modal adjectives.¹ For a similar reason, the

¹Schwarz (2017) considers a theory of non-local modification that is intended to apply to some of the adjectives in Morzycki’s list. The theory is in certain respects similar to that developed by Morzycki and pivots around the idea that non-local adjectives functions as the main “functors” in the semantic composition.

theory of non-local modification here developed does not intend to account for any of the cases Morzycki’s discussion covers. Yet, it remains true that all these adjectives, including the modal ones of our interest, can be characterized by their requirement to be interpreted outside its hosting DP. It is, in this sense, that Morzycki describes all the external readings using the term *non-local*.

One final word on a special case of modal adjectives that will not be treated here. [Leffel \(2014\)](#) has convincing arguments that *necessary* should be treated as another non-local modifier. For instance, the following sentence has (13c) as most salient reading and not (13b), which is semantically odd.

- (13) a. I brought the necessary tools.
 b. #I brought the tools that, in all accessible worlds, are tools.²
 c. I brought the tools that it was necessary for me to bring.

Yet, we observe that, in contrast to the other modal adjectives with non-local readings, the silent complement of *necessary* is more freely determined. For instance, the following sentence has (14c) as more plausible reading, not (14b).

- (14) Context: The director of a graduate program sent to one student all the documents that the student needs to submit with her application.
 a. Director: I emailed you all the necessary documents.
 b. %I emailed you all the documents that it was necessary for me to send.
 c. I emailed you all the documents that it is necessary for you to submit.

Also, note that, in contrast to the other non-local adjectives, *necessary* is allowed to sit in determiner phrases headed by definite articles.

For all these reasons, while many of the things we shall say about non-local modifiers apply to *necessary* as well, we leave the full examination of this adjective to another occasion.

1.3 Background and formal rules

The formal apparatus that we adopt in this dissertation is, essentially, the one most students of formal semantics are familiar with by having studied [Heim and Kratzer \(1998\)](#). Thus, the only rules we shall work with are FUNCTION APPLICATION, PREDICATE MODIFICATION and PREDICATE ABSTRACTION (we refer the reader to the textbook for their precise formulation). The only difference between Heim and Kratzer’s textbook and the system here adopted is that we are working with an intensional system, in which the semantic type

²Henceforth, we shall use the # symbol to indicate that a certain reading of a sentence is semantically odd. We use the % symbol to indicate that a certain reading is not available. Finally, we use the * symbol to indicate that a sentence is ungrammatical.

for truth-values is intensionalised, that is, it is always preceded by the semantic type for worlds. So for instance, predicates such as *run* are treated in an extensional system as functions of type $\langle e, t \rangle$, while in the intensional system here adopted are treated as functions of type $\langle e, \langle s, t \rangle \rangle$.

The simple system of types we work with includes the following primitive types:

- (15)
- a. e = individuals
 - b. t = truth-values
 - c. s = worlds
 - d. d = degrees

Complex types are formed through the concatenation of basic types. The following definition specifies the inductive procedure to generate complex types.

- (16)
- a. e, t, s and d are semantic types.
 - b. If σ and τ is a semantic type, $\langle \sigma, \tau \rangle$ is also a semantic type.
 - c. Nothing else is a type.

It is common practice in formal semantics to use angle brackets to delimit complex types. Here we adopt the following alternative convention, which simplifies reading:

Standard	Here
σ	σ
τ	τ
$\langle \sigma, \tau \rangle$	$\sigma\tau$
$\langle \sigma, \langle \sigma, \tau \rangle \rangle$	$\sigma(\sigma\tau)$
$\langle \langle \sigma, \tau \rangle, \langle \sigma, \tau \rangle \rangle$	$(\sigma\tau)(\sigma\tau)$

1.4 Conventions and abbreviations

1.4.1 Conventions

In the text, we use italics to talk about object language expressions. For instance we talk about the denotation of *Liz interviewed every candidate possible* or the meaning of *conceivable*. This convention is suspended when we give examples of LFs.

Propositions are functions with the following form: $\lambda w_s. \phi$, where ϕ is a meta-variable for expressions of type t . In the text, we shall introduce a proposition by the complementizer *that* and use italics to highlight the fact that we are talking about some specific propositions as an abstract object. So for the instance, the proposition $\lambda w_s. \text{Mary runs in } w$ will be written as *that Mary runs*. Also, we do not adopt particular conventions for metalanguage

expressions used for the denotations of lexical items, which will therefore be written with the current font.

1.4.2 Abbreviations

ACD = Antecedent-Contained Deletion

AP = adjectival phrase

CB = conversational background

CP = complement phrase

DP = determiner phrase

FA = Function Application

GEN = genitive

iff = if and only if

INF = infinitive

IP = inflectional phrase

LF = Logical Form

LOC = local

MB = modal base

NCA = Null Complement Anaphora

NLOC = non-local

PM = Predicate Modification

PP = prepositional phrase

OS = ordering source

QR = Quantifier Raising

RR = reduced relative

s.t. = such that

SBJV = subjunctive mood

TC = *tough*-construction

TOP = topic

w.r.t. = with respect to

1.4.3 Mathematical symbols

Variables

x, y = individuals

$w, w', w'', \text{ etc.}$ = worlds

$d, d', d'', \text{ etc.}$ = degrees

$t, t', t'', \text{ etc.}$ = times

$p, p', p'', \text{ etc.}$ = propositions

Constants

Letters from the beginning of the English alphabet (a, b, c, d, etc.) stand for individual constants.

Any other variable types (e.g. w or d) with a numerical subscript stands for a constant of that type.

Others

i, j, k, l = indices

$x \not\leq y$ = x and y are not comparable

$X \perp Y$ = the sets X and Y are not comparable

$A \mapsto B$ = function from domain A to range B

$\Leftrightarrow$ = equivalence

$\bigcup$ = generalized union

$\bigcap$ = generalized intersection

$\mathcal{P}$ = power set

$\prec$ = precedence

$\preceq$ = precedes or simultaneous to

1.5 Roadmap of the thesis

- In Chapter 2, we analyze [Larson's \(2000\)](#) theory of non-locality, which is based on the hypothesis that non-local adjectives are part of implicit relatives formed via *wh*-movement and then elided via Null Complement Anaphora (NCA). NCA is analyzed here as phonetic deletion under strict syntactic identity with the matrix clause obtained through QRing of the DP hosting the adjective. We object to this analysis that it syntactically and also semantically overgenerates. In contrast, we posit that non-local adjectives participate in reduced relatives formed via application of *tough*-movement, defined here as movement of a null operator (e.g. [Chomsky 1977](#)) to the highest specifier available in the modification structure, Spec, AP. We argue that this analysis does not similarly overgenerate.
- While in Chapter 2, we mainly work with *possible*, in Chapter 3, we extend our analysis to the adjectives *conveivable* and *imaginable*, which have received considerably less attention in the literature on non-locality. We argue that these adjectives bear the hallmarks of non-locality, although their morphological complexity hides the presence of a slight different reading that we are careful enough to differentiate. We also provide experimental evidence test that non-local adjectives allow for *tough*-movement.
- In Chapter 4, the question of why the class of ordinary *tough*-adjectives does not allow for non-local readings is carefully examined. We argue that ordinary *tough*-adjectives (e.g. *hard*, *easy*, etc.) do not allow for a non-local reading, because their argument structure differs from that of non-local adjectives: while non-local adjectives take *for*-CPs as complements, ordinary *tough*-adjectives take bare CPs and *for*-PPs as arguments ([Chomsky 1973](#), [Faraci 1974](#), [Jacobson 1992](#), [Hartman 2011](#), [2012b](#)). We further argue that this distinction has an effect on the derivational step in which the complement of the adjective undergoes NCA; in particular, ordinary *tough*-adjectives do not allow for NCA in this environment, insofar as the *for*-PP does not form a constituent with the bare CP and, thus, the identity condition necessary for NCA is not met.
- In Chapter 5, the last chapter of this dissertation, we investigate the truth-conditions of non-local reading, focusing on what in the first section of this Introduction we have called the *equative effect*. We argue that analyses based on amount quantification such as [Leffel's \(2014\)](#) are both empirically and also analytically problematic, while a standard intersective analysis fares better, provided that the role of modality is properly spelled out. We show that a simple extension Kratzerian model for modals ([Kratzer 2012](#)) provides a simple solution to the puzzle associated with the equative effect.

Chapter 2

Non-locality via *tough*-movement

2.1 Introduction: On the non-local reading of *possible*

In an unpublished paper that has launched a whole area of investigation in semantics, [Larson \(2000\)](#) presents a curious discovery concerning a class of modal adjectives including *possible*, *conceivable* and *imaginable*. These adjectives admit two readings, one of which is not simply a function of the adjective's denotation and the noun's. To illustrate,¹ the modified NP *possible candidate* in (1a) can be interpreted as referring to the set of individuals that are candidates in some possible world; however, it can also be interpreted as in (1c), where the set of individuals is restricted to those (actual) candidates whom Mary could interview.

- (1) a. Mary interviewed every possible candidate.
- b. Mary interviewed every potential candidate.
- c. Mary interviewed every candidate (that it was) possible for her to interview.

As Larson notes and many after him (see, for instance, [Cinque 2010](#), [Leffel 2014](#)), the reading in (1c) can be forced by having the adjective in postnominal position.² In this position, the interpretation is unambiguous, viz. the one paraphrased by a structure where the adjective takes a *for*-infinitive as complement. Thus, (2a) has (2c) as its reading, not (2b).³

- (2) a. Mary interviewed every candidate possible.

¹In this chapter, we focus on *possible*, leaving it as an open question for now whether the other adjectives Larson mentions express a non-local reading.

²This is always the case with *possible*, but, as we will see in Chapter 3, the distributional facts for *conceivable* and *imaginable* are more complex.

³Here and throughout we shall indicate the unavailability of a reading by means of the symbol %.

- b. %Mary interviewed every potential candidate.
- c. Mary interviewed every candidate (that it was) possible for her to interview.

In the following, we adopt Schwarz’s (2006; 2017) terminology, and distinguish the two readings as, respectively, *local* and *non-local*. The term *non-local* expresses the idea that the meaning of the adjective, as paraphrased in (1c) and (2c), applies to material that is external to the denotation of the noun; in fact, to a proposition (i.e. a function of type $\langle s, t \rangle$). This terminology stays neutral as to the exact source of non-locality and, in this sense, is theory-neutral (see Morzycki 2016 for further discussion of other cases that may qualify as non-local).

In contrast, Larson’s own terminology reflects the particular analysis he has in mind, as he distinguishes the two readings as, respectively, “direct” reading and “implicit relative” reading. As the term *direct* already suggests, an adjective directly modifies a noun whenever the resulting meaning is simply a function of the adjective’s denotation and the noun’s. In contrast, the term *implicit* implies in this context that the AP is part of a relative clause which is not overt. Larson also adopts the terminology of “reduced relative,” which should be interpreted here as referring to a kind of relative with no finite morphology (see Bhatt 1999). We shall often refer to REDUCED RELATIVE (RR-) FORMATION as the mechanism of relativization that supports the non-local reading found by Larson.

If non-locality correlates with the requirement that the adjective be part of a reduced relative, two important questions arise. First, what is the mechanism of RR-formation that underlies Larson’s reading? Second, what adjectives can participate in this type of reduced relative?

Thus, this chapter has two goals. First, we argue that Larson’s mechanism of RR-formation, which can for all the intents and purposes be identified with plain vanilla WH-MOVEMENT (Chomsky 1977), does not provide the ground for a sufficiently constrained theory of RR-formation. Specifically, we show that an analysis of RR-formation modeled after *wh*-movement overgenerates, both syntactically and semantically. Second, we provide a novel syntactic analysis that blocks the overgeneration affecting Larson’s model. This analysis posits that the derived predicate is obtained through a different type of movement, namely, TOUGH-MOVEMENT.

The plan for the chapter is as follows: in §2.2, we present Larson’s full derivation of the non-local reading of *possible*, and discuss some welcome features of Larson’s analysis. In §2.3, we test Larson’s theory of RR-formation, and argue that the theory is open to a serious overgeneration threat. In §2.4, we present the new analysis of predicate formation as based on the hypothesis that non-local *possible* has a *tough*-syntax. §2.5 concludes with a summary of the chapter and also with a puzzle for the analysis based on *tough*-movement.

2.2 Larson’s analysis

In this section, we present Larson’s insight, which individuates the source of non-locality of *possible* in the availability of syntactic material external to the DP that contains the adjective, and composing into the DP via independently motivated syntactic operations.

2.2.1 The Larsonian ingredients for non-locality

Larson’s pivotal observation is that the sentences (3a) and (3b) not only express the same meaning – whoever assents to the truth of (3a) should also agree that (3b) is true and vice versa –, but are also syntactically related to each other. Larson’s hypothesis is, in fact, that the non-local meaning inherent in (3a) has its source in the reduced relative (3b), of which the relative in (3c) is just the fully overt realization.⁴

- (3) a. Mary interviewed every candidate possible.
 b. Mary interviewed every candidate possible for her to interview.
 c. Mary interviewed every candidate that it was possible for her to interview.

This hypothesis immediately raises the theoretical question of how exactly the modification structures in (3a) and (3b) are syntactically related. To approach this question, Larson invites us to consider the following facts. First of all, the adjectives that can participate in a non-local meaning can all select an infinitival complement, as shown in (4).

- (4) It is $\left\{ \begin{array}{c} \text{conceivable} \\ \text{possible} \\ \text{imaginable} \end{array} \right\}$ for Mary to interview that candidate.

Secondly, Larson observes that the clausal complements of these adjectives can undergo so-called Null Complement Anaphora (NCA) (see Hankamer and Sag 1976, Grimshaw 1979), which allows for these complements to be tacitly assumed without being overtly realized in the presence of a salient antecedent. The following two examples, adapted from Larson, are intended to show how NCA may target different types of complements, a finite clause in (5) and a non-finite one in (6).

- (5) A: Did Mary interview that candidate? (Larson 2000: 6)
 B: It’s $\left\{ \begin{array}{c} \text{conceivable} \\ \text{possible} \\ \text{?imaginable} \end{array} \right\}$ (that she interviewed that candidate).

⁴While Larson does not say whether he takes (3b) to be a grammatical sentence, he explicitly says that (3a) is the “elliptical” version of (24b). All my informants judged both (3b) and (3c) to be grammatical.

- (6) A: Can John lift 100lbs?
B: It's (im)possible (for him to lift 100 lbs). (Larson 2000: 7)

Larson identifies NCA with ellipsis and, in this respect, he is departing from the DEEP ANAPHORA view due to Hankamer and Sag (1976) that takes NCA to be a pragmatic phenomenon involving a silent pronoun picking out a salient proposition or property. According to this alternative view, the *it* in the examples above is a propositional anaphor picking out the propositions in the brackets, which are made salient by the questions.⁵

Against the deep anaphora approach, and in favor of the ellipsis account, we would like to put forward the following observations. First, under the alternative approach, we would expect NCA to be allowed in unrestricted, wholly pragmatic conditions. This does not seem possible with the modal adjectives we are studying. For instance:

- (7) Context: We are looking in the sky and it seems that a storm is about to arrive.
A: #It's possible (that a storm will arrive).

Second, replacing *it* with another propositional anaphoric pronoun like *that* alters the meaning of the resulting sentence. For instance, replying to A's question in (6) with the following answer alters the meaning dramatically. The answer is now no longer about John's abilities but about the epistemic state of the speaker.

- (8) A: That is (im)possible.

Third, work on the uses of propositional anaphora (see, e.g., Snider 2017), suggests that the anaphora *it* picks out propositions that are not just salient, but taken for granted. That is obviously not the case in the Larsonian examples, where the possible propositional antecedents are embedded in questions.

In conclusion, Larson takes the selection of a *for*-infinitive and the availability of NCA to be necessary conditions for an adjective to license a non-local reading. We have further provided evidence that NCA should be taken here, as Larson does, as ellipsis and not propositional anaphora. Finally, a further condition – one that will be shown to be problematic – is inherent in the theory of relativization Larson puts forward, to which we now turn.

2.2.2 The *implicit relative* analysis

Based on the assumptions described in §2.2.1, Larson's analysis of non-local *possible* involves two main components: an account of relativization and an account of NCA. As far

⁵Alternatively, one could take the *it* to be an expletive. Under such a view, the contentful proform could be silent, and located in object position.

as the relativization process is concerned, Larson’s discussion suggests the hypothesis that RR-formation is dependent on an $\bar{A}$ -chain, where the chain’s head is a null operator co-indexed with the tail of the chain, i.e. a trace variable in the verb’s object position within the adjective’s embedded clause. This relativization bears an evident resemblance with plain vanilla *wh*-movement (Chomsky 1977), in which the head of the $\bar{A}$ -chain (the null operator’s final landing site) is obtained via $\bar{A}$ -movement. The resulting structure, with abstraction of the trace variable left behind by the moved operator, is represented in (9), which corresponds to the reduced relative in (3b).⁶

$$(9) \quad [_{CP_1} \text{ wh } \lambda_j \text{ possible } [_{CP_2} \text{ for Mary to interview } t_j]]$$

↑

Following classic syntactic works (e.g. Sag 1976, May 1985), Larson (2000) posits that the structure in (9) is obtained after the QRing of the object DP in the matrix clause, which has allowed the matrix CP to get copied into an Antecedent-Contained Deletion (ACD) gap contained in an implicit relative such as $[_{CP_1} [_{AP} \text{ possible } [_{CP_2} \blacktriangle]]]$. Here, we shall depart from Larson’s view and analyze Null Complement Anaphora (NCA) of the complement of *possible* as phonetic deletion that is licensed under identity with an antecedent matching clause, viz. *Mary interviewed t_i* in the LF (10b) below.⁷

- (10) a. Mary interviewed every candidate possible.
b. $[_{DP_i} \text{ every } [\text{candidate } [_{CP_1} \text{ wh } \lambda_j [_{AP} \text{ possible } [_{CP_2} \text{ for Mary to interview } t_j]]]]]$
 $\lambda_i [\text{Mary PST interviews } t_i]$

Larson concludes that the adjective can be further “promoted” to the prenominal position, so as to derive (3a), although he does not specify what kind of movement should make that possible.

To summarize, Larson’s analysis identifies the non-local reading of *possible* as the combination of the following three factors: (i) a selectional requirement allowing the modal adjective to take a non-finite CP; (ii) *wh*-movement from the internal argument position of the embedded verb to the edge of the higher clause; (iii) ACD licensed by the QR of the DP. Note that, under such an analysis, the meaning of *possible* is that of a propositional operator, i.e. a function from propositions to propositions.

$$(11) \quad \llbracket \text{possible} \rrbracket = \lambda p_{st}. \lambda w_s. \exists w' [w' \in \text{Acc}_w \wedge p(w')=1]$$

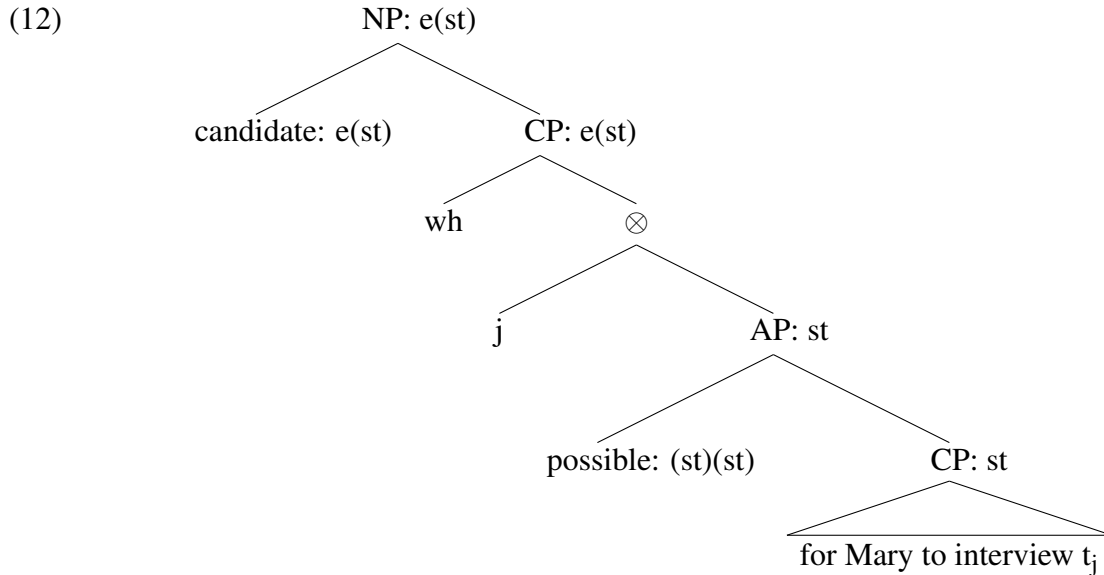
⁶This LF is simplified for the sake of readability. The actual LF would require an additional step in the $\bar{A}$ -movement of the *wh*-operator to the lower Spec,CP₂, which would then abstract again and leave an intermediate trace. From the purposes of semantic interpretation, (9) and (i) are identical. See Abels (2012) for a thorough overview of cyclicity.

(i) $[\text{wh } \lambda_k \text{ is possible } [t_k \lambda_j \text{ for Mary to interview please } t_j]]$

↑

⁷See Chapter 4 for further discussion.

Once abstraction takes place, it generates a property of type $e(st)$, which can then compose with the denotation of the nominal by application of the rule of Predicate Modification. To illustrate:



Before moving forward to assess the main advantages of Larson’s analysis, it is worth going briefly back to the terminology of *reduced relative*. In the introduction, we stated that a reduced relative is a kind of relative with no finite morphology. In the syntactic literature often the examples below are cited as being prototypical examples of reduced relatives:

- (13)
- a. the father [___ proud of his son].
 - b. the man [___ to fix the sink].
 - c. the people [___ likely to come].

Bhatt (1999) convincingly argues that truly reduced relatives are those whose relativizing element is in subject position and such that no finite morphology could possibly appear. As we can see from the tree above, both these conditions are not met in Larson’s parse. First, the relativizing position is in non-subject position; second, although no overt finite morphology is present in Larson’s reading, Larson’s parsing allows for this possibility, as we shall see in §2.3. This tension will be further examined in the last section of this chapter, where we show that our analysis of RR-formation in non-local environments is compatible with Bhatt’s general approach to reduced relatives.

2.2.3 Some good predictions of Larson's analysis

As we saw, Larson's analysis of non-locality requires that *possible* be part of an $\bar{A}$ -chain forming a reduced relative. Thus, one main prediction is that modal adjectives that are unable to participate in an $\bar{A}$ -chain should not have a non-local meaning. For example, any adjectives not selecting a clausal complement should be disqualified from expressing a non-local meaning, as they cannot involve an $\bar{A}$ -chain. Intensional adjectives such as *potential*, *prospective*, *future* represent this group. Moreover, none of these adjectives can appear postnominally.

- (14) a. *We interviewed every candidate potential.
 b. *We invited every candidate prospective.
 c. *We met the president future.

Another main prediction is that, among adjectives selecting a clausal complement, only those that can form a reduced relative should have a non-local meaning. It appears that modal adjectives selecting finite clauses are not able to be part of an $\bar{A}$ -chain forming a reduced relative. For instance, both *probable*, and *possible* can select finite clauses – in fact, *probable* can only select finite clauses (e.g., **It is probable for him to talk to Mary*) – and result in epistemic interpretations, as in (15). Yet, neither of them can be part of a reduced relative (cf. (16)).

- (15) It is $\left\{ \begin{array}{c} \text{possible} \\ \text{probable} \end{array} \right\}$ that Mary will hire this candidate.

- (16) *Mary hired some candidates $\left\{ \begin{array}{c} \text{possible} \\ \text{probable} \end{array} \right\}$ that she interviewed.

Larson straightforwardly predicts the absence of a non-local reading for these adjectives under these selectional facts. The prediction is borne out. The examples below show that (i) *probable* cannot be postnominal and (ii) in prenominal position, neither adjective has a propositional meaning like in (15).

- (17) *Mary interviewed every candidate probable.

- (18) a. Mary interviewed every $\left\{ \begin{array}{c} \text{possible} \\ \text{probable} \end{array} \right\}$ candidate.
 b. Mary interviewed every individual who, as far as we know, is going to be a candidate.
 c. %Mary interviewed every candidate that it was $\left\{ \begin{array}{c} \text{possible} \\ \text{probable} \end{array} \right\}$ that she interviewed.

One additional piece of evidence in support of this prediction comes from Leffel’s (2014) observation that the modal adjectives taking finite CPs can only express an epistemic interpretation. However, such an interpretation is never found with non-local *possible*. In other words, *possible* and *probable* in the example below can only be interpreted epistemically, but such modal flavor is never found in a non-local modification structure. This interpretive effect simply follows if Larson is right in assuming that a pre-condition for expressing a non-local meaning is for the adjective to select a non-finite clause.⁸

- (19) It is $\left\{ \begin{array}{c} \text{possible} \\ \text{probable} \end{array} \right\}$ that Mary interviewed that candidate.

While Larson’s attempt to relate non-locality to RR-formation seems to be on the right track, assessing Larson’s analysis requires us to test his theory of relativization. As we show in the next section, Larson’s assumptions about relativization are not innocent. First of all, they lead us to assume the availability of more reduced relatives than those that are actually attested. Secondly, we would also expect more meaning equivalences of the kind we saw in (3a)-(3c). However, this expectation is not met, as there are APs with clausal complements which can be part of reduced relatives, but whose meanings are not equivalent to their non-reduced counterparts. These empirical arguments lead us to question Larson’s relativization logic, i.e *wh*-movement, which overgenerates and, therefore, cannot provide the key for understanding RR-formation in non-local environments.

2.3 Reduced relative formation: what goes wrong with *wh*-movement

The take-home-message of the previous section is that the non-local reading of *possible* correlates with the presence of a reduced relative within the DP, in which the modal adjective takes a non-finite clause complement. The main question this section addresses is what sort of adjectives can participate in this type of reduced relative under Larson’s assumptions about RR-formation. More specifically, if non-locality correlates with reduced relatives, we need a theory of how a reduced relative can be formed in the first place. Does an analysis based on *wh*-movement provide such a theory?

In this section, we argue that Larson’s theory of RR-formation, as based on *wh*-movement,

⁸On this note, Larson (2000: 3) states: “since the relativized position (t) occurs inside a clausal complement to the adjective, only adjectives selecting clausal complements would be expected to allow IRRs [implicit relative readings]. So *possible* would allow such a reading since it takes a nonfinite complement, but *potential* and *probable* would not.” It is not entirely clear how one should read this passage, as *probable* actually selects finite clauses. We take Larson here to suggest that the right type of clause for a reduced relative that is associated to a non-local reading is to be non-finite. However, the question of why reduced relatives could not also be compatible with finite clauses is an important one that we will address shortly.

does not put any principled constraints on RR-formation. In particular, in §2.3.1 we show that this analysis does not exclude the formation of reduced relatives out of finite clauses, a possibility that is not attested in English. In §2.3.2, we further show that it fails to exclude all those adjectives that can take a non-finite clause, but cannot be part of RRs. Finally, in §2.3.3, we present an argument to the effect that *wh*-movement overgenerates meanings for certain reduced relatives that are not, in fact, attested. The conclusion we shall reach at the end of this section is that we need to identify a different relativization strategy, which may provide a more constrained theory of RR-formation than Larson’s analysis does.

2.3.1 Finiteness and RR-formation

As we learned in §2.2.3, Larson’s theory of non-locality correctly predicts that if an adjective cannot be involved in an $\bar{A}$ -chain and form a reduced relative, it cannot give rise to a non-local reading. In particular, we saw that any adjectives selecting finite clauses, like epistemic *possible* and *probable*, cannot form reduced relatives and, thus, generate a non-local meaning. However, given Larson’s relativization strategy, which, as we saw, is based on *wh*-movement, one may ask the legitimate question of what exactly prevents adjectives selecting finite clauses from forming an $\bar{A}$ -chain in a reduced relative.

- (20) *Mary hired some candidates [$\left\{ \begin{array}{c} \text{possible} \\ \text{probable} \end{array} \right\}$ [that she interviewed]].

One way for Larson to address this question could be to argue that relativization inside non-local modification structures is sensitive to the finite/non-finite distinction: it allows for (21a), but not (21b).

- (21) a. [CP₁ wh λ_j [possible [CP₂ [C⁰ for] Mary to interview t_j]]]
b. *[CP₁ wh λ_j [$\left\{ \begin{array}{c} \text{possible} \\ \text{probable} \end{array} \right\}$ [CP₂ [C⁰ that] Mary PST interview t_j]]]

However, apart from having a stipulative flavor, this argumentative strategy does not explain the asymmetry with standard cases of long-distance relativization, as in (22). Thus, if relativization is in both cases an effect of *wh*-movement, the ungrammaticality of (20) is puzzling.

- (22) a. I read the book Amy says Emily read.
b. the book [CP₁ wh_i Amy PST say [CP₂ Emily PST read t_i]]

As will be shown later on in this chapter, a quite straightforward solution to this puzzle is available. Anyhow, the issue we present next is even more troublesome for Larson’s analysis.

2.3.2 Non-finiteness and RR-formation

Not only is RR-formation never compatible with adjectives selecting finite clauses; it is also not always compatible with adjectives selecting non-finite clauses. The examples that follow show that there are modal adjectives such as *responsible* and *understandable* that take non-finite clauses, but cannot partake in a reduced relative of the relevant kind.^{9,10}

(23) It is $\left\{ \begin{array}{c} \text{understandable} \\ \text{responsible} \end{array} \right\}$ for Mary to interview that candidate.

(24) *Mary interviewed every candidate $\left\{ \begin{array}{c} \text{understandable} \\ \text{responsible} \end{array} \right\}$ for Mary to interview.

However, *wh*-movement should apply straightforwardly in these cases as well, and derive structures of the following form:

(25) $[_{DP_i} \text{ every } [_{\text{candidate}} [_{CP_1} \text{ wh } \lambda_j [\left\{ \begin{array}{c} \text{understandable} \\ \text{responsible} \end{array} \right\} [_{CP_2} \text{ for Mary to interview } t_j]]]]]] \lambda_i [\text{Mary PST interview } t_i]$

Furthermore, it is worth noting that a full-blown relative clause expressing the meaning that (25) would express, were it licit, is perfectly grammatical. This provides the kind of control sentence needed to validate the conclusion that ordinary *wh*-movement is not involved in RR-formation.

(26) Mary interviewed every candidate that it was $\left\{ \begin{array}{c} \text{responsible} \\ \text{understandable} \end{array} \right\}$ for her to interview.

Thus, in the absence of further constraints, these examples show that Larson's analysis overgenerates RRs.

⁹In a passage of his dissertation, [Leffel \(2014\)](#) points out that the adjectives *responsible* or *understandable* do not have non-local meanings, although they select for non-finite complements. This, according to him, proves that selecting a non-finite complement may be a necessary but not sufficient condition for deriving non-local meanings. In the logic of this chapter, what this actually proves is that selection of a non-finite clause is not a sufficient condition for RR-formation.

¹⁰Note that *responsible* can occur postnominally, but it has a different meaning, paraphrasable as *responsible for ϕ* , where the value of ϕ is contextually provided.

(i) The policeman interrogated the individuals responsible (for those crimes).

2.3.3 Meaning and RR-formation

The discussion in the previous subsections has focused on grammaticality patterns. What was shown there is that Larson's approach to relativization, as based on *wh*-movement, overgenerates reduced relatives. In this subsection, the focus is on meaning. What will be shown here is that the same analysis also overgenerates interpretations.

Consider the following pair of examples, which, intuitively, do not express the same meaning.

(27) Liz rejected an excuse which it was too late for her to accept.

(28) Liz rejected an excuse too late for her to accept.

In (27), we have a complex NP with a relative clause introduced by the pronoun *which* and whose subject is an expletive. What the relative clause expresses is that Liz could not accept the excuse in question, because there was no time left for her to accept the excuse (for whatever reason). Importantly, the meaning of this relative is compatible with a situation in which the excuse was received on time. In contrast, the reduced relative present in (28) entails that the lateness is a property of the excuse itself.

This subtle difference in meaning between the two sentences becomes more evident when we attempt to modify the noun *excuse* by a temporal adjective such as *timely*.¹¹ The resulting sentences diverge in semantic acceptability, as only the sentence with the full-blown relative is now semantically plausible. In fact, the sentence with the RR is semantically odd, as it predicates of the excuse that it is both timely and also too late.

(29) Liz rejected a timely excuse which it was too late for her to accept.

(30) #Liz rejected a timely excuse too late for her to accept.

The reason why this example is relevant is because, under Larson's analysis of RR-formation, (27) is just the full-blown overt version of (28). As the logical forms below show, in both cases *too late* functions as a propositional operator, and the resulting meaning after abstraction of the variable in object position cannot but exclude the attribution of lateness to the excuse. Thus, the meaning of (28) is predicted to be identical to that of (27), contrary to facts.

(31) a. $[_{DP_i} \text{ an } [_{\text{excuse}} [_{CP_1} \text{ which it was } \lambda_j [\text{too late } [_{CP_2} \text{ for Liz to accept } t_j]]]]] \lambda_i [_{\text{Liz PST accept } t_i}]$

¹¹Thanks to Luis Alonso-Ovalle for suggesting this test.

- b. $[_{DP_i} \text{ an } [_{\text{excuse}} [_{CP_1} \text{ wh } \lambda j [\text{too late } [_{CP_2} \text{ for Liz to accept } t_j]]]]] \lambda i [\text{Liz PST accept } t_i]]$

It can be shown that the DPs above express, in fact, different contents, insofar as the subject of the property *too late for her to accept* in (28) is the excuse itself, as the informal representation (33) shows.¹²

(32) an excuse x s.t. it was too late for Liz to approve x .

(33) an excuse x s.t. x was too late for Liz to approve x .

In conclusion, in addition to a syntactic overgeneration worry, Larson’s approach to the meaning of reduced relatives also overgenerates. The meaning equivalences shown with non-local *possible* do not generalize to other APs, suggesting that there is something special about *possible*, which the mere application of *wh*-movement misses.

2.3.4 Summary of the section

We shall take stock here. So far, we provided evidence that Larson’s appeal to *wh*-movement as the mechanism that accounts for relativization in RR-formation leads to overgeneration: one should be able to find more reduced relatives (and, therefore, more non-local meanings), when there is no evidence for any. Accordingly, while Larson’s correlation between the impossibility of non-locality and the absence of reduced relatives still stands, his relativizing strategy does not succeed to support it, precisely because it does not provide constraints on RR-formation.

The impossibility of RR-formation in the cases in which a modal adjective selects a finite clause is not predicted by Larson. Given *wh*-movement, reduced relatives should be possible with modification structures involving *possible that* or *probable that*, contrary to facts. Still, it is important to stress that the ungrammaticality of examples of reduced relatives involving *possible that* and *probable that* does not disqualify the main hypothesis that, in the absence of a reduced relative, no non-local reading arises. It only shows that *wh*-movement does not account for RR-formation.

Moreover, we also considered cases in which a modal adjective (e.g. *responsible*) takes a

¹²One way to derive the meaning by (28) is to adopt Nissenbaum and Schwarz’s (2008) proposal that the surface relative in (28) the result of composing two relative structures, the rightmost of which is obtained by abstraction from subject position, whereas the leftmost is a Degree Phrase with a *wh*-operator having moved from the object position of the embedded clause to the edge of the degree phrase.

(i) excuse $[[_{DegP} \text{ wh } \lambda j [\text{too} [\text{for Liz to accept } t_j]]] \text{ wh } \lambda i \lambda d [t_i \text{ d late}]]$

In order for the composition to go through, Nissenbaum and Schwarz have to introduce a new “flexible” rule in the grammar that allows two functions from D_e to compose together, so that their individual argument is bound by the same lambda abstractor.

non-finite clause, but no reduced relative is available. Again, *wh*-movement should apply smoothly in these examples and derive reduced relatives, contrary to fact. Therefore, we are left with the question of what other grammatical rules support RR-formation.

Finally, we presented an argument to the effect that if Larson’s approach was correct, as we should be able to find more meaning equivalences between reduced and full-blown relatives, as observed with *possible*. The example with *too late* shows that an unregimented application of *wh*-movement generates a reading that is not the one actually attested in the reduced relative.

The take-home message from this section is that while there is a substantial body of evidence in support of the hypothesis that non-locality is the semantic output of RR-formation, *wh*-movement cannot be the right mechanism behind this process. Consequently, Larson’s theory of non-locality is unable to provide a principled explanation of what in the literature has sometimes been called the “adjective restriction.” (see, for instance, [Leffel 2014](#)). What should be clear after this discussion is that, in the present context, the restriction should not be intended as concerning the question of which adjectives can express non-local meanings, but the more basic question of which adjectives do support RR-formation, a pre-condition for non-locality.

2.4 The “tough” hypothesis

In this section, we present a novel hypothesis concerning RR-formation involving modal adjectives, which will help surmount the problems deriving from adopting an unconstrained form of *wh*-movement. The hypothesis in question is that the kind of *wh*-movement that occurs in a non-local configuration is *tough*-movement. This hypothesis, together with a further hypothesis concerning the correct size of the structure involved in non-local modification, effectively accounts for the adjective restriction under investigation in this chapter. Moreover, this hypothesis (better, a particular version of this hypothesis) will be shown to nicely fit with the observation that relativization in a reduced relative always occurs from subject position (cf. [Bhatt 1999](#)).

Tough-adjectives are, as the word suggests, tough to analyze (see [Hicks 2009](#) for an overview of the syntactic literature on the topic). But their inherent syntactic complexity should not discourage the reader; their discussion here will be scaled down to serve the task at hand, which is not that of providing an analysis of *tough*-movement, but of finding a principled account of RR-formation. In this respect, we will present two hypotheses about *tough*-movement in non-local configurations that are both compatible with a theory of relativization that overcomes the overgeneration worries presented in the previous section, while keeping the spirit of the Larsonian approach.

2.4.1 The *tough*-construction

A *tough*-construction (TC) is characterized by an adjective in predicative position taking an embedded clause with a gap. The TC-subject is semantically interpreted in this gap position. The resulting interpretation is, roughly, equivalent to the one in which the object remains in situ and an expletive subject appears.¹³ Thus, in (34b), the subject of the complex predicate *is tough to please* is also the object of the embedded predicate *to please*.

- (34) a. It is $\left\{ \begin{array}{c} \text{easy} \\ \text{tough} \\ \text{difficult} \end{array} \right\}$ to please this client.
 b. This client is $\left\{ \begin{array}{c} \text{easy} \\ \text{tough} \\ \text{difficult} \end{array} \right\}$ to please.

While the observation that *possible* is a *tough*-adjective will need a careful empirical investigation,¹⁴ initial evidence is provided by Leffel (2014: 149), who reports that the adjective participates in the abovementioned alternation.

- (35) a. It is possible (for Mary) to interview this candidate.
 b. ?This candidate is possible (for Mary) to interview.

A further supporting observation can be found in Harris (2012: 165), whose example below involves a silent *wh*-pronoun in subject position that is to be interpreted as co-referential with the trace in object position in the infinitive, suggesting a typical *tough*-configuration.^{15,16}

- (36) John looked at every person that (it) was $\left\{ \begin{array}{c} \text{possible} \\ \text{conceivable} \\ \text{available} \\ \text{imaginable} \\ \text{?thinkable} \\ \text{?visible} \\ \text{\#responsible} \end{array} \right\}$ to look at.

¹³It has been noted (cf., e.g., Hicks 2009) that a TC implies that the property expressed by the *tough* predicate is an inherent property of its external argument. Such an implication is absent in the expletive construction. Yet, we should not call this an entailment, see footnote 18.

¹⁴We refer the reader to Chapter 3 for empirical support of this claim.

¹⁵The judgments are provided by Harris. Jessica Coon (p.c.) finds it impossible for *thinkable* and *visible* to occur in this construction. She also reports that *available* is not fine with the expletive *it*.

¹⁶The question of whether the other modal adjectives are *tough* and whether they can express non-local adjectives will be considered in next chapter.

Three further observations are worth mentioning. First, predicates such as *responsible* and *understandable* do not participate in the same alternation.

- (37) a. It is $\left\{ \begin{array}{c} \text{responsible} \\ \text{understandable} \end{array} \right\}$ (for you) to read this book.¹⁷
 b. *This book is $\left\{ \begin{array}{c} \text{responsible} \\ \text{understandable} \end{array} \right\}$ to read.

Second, the non-finiteness requirement is a selectional feature of *tough*-adjectives.

- (38) a. It is $\left\{ \begin{array}{c} \text{possible} \\ \text{probable} \end{array} \right\}$ that Mary read this book.
 b. *This book is $\left\{ \begin{array}{c} \text{possible} \\ \text{probable} \end{array} \right\}$ that Mary read.

Finally, it is important to observe that *tough*-adjectives allow for the kind of reduced relative that *possible* also does. For instance.

- (39) I hired all the candidates $\left\{ \begin{array}{c} \text{difficult} \\ \text{tough} \\ \text{easy} \end{array} \right\}$ (for me) to interview.

Thus, the facts described in (37) to (39) already provide a hint as to when we should expect an adjective not to form a reduced relative. The hypothesis we shall submit here is that whichever mechanism is behind *tough*-movement – two possible analyses will be presented in the next subsection – is also responsible for RR-formation in non-local modification structures.

(40) **Generalization:**

Only adjectives taking non-finite clauses can form reduced relatives in non-local modification; specifically, only those that allow to participate in a *tough*-construction.

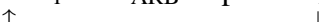
2.4.2 Two analyses of *tough*-constructions

In this subsection, we propose two ways of cashing out the hypothesis that *tough*-movement feeds RR-formation. Both analyses maintain some of the assumptions underlying the Larsonian approach; in particular, they maintain that *possible* takes a non-finite CP and that the embedded predicate contains a trace of a *wh*-operator. Where the new analyses diverge from Larson's is where the *wh*-operator is taken to move. In one case, the movement is internal to the edge of the embedded clause, while in the other is external to it.

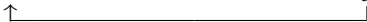
¹⁷ Alan Bale (p.c.) does not find the variant with *responsible* acceptable.

2.4.2.1 Internal movement analysis

The first analysis is inspired by Chomsky's (1977) classic treatment of *wh*-movement, which he extended to *tough*-constructions (for a recent defence of this analysis, see [Keine and Poole 2017](#)). This analysis takes the subject of the TC to be base-generated in the matrix clause, with a *wh*-operator $\bar{A}$ -moving from the object position of the embedded verb to the edge of the clause.

- (41) a. Alex is tough to please.
 b. Alex_i is tough [_{CP} wh λ_i PRO_{ARB} to please t_i] ([Keine and Poole 2017: 2](#))
- 
- A horizontal line with an upward arrow at the left end, connecting the trace t_i to the wh operator.

Applying this analysis to the modification structure under study here, we derive the following LF chunk. As you can see, *tough*-movement is wholly internal to the embedded clause.

- (42) [_{NP} candidate [_{AP} possible [_{CP} wh λ_j for Mary to interview t_j]]]
- 
- A horizontal line with an upward arrow at the left end, connecting the trace t_j to the wh operator.

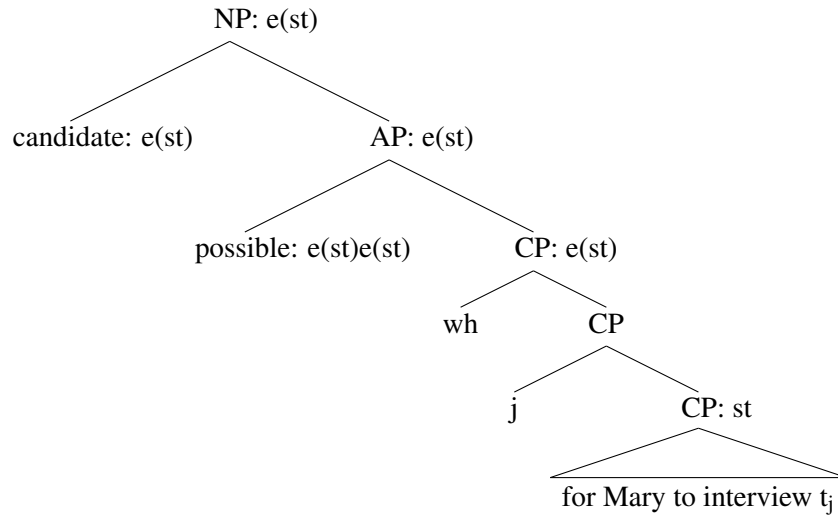
As the attentive reader will readily notice, this analysis needs to posit that the denotation of *possible* no longer takes a proposition as its argument, but a property of type $e(st)$. If we take the meaning of *possible* to be that of a propositional function, a type-shifting operation such as the so-called GEACH RULE (for a recent discussion, see [Jacobson 2014](#)) will have to be assumed in order to make the composition work out.¹⁸

- (43) $\llbracket possible \rrbracket =_{geached} \lambda f_{e(st)}. \lambda x_e. \lambda w_s. \exists w' [w' \in Acc_w \wedge f(x)(w')=1]$

Once the geached meaning of *possible* applies to the derived property of the embedded clause, the resulting property will still combine with the denotation of the NP via Predicate Modification. The resulting semantic tree looks as follows:

¹⁸The rule allows to do the following: suppose you have a function f of type $(\sigma, \tau), (\sigma, \tau)$. Then, for any arbitrary type α , application of the Geach Rule to f will deliver a function f' of type $(\alpha(\sigma, \tau), (\alpha(\sigma, \tau)))$. Instead of assuming this type-shifting operation, one could also assume that there are two separate denotations in the lexicon, as Keine and Poole do in their paper.

(44)



Apart from accounting for the impossibility of adjectives such as *responsible* and *understandable* to express a non-local meaning – this simply follows from the fact that these adjectives do not allow *tough*-movement –, this analysis provides a key to understand the puzzling contrast we observed in §2.3.1. The puzzle resulted from assuming that *wh*-movement is in force both in (20) and (22) (repeated below as, respectively, (45a) and (45b)). Banning the first structure as not grammatical by claiming that relativization is sensitive to extraction out of finite contexts was taken to be a suspicious move, given cases of long-distance relativization. Thus, it would remain a mystery why (46) would be a good parse in one case, but not in the other.

- (45) a. *a candidate possible (that) Mary interviewed
 b. a candidate John said Mary interviewed

(46) $[_{CP} \text{ wh } \lambda j [_{CP} (\text{that}) \dots t_j]]$

The solution to this puzzle is straightforward under the *tough*-movement analysis that we are putting forward.¹⁹ As the attentive reader will have already noticed, in contrast to the Larsonian parse, (42) only contains the innermost CP, which is embedded by the adjective within a bare AP structure. Since the structure is effectively reduced – neither C^0 nor I^0 appear outside the innermost CP – there is no dedicated site for the null operator to land in above Spec,AP. Thus, the basic contrast in (45) is simply explained away by showing how the two surface strings, albeit superficially similar, are generated by two different structures, only one of which is truly reduced. Therefore, *wh*-movement cannot straightforwardly apply in (45a), as it did in Larson’s parse.

However, this analysis is open to a different overgeneration worry. Once we posit a type-

¹⁹Thanks to Bernhard Schwarz for suggesting it in discussion.

shifting operation like the Geach Rule, we run into the risk of reducing the overall explanatory power of the resulting theory. Specifically, once the Geach Rule is introduced, application of *wh*-movement out of a finite clause would generate the correct type of argument for *possible* to combine with. A parse such as (44) does not, in fact, exclude this possibility and we are still led to wrongly posit RR-formation out of finite clauses. Moreover, assuming *wh*-movement is still available inside the embedded clause, we can imagine the Geach Rule applies to a predicate such as *understandable*, so as to derive a new property of type $(e(st), e(st))$, which would then compose with the predicate derived from *wh*-movement. Again, this is an unwelcome result. The analysis we present next, by not positing any type-shifting principle, overcomes this overgeneration.

2.4.2.2 External movement analysis

Under the previous analysis of *tough*-movement, we saw that the *wh*-operator moves internally to the edge of the embedded CP. In order to combine with a property of type $e(st)$, this analysis needs then to posit that the denotation of the AP is type-shifted to acquire a higher type, i.e. $(e(st), e(st))$. The cost of this move is that the same type-shifting operation overgenerates unattested meanings. An alternative parsing strategy is to have the *wh*-operator move externally to Spec,AP, as in (47).

$$(47) \quad [_{AP} \text{ wh } \lambda j \text{ possible } [_{CP} \text{ for Mary to interview } t_j]]]$$

↑

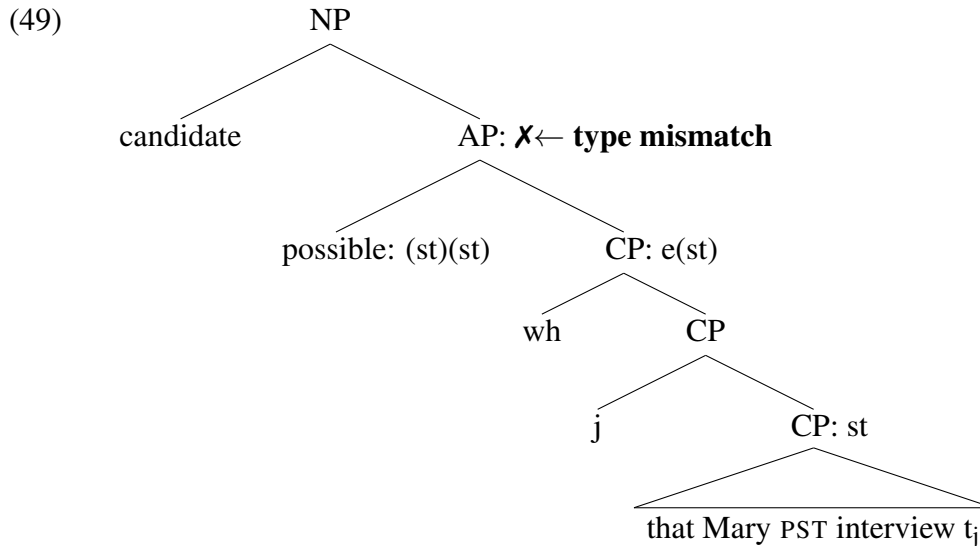
An interesting feature of this proposal is that it does not have to posit any type-shifting operation or more than one denotation in the lexicon, as *possible* is here treated as fully propositional. Consequently, the external movement analysis has an advantage over the internal movement analysis, as it can be shown not to overgenerate.

In particular, we discussed the problem of deriving the contrast in (45) above. Both the internal-movement account and the external-movement one explain it away by positing a bare AP structure for (45a), but not for (45b), so that in the case of (45a) there is no higher Spec,CP for the null operator to land in. Yet, we already observed that the operator could still $\bar{A}$ -move to the edge of the embedded clause, as in (48). Since the internal movement analysis assigns an $(e(st), e(st))$ denotation to *possible*, (48) should be interpretable, contrary to facts.

$$(48) \quad [_{AP} \text{ possible } [_{CP} \text{ wh } \lambda j \text{ that Mary PST interviewed } t_j]]]$$

↑

In contrast, the external movement analysis directly derives the ungrammaticality as a type mismatch. Since, under this analysis, *possible* takes a proposition as its argument and instead receives a property, the derivation crashes.



Furthermore, this analysis also makes it impossible for adjectives such as *understandable* or *responsible* to form reduced relatives. On the one hand, since these adjectives do not contemplate *tough*-movement, movement of the *wh*-operator to Spec,AP is forbidden, whereas *wh*-movement to the lower Spec,CP would give rise to the same type-mismatch we see being in force in (49).

2.4.3 Summary & discussion

In this section, we showed how the hypothesis that *possible* is a *tough*-adjective derives the restriction that not any kind of modal adjectives selecting for a clausal complement can participate in a reduced relative and, thus, meet the necessary precondition for giving rise to a non-local reading. The fact that adjectives such as *responsible* or *understandable*, on the one hand, and *probable* or *possible (that)*, on the other, cannot instantiate *tough*-movement excludes them from forming reduced relatives. If we accept Larson's hypothesis that non-locality correlates with RR-formation, then we can conclude that these adjectives cannot express non-local meanings.

We presented two analyses of *tough*-movement as based on the movement of a null operator from the object position of the embedded clause, and showed that both derive the adjective restriction. Moreover, positing a bare AP configuration offers a simple solution to the puzzle arising from the contrast in (45). The external movement analysis further excludes an unwelcome combinatorial possibility which the internal movement analysis allows. For this reason, we shall hereafter keep working with the external-movement analysis.

Before concluding this chapter, we would like to address two issues. The first issue concerns the general picture that emerges concerning reduced relatives. At the end of §2.2.2, we pointed out a tension between Larson's approach to relativization and Bhatt's conception of reduced relatives. There, we saw that, according to Bhatt, a truly reduced relative

is one in which relativization is from subject position and no finite morphology can be realized. The hypothesis that *tough*-movement feeds reduced relative formation is compatible with this picture: (i) finiteness is not manifest and (ii) relativization, at least in the case of the external-movement analysis, occurs from the external argument position of the adjective.²⁰ Are there other adjectives that meet these two conditions for reduced-relative formation? It appears that raising adjectives constitute a case in point.

(50) John is certain to get the job.

(51) I talked to every candidate certain to get the job.²¹

Whatever the mechanism of abstraction is in force in all these adjectives – raising or *tough*-movement – both types add more empirical evidence to the picture of reduced relatives given by Bhatt.²²

Finally, we would like to raise a question concerning whether other analyses of *tough*-movement could be compatible with the theory of relativization assumed in this section. What we have in mind is the family of theories that, in some version or other, submit to a *long-movement* analysis of *tough*-movement (see [Keine and Poole 2017](#) for references). This analysis posits that the TC-subject originates in the gap position, then $\bar{A}$ -moves to the edge of the embedded clauses and, finally A-moves to the matrix subject position, which is typically identified with Spec,TP.

(52) Alex_i is tough [t_i PRO_{ARB} to please t_i] ([Keine and Poole 2017](#): 1)



Now, given that we assumed that *possible* occurs in a bare AP configuration, clearly having the TC-subject derived by A-movement in Spec,TP is no longer an option under this proposal. However, Spec,AP is an available subject position and we could hypothesize that the TC-subject finds an escape landing site there. Further abstraction from the subject position would have to be assumed in order for the AP to compose with the head noun in the modification structure.

While this option is theoretically possible, difficult syntactic questions arise concerning the

²⁰A different issue concerns why *possible* by itself does not express a property that can be predicated of its external argument. Note, however, that the same applies to *tough*-adjectives.

(i) This mountain is tough to climb. $\nrightarrow$ This mountain is tough.

²¹Another example of raising adjective was introduced earlier; see [\(13c\)](#).

²²Observe that in both cases, overt relative clauses make it clear that relativization happens from subject position: e.g.,

(i) the candidate that was certain to get the job.
(ii) the candidate that was possible for us to interview.

type of movement involved here. $\bar{A}$ -movement followed by A-movement is taken to be an instance of Improper Movement (on this, see [Hicks 2009](#)). Further evidence against the long-movement analysis in *tough*-constructions, and in particular against the presence of A-movement, can be found in [Keine and Poole \(2017\)](#).

2.5 Conclusion

In this chapter, we focused on the question of what sort of adjectives can have a non-local meaning. We suggested that in order to answer this question, we need to understand the conditions under which an adjective can be part of a reduced relative, as there is distributional evidence supporting the correlation between the absence of a non-local meaning and the impossibility for an adjective to be part of a reduced relative. We argued that Larson's account of non-locality, as based on *wh*-movement, does not sufficiently constrain the RR-formation, as it overgenerates both structures and meanings.

The alternative hypothesis we introduced in this chapter is that *tough*-movement feeds relativization. This hypothesis straightforwardly accounts for why adjectives such as *responsible* or *understandable* cannot form reduced relatives, as they do not allow for *tough*-movement. Two hypotheses concerning *tough*-movement have been shown to derive the adjective restriction, one of which was also shown to be immune to an overgeneration worry and also be compatible with the general theory of RR-formation assumed by Bhatt. Moreover, the simple hypothesis that *possible* occurs in a bare AP structure derives a further contrast that was observed in relation to the impossibility for *possible* to appear in a reduced relative while taking a finite clause.

Given these positive results, one could be tempted to offer the following generalization concerning non-local meanings:

(53) **The *tough* generalization:**

Only a subset of adjectives selecting infinitival clausal complements, namely, *tough*-adjectives, can trigger non-local readings.

As it stands, the generalization is, however, open to a new overgeneration challenge. The issue we will need to address is why non-local meanings do not seem to be attested with other *tough*-adjectives, e.g., *difficult*, *easy*, *interesting*, etc. Given the hypothesis introduced in this chapter, these adjectives should be on the front line in expressing non-local meanings, but something prevents them from behaving exactly as *possible* (and, as we will see, also *conceivable*, *imaginable*). The relation between the behaviour of *possible* and that of these other adjectives has not received much attention in the semantic literature, so a chapter devoted to its study is in order. But before looking into this issue, we devote the next chapter to the equally pressing question of whether other modal adjectives express non-local meanings.

Chapter 3

Beyond *possible*: other non-local modifiers

3.1 Introduction: Non-locality and other modal adjectives

In the previous chapter, we introduced the non-local reading of *possible* and revised Larson’s theory of non-local modification, arguing that this non-local reading is subject to two conditions: (i) a syntactic condition on what feeds relativization inside the modification structure, i.e. *tough*-movement, and (ii) an identity condition on what can be elided for the purposes of Null Complement Anaphora.

The question that we will address in this chapter and the next one is how productive non-local modification is. In this chapter, we will test whether our *tough*-analysis undergenerates; specifically, whether it fails to capture Larson’s (2000) observation that other modal adjectives such as *conceivable* and *imaginable* have non-local interpretations similar to that of *possible*. In the next one, we will examine whether our analysis overgenerates; i.e., whether it is too powerful and thus predicts that we should expect more adjectives, in particular ordinary *tough*-adjectives, to be able to license a non-local interpretation, when, in fact, they cannot.

If *conceivable* and *imaginable* have non-local readings, we should expect that they share similar syntactic properties with *possible*. In this chapter, we show that they, in fact, do. Furthermore, we also experimentally test the acceptability of all these adjectives in *tough*-constructions. The experiment’s results support our hypothesis that these adjectives can license *tough*-movement.

The plan for the chapter is as follows: §3.2 investigates the existence of a non-local reading for *imaginable* and *conceivable*. §3.3 explores the syntactic properties of these adjectives, which support the hypothesis that their non-locality is due to the same factors in force in the non-local reading of *possible*. §3.4 provides some experimental evidence that these

non-local adjectives, including *possible*, license *tough*-movement. §3.5 looks at other *-able* adjectives, and shows evidence that these can occur in environments similar to those licensing non-locality, but without giving rise to non-local readings. We discuss these examples and suggest an analysis based on the idea that these adjectives can decompose. We further raise the question of whether a decomposition analysis could also account for the non-local readings as well, so as to make our analysis of non-local dispensable. However, we argue that non-locality is not reducible to decomposition.

3.2 *Conceivable and imaginable*

According to Larson (2000), aside from *possible*, the modal adjectives *conceivable* and *imaginable* have also a non-local reading. The same claim is made by Romero (2013) and Leffel (2014). However, neither Larson nor these other scholars provide direct evidence in support of this empirical claim, focusing their analyses on the sole case of *possible*. Thus, the question we shall first address here is whether these modal adjectives have, in fact, a non-local reading. Since our answer is positive – these adjectives do have a non-local reading –, our following task is to determine whether the analysis proposed in Chapter 2 for *possible* can be carried over into these other adjectives.

3.2.1 Local and non-local readings of *conceivable* and *imaginable*

In the case of *possible*, we observed that in prenominal position, when the conditions for a non-local reading hold, in particular the choice of the right type of determiner, an ambiguity concerning the adjective’s interpretation can be detected. The adjective can either receive a LOCAL, usually epistemic, interpretation or a NON-LOCAL, always non-epistemic, one. In effect, one can construct scenarios where the sentence is judged to be true under one reading but false under the other. Moreover, the fact that, if confronted with postnominal *possible*, speakers only detect a non-local meaning further provides further support for the existence of such a reading.

We may now ask whether the same interpretive patterns hold in the case of *conceivable* and *imaginable*; specifically, whether we can detect an ambiguity in prenominal position that gets resolved in favor of a non-local reading in postnominal position. To answer this question, we should first determine what the local reading of these adjectives is like. Consider the following sentence being uttered in 2015:

- (1) Donald Trump isn’t a(n) $\left\{ \begin{array}{l} \text{conceivable} \\ \text{imaginable} \end{array} \right\}$ president.

What this sentence expresses is that, in the world of evaluation, Donald Trump is not an individual who someone could conceive of or imagine as president.¹ No further reading

¹And indeed no one would object that the sentence was true in 2015.

seems available and, importantly, no appeal to material external to the DP is made. We can capture the local reading of these adjectives by means of the following definition, which states that something is a conceivable P or an imaginable P, for an arbitrary property P, iff someone can conceive of or imagine that something to be P.²

$$(2) \quad X \text{ is a } \left\{ \begin{array}{c} \text{conceivable} \\ \text{imaginable} \end{array} \right\} P : \Leftrightarrow \text{one is able to } \left\{ \begin{array}{c} \text{conceive of} \\ \text{imagine} \end{array} \right\} X \text{ as/to be } P.$$

To further illustrate, a *conceivable/imaginable solution to a problem* may simply be a proposal that someone can conceive of or imagine as a solution. Of course, it may turn out that the proposal itself is not going to work as a solution, and therefore would not be an actual solution.

In contrast, the example below is different. The local interpretation of the adjective is marginal, and could emerge in a context like the following one.³ Imagine the officers of the so-called *ministro dei beni culturali* (“minister of the cultural heritage”) in Italy visited all the sites that, potentially, could be transformed into museums. In this context, (3) would be uttered with the intention to report on all non-actual museum in Rome that could be turned into actual ones.

$$(3) \quad \text{Last summer in Rome, we visited every } \left\{ \begin{array}{c} \text{conceivable} \\ \text{imaginable} \end{array} \right\} \text{ museum.}$$

However, under its most natural interpretation, the meaning of the NP *conceivable/imaginable museum* does not refer to locations that someone can conceive of or imagine as museums, which could include even non-actual museums, but to actual museums that the subject of the sentence managed to visit in Rome.

Thus, given that the interpretation of these adjectives makes reference to material that is external to the DP but structurally related to the main clause, the following paraphrase adequately expresses this non-local reading. This is essentially parallel to the one given for the non-local reading of *possible*.

$$(4) \quad \text{Last summer in Rome, we visited every museum (that it was) } \left\{ \begin{array}{c} \text{conceivable} \\ \text{imaginable} \end{array} \right\} \text{ for us to visit.}^4$$

Note that when the adjective appears in postnominal position, the local reading is not avail-

²The definition leaves open the issues of determining who the subject of the ability ascription is and at how the *as*-phrase is represented. Also, is the adjective syntactically or only semantically decomposable?

³The scenario was suggested by Bernhard Schwarz.

⁴There is some variation in how good the reduced paraphrase with the bare form of the adjective is judged, but speakers generally find it acceptable.

able, and speakers tend to interpret the sentence as in (5c).

- (5) a. Last summer in Rome, we visited every museum $\left\{ \begin{array}{l} \text{conceivable} \\ \text{imaginable} \end{array} \right\}$.
 b. %Last summer in Rome, we visited every location that one is able to $\left\{ \begin{array}{l} \text{conceive of} \\ \text{imagine} \end{array} \right\}$
 as a museum.
 c. Last summer in Rome, we visited every location $\left\{ \begin{array}{l} \text{conceivable} \\ \text{imaginable} \end{array} \right\}$ for us to visit.

Having established that *conceivable* and *imaginable* have a non-local reading, in addition to a local one, we will now investigate whether this non-local reading can be explained in the same way as the one of *possible*. Thus, in the next subsection, we start with exploring the syntactic and selectional properties of these adjectives, paving the way for us to test the hypothesis that *tough*-movement is also involved in the licensing of their non-local readings.

3.3 Syntactic properties of *conceivable* and *imaginable*

In illustrating the non-local reading of *conceivable* and *imaginable*, we gave a paraphrase that is in all respects similar to that provided for the non-local reading of *possible*. In doing so, we made tacit appeal to certain intuitions about the English syntax of these adjectives. Specifically, there are three intuitions that we relied on and that need to be scrutinized:

1. These modal adjectives can select *for*-infinitivals as complements.
2. When taking infinitivals, these adjectives can form reduced relatives containing a gap in non-subject position.
3. The infinitival complements of these adjectives can undergo Null Complement Anaphora (NCA).

Clearly, if empirically confirmed, all these intuitions would put *conceivable* and *imaginable* on a par with the facts presented in the previous chapter for *possible*, supporting the hypothesis that all these adjectives belong to the same class of non-local modifiers. Empirical evidence for the third intuition is particularly suggestive of a connection with *tough*-movement. In this section, we will look for more evidence concerning each of these intuitions, whereas in the next one, we will experimentally test the hypothesis that these adjectives allow for *tough*-movement.

3.3.1 *For*-infinitivals

The first intuition, namely, that these adjectives take *for*-infinitivals, is supported by natural occurrences such as the following ones.⁵

- (6) He asked if it was “conceivable” for the U.S. to ratify the treaty.⁶
- (7) ‘Contracts’ require ‘two parties’ to agree to something and, in response to Stephen’s comment, it would not be imaginable for a teacher to agree to a student doing nothing during the course of a semester.⁷

A legitimate question to ask is why we should treat the *for*-DP sequence as introducing the subject of the embedded infinitival and not as referring to the individual who is in the relevant mental state denoted by the verb from which the adjective is morphologically derived. That is, could the *for*-DP sequence surfacing in these examples be a PP denoting an individual or group of individuals according to whom the embedded propositions are imaginable or conceivable? Under this alternative, *imaginable* and *conceivable* would select a PP denoting a mental experiencer, similarly to *tough*-adjectives such as *easy* that are (usually) taken to select PP-experiencers.^{8,9}

⁵It is worth observing that this selectional property is not passed up, so to speak, by the verbs which these adjectives are morphologically related to. Specifically, the attitude verbs *conceive* and *imagine* either select finite clauses ((i) below) or function as ECM verbs taking a gerund clause or, less frequently, an infinitive with an intervening DP that functions as the object of a preposition selected by the verb (see (ii)) or the direct object of the verb. (see (iii)). Huddleston and Pullum (2002) call this type of construction COMPLEX CATENATIVE CONSTRUCTION. In these cases, the intervening DP controls the PRO of the gerund clause or infinitive. Moreover, *imagine* can also take a bare infinitive (see (iv)). In this construction, it is the subject of the matrix that controls the subject of the infinitive.

- (i) X $\left\{ \begin{array}{l} \text{conceives} \\ \text{imagines} \end{array} \right\}$ that/*for-CP.
- (ii) X conceives of DP_i [PRO_i ϕ -ing]/[PRO_i to ϕ]. (cf. *John can’t conceive of Mary (to) love(/ing) Jim.*)
- (iii) X imagines DP_i [PRO_i ϕ -ing]/[PRO_i to ϕ]. (cf. *Mary can’t imagine John (to) love(/ing) Sue.*)
- (iv) John_i imagined [PRO_i to go to the party].

Finally, given the selectional fact in (i), it is not surprising that *conceivable* and *imaginable* can take finite clauses.

- (v) It’s $\left\{ \begin{array}{l} \text{conceivable} \\ \text{imaginable} \end{array} \right\}$ that Liz will interview those candidates.

⁶<https://www.theguardian.com/world/us-embassy-cables-documents/226331>

⁷<http://davecormier.com/edb/2011/07/01/contracts/>

⁸A third analytical possibility seems to arise when the *for*-DP sequence denotes a beneficiary of whichever state of affair one can conceive of or imagine. For instance, (i) below, which concerns a comparison between cities in the U.K. and cities in China, states that the former cities work in a way that, imaginably, China could implement.

- (i) Its big cities work in a way that is imaginable for China and those who live in them enjoy a lifestyle many Chinese citizens hope for. (<http://www.bbc.com/news/uk-politics-27865854>)

⁹See next chapter for discussion on the function of *for*-DP sequences with ordinary *tough*-adjectives.

These two hypotheses lead to the positing of two different parses. The *for*-CP HYPOTHESIS would have to be based on (8), in which *for* is the complementizer of the embedded clause, while the *for*-PP HYPOTHESIS would not necessitate the presence of a *for*-complementizer in the embedded clause, as in (9).

(8) [AP [A⁰ conceivable] [CP [C⁰ for] [IP ...]]] *for*-CP

(9) [AP [A⁰ conceivable] ([PP for DP]) [CP [C⁰ $\emptyset$] [IP ...]]] *for*-PP

Thus, examining the role of *for*-DP sequences in constructions involving *conceivable* and *imaginable* is an important step in the assessment of the hypothesis that the non-local reading of these adjectives is associated with the same kind of parse we have posited for the non-local reading of *possible*. Needless to say, this hypothesis would be supported if evidence were to be found in support of (8) and not (9). In what follows, we show that there is abundant evidence for the *for*-CP hypothesis.

3.3.1.1 Two *for*-phrases

Conceivable and *imaginable* can appear in expletive constructions followed by two *for*-DP sequences. In such constructions, the second *for*-DP sequence must be interpreted as the subject of the infinitive, whereas the first *for*-DP sequence refers to the individual who is in the relevant mental state of *conceiving* or *imagining*. For instance, in (10), the first *for*-DP sequence intuitively denotes the individuals according to whom the U.S. may ratify the treaty. Also, intuitively enough, the second *for*-DP sequence is the subject of the embedded proposition, viz. the entity that may ratify the treaty. This configuration shows that *for* can be a complementizer.

(10) a. It is $\left\{ \begin{array}{l} \text{conceivable} \\ \text{imaginable} \end{array} \right\}$ for many experts for the U.S. to ratify the treaty.

It is worth noting that this configuration is shared by ordinary *tough*-adjectives, when they occur in expletive constructions. This observation, originally due to Chomsky (1973) (see also, among others, Chomsky 1977, Faraci 1974, Hartman 2011, Keine and Poole 2017) is substantiated by examples like the following one:

(11) It would be $\left\{ \begin{array}{l} \text{good} \\ \text{nice} \\ \text{pleasant} \end{array} \right\}$ for both families for Mary and John to get married.

In such cases, the first *for*-DP sequence denotes, loosely speaking, an experiencer, that is, an individual according to whom the embedded proposition may be taken to be good, nice or pleasant.

Also, note that while the second *for*-DP sequence in all these examples is part of the embedded sentence's intonation, the first *for*-DP sequence must be intonationally separated from both the embedding construction (e.g. *it would be Adj*) and the embedded one. This observation can be explained if we take the first *for*-DP sequence to be an adjunct, whereas the second *for*-DP sequence to be the subject of the infinitive.

3.3.1.2 Fronting

In support of the *for*-CP hypothesis (see (8)), note that while the leftmost *for*-DP sequence can front, the rightmost cannot.¹⁰ This is again expected if the first *for*-DP sequence is an adjunct while the second one introduces the external argument of the embedded sentence. Consider:

- (12) a. For many experts, it is conceivable for the U.S. to ratify the treaty.
 b. ??For the U.S., it is conceivable for many experts to ratify the treaty.

The interpretation of (12a) can be rendered by explicitly separating the attitude verb that is morphologically related to the adjective from the modal component provided by *-able*, viz. a possibility modal.

- (13) a. Many experts think the U.S. may ratify the treaty.
 b. According to many experts, the U.S. may ratify the treaty.

In contrast, while (12b) can be paraphrased as (14), this interpretation would force the left-in-situ *for*-DP sequence to be the subject of the infinitive. Given our world knowledge, this interpretation is odd enough to be discarded.

- (14) #According to the U.S., many experts may ratify the treaty.

Noting that it is a well-known fact that extraction is generally not possible for subjects, the asymmetry that we have observed here is explained if we take the first *for*-DP sequence to be an adjunct, while the second *for*-DP sequence to be the subject of the infinitive.

3.3.1.3 Inanimate *for*-DP sequences

When a *for*-DP sequence contains a DP that refers to an inanimate entity, the only interpretation available is one where the DP following *for* is the subject of the infinitive. Therefore, we must take *for* to be a complementizer.

¹⁰This test was first discussed by Chomsky (1973). We will discuss it again in the next chapter in relation to *for*-DP sequences in *tough*-constructions.

- (15) It is conceivable for this coat to last 100 years.

Relatedly, sometimes the *for*-DP sequence can contain an expletive.

- (16) It is conceivable for there to be snow in July.

In either case, fronting is possible, providing additional evidence that the only parse available requires these *for*-DP sequences to introduce the subjects of the embedded infinitives.

- (17) a. ?*For this coat, it is conceivable to last 100 years.
b. *For there, it is conceivable to be snow in July.

3.3.1.4 Passivization and idioms

Passive constructions provide further evidence that these adjectives select *for*-infinitivals. If the embedded infinitive of, for instance, (18a) were to be passivized but its meaning not preserved, this would speak against the hypothesis that *for* introduces the subject in these constructions, and in favor of the other view that the DP following *for* denotes the individual who does the conceiving or imagining. However, (18b), which is the passivized variant of (18a), does not alter the truth-conditions of the active sentence. Importantly, we must take *the treaty* to be the subject of the embedded construction.

- (18) a. It is conceivable for the U.S. to ratify the treaty.
b. It is conceivable for the treaty to be ratified (by the U.S.).

Similarly, certain idioms involving transitive verbs can be passivized. An example is the following:

- (19) a. John broke the news.
b. The news was broken by John.

When both sentences are embedded as the complements of *conceivable*, their meanings are still equivalent. This shows that the object of a transitive verb, even when used idiomatically, can participate in the passivization of a *for*-infinitive, forcing the resulting *for*-DP sequence to be its subject.¹¹

- (20) a. It was conceivable for John to break the news.
b. It was conceivable for the news to be broken by John.

¹¹Thanks to Junko Shimoyama for suggesting to look into idioms.

This argument further strengthens the hypothesis that these modal adjectives not only can take a non-finite CP whose head is the complementizer *for*, sometimes they must.

3.3.2 Reduced relatives

The adjectives *conceivable* and *imaginable* also participate in reduced relatives of the kind that is relevant to the study of their non-local readings. The following examples were found in the *English Web 2013* and *English Web 2015* corpora:¹²

(21) This is the new Note GALLERIA GM7970M laptop from the Japan based Dospara. It's a big 17.3 inch laptop that offers virtually every extra imaginable for the buyer to choose from.

(22) Canine owners want their pets to have the healthiest food conceivable to eat.

Our query generated no instance of *for*-infinitives in reduced relatives headed by *conceivable*. However, for the most part, our informants judged the instances found for *imaginable* to be equally fine if the adjective was replaced by *conceivable*.

Moreover, it is interesting to observe that all the instances of reduced relatives we found occur in the restrictor of a universal quantifier or of *any* interpreted with universal force, or are part of a superlative definite:

	Universal quantifier	Superlative	Any
conceivable	3	2	1
imaginable	9(5)	9(6)	2

Table 3.1: Environments in which the reduced relatives were found. The numbers in parentheses indicate how many of those examples involve *for*-DP sequences.

In the next subsection, a further argument in favor of the view that the *for*-DP sequences can introduce the subjects of the infinitival complements of these adjectives is provided by the third abovementioned intuition, namely the intuition that these adjectives allow for their complements to undergo Null Complement Anaphora.

3.3.3 Null Complement Anaphora

According to Larson (2000), *conceivable* and *imaginable*, like *possible*, allow for their clausal complements to undergo Null Complement Anaphora. The example Larson provides is the same as the one he gives for *possible*, involving a question in which these

¹²The corpora can be accessed through www.sketchengine.eu.

adjectives take a finite clause. The answer to the question makes tacit reference to the finite clause of the question.

- (23) a. Did Mary interview that candidate?
 b. It's $\left\{ \begin{array}{l} \text{conceivable} \\ \text{imaginable} \end{array} \right\}$ (that she interviewed that candidate).

One can also construct a different example involving a question in which the adjectives take this time an infinitival complement, which is then tacitly assumed in the answer (see (24b)). In this case, the subject of the embedded infinitive is Mary. However, one must be careful to also consider that (24a) has a different interpretation, according to which what is asked is whether Mary thinks that the relevant candidate can be interviewed. This question can be answered by (24c), but not (24b), which sounds infelicitous under this reading of the question.

- (24) a. Is it $\left\{ \begin{array}{l} \text{conceivable} \\ \text{imaginable} \end{array} \right\}$ for Mary to interview that candidate?
 b. Yes, it is $\left\{ \begin{array}{l} \text{conceivable} \\ \text{imaginable} \end{array} \right\}$ (for her to interview that candidate).
 c. Yes, it is $\left\{ \begin{array}{l} \text{conceivable} \\ \text{imaginable} \end{array} \right\}$ for her (to interview that candidate).

While (24c) shows that these adjectives allow for parses of a *for*-DP sequence as a PP, the possibility of (24b) as an answer to (24a) provides further evidence that these adjectives also allow for a parse in which a *for*-phrase introduces the infinitive's subject.

Finally, as we did for *possible*, we may ask whether NCA here is really ellipsis or propositional anaphora. We refer the reader to the arguments put forward in Chapter 1 in favor of the former view.

3.3.4 Summary

To sum up, not only can *for* be a complementizer of an infinitive selected by *conceivable* or *imaginable*, in some cases it is the only conclusion that we can draw concerning its structural role in these constructions. Arguments from inanimate *for*-DP sequences, fronting, passivization and idioms, NCA support this conclusion. Accordingly, we must conclude that the following parse is an attested syntactic configuration in the English grammar:

- (25) [AP conceivable [CP [C⁰ for] [IP ...]]]

3.4 Testing *tough*-movement

As seen in §3.2.1, *conceivable* and *imaginable* have non-local readings which we rendered with paraphrases in all respects similar to that used to describe the non-local reading of *possible*. Furthermore, the observations in §3.3 support the syntactic plausibility of these paraphrases. In this section, we present an experiment that is designed to test the syntactic hypothesis that these adjectives allow for TOUGH-MOVEMENT. Our experiment will also test *possible*, as in Chapter 2 we only took on board the suggestion that this adjective allows for *tough*-movement, without providing empirical evidence for it. If confirmed, the hypothesis that all these adjectives allow for *tough*-movement would validate the same kind of explanation for their non-local readings.

The experiment will look at how non-local adjectives (*possible*, *conceivable* and *imaginable*) are perceived in a TOUGH-construction (TC). We compare their behavior in a TC to that of ordinary TOUGH-adjectives (e.g. *hard*) and CONTROL-adjectives (e.g., *eager*) in the same kind of construction. CONTROL adjectives are so called because the matrix subject of a CONTROL-construction is “controlling” a PRO in the embedded infinitival, as the following example illustrates:

(26) Ed_i is eager [PRO_i to apply to the program].

The reason why control adjectives are contrasted with the other two classes of adjective is that these adjectives behave badly in a TC (see (27)).

(27) *The program_k is eager for Ed to apply to t_k.

Moreover, neither *tough*-adjectives nor control ones have non-local readings.

(28) a. *Liz interviewed every candidate interesting (for her to interview).
b. *Liz interviewed every candidate eager (for her to interview).

Given their known behavior in TCs, control adjectives provide an excellent class of comparison to evaluate the behavior of non-local adjectives. In fact, it is worth observing that one can find claims in the literature on *tough*-predicates that an adjective like *possible* does not allow to sit in a TC. For instance, in their classic English grammar, Huddleston and Pullum (2002) claim the following (a similar claim can also be found in Keine and Poole 2017):

Note that *impossible* belongs in the class [of *tough*-adjectives] but *possible* does not: *That claim is impossible/*possible to substantiate*. (H&P 2002: 1246)

If non-local adjectives are unable to license *tough*-movement at all, we should expect their behavior to be similar to that of control adjectives in the same *tough*-frame.

3.4.1 Methods

In this experiment, the variable we manipulate is the type of adjective, which may correspond to any of the following three classes of adjectives: i.e., TOUGH, NON-LOCAL, CONTROL. The null hypothesis of the experiment is that whether a TC contains a NON-LOCAL or CONTROL adjective has no effect on its acceptability (measured on a scale of 1 to 8, where 1=least acceptable, 8=most acceptable).

The experiment involved 27 trials per subject. The trials were determined on the basis of 9 item sets with three sentences each, varying in the type of predicate, an example of which is given in (29). So, for instance, in a trial, a subject was presented with a context like the one in (29), followed by one of the three sentences ((29a) or (29b) or (29c)).¹³ The subject was then asked to evaluate the acceptability of the sentence that was randomly assigned to her.

- (29) Context: The House of Commons is debating an amendment to a bill. A journalist writes about the situation in the following terms:
- a. This amendment is hard for the House of Commons to pass. TOUGH
 - b. This amendment is imaginable for the House of Commons to pass. NLOC
 - c. This amendment is eager for the House of Commons to pass. CONTROL

The trials were presented pseudo-randomly, such that a condition would only be repeated maximally once. Furthermore, the distance between trials from the same item set was maximized by splitting the 27 trials into 3 separate blocks, each containing only one sentence from the respective item set, with an equal number of trials from each condition in each block. The order of blocks was varied randomly between participants. The participants were not aware that the trials consisted of three different blocks.

The participants were 20 North American English speakers, mostly undergraduate students, therefore making 540 observations in total. The trials were randomized so that participants never saw the same condition twice in a row, and trials from the same item were organized into different blocks to reduce priming and habituation effects.

3.4.2 Results

The average response for each class of adjectives are shown in the box plot in Figure 3.1. The TOUGH-class got, on average, 6.4, the NON-LOCAL-class 4.8, the CONTROL-class 1.8. The box plot also indicates where the median and half of the observations for each condition

¹³The full list of stimuli is provided in Appendix A.

lie (these correspond, respectively, to the black lines and the boxes that enclose those lines). While we expected both a difference between the *tough*-adjectives and the control ones, on the one hand, and also a difference between the *tough*-adjectives and the non-local ones, on the other, we find the large difference between the non-local adjectives and the control ones surprising, given the general take that these modal adjectives should not allow for *tough*-movement.

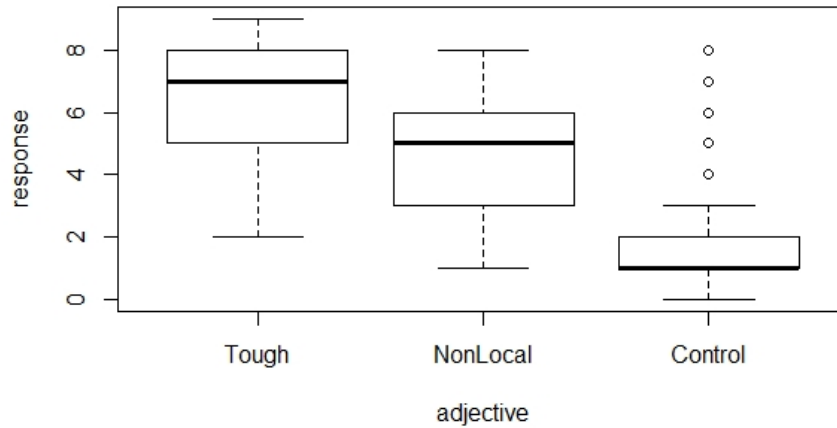


Figure 3.1: Box plot of response versus type of adjective

As for the standard deviation, the values registered indicate that the most variability occurred in evaluating the class of non-local adjectives.

	SD _{participant}	SD _{item}
TOUGH	0.8	0.6
NON-LOCAL	1.1	0.6
CONTROL	0.7	0.3

Table 3.2: Standard deviation values for participants and items

It is also interesting to observe how each non-local adjective behaved individually. The following bar plot groups the items with respect to the type of adjective. So, for instance, Group 1 includes items formed out of the following set of three adjectives: *{difficult (TOUGH), possible (NON-LOCAL), impatient (CONTROL)}*. Group 2 is based on items formed out of this other set: *{easy (TOUGH), conceivable (NON-LOCAL), willing (CONTROL)}*. Finally, items from Group 3 are composed out of any of the adjectives in this set: *{hard (TOUGH), imaginable (NON-LOCAL), eager (CONTROL)}*. The plot shows that

possible and *conceivable* were evaluated the best in the NON-LOCAL-class, with an average of, respectively 5.2 and 5.0, whereas *imaginable* got an average 4.2.

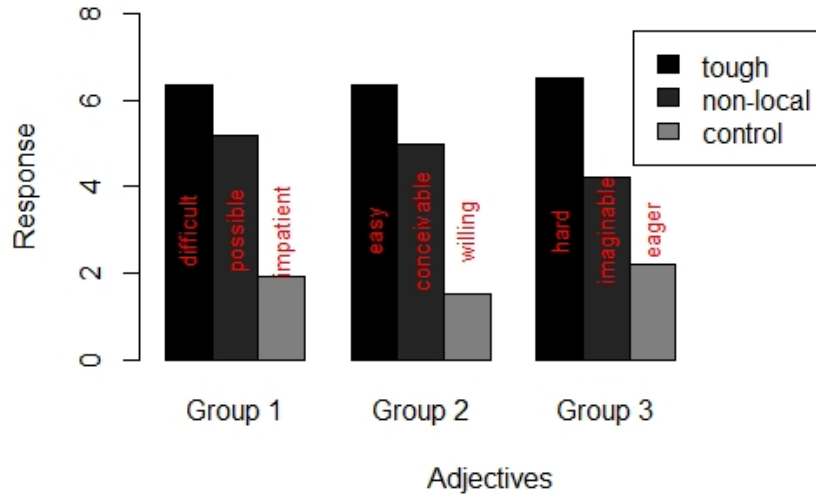


Figure 3.2: Bar plot showing how each adjective behaved.

We fitted a linear mixed-effects model of the acceptability rating as a function of the type of adjective with correlated random intercepts and slopes within participants and items. P-values were estimated based on the Satterthwaite approximation, using the package *lmerTest* (Kuznetsova et al. 2013). The experiment has found that TOUGH-adjectives and CONTROL-adjectives significantly differ in their acceptability rates ($p < 0.001$). So do TOUGH-adjectives and NON-LOCAL-adjectives ($p < 0.001$). Importantly, the experiment has also found that NON-LOCAL-adjectives are perceived as significantly better than CONTROL-adjectives in a TC ($p < 0.001$).

3.4.3 Discussion

The results of this experiment lead us to reject the null hypothesis that the type of class of adjectives has no effect on the acceptability of a *tough*-construction. Not surprisingly, whether a *tough*-construction is composed out of a *tough*-adjective or control one matters. However, we think that the difference between *tough*-adjectives and non-local ones should be read in the light of the fact that we also found that non-local adjectives and control adjectives significantly differ in a *tough*-construction. If a non-local adjective were not to allow for *tough*-movement, we should expect their behavior to be more in line with control adjectives, against fact.

While we currently lack an explanation for why non-local adjectives do not behave as clear-cut examples of *tough* adjectives, we take the results of this experiment to provide support for our analysis, insofar as they point to a gray area in which it is possible to hypothesize that non-local adjectives allow for *tough*-movement under non-fully well understood conditions. Everything else being equal, we arrive at suggesting that the non-local reading of *conceivable* and *imaginable* can be derived along the same lines of the non-local reading of *possible*.

- (30) $[_{AP} \text{ wh } \lambda j \text{ conceivable } [_{CP} [_{C^0} \text{ for }] [_{IP} \dots t_j]]]$
- ↑

We believe future experimental work should test whether modifying syntactic and semantic features of a *tough*-frame may strengthen the acceptability of a TC with a NON-LOCAL adjective.

3.5 A third reading?

After having established that *conceivable* and *imaginable* have non-local readings that are compatible with the parse we have posited for the non-local reading of *possible*, in this section we look at some examples that share a similar distribution with these non-local modifiers but, crucially, do not involve ellipsis. The question we shall address is what these cases imply for the theory of non-local modification we are after.

3.5.1 The examples

The adjectives in the examples below show a similar distribution to that of the non-local modifiers: they are all *-able* adjectives, they appear postnominally and the heads of the hosting determiner phrases are, in each case, a universal.

- (31) She tried on different tops and pants in **every combination thinkable**.¹⁴
- (32) Martin said a primary concern is having plans for **every contingency foreseeable**.¹⁵

Yet, as one can easily verify, no ellipsis is involved in these cases. To illustrate this point, first consider that all these *-able* adjectives can select *for*-infinitivals. For instance,

- (33) How else would it be thinkable for organisations and councils to deploy ‘spikes’ in doorways to deter homeless people from bedding down for the night?¹⁶

¹⁴<http://www.giantessworld.net/viewstory.php>

¹⁵<https://www.stamfordadvocate.com/home/collectionRss/Homepage.php>.

¹⁶<https://www.independent.co.uk/voices/comment/some-myths-about-benefit-fraud-and-tax-evasion.html>.

- (34) BMG research director Michael Turner said support for independence has gradually increased from earlier polls, and that it is “foreseeable” for this trend to continue as details of the Brexit deal emerge.¹⁷

However, despite meeting a necessary condition for a non-local reading to arise, we cannot provide non-local paraphrases for the sentences (31) and (32). Not only are the paraphrases below convoluted, they also do not seem to quite capture the intended meanings of the original sentences.

- (35) She tried on different tops and pants in **every combination thinkable for her to try on different tops and pants in**.
- (36) Martin said a primary concern is having plans for **every contingency foreseeable to have plans for**.

In contrast, the following paraphrases, which do not appeal to ACD, do a better job at approximating what (31)-(32) intend to convey.

- (37) She tried on different tops and pants in **every combination that one can think of**.
- (38) Martin said a primary concern is having plans for **every contingency one can foresee**.

Even *-able* adjectives that have attested non-local readings can occur in postnominal position without giving rise to a non-local reading. In the example below, *imaginable* occurs postnominally but no possible antecedent for NCA to apply is available. On the other hand, a local reading is out of question, as the part in red is not about things which can be imagined as hues, but about actual (or at least actual in the world of the story) hues one can think of.

- (39) Mountains that went beyond the clouds, striations of **every hue imaginable** and alien landscapes that I know I had seen in quite a few sci-fi movies were around every twisty-turny mountain pass or long desolate straightaway.¹⁸

As for the other examples, a paraphrase where the adjective is rendered with a possibility modal verb and the relevant attitude verb is more appropriate or, to hint to the analysis we shall propose shortly, with a decomposition of the adjective between a *possible* component and the attitude verb.

¹⁷<https://www.huffingtonpost.ca/entry/scotland-independence-referendum>.

¹⁸<https://www.applecidermage.com>

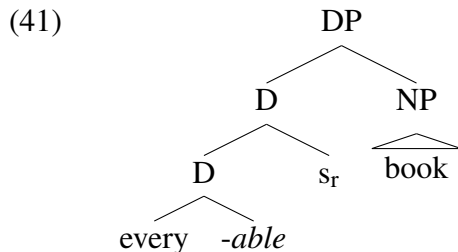
- (40)
- a. striations of every hue imaginable.
 - b. striations of every hue that one can imagine
 - c. striations of every hue (that is) possible to imagine.

What all these examples suggest is that some of these *-able* adjectives can also combine with DPs and not just CPs. Moreover, there seem to be also restrictions on the kind of DPs they can combine with. *Thinkable* and *foreseeable*, for instance, can combine with abstract nouns, whereas, in the example above, *imaginable* combines with a color noun, viz. *hue*, ascribing to it the property of being able to be imagined.¹⁹ What these examples further show is that non-locality is not a necessary condition for an *-able* to occur postnominally. An *-able* adjective can occur postnominally without there being a possible antecedent for it to trigger a non-local reading.

In the next subsection, we propose an analysis of these adjectives based on decomposition. We shall then ask whether this analysis could be extended to cover non-local examples. We answer negatively to this question: non-locality cannot be explained away and, thus, is real.

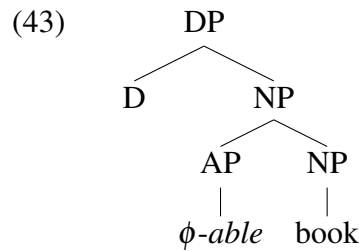
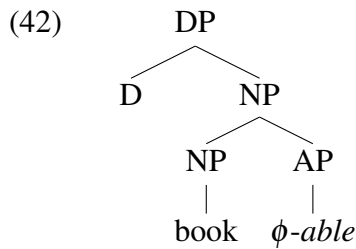
3.5.2 A decomposition analysis

One way to approach the adjectives just discussed is to assume that they are lexical “exceptions.” Harris (2012) takes up this approach and further argues that even the non-local adjectives are, in fact, not non-local. His proposal is to treat these adjectives as restricting resource situation variables present in the hosting determiner phrases (Schwarz 2009, 2012), suggesting a parse like the following, with the option for the adjective to be linearized either prenominally or postnominally.



Alternatively, one could simply argue that these adjectives combine directly with the nouns via Function Application. Under this account, the adjectives would denote properties of type $(e,(st)),(e,(st))$.

¹⁹The sense of *imagining* at stake here is the ability to “simulate” a copy of what the imagining is about (see Currie and Ichino 2013).



What both these approaches miss, however, is a strong syntactic generalization (see, e.g., Cinque 2010), namely, that only adjectives that encode silent structure can go postnominally in English. If Harris's hypothesis that these *-able* adjectives are lexical exceptions were right, then it would be a mystery why adjectives such as *malleable* or *amiable* could not be exceptions and surface postnominally. However, this restriction follows from the observation that these adjectives do not select clausal material and the further hypothesis that only adjectives that do so can go postnominally.

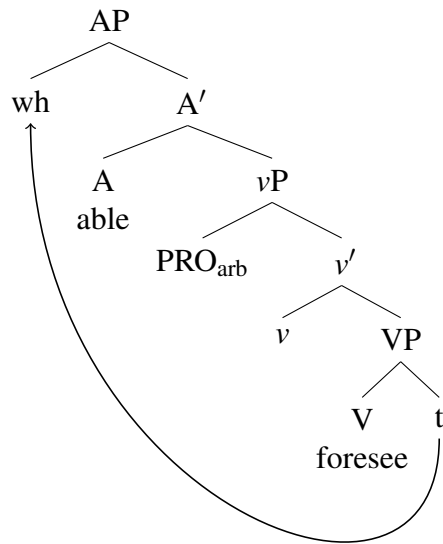
- (44) a. *The chemist produced every substance malleable.
 b. *I met every student amiable.

However, one may legitimately ask what kind of clausal structure is available to the *-able* adjectives that occur postnominally without ACD. Here we would like to suggest a third analytical option, which is to assume that those *-able* that can occur postnominally without giving rise to a non-local reading allow for syntactic decomposition, and this morphological complexity explains the postnominal restriction.

Specifically, one can see that all the adjectives that we considered in the previous subsection are morphologically composed of an attitude verb and an *-able* suffix. The latter is to be interpreted as a possibility modal with an ability flavor, as the paraphrases in (37), (38) and (40b) illustrate. The former usually select propositional arguments, but they can also take certain kind of nominals, usually abstract nouns, content nouns (Moulton 2009) or, in the case of *imagine*, nouns that refer to things that one can simulate.

The tree below exemplifies the type of structure we have in mind. What is worth noticing is that we are still treating these APs as derived predicates and we are still contemplating *tough*-movement from the object position of the attitude verbs. So, while these modification structures do not involve ACD, they still share a derivational core with non-local modification structures, viz. *tough*-movement.

- (45) Decomposition analysis of *-able* adjectives:



What we would like to further point out is that this parse is in principle compatible with the existence of a non-local parse as well. But to make sure that it is, in fact, compatible, we shall address in the next subsection the question of whether a decomposition analysis could account for non-local readings as well. Since our answer is negative – the decomposition analysis cannot (at least not straightforwardly) apply to non-local readings –, we conclude that non-locality cannot be reduced to an analysis that does not appeal to the original hypothesis that ellipsis fixes these adjectives’ interpretation.

3.5.3 Non-locality vs. decomposition

In §3.2.1, we provided our starting example (3), repeated as (45), with paraphrases like the ones below and argued that these truly capture a non-local reading of *conceivable* and *imaginable*.

- (46) Last summer in Rome, we visited every $\left\{ \begin{array}{l} \text{conceivable} \\ \text{imaginable} \end{array} \right\}$ museum.

- (47) a. Last summer in Rome, we visited every museum that it was $\left\{ \begin{array}{l} \text{conceivable} \\ \text{imaginable} \end{array} \right\}$ for us to visit.
 b. ?Last summer in Rome, we visited every museum $\left\{ \begin{array}{l} \text{conceivable} \\ \text{imaginable} \end{array} \right\}$ for us to visit.

Yet, once we have shown the existence of a subtly different reading of these adjectives, which we argue is best amenable to a decomposition analysis, we may ask whether the non-local reading is just a special case of it. What we want to determine here is whether the reading below, which does not depend on non-local content, may capture the non-local reading, thus making the appeal to the latter unnecessary.

- (47) Last summer in Rome, we visited every museum that one can $\left\{ \begin{array}{l} \text{conceive of} \\ \text{imagine} \end{array} \right\}$.

Now, relating this reading to the non-local one is not an obvious task, as the two do not seem to be in an obvious entailment relation (even if the set of museums is implicitly restricted in both cases to museums in Rome). Thus, we suggest to look at some further examples and see whether one reading or the other would be more likely to be in force. For instance, let us consider a different example:

- (48) Sean joined the Learning Technologies Center in August 2006 after twelve years of IT management and technical work, was briefly transitioned to UITS/CCIT before rejoining the newly formed department Office of Instruction and Assessment (OIA). In his career he has played **every role conceivable** – helpdesk, network/systems administrator and manager; with a sprinkling of project management, career development and workplace diplomat.

The two readings, i.e. the non-local and what we may call the *decomposition* reading, are as follows:

- (49) a. In his career he has played **every role conceivable for him to play**.
b. In his career he has played **every role that one could conceive of**.

The non-local reading seems here to provide the right restriction, as the speaker is talking about roles that Sean could effectively play, whereas the decomposition reading is insufficiently constrained in this respect. However, one could imagine that covert domain restriction applies to the nominal *role*, to return something like (50):

- (50) In his career he has played every [role *apt for him to play*] **that one could conceive of**.

While under this rendition, *conceivable* receives a decomposition reading, the domain restriction of the nominal still makes appeal to what looks like non-local content. So we would try to eliminate a reading from the interpretation of the adjective only by pushing it in the interpretation of the NP. In a similar vein, consider this other example:

- (51) Anne is a six year old student who just had her first arithmetic class in her life. At the end of the class Anne had every conceivable question.

Again, it seems that the non-local reading provides the right restriction, insofar as we are talking about questions that a child like Ann could have and not say questions that the man on the street could have.

- (52) a. Anne had every question conceivable for her to have.
b. Anne had every question that one could conceive of.

And, again, we could try domain restriction of the nominal to get a sufficiently constrained reading, as in (53):

- (53) Ann had every [question *that a child like her could have*] conceivable.

The same objection I made above applies here. It seems that we are just pushing non-local content elsewhere in the nominal domain. Moreover, it seems that the domain restriction, in fact, excludes by itself the need of the modification of the modal adjective, whose presence in (53) sounds redundant.²⁰

In conclusion, in this subsection we have shown that a decomposition analysis cannot be easily carried over to non-local readings without appealing to the very notion of non-local content. Accordingly, we conclude that non-locality is real and that the neo-Larsonian analysis we have proposed is still the best analytical candidate to account for it.

3.6 Conclusion

In this chapter, we have extended our discussion of the Larsonian reading to the other *-able* adjectives that Larson mentioned. We have argued that these adjectives do have non-local readings, and provided evidence that an analysis based on *tough*-movement is empirically well-motivated. We have further explored the distribution of certain *-able* adjectives and discovered that they can appear in environments identical to those that trigger non-locality but without giving rise to non-local readings. We have argued that while a decomposition analysis best accounts for these cases – specifically it captures the postnominal restriction –, such an analysis cannot be extended to non-local readings. One question we are left over is why both non-local readings and what we call decomposition readings share the same determiner restriction.

²⁰This may explain why one of my informants found it more difficult to apply domain restriction under a middle way reading.

Chapter 4

Tough-adjectives and absence of non-locality

4.1 Introduction: On the absence of non-locality in ordinary *tough*-adjectives

Chapter 2 ended with the following question: if having a *tough*-syntax is a precondition for an adjective to express a non-local reading, how come ordinary *tough*-adjectives do not occur postnominally with a non-local interpretation? In fact, when these adjectives occur postnominally, as in (1), ungrammaticality results.

- (1) *Liz interviewed every candidate $\left\{ \begin{array}{c} \text{difficult} \\ \text{easy} \\ \text{interesting} \end{array} \right\}$.

Without some additional constraints, the analysis proposed in Chapter 2 overgenerates, as it predicts that *tough*-adjectives should be able to express non-local readings. In particular, the LF (2) should be perfectly legitimate under this analysis.

- (2) $[_{DP_i} \text{ every } [_{AP} \text{ wh } \lambda j [\left\{ \begin{array}{c} \text{difficult} \\ \text{easy} \\ \text{interesting} \end{array} \right\} [_{CP} \text{ for Liz to interview } t_j]]]]] \lambda i [\text{Liz PST interview } t_i]$

Thus, this chapter investigates the question of why (2) is illicit, with the ultimate goal of constraining our theory of non-locality.

4.1.1 Locating the source of the problem

As a starting observation, it is worth noting that when an ordinary *tough*-adjective takes an infinitive in postnominal position, the resulting sentence is judged to be grammatical.

- (3) Liz interviewed every candidate $\left\{ \begin{array}{c} \text{difficult} \\ \text{easy} \\ \text{interesting} \end{array} \right\}$ for her to interview.

Given the analysis proposed in Chapter 1, which posits that *tough*-movement feeds relativization inside the modification phrase, the grammaticality of (3) is expected. Therefore, since relativization is in principle possible, one can further infer that the ungrammaticality of (1) above must be due to something other than the *tough*-syntax of these adjectives.

As we learned from the previous chapter, the other essential ingredient in the derivation of a non-local reading is the ellipsis of the adjective's complement via Null Complement Anaphora (NCA), which we have assumed to take the form of phonetic deletion under a strict syntactic match with a local antecedent. In this chapter, we defend the hypothesis that NCA cannot apply to the complements of ordinary *tough*-adjectives in reduced relatives, because the argument structure associated with these adjectives is different than that of non-local adjectives. In particular, supporting a classic tradition (Chomsky 1973, Faraci 1974, Jacobson 1992, Hartman 2011), we assume that a *for*-DP sequence in modification structures headed by ordinary *tough*-adjectives, as the one surfacing in (3), forms a PP denoting an experiencer (henceforth a PP-experiencer), and not the subject of the embedded CP. This, as we will show, is the factor responsible for blocking NCA and, thus, preventing the adjective from expressing a non-local reading.

The plan for this chapter is as follows: in §4.2, we introduce our main argument. In §4.3, we present a battery of empirical arguments, some from the abovementioned authors and others original, which support the conclusion that a *for*-sequence in a *tough*-construction headed by an ordinary *tough*-adjective must be a PP-experiencer. These arguments are organized in two subsections: in §4.3.1, we show that a PP parse of *for*-DP sequences is possible, while in §(4.3.2), we show that a parse where these are treated as introducing the subjects of the embedded infinitives is impossible.

4.2 The argument

Our main argument proceeds in three steps: first, we present the hypothesis that the argument structure of *tough*-adjectives differs from that of non-local adjectives. This hypothesis will serve as premise for our main proposal to be presented in §4.2.3. Evidence for this hypothesis will then be provided in §4.3. Second, we make our assumptions concerning NCA more explicit. In particular, we require that NCA in non-local modification structures be possible under a syntactic isomorphism modulo functional heads. Finally, we show that

such an isomorphism cannot be met in reduced relatives headed by *tough*-adjectives. Consequently, we conclude that *tough*-adjectives cannot express non-local readings.

4.2.1 On the argument structure of ordinary *tough*-adjectives

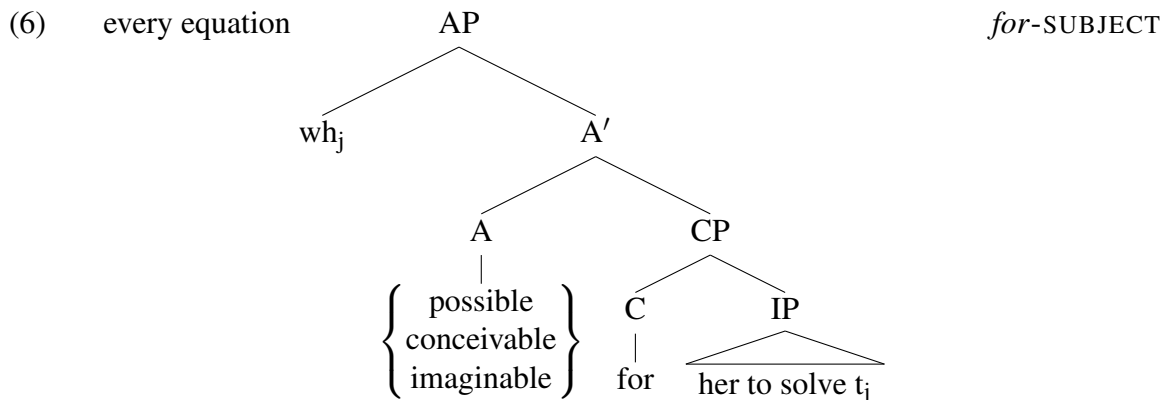
As we just saw, reduced relatives can be headed not only by non-local adjectives, but also *tough*-adjectives. Again, this is naturally expected if *tough*-movement *can* feed the relativization of a reduced relative.

(4) Friede tried to solve every equation $\left\{ \begin{array}{c} \text{conceivable} \\ \text{possible} \\ \text{imaginable} \end{array} \right\}$ for her to solve.

(5) Friede tried to solve every equation $\left\{ \begin{array}{c} \text{difficult} \\ \text{easy} \\ \text{interesting} \end{array} \right\}$ for her to solve.

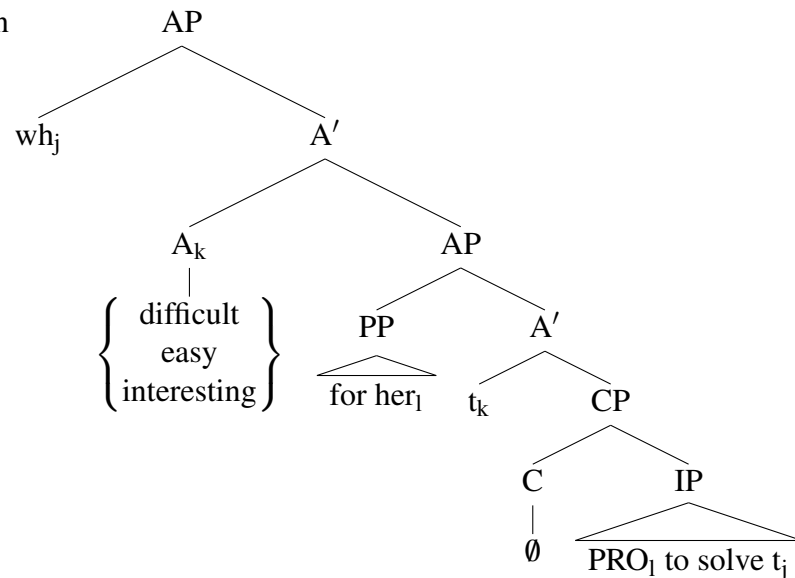
Moreover, as we learned from the previous chapters, the structure of the embedded infinitive in reduced relatives headed by non-local adjectives requires the *for*-DP sequence to introduce the complementizer and the subject of the clause. The null hypothesis would be, therefore, that a similar structure holds for reduced relatives headed by *tough*-adjectives. However, we shall argue that, in contrast to non-local adjectives, *tough*-adjectives have a different compositional profile; specifically, that the *for*-DP sequence surfacing in a reduced relative headed by an ordinary *tough*-adjective, such as (5), is a PP that denotes an experiencer, viz. an individual who evaluates the proposition denoted by the embedded clause as *difficult*, *easy*, etc.

What we are here suggesting is that, albeit their surface forms are identical, (4) and (5) have different argument structures, which we shall dub, respectively, *for*-SUBJECT parse and *for*-PP parse, to highlight the different roles that the *for*-DP sequence takes in each of them (for ease of visualization, the indices are directly represented on the *wh*-pronoun):



(7) every equation

for-PP



4.2.2 Null Complement Anaphora and isomorphism

In their classic paper on varieties of anaphora, [Hankamer and Sag \(1976\)](#) treated the phenomenon of NCA as pragmatic on the basis of examples like the following, where the intended complement of *approve* is, in their own words, “pragmatically controlled.” More specifically, they posit that NCA involves the presence of some pro-form at Deep Structure—hence they dubbed the phenomenon “deep anaphora”—, which is then free to pick out whichever proposition is salient in the context of utterance. Hence, according to their view, (9) would be the correct representation of the NCA in (8).

(8) *Context: Max’s son is eating too much chocolate.*
Max’s wife: Max would not approve.

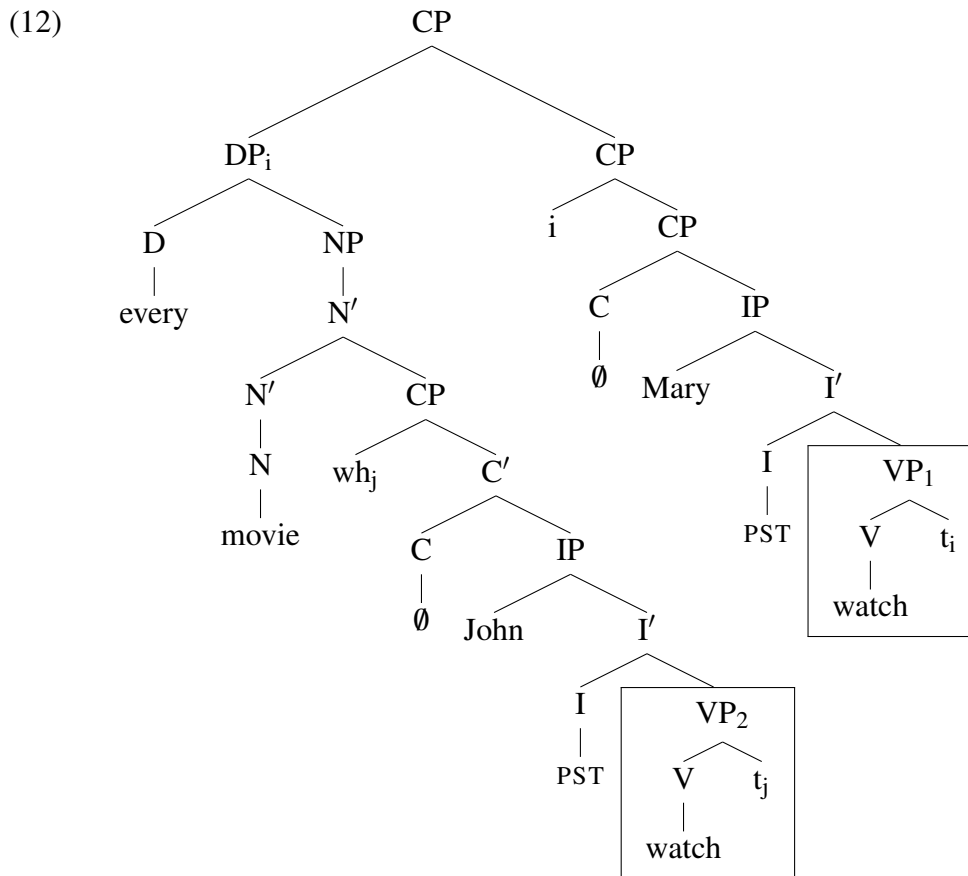
(9) Max would not approve <it>.

However, the kind of NCA available in the non-local modification structures is not so liberal. In fact, the implied complement of the non-local adjectives is never contextually determined, so that (10b) is not a possible interpretation of (10a), but always isomorphic to the main clause that results from the object DP’s QRing, as shown in (10c).

- (10) *Context: The local department of Linguistics is recruiting a lecturer and a professor. Liz is in charge of running the interviews.*
- Liz interviewed every candidate possible.
 - #Liz interviewed every candidate possible <for the department to hire>.
 - Every candidate possible <for Liz to interview t_j >
 $\emptyset$ Liz PST interview t_j

The parallelism instantiated in (10c) puts this type of NCA on a par with well-studied cases of VP-ellipsis involving Antecedent-Contained Deletion (ACD), the phenomenon in which the elided VP is contained within the very VP that provides its antecedent. ACD involves identity at LF between the elided VP and its antecedent, which is generally assumed to be derived via the operation of QR.¹ For example, the following sentence with ACD is grammatical in virtue of its syntactic structure (12) containing two isomorphic structures, i.e. VP₁ and VP₂, which are both occurrences of the same phrase marker defined over the same terminal vocabulary.² Ellipsis can, therefore, apply.

(11) Mary watched every movie John did.

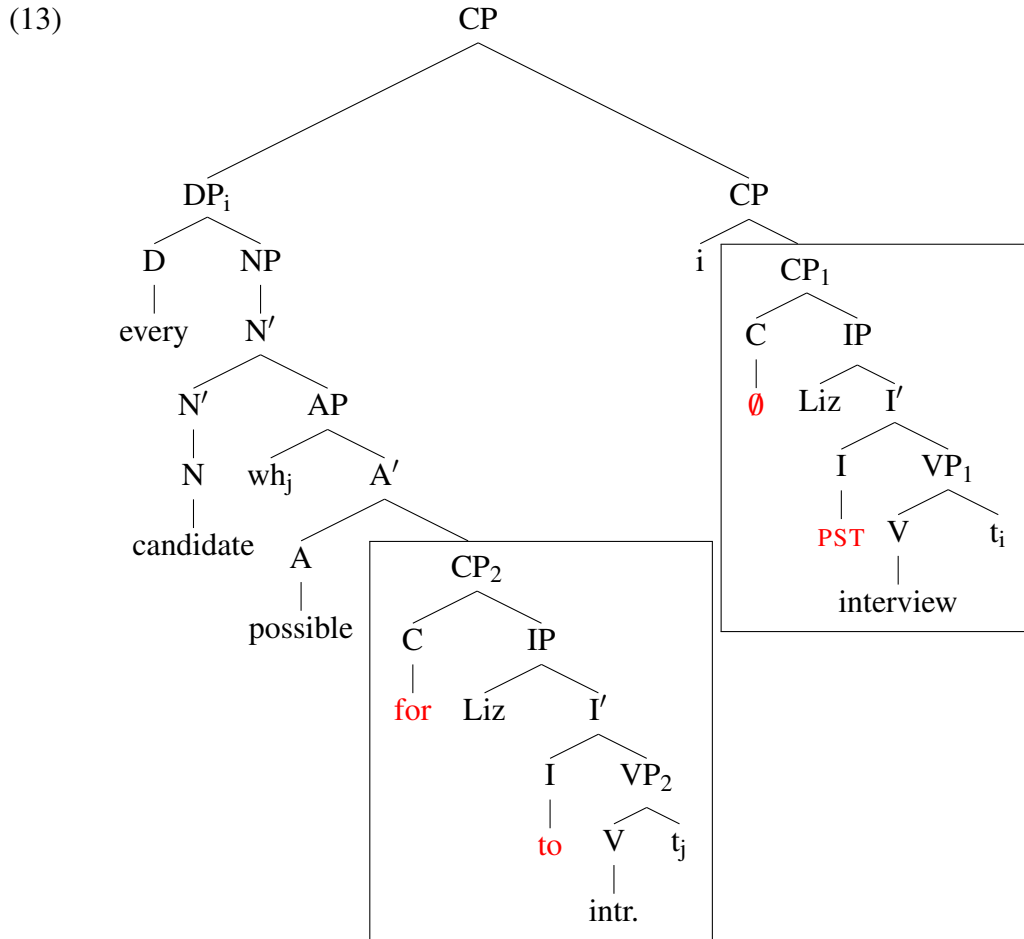


At the same time, as is evident from the syntactic tree below, which is the rendition of (10c), the isomorphism at stake here must be defined modulo functional heads, as both C and I

¹See Kennedy (1997) for an especially lucid review of the main arguments in favor of such a position. No appeal to QR is instead made by Jacobson (1998), whose account of ACD is briefly discussed later.

²The concept of isomorphism is sometimes cashed out in terms of Fiengo and May's (1994) notion of RECONSTRUCTION which they identify as any set of token structures that are "occurrences of a sub-phrase marker over a given terminal vocabulary" (p. 94).

are instantiated differently in CP₁ and CP₂ (for ease of visualization, inactive Spec,CPs are not represented).



A word on the nature of the elided CP (i.e. CP₂ in the tree above). There appears to be two main schools of thought on the issue. The first, which we have espoused here, posits phonetic deletion of the elided material under identity with a linguistic antecedent. Such an approach traces back to the work of [Ross \(1967\)](#) and [Sag \(1976\)](#). A different approach (see [Williams 1977](#), [May 1985](#), [Fiengo and May 1994](#)) posits the existence of an ACD gap in the ellipsis site that gets filled in, at LF, with a copy of the matrix clause that is the result of the object DP's QRing. There probably aren't any substantial relevant differences between the two approaches—note that, in fact, [Larson \(2000\)](#) opts for the latter—; however, we have chosen to follow the former approach for the sake of theoretical simplicity, as we believe that there is more theoretical burden on the defenders of the “copy & paste” account to explain how exactly the copying operation works.

Finally, before moving to the final step of our argument, we would like to address an important issue related to the evidence we have for positing a type of NCA different than the

one studied by Hankamer and Sag.

4.2.2.1 Evidence that NCA in a non-local context is a form of ACD

We have argued that NCA in a non-local environment is not a form of deep anaphora, as in Hankamer and Sag's analysis, but a form of ACD requiring a linguistic antecedent. The only evidence that we have used in support of this analysis is the observation that the implied complement of the non-local adjective is never contextually determined, but always isomorphic to the matrix clause. Thus, we would like to address here the question of whether there is additional evidence for this kind of more constrained form of NCA.

To approach this question, it is worth stressing that the neo-Larsonian parse that we posit for non-local readings contains a movement chain. Accordingly, one could try to test for island effects.³ More specifically, one could try to QR a DP containing an occurrence of a non-local adjective out of an island, and then test possible ellipsis sites. For example, we could consider to embed a DP containing an occurrence of a non-local adjective in the antecedent of an *if*-clause, which is an island for QR.

(14) I lose the bet if Liz interviews every candidate possible.

Suppose now we QR the object DP of *interviews* out of the *if*-island, so that the ellipsis site includes the whole clause isomorphic to CP₁ in the LF (15) below. The relevant observation is that the reading associated with (15) is not a possible reading of (14), while the one associated with (16), in which QR happens below *if*, is:

(15) [DP_i every cand. [AP wh λj possible [CP₂ ~~for me to lose the bet if Liz PRES intr. t_j~~]] λi[CP₁ I PRES lose the bet if Liz PRES interview t_i] ✗

(16) I lose the bet [if [CP₃ [DP_i every cand. [AP wh λj possible [CP₂ ~~for Liz to interview t_j~~]]] λi[CP₁ Liz PRES interview t_i]]] ✓

Similarly, the only reading of (17), in which an instance of non-local *possible* occurs inside a complex DP-island, is the one associated with the LF (19), and not (18).

(17) Jim heard the rumor that Liz interviewed every candidate possible.

(18) [DP_i every cand. [AP wh λj possible [CP₂ ~~for Jim to hear the rumor that Liz PST intr. t_j~~]] λi[CP₁ Jim PST hear the rumor that Liz PST interview t_i] ✗

³Thanks to Susi Wurmbrand for having first suggested this test to me and then to Bernhard Schwarz for providing the example that follows in the text.

- (19) Jim heard the rumor that [_{DP_i} every cand. [_{AP} wh λ_j possible [_{CP₂} ~~for Liz to intr.~~ _{t_j}]] λ_i [_{CP₁} Liz PST interview _{t_i}]] ✓

Under a Larsonian account like the one we defend, these locality effects follow from syntax, as, e.g., extraction out of scope islands is impossible. In contrast, a pragmatic account of NCA in the Hankamer and Sag style, which puts no such restrictions, makes no prediction in this regard.

Finally, we would like to observe a potential complication for our account. Revisiting an observation made by Schwarz (2006) in relation to *wrong*, a non-local adjective's complement always refers to the closest linguistic antecedent available, even in the presence of other linguistic antecedents. For instance, (20a) is interpreted as (20b), not as (20c).

- (20) a. Liz interviewed every candidate possible and Bill hired every candidate possible.
 b. Liz interviewed every candidate possible for her to interview and Bill hired every candidate possible for him to hire.
 c. #Liz interviewed every candidate possible for her to interview and Bill hired every candidate possible for Liz to interview.

However, this restriction is not in force in cases of ACD in VP-ellipsis, as noted by Kennedy (1998). For instance, (21a) can be interpreted either as (21b) or (21c).

- (21) a. I like every movie Mary does, and you hate every movie John does.
 b. I like every movie Mary *likes*, and you hate every movie John *likes*.
 c. I like every movie Mary likes, and you *hate* every movie John *hates*.

While we shall leave this contrast as an open puzzle for future work on the topics of ellipsis and non-local modification, it is also worth pointing out that the pattern in (20) is reminiscent of a pattern discussed by Kennedy (1997) in relation to COMPARATIVE DELETION. As Kennedy observes, examples like the following (his ex. (167), p. 193) can only be interpreted as in (23) and not (24). Noticing the contrast with the pattern exemplified to (21), he concludes that comparative deletion should not be treated as a case of ellipsis.

- (22) The table is wider than the rug is, but this rug is longer than the desk is.
 (23) The table is wider than the rug is wide, but this rug is *longer* than the desk is *long*.
 (24) The table is *wider* than the rug is wide, but this rug is longer than the desk is *wide*.

Of course, if Kennedy was right in his reasoning, then we should also abandon our theory of non-local modification which is based on the hypothesis that ellipsis is primarily involved

in this type of reading. However, the burden is left to the opponent of an ellipsis account of non-local modification to explain all the restrictions that are covered under it.

4.2.3 No isomorphism in reduced relatives headed by ordinary *tough*-adjectives

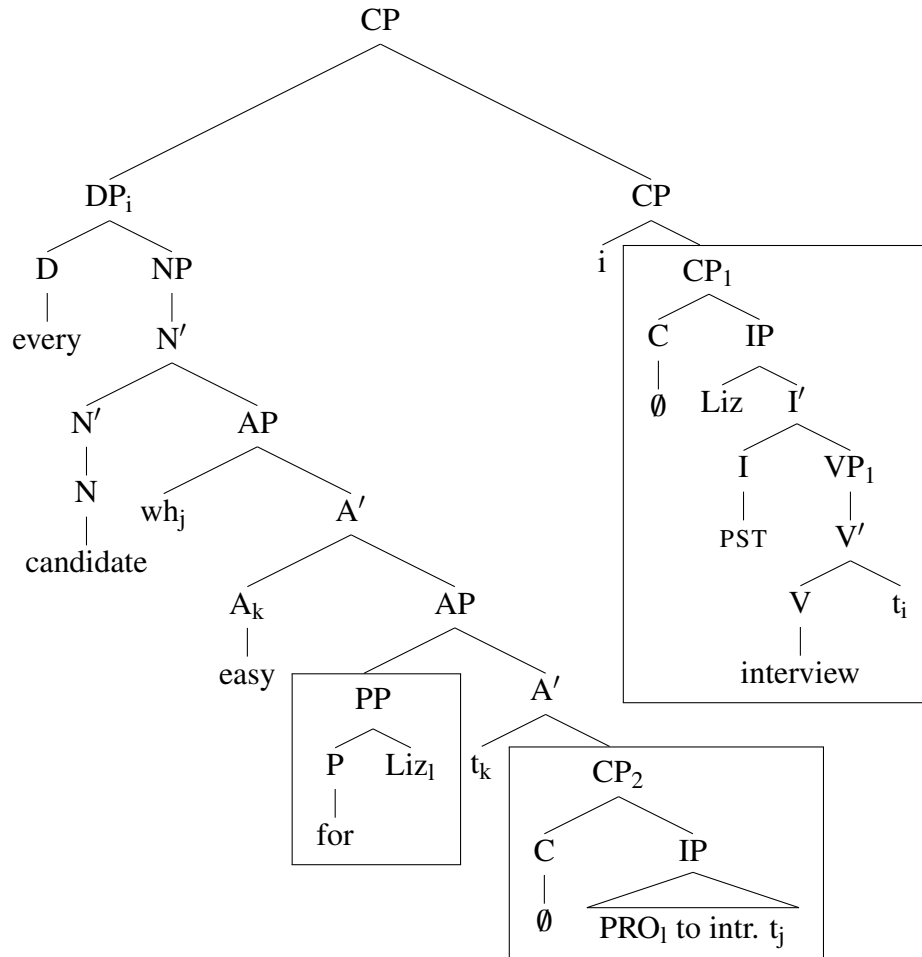
The final step in our argument is to show that, given the argument structure we have assumed for the reduced relatives headed by ordinary *tough*-adjectives (see (7)), NCA, as described in the previous subsection, cannot apply.

To illustrate, it is useful to remind the reader what the derivation of a non-local reading is. The important point to highlight in the derivation below is that the ACD can be resolved via QR, because there is a possible syntactic isomorphism between the matrix CP and the *for*-CP that is the complement of the non-local adjective, as shown in (25) above.

- (25)
- a. Liz PST intr. every cand. [_{AP} wh λj possible [_{CP} for L. to intr. t_j]] $\Rightarrow$ QR
 - b. [_{DP_i} every cand. [_{AP} wh λj possible [_{CP} for L. to intr. t_j]]] λi [_{CP} Liz PST intr. t_i] $\Rightarrow$ NCA
 - c. [_{DP_i} every cand. [_{AP} wh λj possible [_{CP} for L. to intr. t_j]]] λi [_{CP} Liz PST intr. t_i]

However, when we move to consider the possibility of a non-local derivation for *tough*-adjectives, the isomorphism condition that is necessary for NCA cannot be met here, as the CP₂ and the PP in the tree below do not match with CP₁. Specifically, the intended ellipsis site is an AP containing an A-trace and a CP complement, while the intended antecedent is a mere CP.

(26)



In conclusion, NCA is possible in the case of non-local adjectives, because their argument structure allows for their complement to match its antecedent (modulo functional heads), but it is impossible in the case of ordinary *tough*-adjectives, as their argument structure does not allow for the same match.

4.2.4 Interim conclusion

We have argued in §§4.2.1-4.2.3 that the impossibility for an ordinary *tough*-adjective to have a non-local reading follows from two assumptions: (i) that the argument structure of ordinary *tough*-adjectives involves *for*-PPs denoting experiencers and (ii) that ellipsis of such phrases in a modification structure headed by a *tough*-adjective is impossible, as no antecedents are available. From these two assumptions, we have derived our hypothesis that *for*-PPs block NCA in reduced relatives headed by ordinary *tough*-adjectives, which, in turn, derives the impossibility of their non-locality. What we have not provided yet is empirical justification for taking *for*-DP sequences to be PPs in the case of ordinary *tough* adjectives. To this task we now turn.

4.3 The grammatical role of *for*-DP sequences in *tough*-constructions

In the previous section, the hypothesis that *for*-DP sequences surfacing with ordinary *tough*-adjectives are PPs denoting experiencers was introduced to support the claim that the impossibility of non-local readings for ordinary *tough*-adjectives follows from it. In this section, we engage with empirical arguments in support of this hypothesis.

To set out the scene for our discussion, it is useful to look back at Chomsky's (1973) observation that while *tough*-adjectives allow for two *for*-DP sequences to appear in an expletive construction such as (27a), the same succession of two *for*-DP sequences is not possible in the corresponding *tough*-construction (i.e. (27b)) (henceforth TC).

- (27) a. It is easy for the rich for the poor to do the work.
b. *The work is easy for the rich for the poor to do.

While the grammaticality of (27a) has never been seriously tested,⁴ the ungrammaticality of (27b) seems fairly established. However, as Keine and Poole (2017) rightly observe, surface form alone cannot help decide whether, by eliminating one of the two *for*-DP sequences, the remnant *for*-DP sequence is a PP or the subject of the infinitive. To address this issue, more facts need to be taken into account.

The literature on the role of *for*-DP sequences in TCs seems to divide exactly in two factions: on the one hand, authors from the 70s to the 90s (Chomsky 1973, Faraci 1974, Jacobson 1992, more recently Hartman 2011, 2012b) have argued that *for*-DP sequences are PP-experiencers; on the other hand, Keine and Poole 2017 have recently defended the opposite view, namely, that the a *for*-DP sequence must introduce the subject of the *tough*-adjective's infinitive. In what follows, we review the arguments for both sides and conclude that the PP-hypothesis is the most plausible.

4.3.1 Arguments that a *for*-PP parse is possible with ordinary *tough*-adjectives

4.3.1.1 Faraci's test

Faraci (1974) provides an interesting test to determine whether a *for*-DP sequence is the subject of an infinitive or not. The test focuses on cases of ellipsis in comparative constructions involving infinitives and also the presence of *for*-DP-sequences. Faraci observes that ellipsis in comparatives is possible only if what is not elided forms a constituent. For instance, the *for*-DP sequences in the b-examples in (28) are fine, in contrast with the *for*-

⁴According to two native speakers I consulted, the sentence cannot even be parsed. Interestingly, for one of them, the grammaticality improves if *easy* is replaced by the adjective *impossible*.

DP sequences in the second clauses of the sentences in (29). This means that each *for*-DP sequence is a PP in the examples in (28), but not in those in (29).

- (28) a. This problem was especially difficult for Bill to solve, but not so much for the rest of the class.
 b. These problems were more difficult for the teachers to solve than for the students.
- (29) a. *I built this harpsichord more for Alice to practice on than for Bill.
 b. *I built this harpsichord especially for Alice to practice on and not so much for Bill.
 c. *I wanted more for Bill to come than for Harry.
 d. *I especially hoped for Bill to come, though not so much for Harry.

Thus, whenever ungrammaticality results from ellipsis applying to the infinitive in the second term of the comparison to the exclusion of the *for*-DP sequence, one can conclude that the *for*-DP sequence is not a constituent, i.e. a PP, but must be the intended subject of the infinitive. On the other hand, if the *for*-DP sequence can stand alone, it follows that it is a PP. The underlying assumption is that ellipsis in the second term of the comparison can target the adjective-plus-infinitive to the exclusion of the *for*-DP sequence only when *for* forms a constituent with the DP, and this is only possible in the case in which *for* is a preposition selecting the DP that is its complement.

The importance of Faraci's test is that it forces the *for*-DP sequence to be a PP in a comparative *tough*-construction. Thus, while the test does not exclude that a *for*-subject parse is impossible, it shows that a *for*-PP parse is possible.

4.3.1.2 Fronting

Two other arguments in favor of the hypothesis that the *for*-DP sequence is a PP are presented by Chomsky (1973) and revisited by Jacobson (1992). The first pivots on the distribution of *for*-DP sequences in *tough*-constructions. A *for*-DP sequence can front, extract and appear in other locations where we would expect PPs to appear.

- (30) a. For whom is the rock easy to move?
 b. For Bill, the rock is easy to move.
 c. The rock is easy to move for Bill. (Jacobson 1992: 275)

While this evidence does not directly prove the impossibility for the *for*-DP sequence to be the subject of the embedded clause, it shows that a *for*-PP parse is possible.

4.3.2 Arguments that a *for*-subject parse is impossible with ordinary *tough*-adjectives

4.3.2.1 The animacy condition

Faraci (1974: 180) also argues that when a *for*-DP sequence is inanimate, it cannot occur in a *tough*-construction, but can occur in the corresponding expletive-construction. For example, the same *for*-DP sequence can appear in the expletive construction (31a), but not in the *tough*-construction (31b). The conclusion Faraci draws is that if the *for*-DP sequence were to be the subject of (31b), then the contrast with (31a) would be mysterious.

- (31) a. It is good for the chalk to stick to the blackboard.
b. *The blackboard is good for the chalk to stick to.

Note that this contrast does not hold across the board, as there are *tough*-predicates that do not allow for a *for*-DP sequence to be inanimate in either contexts. For instance,⁵

- (32) a. *It is fun for the chalk to stick to the blackboard.
b. *The blackboard is fun for the chalk to stick to.

Moreover, Faraci notices that the same animate restriction does not apply to other kind of gapped constructions.

- (33) a. The surface was not porous enough for the chalk to adhere to.
b. The salt crystals were too large for the water to break down.
(Faraci 1974: 198)

Keine and Poole (2017) have recently disputed Faraci's evidence, thus arguing against the PP-hypothesis, on the basis of an example such as (34b), which they judge to be grammatical.

- (34) a. It is easy for the chalk to stick to the blackboard.
b. The blackboard is easy for the chalk to stick to.

Yet, not only did all my informants find (34b) weird, unless the sentence is interpreted as in a game of make-believe, but a corpus query, which was effectuated using the corpus *English Web 2012*,⁶ showed that, in 197 of the first 200 examples generated by the concordance specified for the environment in (35), the *for*-DP was animate. The remnant 3 *for*-DP

⁵See also §4.3.2.2 and §4.3.2.3.

⁶Accessible via www.sketchengine.eu.

sequences all referred to organizations or companies, to which one can indirectly attribute intentionality in virtue of being composed by human individuals.

(35) DP be easy for DP to VP

4.3.2.2 Expletives

The second argument concerns the impossibility for expletive subject to appear in a *tough*-construction. The following examples, and respective judgments, are due to Jacobson (1992: 276):

- (36) a. ?*This park would be easy for there to be a riot in.
b. *John would be easy for it to be obvious that Bill likes.

If the *for*-sequence in a *tough*-construction introduces the subject of the infinitive, then the impossibility of expletive subjects is puzzling. As Jacobson notes, there is a strong tendency to interpret the DP following *for* as having abilities. This point further supports the abovementioned animacy constraint.

4.3.2.3 Passivization in expletive constructions

Finally, there is another relevant consideration, and original as far as we know, which, albeit not concerning *tough*-constructions but their expletive variants, supports the view that the main grammatical function of *for*-DP sequences occurring with *tough*-adjectives is that of PP-experiencers. Consider the pair of sentences below: if *Ed* were the embedded subject of the expletive construction in (37a), then passivization should produce a meaning-equivalent sentence. However, the passivized variant of (37a), i.e. (37b), is odd. The intuitive explanation for this contrast is, once again, that *easy* selects for a PP denoting an experiencer but *this book* is not a possible experiencer.

- (37) a. It is easy for Ed to read this book.
b. #It is easy for this book to be read by Ed.

We should be careful, however, not to draw too strong conclusions from this type of example. On the face of it, this test would seem to show that a *for*-subject parse is not possible. However, this conclusion clearly contrasts with Chomsky's type of example (see (27a) above). Moreover, Bernhard Schwarz suggested this example to show that passivization is possible with an inanimate *for*-DP:

- (38) It is easy for the rich for the work to be done by the poor.

Yet, we observe that without *for the rich* the sentence is, again, odd.

(39) #It is easy for the work to be done by the poor.

While we shall leave to future work the testing of examples such as (38) (and comparing them with the Chomskyan ones), we think it is reasonable to conclude that there is an overall strong preference to parse *tough*-constructions with a *for*-PP strategy.

4.3.3 Summary

In this section, we presented a number of empirical arguments in support of the hypothesis that the *for*-sequence of ordinary *tough*-adjectives is a PP – more precisely, a PP denoting an experiencer – and not the subject of the infinitive. This provides the empirical basis for the argument in §4.2 that ordinary *tough*-adjectives do not come with non-local readings.

4.4 Conclusion

In this chapter, we have dealt with a tough question: why do *tough*-adjectives not have non-local meanings, given that our analysis posits that *tough*-movement is a precondition for non-locality? We have answered this question by showing that the neo-Larsonian strategy that we defend cannot possibly apply to ordinary *tough*-adjectives. The reason is that ordinary *tough*-adjectives select *for*-PP phrases and, therefore, their argument structure leads to a mismatch with the only possible antecedent in the sentence, the matrix clause. This makes it impossible for these adjectives to undergo ellipsis and so no non-local reading arises.

Interestingly, though, Pustejovsky (1995) presents cases of *tough*-adjectives in modification structures where the adjective is prenominal, which seem to give rise to non-local readings. One of his examples is the following one, in which *easy class* may mean *easy to teach*.

(40) He taught an easy class.

Yet, *easy class* may also mean, for instance, *easy to take* and not *easy to teach*. In fact, it would not be infelicitous at all to add a continuation such as “yet, the class itself was difficult to teach.”

We think the most plausible explanation for this kind of cases simply involves the polysemy of such adjectives, and we have not much to say in this place. Yet, we just observe that the possibility of these readings do not constitute a counter-example to the theory of non-local modification that we have proposed.

Furthermore, we would also like to add a comment on a test used by Keine and Poole (2017) to show that the *for*-DP sequence in a *tough*-construction introduces the subject of the embedded clause. They claim that, in a *tough*-construction, the *for*-DP cannot be interpreted above the adjective (while it would be possible for that configuration in the corresponding

expletive construction). In the example below (originally from [Hartman 2011](#)), which involves the modal adjective *impossible*, they claim that the only scope relation possible is the one in which the *for*-DP stays lower.

- (41) This test is impossible [for every student] to fail.
*impossible >> every student; *every student >> impossible*

Yet, the choice of their adjective is interesting. They choose a modal adjective and we know from the discussion in the previous chapter that these adjectives are best analyzed as involving a *for*-subject parse. Yet, when we consider ordinary *tough*-adjectives, for which we argue that a *for*-PP parse is the best analytical option, it is interesting to observe that nothing wrong seems to happen when the *for*-phrase takes inverse scope.

- (42) Bernhard is easy [for every student] to talk to.
easy >> every student; every student >> easy

So, while Hartmann's type of evidence is compatible with our account of modal adjectives as a special case of *tough*-adjectives, it does not seem to affect our conclusion concerning *tough*-adjectives.

Chapter 5

The equative effect of non-local readings

5.1 Introduction: On the equative effect of non-local readings

In the previous chapters, we have argued that a necessary condition for a non-local reading to arise is that the adjective be of the right sort: not only has it to allow for *tough*-movement, but it also has to take a *for*-CP, which allows for the ACD's requirement of syntactic parallelism to hold. Also, our account of non-locality is based on the hypothesis that the meaning of the head noun and that of the non-local modification structure compose intersectively. For instance, the NP *tool possible* in (1a) is (informally) analyzed as in (1b).

- (1) a. I brought every tool possible.
 b. $\llbracket \text{tool} \rrbracket \wedge \llbracket \text{possible for me to bring} \rrbracket$

We will now explore whether this intersective analysis captures the intuitive truth-conditions of sentences such as (1a). The challenge this analysis faces is to explain how come intuitive intersective readings of this sentence are not available in some cases. To illustrate the nature of this challenge, let us consider a simple scenario for (1a).

- (2) Scenario 1: Suppose there were eleven tools available to be carried. Further assume that each individual tool could be carried by the speaker in this scenario and also that, given her physical abilities and external circumstances (e.g., how much space there was in the speaker's bag), she could carry all of them together.

Given (2), we know that if our speaker actually brought eleven tools, the sentence is not only intuitively true, but our intersective analysis has no problems to account for this scenario.

Now, let us consider a variant of the scenario just described.

- (3) Scenario 2: As before, suppose there were eleven tools and all could be individually brought by the speaker. However, in contrast to the previous scenario, suppose the circumstances prevented the speaker from carrying more than ten tools, and she did indeed carry ten tools, leaving one behind.

In such a scenario, (1a) is intuitively considered to be true,¹ but it is unclear whether the intersective analysis can capture this result. After all, one may think the set that functions as the restrictor of the universal quantifier should contain each tool that could be individually carried. Since each of the eleven tools had an equal chance to be carried before the event described by the sentence took place, it would seem that the sentence should be false in this scenario under this analysis, given that she failed to carry all of the eleven tools.

We call the observation that (1a) is true in Scenario 2 the “equative effect,” as we observe that this reading of the sentence can be paraphrased by means of an EQUATIVE, i.e. a degree construction that compares two amounts. Under such a reading, (4) compares two cardinalities: that of the group of tools that the speaker brought and that of a largest group of tools it was possible for her to bring, asserting that the former is at least as big as the latter. (4) is clearly true in both the scenarios just contemplated.

- (4) I brought as many tools as (it was) possible for me to bring.

In this chapter, we will explore this observation in detail and compare an analysis that directly implements it with Leffel’s (2014) hypothesis that non-locality correlates with so-called AMOUNT RELATIVES (also DEGREE RELATIVES), relatives that make reference to amounts (see Carlson 1977, Heim 1987, Grosu and Landman 1998 and others).

After having presented a puzzle for Leffel’s analysis, which involves a maximality operator, we claim that it is possible to capture the equative effect without appealing to any underlying degree constructions. What can capture the effect of amount of quantification if not degrees? In Chapter 2, we already discussed Leffel’s observation that the syntactic nature of the embedded infinitive constrains the type of modality expressed by the modal: circumstantial and not epistemic. The question we will address here is the following: what circumstances determine the interpretation of the modal? We shall see that a theory of modality along the classic Kratzerian lines (Kratzer 2012) can account for the variability of truth-conditions.

Moreover, in this chapter we also discuss a determiner restriction that has been observed in relation to non-local readings, namely that only universal determiners license them (Larson

¹As Michael Wagner suggested (p.c.), it is not clear whether the same intuition holds if *possible* is placed in prenominal position. We share his judgment, and we hope to be able to explore its possible implications in future work.

2000, Harris 2012, Leffel 2014). In fact, Leffel’s analysis of non-locality based on amount quantification is originally motivated by an attempt to explain the determiner restriction. We argue that analyses based on amount quantification do not explain the restriction and, thus, the main motivation to introduce these analyses is lost.

The plan for the chapter is as follows: in §5.2, we present the topic of amount relatives and also introduce Leffel’s observation that a similar determiner restriction holds in amount relatives and non-local readings. In §5.3, we compare two analyses that implement the idea that non-locality correlates with amounts: the first associates non-local readings to an underlying equative syntax, while the other, due to Leffel (2014), builds on classical analyses of amount relatives. In §5.4, we present our proposal. The final section concludes with some speculation as to what the determiner restriction may be due. Focusing on the existential case, we suggest a possible explanation that pivots on the idea that the combination of this class of determiners and the modality inherent in these non-local modification structures gives rise to some pathological meaning.

5.2 Amount relatives

5.2.1 A strange kind of relatives

Besides RESTRICTIVE RELATIVES, i.e., relatives whose meanings intersectively combine with the meanings of the NPs they modify, and APPositIVES, i.e., relatives that contain elements anaphorically linked to some referential expressions external to the relative clause (e.g. *I talked to Bill, who is a well-known philosopher*), a “third kind” (Grosu and Landman 1998) of relatives has been discussed in the literature. AMOUNT RELATIVES (also DEGREE RELATIVES) are relatives whose relativizing position does not stand for individuals, but amounts or degrees. The following example from Heim (1987) clearly illustrates the phenomenon. The relative *that/∅² they spilled last night* can only make sense under an AMOUNT-reading, as the RESTRICTIVE one is pragmatically odd.

- (5) a. It would take us the rest of our lives to drink the champagne *that/∅* they spilled last night.
 b. #... to drink the x s.t. x is champagne and they spilled x last night. RESTRICTIVE
 c. ... to drink the amount of champagne equal to that they spilled last night.
 AMOUNT

In his pioneering contribution on the topic, Carlson (1977) argued that amount readings are also associated with RELATIVES OUT OF EXISTENTIALS and ACD-RELATIVES:

²As first observed by Carlson (1977), only *that* and the empty relativizer can license an amount reading. The relativizer *which* is necessarily associated with an intersective reading, as one can verify by the impossibility of an amount reading for Heim’s sentence, when *that* or the null relativizer is replaced with *which*.

- (6) a. I took the books there were on the table. (cf. Grosu and Landman 1998)
 b. Marv put in his pocket everything he could. (Carlson 1977)

Interestingly, the general take is that these relatives can receive either a restrictive or an amount reading. For instance, (6b) may be rendered in one of the two following ways (see Leffel 2014: 145), where the amount reading takes the form of an EQUATIVE construction.

- (7) a. Marv put in his pocket every (single) object that he could. RESTRICTIVE
 b. Marv put in his pocket as much stuff as he could. AMOUNT

Also, notice that one common scenario used to argue for a difference in truth-conditions between these two readings is structurally parallel to the one we discussed in the Introduction in relation to the equative effect of non-local readings. In a scenario where Marv put in his pocket only half of the objects that he could fit in individually, the sentence is reported to be false under the restrictive reading, but could be true under the amount reading if Marv's pocket were full.

Much literature has been produced on the topic since Carlson's paper and many have noted a common puzzling feature of these environments, to which our non-local readings are no exception: how come relatives that do not bear any signs of degree morphology appear to make appeal to amounts?

5.2.2 A similar determiner restriction

In support of the hypothesis of a correlation between amount relatives and non-local readings there is the observation due to Leffel (2014) that a determiner restriction similar to the one that applies to amount relatives also applies to non-local readings. In particular, Leffel refers to the following evidence concerning relatives out of existentials (cf. Leffel 2014: 146, his examples (4.47) and (4.48)):

- (8) a. every book there was on the table
 b. the (three) books there were on the table
 c. the [(one)/(only)] book there was on the table
 d. the longest books there were on the table
- (9) a. *several/some/∅ books there were on the table
 b. *few(er than three)/many/most books there were on the table

Given this evidence, Leffel (2014: 147) highlights the following generalization:

- (10) **Determiner restriction for amount relatives**
 Relative clauses with a degree-based semantics are only licensed by *the*, (as long

as the noun is not count and singular), by *the only*, by *-est*, and by *every*.

As Leffel goes on to notice, a similar restriction applies to non-local readings as well.³ Specifically, while the determiner phrases in (11) allow for a postnominal non-local adjective to occur inside them, the determiner phrases in (12) do not.

$$(11) \quad \text{Liz interviewed } [_{\text{DP}} \left\{ \begin{array}{c} \text{every} \\ \text{each} \\ \text{all the} \\ \text{the only} \\ \text{the most} \\ \text{the fewest} \end{array} \right\} \text{ candidate(s) possible}].$$

$$(12) \quad * \text{Liz interviewed } [_{\text{DP}} \left\{ \begin{array}{c} \text{some} \\ \text{most} \\ \text{many} \\ \text{few} \\ \text{the} \\ \emptyset \end{array} \right\} \text{ candidate(s) possible}].$$

Moreover, notice that, as far as the prenominal position is concerned, only a local interpretation of *possible* is available with the determiners and quantifiers in (12). For instance, (13a) can only mean that John bought some items that, in some possible worlds, are presents and not that he bought (actual) presents that it was possible for him to buy.

- (13) *Context: John went doing some Christmas shopping. He did not have much money, so he bought only some unexpensive books and records. He is still unsure whether he will give all of them to members of his family, or whether he will keep some of them for himself.*
- a. John bought some possible presents.
 - b. John bought some potential presents. ✓LOC
 - c. John bought some presents (that it was) possible for him to buy. ✗NLOC

In the light of this analogy, Leffel (2014) further hypothesizes that there is a correlation between non-locality and the syntax of relativization, on the one hand, and the choice of the determiner, on the other. Specifically, Leffel suggests that the determiner restriction in non-local readings is tied to their underlying syntax, which, in his view, is the same as that of amount relatives.

³Larson (2000) was the first to observe a determiner restriction in these non-local readings, noticing that the determiners allowing for them are the “strong” ones in Milsark’s (1977) sense.

5.2.3 The Carlson/Heim approach to amount relatives

It is useful to sketch here the standard explanation that has been given for the determiner restriction that holds in relatives out of existentials, as this will help us introduce the main technology behind the proposals based on an amount syntax in the next section. The explanation, which was first given by Carlson (1977) and then re-elaborated by Heim (1987), goes as follows. The first step is to (re)consider the nature of the so-called “definiteness effect” (Milsark 1974), the observation that only the quantifiers exemplified in (14a), which are “weak” in Milsark’s classification, allow for *there*-insertion, in contrast to the determiners and quantifiers in (14b)-(14c) (“strong” for Milsark).

- (14) a. There are $\left\{ \begin{array}{l} \text{some} \\ \text{several} \\ \text{many} \\ \text{eleven} \\ \text{few} \\ \text{lots of} \\ \text{etc.} \end{array} \right\}$ men in the laundromat. (Carlson 1977)
- b. *There is $\left\{ \begin{array}{l} \text{the} \\ \text{that} \\ \text{this} \\ \text{Mary's} \\ \text{every} \\ \text{each} \\ \text{any} \end{array} \right\}$ man in the laundromat.
- c. *There are $\left\{ \begin{array}{l} \text{all} \\ \text{most} \end{array} \right\}$ men in the laundromat.

Carlson (1977: 522) observes that the weak quantifiers can be distinguished from the strong ones in (14b)-(14c) by the following property: only the latter can be followed by expressions referring to amounts, as the following list, partially reproducing Carlson’s (1977: *ibid.*), illustrates.⁴

⁴Actually, *each* seems to be fine with expressions of amounts. Many examples like the following can be found:

(i) Time is of the essence. Each five or six circumcisions prevents an infection, he said.
(www.nytimes.com/2011/09/27/health/27circumcision.html)

- | | | |
|------|---|---|
| (15) | Acceptable
the 40 men
every 10 minutes
all fifty Vikings
any 5 cigars
these 5 criminals | Unacceptable
many twelve pounds
few several incidents
some eight mammals
most 40 candidates
each 50 seconds |
|------|---|---|

The second step in the argumentation refers to an additional assumption, namely that trace-variables count as *strong* DPs.⁵ Since this would place this type of DP in the same bag as the DPs in (14b)-(14c), one would predict the definiteness effect to be present also in cases where relativization occurs in a *there*-insertion context, as in (6a) above. That is, that relative would be expected to be ungrammatical if parsed as in (16), contrary to fact.

- (16) I took the books [_{CP} wh λi [_{IP} there were t_i on the table]].

The third, and final, step involves reconsidering these relatives as making reference to amounts. In particular, this step identifies the relativizing position of such relatives with the presence of a silent *d-many* expression. For instance, (6a), repeated below as (17a), has as its (informal) representation (17b). Importantly, while *d* is itself strong, the phrase *d-many* is not, so that the definiteness effect is avoided.

- (17) a. I took with me the books there were on the table.
b. ... the books there were **d-many** on the table.

To sum up, the Carlson/Heim approach to degree relatives posits a *d-many* expression in the syntax of these relatives. Since this expression counts as weak, it does not give rise to the definiteness effect that *there*-insertion would trigger if the variable in the relativizing position referred to individuals.

⁵Carlson actually derives this assumption by identifying the trace with a complex DP whose head is a definite determiner, which he symbolizes as *THAT*, and an NP matching with the NP external to the relative clause and modified by it. The relativization process involves the following steps in Carlson's analysis: the NP in the relative clause gets deleted under identity with the NP external to the relative. The determiner gets replaced with a *wh*-pronoun, which then moves to the left periphery of the clause. Thus, for example, the expression *the man who John met* is parsed as [_{NP} [_{N'} [_{N'} [_N man]] [_{CP} wh λi John met ~~*THAT* man]]]. Carlson's analysis can be considered a matching analysis of relative clauses (see Lees 1960 and Chomsky 1965; for a more recent defense of this analysis, see Sauerland 1998 and Sauerland 2003). That traces count as strong also straightforwardly follows from the copy theory of movement in Fox (2002).~~

5.3 Non-local readings as a sub-kind of amount relatives?

5.3.1 Non-local modification as equative

According to Leffel, non-local readings of *possible* are a sub-kind of amount relatives, witnessing the fact that they can be rendered as directly referring to amounts. As we saw in §5.1, a sentence with a non-local modifier such as (18a) can be naturally paraphrased as in the equative variant (18b). Although Leffel is not explicit about this analogy, he seems to endorse it, so let us see how far a direct implementation of it could take us.

- (18) a. I brought every tool possible.
 b. I brought as many tools as (it was) possible for me to bring (**d-many tools**).

Moreover, it is interesting to observe that languages other than English, e.g. Japanese, explicitly use equative constructions to express the kind of reading that we have described as giving rise to the equative effect. The following example, which was provided by Junko Shimoyama, illustrates the point:

- (19) Ana-wa [dekiru kagiri takusan]-no koohosha-to mensetsushita
 Ana-TOP can.do extent many-GEN candidate-with interviewed
 ‘Ana interviewed as many candidates as she possibly could.’ (Japanese)

Adapting Crnič and Fox (2019), we make the following assumptions concerning the syntax and semantics of these constructions: first, we take the meaning of *many* to be that of a cardinal quantifier (see Hackl 2000):

- (20) $\llbracket many \rrbracket = \lambda d_d. \lambda P_{e(st)}. \lambda Q_{e(st)}. \lambda w_s. \exists x[P(x)(w)=1 \wedge |x| = d \wedge Q(x)(w)=1]$

Second, we assume the meaning of *as* to be a quantifier with existential force relating two sets of degrees.⁶ The matrix degree property is obtained by first QRing the generalized quantifier *d-many tools*⁷ and then abstract over the degree variable. The other degree property is obtained similarly except that a generalized quantifier over degrees in the form of a MAX-operator moves out of the degree argument of *d-many tools*, leaving a degree trace behind. The operator receives the following standard denotation (cf. Rullmann 1995):

- (21) $\llbracket MAX \rrbracket = \lambda d_d. \lambda D_{dt}. \lambda w_s. d = \iota d[d \in D \wedge \forall d' [d' \in D \rightarrow d' < d]]$
 $\approx \lambda d_d. \lambda D_{dt}. \lambda w_s. d = \max(D)$

⁶Alternatively, one could take *as* to directly encode maximality. Nothing substantial hinges on this choice.

⁷We are considering here a de dicto reading, where the generalized quantifier attaches below *possible*, but not much hinges here on the choice of the attachment site of the GQ.

Moreover, further abstraction of the degree argument of MAX generates a degree property that functions as the first argument of the existential denoted by *as*. Putting all these pieces together, we arrive at assigning the modal equatives in (18b) the following structure.⁸

$$(22) \quad \exists^d \left[\text{wh } \lambda d [\text{MAX } d] \lambda d' [\text{AP possible } [d' \text{-many tools } \lambda j [\text{CP for me to bring } t_j]]] \right] \\ \left[\lambda d [d \text{-many tools } \lambda i [\text{I PST bring } t_i]] \right]$$

The meaning associated with (22) is as follows (NB: s_c stands for the contextually provided speaker of (18a)):

$$(23) \quad \llbracket (22) \rrbracket^{a,c} = \lambda w_s. \exists d'' [d'' = \max(\{d' : \exists w' [w' \in \text{Acc}_w \wedge \exists x [x \text{ is a tool in } w' \wedge |x| = d' \wedge s_c \text{ brings } x \text{ in } w']]\}) \wedge \exists x [x \text{ is a tool in } w \wedge s_c \text{ brought } x \text{ in } w \wedge |x| = d \wedge d \geq d'']]$$

I.e. ‘The number of tools that I brought is at least as great as the number of tools that it was possible for me to bring.’

Let us have a look at how this analysis accounts for the scenarios described in §5.1. Concerning Scenario 1 (see (2)), a world in which all the tools could be brought together, and the speaker brought all of them is a world belonging to (23), insofar as the cardinality of the set of objects the speaker actually brought is at least as great as that of the set of tools she could bring. Similarly, the denotation of (22) would also include a world instantiating Scenario 2 (see (3)). In that scenario, of the 11 tools available, only a group of 10 could be brought by the speaker and was in fact brought by her. In any world instantiating this scenario, the maximal cardinality of a group of tools that was possible for the speaker to bring is 10 and that cardinality is equaled by the number of tools actually brought by her.

Notice that in any world where the number of tools actually brought by the speaker is less than the (maximal) number of tools that in some accessible world was brought by her, the sentence would be false, an intuitively correct result.

5.3.2 Leffel’s maximality analysis

As we said earlier, Leffel’s main concern is to derive the determiner restriction. While his analysis does not address the equative effect at all, his semantics is at least partially motivated by an analogy with equative constructions and, therefore, should be tested in this regard.

Leffel’s analysis posits that the structure of a DP containing a non-local adjective involves two types of relativization: the first is the abstraction of an individual variable in the object position of the verb embedded by the adjective. In terms of the proposal we have put for-

⁸Once again, this structure assumes a matching theory of relative clauses. See footnote 4 and references therein.

ward in Chapter 2, we could reinterpret Leffel as claiming that *tough*-movement generates a property of individuals. However, in contrast to our proposal, a second abstraction takes place in Leffel’s derivation: the embedded CP contains a *d-many* expression, whose degree argument extracts generating a λ -abstract, i.e. a property of degrees which then serves as an input to a maximality operator.

$$(24) \quad \text{every } [_{NP} [_{N'} [_{N'} [N \text{ tool}]]] [_{AP_2} \text{MAX } \lambda d [_{AP_1} \text{wh } \lambda j \text{ possible } [_{CP} \text{for us to bring d-many } t_j]]]]]$$

Leffel (2014: 153) defines the operator MAX as in (25). This operator takes a property of degrees P and returns every function from *sums* or *groups* (i.e. individuals defined as in Sharvy 1980 and Link 1983) to 1 just in case there is a cardinality in the domain of MAX which is their exact cardinality and such that no other equinumerous group has P. This implies that the set of individuals that MAX returns will be a singleton set containing the largest group having P.

$$(25) \quad \llbracket \text{MAX} \rrbracket = \lambda P_{d(e(st))}. \lambda x_e. \lambda w_s. \exists d [P_d(x)(w)=1 \wedge \forall y [P_d(y)(w)=1 \rightarrow x = y]]$$

As for *many*, we can treat it here as having an adjectival meaning that relates groups to their cardinality, i.e. the number of their atomic elements (see, e.g., Beck and Rullmann 1999).

$$(26) \quad \llbracket \text{many} \rrbracket = \lambda d_d. \lambda x_e. \lambda w_s. |x| = d$$

The resulting denotation of a sentence such as (18a) is provided in (27b), assuming the LF in (27a). In any world where there was a sum of tools that was larger than any other sum of tools that was possible to bring and which the subject brought, the extension of (27b) at that world is 1.⁹

$$(27) \quad \begin{array}{ll} \text{a.} & [_{DP_i} \text{every } [_{NP} [_{N'} [_{N'} [N \text{ tool}]]] [_{AP_2} \text{MAX } \lambda d [_{AP_1} \text{wh } \lambda j \text{ possible } [_{CP} \text{for us to} \\ & \text{bring d-many } t_j]]]]]] \lambda i [\text{we PST bring } t_i] \\ \text{b.} & \llbracket (27a) \rrbracket^{a,c} = \lambda w_s. \forall x [x \text{ is a tool-sum in } w \wedge \exists d [d \in \{d: \{x: \exists w' [w' \in \text{Acc}_w \\ & \wedge s_c \text{ bring } x \text{ in } w' \wedge |x| = d \wedge \neg \exists y [y \neq x \wedge \exists w' [w' \in \text{Acc}_w \wedge s_c \\ & \text{brings } y \text{ in } w' \wedge |y| = d]]]]\} \rightarrow s_c \text{ brought } x \text{ in } w] \\ & \text{'For any } x, \text{ if } x \text{ is the maximal amount of tools that (it) was possible for me} \\ & \text{to bring, I actually brought } x.\text{'} \end{array}$$

While accounting for Scenario 1 (see (2)), this analysis does not capture Scenario 2 (see (3)). In that scenario, there are eleven objects, all of which could be individually carried,

⁹Interestingly, *every* does not usually tolerate singleton restrictors: e.g., *#every tallest student in this class*. Thanks to Bernhard Schwarz for pointing this out.

but only ten of which could be carried together. Remember, each tool of the eleven tools had the same chance of being chosen to be brought by the speaker. In such a scenario, there doesn't seem to be a unique most numerous group of tools that it was possible for the speaker to bring, in fact there should be $\binom{11}{10}$ possible such groups, i.e. 11. Accordingly, the sentence's meaning should be undefined. Thus, although this analysis is seemingly motivated in part by the analogy with equatives, it does not actually replicate an equative semantics, and hence fails to capture the equative effect.

Moreover, this analysis also suffers from a different shortcoming concerning the parallelism condition necessary for ACD to hold. As the attentive reader will have already spotted, the embedded CP in (27a) does not match with the matrix clause *we PST bring t_i* , for the latter does not contain a *d-many* expression. Accordingly, NCA could not apply to derive the surface form (18a).¹⁰

5.3.3 Determiner restriction still unexplained

As we saw, non-local readings come with a determiner restriction. Such a restriction, however, is not explained by any of the two amount analyses, the one that identifies a non-local reading in an underlying equative construction and the other based on Leffel's maximality operator.

Concerning the first analysis, it is difficult to see how a universally quantified sentence such as (18a) can be rendered as an equative construction. Let us suppose that there were some fancy spell-out rule allowing the degree morphology normally associated with equatives to be spelled out as a universal quantifier in non-local environments. Then, the burden would be on the defender of such an account to explain why such a spell-out rule should generate universals and, not, say, existentials.

Moreover, while Leffel's analogy between the determiner restriction for non-local readings, as shown in (11) and (12) above, and the determiner restriction for amount relatives, as seen in (8) and (9), is striking, it is by no means perfect. There are three main aspects that the analogy does not capture.

First of all, while a definite followed by a bare plural noun is enough to license a relative out of an existential, as in (8b) above, the same configuration does not allow for a non-local occurrence of *possible*:

(28) *Liz interviewed the (three) candidates possible.¹¹

¹⁰This issue may be dealt with by espousing a copy theory of traces such as in Fox (2002).

¹¹Leffel suggests a different explanation based on a conflicting interaction between the uniqueness presupposition of the definite and the modal force of the adjective. Unfortunately, lack of time prevents us from fully exploring this interesting idea, but we note that the particular analysis suggested by Leffel does not succeed. Consider the following example and the paraphrase that Leffel provides (*/# are his judgment):

Secondly, the universal *each* does not license *there*-insertion. Yet, *each* is fine with non-local modifiers.

(29) *Each man there was disagreed. (Carlson 1977: 525)

(30) To open the safe, the burglar tried each combination $\left\{ \begin{array}{c} \text{conceivable} \\ \text{possible} \\ \text{imaginable} \end{array} \right\}$.

Finally, there is a more general problem for all accounts of amount relatives, which extends to Leffel's approach to non-locality. As we saw earlier, it is assumed that ACD-relatives are ambiguous between a restrictive reading and an amount one. But while the unavailability of an amount reading with existential quantifiers may follow from whichever constraint is in force against such quantifiers in amount constructions, it is unclear why universals should allow for intersective readings of such relatives, while existentials should not.

- (31) a. John interviewed every (individual) candidate he could.
b. ??John interviewed some (individual) candidates he could.

By the same token, we should expect non-local modification structures to be ambiguous between an intersective reading and an amount reading under Leffel's analysis, although Leffel does not consider the possibility of an ambiguity.

- (32) a. Liz interviewed every candidate possible.
b. Liz interviewed every (individual) candidate that it was possible for her to interview.
c. Liz interviewed as many candidates as possible for her to interview.

As for ACD-relatives, we need an independent explanation for why restrictive readings should not be available with existentials. In other words, we need an independent explanation for why (33a) cannot mean (33b); in fact, we need an explanation for why (33a) is not grammatical at all.

(i) */#I brought with me the tools possible.

'I brought the unique set of tools x s.t. for some situation in which I accomplish what I need to, I bring x .'

According to Leffel, (i) is odd, because it suggests that there is a unique set of tools x that it was possible for the speaker to bring. However, Leffel's intuition is that the sentence "strongly" suggests that there isn't any such unique group. Yet, it seems quite plausible to come up with contexts where the uniqueness requirement of the definite is satisfied. Imagine there are two groups of tools, respectively $a \oplus b \oplus c$ and $d \oplus e \oplus f$, but only the former would allow the speaker to accomplish what he needs to accomplish. In such a scenario, the presuppositional requirement would be satisfied and the sentence could be truth-conditionally evaluated.

- (33) a. *Liz interviewed some (individual) candidates possible.
 b. Liz interviewed some (individual) candidates that it was possible for her to interview.

In conclusion, the argument that the determiner restriction for non-local readings follows from assuming an amount syntax is at best inconclusive. First, it leaves unexplained why definites that allow to combine with amount relatives do not allow to combine with non-local modifiers. Second, it leaves out good quantifiers such as *each*. Finally, it does not provide an account for why restrictive readings of non-local modifiers should be available with universals, but not with existentials.

5.4 Getting the equative effect from modality

As saw in the Introduction to this chapter, the fact that (1a), repeated below as (34), comes out true in Scenario 2 in (3), also repeated below, led us to consider the possibility of degree analyses that are alternative to our intersective one.

- (34) I brought every tool possible.
- (35) Scenario 2: Suppose there were eleven tools and all could be individually brought by the speaker. However, suppose the circumstances prevented the speaker from carrying more than ten tools, and she did indeed carry ten tools, leaving one behind.

In this section, we provide a defense of the intersective analysis. The analysis to be detailed below aims to implement the following intuition: despite initial appearances, the domain of *every* in Scenario 2 does not include all eleven tools. Yes, there is a point in time in the scenario where for each of the eleven tool there is an accessible world where it is brought. However, consider now a time in the described event's development when the speaker's bag is already filled, with ten of the eleven tools, and with only the hammer left on the table. We intuit that the speaker could now say, truthfully, something like "I can't bring the hammer." We can understand this statement being true in virtue of the circumstances (the bag is full) and certain additional assumptions (e.g., that none of the ten tools will be taken out again to make space for the hammer). Given those circumstances and the additional assumptions, then, the ten tools in the bag are all the tools that it is possible for the speaker to bring. The idea, then, is that (34) can be judged true in Scenario 2 because the modality can be evaluated at a time, and relative to additional assumptions, when it determines only the ten tools ultimately brought to be in *every*'s domain of quantification.

5.4.1 The basic Kratzerian ingredients

5.4.1.1 Conversational backgrounds

In Chapter 2, we assumed that the accessibility relation of a modal was contextually determined. Here, we posit that the accessibility relation is relativized to a CONVERSATIONAL BACKGROUND (henceforth CB) f (Kratzer 2012), and we shall write $w' \in \text{Acc}_w^f$. Accordingly, the denotation of *possible* is rewritten as follows:

$$(36) \quad \llbracket \text{possible} \rrbracket^f = \lambda p_{\text{st}}. \lambda w_s. \exists w' [w' \in \text{Acc}_w^f \wedge p(w')=1]$$

A conversational background f is a function from worlds to sets of propositions (i.e. sets of sets of worlds): i.e. $f: W \mapsto \mathcal{P}(\mathcal{P}(W))$. Conversational backgrounds can be of different kinds: to name the most common ones, they can be circumstantial, deontic, teleological, stereotypical and epistemic. Under the standard Kratzerian model, when f is a circumstantial conversational background, it takes a world as argument and returns the set of propositions describing the circumstances that hold in that very world. The resulting set is called the MODAL BASE (henceforth MB). For instance, given a world w in which the speaker of (34) carries tool a and tool b in her bag, and no space for a third tool is available in the bag, the modal base may contain at least the following three propositions.

$$(37) \quad f(w) = \left\{ \begin{array}{l} \text{that } s_c \text{ carries tool } a \text{ in her bag,} \\ \text{that } s_c \text{ carries tool } b \text{ in her bag,} \\ \text{that } s_c \text{'s bag has no space for an additional tool} \\ \dots \end{array} \right\}$$

Intuitively speaking, a world w' is accessible from another world w relative to a circumstantial modal base whenever w' is compatible with the set of facts determined by the given CB at w . More formally, w' is accessible from another world w relative to a modal base iff it is a member of each member of Acc_w . Following a common technique (see Portner 2009), it is often useful to work with the generalized intersection of $f(w)$, viz. $\bigcap f(w)$, which is the set of worlds where all the propositions in $f(w)$ are true. Accordingly, we recast the definition of accessibility in the following terms: a given world w' is accessible from another world w relative to a modal base iff w' is a member of the generalized intersection of $f(w)$.

$$(38) \quad \forall w, w', w' \in \text{Acc}_w^f \text{ iff } w' \in \bigcap f(w)$$

Note that the accessibility relation determined by any given circumstantial conversational background is reflexive,¹² insofar as, for any given world in the MB determined by that

¹²Whenever an accessibility relation of a MB is reflexive, the MB is said to be *realistic*.

CB, that world is compatible with what the circumstances are in that world (in the sense of *accessibility* defined in (38)).

5.4.1.2 Ordering sources and best worlds

Not all worlds count the same, some are better than others. Worlds can be ranked in relation to how close they are to some contextually given ideal. For instance, given a certain circumstantial MB such as the $f(w)$ described above, we can consider which worlds are *most normal*, i.e. which worlds are most expected. Given the $f(w)$ above, we know our speaker has fully loaded her bag with two tools. Clearly, a world where one tool in the bag is replaced by another would have to count as less normal. And worlds where a magic elf pops out and takes out a tool from the bag or adds one by extending the size of the bag are less normal (much less so) than worlds where nothing happens to the speaker's bag unless the speaker decides to change something. *Mutatis mutandis*, worlds where some unlikely natural force applies making the bag disintegrate are less normal than worlds where the bag is still loaded with the two tools, but more normal than worlds with magic elves.

In order to impose an order on the worlds of the circumstantial $f(w)$ above we need to consider a different set of propositions that (contextually) determines the set of expectations in w . This set of propositions is determined by a so-called ORDERING SOURCE (henceforth OS) (Kratzer 2012), which is another kind of conversational background. The ordering source in question will be a stereotypical ordering source, as we are interested in ordering worlds in relation to how *normal* or *expected* they are.

The notion of ordering that Kratzer proposes, written $\leq_{g(w)}$, ranks worlds according to how close they come to satisfying the ideal given by g . The ordering is based on the following definition, which states that given two worlds w' and w'' , w' is at least as close to the ideal determined by g in w (for any arbitrarily chosen g and w) as w'' , if and only if the propositions in $g(w)$ that hold in w'' are a subset of those in $g(w)$ that hold in w' .

- (39) $\forall w, w', w'' \in W$ and $g(w) \subseteq \mathcal{P}(\mathcal{P}(W))$:
 $w' \leq_{g(w)} w''$ iff $\{p: p \in g(w) \wedge p(w'')=1\} \subseteq \{p: p \in g(w) \wedge p(w')=1\}$
 ‘The world w' is at least as close as w'' to the ideals set by g in w iff the set of propositions of $g(w)$ holding in w'' are a subset of the set of propositions of $g(w)$ holding in w' .’

We can thus define what it means for a world to be a best world. A world w' in an arbitrarily chosen MB $\bigcap f(w)$ is a *best* world w.r.t. an arbitrarily chosen ordering source g iff there is no world $w'' \in \bigcap f(w)$ s.t. the propositions in the relevant OS that hold in w'' are a superset of those that hold in w' . Following Portner (2009), we can introduce an operator BEST that returns the set of best worlds in a given MB w.r.t. a salient OS.¹³

¹³Given that the ordering source that we shall work with is based on a single proposition, a best world is here defined having the so-called LIMIT ASSUMPTION in mind (see Portner 2009 for discussion and refer-

$$(40) \quad \text{BEST}_{\leq g(w)}(\bigcap f(w)) := \{w' : w' \in \bigcap f(w) \wedge \neg \exists w'' \in \bigcap f(w) \text{ s.t.} \\ \{p : p \in g(w) \wedge p(w')=1\} \subset \{p : p \in g(w) \wedge p(w'')=1\}\}$$

Accordingly, the notion of accessibility is now defined over best worlds only:

$$(41) \quad \forall w, w', w' \in \text{Acc}_w^B : \Leftrightarrow w' \in \text{BEST}_{\leq g(w)}(\bigcap f(w))$$

Assuming this Kratzerian semantics that takes into account normal or expected worlds, we can rewrite the denotation of *possible* based on this notion of *best worlds*:¹⁴

$$(42) \quad \llbracket \text{possible} \rrbracket^{f,g} = \lambda p_{st}. \lambda w_s. \exists w' [w' \in \text{BEST}_{\leq g(w)}(\bigcap f(w)) \wedge p(w')=1]$$

Limiting our attention to not so outlandish scenarios (worlds with no elves or witches, to be sure), we may now ask what the ideal may be in them. We could go on listing all the propositions that are not ideal (i.e. not normal or expected) – e.g., *that replacing a tool with another is not ideal*, *that extending the bag is not ideal*, etc. –, but that would be certainly impractical. Instead, we posit a single general principle that determines the most general ideal at the basis of our toy example. The principle is the following:

$$(43) \quad \text{Don't alter!}$$

What this principle implies in the case at hand is simply that, other things being equal, it is not normal that our subject alters the course of events by, for instance, expanding or shrinking her bag. This principle is so general that it induces a simple partition of worlds: worlds where the bag stays the same in contrast to worlds where some modification or other happens. Applying Kratzer's definition above, the latter worlds are necessarily “worst” worlds, in that the set of propositions defining the ordering source – i.e. the singleton set containing the proposition expressed by (43) – does not hold in them. Vice versa, a best world will be simply one where (43) holds.¹⁵

ences).

¹⁴Note we are treating here both f and g as parameters of the interpretation function. Others (e.g. von Stechow and Heim) prefer to have them to be explicitly represented in the syntax of modals. Hopefully, nothing essential for our explanation of the equative effect is lost in this particular meta-semantic choice.

¹⁵Thus, the resulting order is total, as every pair of worlds in the set of possible worlds is comparable with respect to whether (43) holds or not. True, this simplification does not capture the intuition described above that there are different degrees of abnormality. Of course, we could have considered more complex ordering sources that would have determined partial orders in which not every pair of worlds would be comparable. However, the ordering source we suggest here will be sufficient to provide a domain of quantification for our modal adjectives that is empirically adequate to capture the truth-conditions we are after.

5.4.2 Getting the right time

An adequate semantics for circumstantial modals should model the fact that circumstances in the world change over time. In the scenario described above for our toy example, we considered a time at which the bag was fully loaded. We could have considered a different time at which the bag was not fully loaded. Intuitively, the set of possibilities that is accessible depends on the time at which we fix the modal’s interpretation. What the speaker can bring or not depends on whether the bag is fully loaded; at times when the bag is not fully loaded, it will be true that it is possible for the speaker to bring more tools. *Mutatis mutandis*, at times in which the bag is fully loaded, it will no longer be possible for the speaker to bring any further tools. This observation is corroborated by the intuition that our speaker can truly and felicitously assert something like “I can’t bring more tools!” in such a context.

We shall thus extend the Kratzerian model by including a time parameter, so that a conversational background will now determine a modal base relative to both a world and a time. Thus, a conversational background will be now a function f from worlds and times to sets of sets of worlds; i.e. $f: \mathbb{W} \times \mathbb{T} \mapsto \mathcal{P}(\mathcal{P}(\mathbb{W}))$.¹⁶

Suppose in our world of evaluation w_1 , our speaker needs to fix a certain issue the sorting of which requires the use of several tools. Suppose there is a time t_1 in which it is possible for her to bring three tools only, as her bag can contain at most three tools. The modal base in that world at t_1 will include all those circumstances that are true at t_1 in w_1 ; focusing on the sole relevant propositions, it will look as follows:

$$(44) \quad f(w_1, t_1) = \left\{ \begin{array}{l} \text{that } s_c \text{ carries no tool at } t_1, \\ \text{that } s_c \text{'s bag has room for three tools at } t_1 \end{array} \right\}$$

Consider now a later time t_2 , when our speaker has loaded her bag with tools a, b and c, but she can still bring another tool, call it d, as her bag has now room for another tool (imagine that, in the meantime, the speaker has managed to take out some other objects from her bag, while keeping the other tools inside). The modal base at t_2 is obviously different:

$$(45) \quad f(w_1, t_2) = \left\{ \begin{array}{l} \text{that } s_c \text{ carries tool a at } t_2, \\ \text{that } s_c \text{ carries tool b at } t_2, \\ \text{that } s_c \text{ carries tool c at } t_2, \\ \text{that } s_c \text{'s bag has room for one additional tool at } t_2 \end{array} \right\}$$

Note we are not here relativizing our ordering source to a time, as the principle we have posited simply regulates our expectations about the course of events irrespective of its unfolding.

¹⁶See [Condoravdi \(2002\)](#) for discussion and references.

But how do these possibilities along a temporal dimension get determined in our non-local reading of (34), repeated below as (46)?

(46) I brought every tool possible.

So far, we have assumed a structure for the sentence containing the non-local adjective along the following lines:

(47) $[\text{DP}_i \text{ every } [\text{NP } [\text{N}' [\text{N}' [\text{N } \text{tool}]]] [\text{AP } \text{wh } \lambda j [\text{possible for me to bring } t_j]]]] \lambda i [\text{I PST bring } t_i]$

First, let us consider the interpretation of the matrix clause, which contains the morpheme PST. The question arises as to how, compositionally, the meaning of PST enters in the derivation of the meaning of the clause. Let us simply assume that the semantic role of PST is to directly provide a time interval t (abbreviated as t_c) preceding the utterance time (abbreviated as t_u) in the interpretation of the lexical predicates that are under its scope.¹⁷

(48) $[[\lambda i [\text{I PST I bring } t_i]]]^{a[i/x], t_u, c} = \lambda x_c. \lambda w_s. s_c \text{ brings } x \text{ at } t_c \text{ in } w \quad (\text{where } t_c \prec t_u)$

Second, concerning the interpretation of the AP in (47), we see that the structure is not under the scope of tense. By default, the structure should be interpreted relative to t_u , but this clearly cannot be the case. We are not interpreting the possibility modal relative to the utterance time, but, as in the case of the matrix clause, relative to some contextually provided time interval preceding the utterance time. This time, abbreviated as t^* , can precede t_c or overlap with it, and we shall only assume here that there are general discourse principles regulating the relation between t^* and t_c (see, for instance, Partee 1984). Accordingly,

(49) $[[\text{AP}]]^{a[j/x], t^*, f, g, c} = \lambda x_c. \lambda w_s. \exists w' [w' \in \text{BEST}_{\leq g(w, t^*)}(\bigcap f(w, t^*)) \wedge s_c \text{ brings } x \text{ in } w' \text{ at } t^*]$

Finally, as for the truth-conditions of (46), our analysis simply posits that the sentence is true if and only if for every (actual) tool $s.t.$ the speaker of the context (s_c) brings at t^* in some possible worlds that BEST makes accessible from the MB $\bigcap f(w, t^*)$ relative to the OS g operating at (w, t^*) , s_c also brings it at t_c in the actual world.

(50) $\lambda w_s. \forall x [[x \text{ is a tool in } w \wedge \exists w' [w' \in \text{BEST}_{\leq g(w, t^*)}(\bigcap f(w, t^*)) \wedge s_c \text{ brings } x \text{ in } w' \text{ at } t^*]] \rightarrow s_c \text{ brought } x \text{ in } w \text{ at } t_c]$

¹⁷The underlying theoretical assumption is that we are here adopting a referential account of tense, as in Partee (1974) and Kratzer (1998). However, note that we are not explicitly representing times in our syntax, but treating them as parameter of the interpretation function.

5.4.3 Equative effect explained

Remember, our objective is to provide a semantics for non-local readings that captures the equative effect. So let us test our semantics with a concrete example that instantiates the effect. Consider a scenario where there were four tools a, b, c and d that were each available to be carried at some point in time but the speaker could bring only three of them together, as her bag had no sufficient space to include all four of them. If, at some later time, the speaker of (46) actually brought three tools, (46) is judged to be true. If she brought less than three tools, the sentence comes out false.

Now, let us explore the scenario just described but first consider a time at which our speaker is without any tools. This will allow us to see how our semantics is tuned to the change of circumstances. The relevant world-time coordinate that characterizes this scenario is the pair (w_1, t_1) . At this coordinate, we get the following modal base:

$$(51) \quad f(w_1, t_1) = \left\{ \begin{array}{l} \text{that } s_c \text{ carries no tool at } t_1, \\ \text{that } s_c \text{'s bag has room for 3 tools at } t_1 \end{array} \right\}$$

At this point in time, the only relevant expectation that we need to consider is that no external force, whether natural or supernatural, intervene and alter the normal course of events, so as to, say, extend or reduce the size of the speaker's bag, hide or destroy it, and so on and so forth. These possibilities, albeit logically possible, are not normal and our OS defines them as not ideal.

Thus, at t_1 it is a logical possibility that each of the four tools is brought at some later time. Of course, given that there are no expectations about how many tools the speaker will carry, there are stereotypical worlds where s_c goes on to load her bag with only one, only two or only three tools. Also, given the salient MB and OS, there are also normal worlds where s_c carries no tools at all, but no normal worlds where the speaker loads all the four tools in her bag, as this would require something abnormal to occur.

However, as the reader can easily verify, insofar as there are normal worlds where at least one of the four objects is brought (doesn't matter which), the domain of *every* in w_1 at t_1 is bound to contain all the four tools. Given that there are no expectations about the speaker bringing any specific tool, this situation is already sufficient to establish that the set of individuals in the restrictor of *every* will contain each individual tool such that there is a normal world where s_c brings that tool. Which set of tools will the restrictor of *every* be identified with? Clearly, it is the set containing a, b, c and d. Accordingly, when the modal is interpreted relative to the coordinate (w_1, t_1) , the extension of (46) comes out false at w_1 ; only three of the four tools that at t_1 are possible for the speaker to bring are actually brought by her at a time later than t_1 .

Let us now move on to a later time, call it t_2 . At this point in time, suppose the speaker has loaded her bag with tools a and b. As before, the bag could be filled with up to three tools.

The MB would then be as follows:

$$(52) \quad f(w_1, t_2) = \left\{ \begin{array}{l} \text{that } s_c \text{ carries tool a at } t_2, \\ \text{that } s_b \text{ carries tool b at } t_2, \\ \text{that } s_c \text{'s bag has space for one tool but not more at } t_2 \end{array} \right\}$$

Given this MB, we can now ask what the most normal worlds are. Again, assuming that no force intervenes altering the normal course of events, i.e. assuming (43) is in force, BEST should output a set of worlds that includes worlds where s_c additionally carries tool c and worlds where she additionally carries tool d but no worlds where she additionally carries both c and d.

The reader is invited to verify that, even in this case, the restrictor of *every* is bound to contain all the tools a, b, c and d, so that, as in the previous time snapshot, we end up with a too strong reading.

Finally, we can move on to a later time, call it t_3 , at which our speaker has fully loaded her bag with tools a, b and c. This, as we know, is just the kind of scenario where the equative effect manifests and we are now in a position to explain it. Thus, consider the following MB holding at (w_1, t_3) :

$$(53) \quad f(w_1, t_3) = \left\{ \begin{array}{l} \text{that } s_c \text{ carries tools a, b and c in her bag at } t_3, \\ \text{that } s_c \text{'s bag has no room for any additional tools at } t_3 \end{array} \right\}$$

Intuitively, at this point, it is no longer a possibility for the speaker to bring an additional tool, as this would require something abnormal to happen. Application of BEST should, therefore, return a set of normal worlds where no additional tool is carried by the speaker. Other things being equal, the set of normal worlds should contain worlds where only tools a, b and c are brought. Accordingly, this situation implies that the restrictor of the universal will contain only a, b and c, and so long as the speaker actually brought these three tools at a time that is either simultaneous to the time when the restrictor of the modal is interpreted or later than this, the sentence's denotation will map w_1 to 1.

Note that without the restriction coming from the ordering source as defined in (43), we would make the resulting reading too strong. For instance, without considering these as the most normal worlds, there would be worlds that are logical possibilities where, for instance, the speaker's bag gets extended so as to include tool d. In the presence of any such worlds, it would therefore be possible even at the coordinate (w_1, t_3) to bring also d in addition to a, b, c. The equative effect would remain unexplained.

In conclusion, we have shown that whenever the the equative effect — the observation that a sentence with a non-local reading comes out true even when the restrictor of the universal does not quantify over all the elements of the noun's denotation — is explained by looking at the right type of circumstances. A richer notion of MB that incorporates times together

with a proper restriction on the type of possibilities the modal quantifies over (only the most normal ones) derives the equative effect, while also capturing the intuitive truth-conditions of non-local readings without appealing to any underlying degree constructions.¹⁸

5.5 Conclusion

In this chapter, we have defended the view that an intersective analysis of non-local readings based on an extension of Kratzer’s semantics for modals is empirically adequate, insofar as it captures the truth-conditions of these sentences. The equative effect – the observation that a sentence containing a non-local modification structure embedded in a DP headed by a universal is true whenever a corresponding equative construction is also true – is explained by this semantics without appealing to degree quantification, whose presence we have shown to be empirically dubious and also theoretically problematic.

One main issue that we have claimed affects accounts of non-locality based on degree quantification is that appealing to it does not explain the determiner restriction we have seen associated with these readings. Lack of time prevents us from fully dealing with the issue here, but we wish to conclude this chapter with the sketch of a possible explanation. In particular, we provide an intuitive explanation for the impossibility of an existential to allow for a non-local reading.

(54) *Liz interviewed some candidates possible.

We claim that the source of the ungrammaticality of (54) is that the truth-conditions associated with it (under the assumption that *possible* is non-local) are the same as the ones that are associated with the non-modified variant of that sentence, (55):

(55) Liz interviewed some candidates.

In fact, assuming that the modal base is circumstantial, in any world where (55) is true, one can easily verify that (54) is also true (and vice versa). Since (55) expresses what (54) also does, the presence of the modal is necessarily redundant and, therefore, its semantic content trivially composes with the rest of the clause.

As much work in semantics following Gajewski (2002) has shown in recent years, trivial content can lead under certain conditions to unacceptable structures. However, we should be clear in what sense we interpret triviality here. The kind of triviality at stake here cannot be identified with Gajewski’s notion of L-analyticity, as a sentence such as (54) is not true under all permutations.¹⁹

¹⁸Could Leffel’s account be rescued by adopting this semantics for modality? Perhaps, but the question would then remain why we should introduce amount quantification, given that our current proposal accounts for the same facts without positing any additional syntactic machinery.

¹⁹A sentence is L-analytic whenever it is always true under all its permutations of its “non-logical” (i.e.

We would like to suggest that ungrammatical sentences can also result from a different kind of triviality: following [Schwarz et al. \(2019\)](#), we take the ungrammaticality of (54) to follow from a blocking effect due to the existence of another sentence, viz. (55), which is syntactically less complex expressing the same truth-conditional content.

But sure, one may reply, (56) is more syntactically complex than (55) and, yet, is not ungrammatical despite the second conjunct being truth-conditionally redundant.

(56) Liz interviewed some candidates and Liz interviewed some candidates.

However, assuming Gajewski's account of L-analyticity based on the logical technique of permutations, one can verify that (54) and (56), in fact differ. While, (54) is necessarily redundant under all permutations, there are some permutations of lexical items in (56), which make the sentence not redundant. Just assume that the two occurrences of the nominal *candidates* in (56) are interpreted relative to different permutations: one permutation of the first occurrence of the nominal will map the set of candidates onto the set of actual candidates, while a different permutation of the second occurrence will map the same set onto the set of non-candidates.

Thus, the view that we submit here is that the determiner restriction is, ultimately, related to triviality from necessary blocking. What rests to be shown is how this proposal may extend to cover definites and *most*. We shall leave this task to future work.

lexical) parts. A permutation π on D_e is defined as a bijection from D_e to D_e . One can inductively generate a family of bijections by lifting a permutation π on D_e (cf. [Gajewski 2002: 11](#)):

- (i)
 - a. $\pi_e = \pi$
 - b. π_t = the identity map
 - c. $\pi_{(a,b)} = \{ \langle \pi(x), \pi(y) \rangle : \langle x, y \rangle \in f \}$ for $f \in D_{(a,b)}$

Chapter 6

Conclusions

In this dissertation, we have provided a theory of non-local modification that accounts for the class of modal adjectives that includes *possible*, *imaginable* and *conceivable*. The main tenets of this theory can be summarized as follows:

- A non-local reading is possible only if the adjective allows for *tough*-movement.
- A non-local modification structure involves a *for*-subject parse of the embedded infinitival clause.
- Since the infinitival clause is isomorphic to the matrix clause after QR of the DP containing the modification structure, the ellipsis of the embedded clause is possible.
- Ordinary *tough*-adjectives do not have non-local readings because their argument structure is different from that of non-local adjectives: the former instantiate a *for*-PP parse in modification structures. Accordingly, ellipsis of the embedded infinitival clause is not possible with them.
- The truth conditions of non-local modification cases (with *possible*) allow for an “equative effect,” which a simple extension of the Kratzerian model for modals accounts for.

There are a number of questions that, in future work, we aim to further explore: can a unitary explanation for the determiner restriction, along the lines suggested in the conclusion to the last chapter, be sought? What exactly does the local reading of these modal adjectives amount to and what are the theoretical implications of this work for a general theory of meaning? Concerning the very last question, one aspect that should have emerged from the theoretical approach taken up in this work is that semantics is strongly constrained by syntactic theorizing. This may not be a surprise to many, but in this work we have, hopefully, established a strong correlation in the form of syntactic hypotheses that predict the emergence of a very specialized type of meaning. In this respect, we see a clear connection with recent work by [Hirsch \(2017\)](#) and, in particular, his sustained criticism of semantic type-lifting principles such as the *Geach Rule* discussed in Chapter 2.

In the remaining part of this chapter, we would like to briefly address the question of what the cross-linguistic implications of this work are. Here, we would like to discuss some potential complications for the theory we have proposed. The complications in question concern specific syntactic restrictions in languages other than English that are reported to express non-local readings.

The language we shall focus on here is a Romance language, viz. Italian, which is reported to express non-local readings with *possibile* ‘possible’ (see Cinque 2010). In contrast to English, a non-local reading is available only in postnominal position, where a local interpretation is also said to be possible, while the prenominal position is unambiguously local.¹ The following examples and respective paraphrases are taken from Cinque (2010):

- (1) Maria ha intervistato ogni possibile candidato.
 Maria has interviewed every possible candidate
 ‘Maria has interviewed every potential candidate’
 % ‘Maria has interviewed every candidate that it was possible for her to interview’
- (2) Maria ha intervistato ogni candidato possibile.
 Maria has interviewed every candidate possible
 ‘Maria has interviewed every potential candidate’
 ‘Maria has interviewed every candidate that it was possible for her to interview’

Two issues arise from these examples. First, why does Italian not allow for a non-local reading of *possibile* in prenominal position? Second, can our theory of non-local modification explain the non-local reading of postnominal *possibile*? The first question lies outside this work’s domain of investigation and should be properly addressed within a theory of adjectival order (see, in this regard, Alexiadou et al. 2007 and Cinque 2010). The second question is, needless to say, more central and, therefore, deserves some thoughts.

What facts could be considered in favor of our neo-Larsonian theory? First, we should consider whether *possibile* in Italian is a *tough*-adjective or not. The facts are here parallel to those in English. My informants agreed that while a sentence such as (3) is not fully acceptable but still grammatical,² the variant with *impossibile* ‘impossible’ in (4) is perfectly fine.

- (3) ?Questo candidato è possibile da assumere.
 This candidate is possible to interview.INF

¹Two facts need to be reported: first, our informants are less sure about the availability of a local interpretation in postnominal position. Second, they prefer the universal *tutti* ‘all’ to *ogni* ‘every’ to license the non-local interpretation.

²The sentence would be fine in a context like the following: the local department of linguistics is selecting those candidates that meet the criteria for an open job position. The speaker is indicating, for each candidate, whether he or she meets the criteria.

‘This candidate is possible to hire’

- (4) Questo candidato è impossibile da assumere.
This candidate is impossible to interview.INF
‘This candidate possible is impossible to hire’

Second, we need to test whether Italian allows for reduced relatives with *tough*-adjectives and *possibile*. The following data suggest that Italian behaves as in English in allowing reduced relatives headed by *tough*-adjectives.³

- (5) Maria ha incontrato tutti i candidati difficili da assumere.
Maria has interviewed all the candidates difficult to hire
‘Maria has interviewed every candidate who was difficult to hire’

Importantly, *possibile* is also fine in the same environment:

- (6) Maria ha incontrato tutti i candidati possibili da assumere.
Maria has interviewed all the candidates possible to hire.INF
‘Maria has interviewed every candidate who were possible to hire’

Moreover, as in English, a reduced relative headed by *possibile* taking a clause introduced by the complementizer *che* ‘that’ is not grammatical.⁴

- (7) *Maria ha incontrato tutti i candidati possibili che il dipartimento
Maria has interviewed all the candidates possible that the department
assuma.
hire.SBJV
‘Maria has interviewed every candidate possible that the department will hire’

So far, the data we have considered seem to fully parallel the data in English, suggesting that an analysis of non-local *possibile* in Italian in terms of *tough*-movement is viable. However, a complication arises. It appears that Italian is a language that does not allow *for*-infinitives with overt subjects (Hartman 2011, 2012b, Keine and Poole 2017).⁵ The

³All the classic examples cited in the English literature on *tough*-adjectives are also *tough* in Italian: for instance, *facile* ‘easy’, *impossibile* ‘impossible’, *interessante* ‘interesting,’ etc.

⁴In unembedded contexts, *possibile* can take a clause introduced by *che* ‘that’ with the embedded verb realizing subjective mood: *è possibile che il dipartimento assuma tutti i candidati*.

⁵This seems to be true despite the fact that the preposition *per* ‘for’ can function as complementizer selecting infinitives. For instance:

- (i) Sta per piovere.
Is for rain

following contrast between Italian and English supports this claim:

- (8) *È necessario per questo documento essere firmato da entrambi i tuoi genitori.
 Is necessary for this form be signed by both the your parents
 ‘It is necessary for this form to be signed by both your parents.’
- (9) It is necessary for this form to be signed by both your parents.
 (Huddleston and Pullum 2002: 1183)

Note that a *per*-DP sequence following the *tough*-adjective is, indeed, possible, but the preference is for DPs that denote animate individuals.

- (10) È impossibile (**per gli studenti**) capire questi problemi.
 Is impossible for the students understand.INF these problems
 ‘It is impossible (for the students) understand these problems.’

Moreover, it is also claimed that a *per*-DP sequence following the adjective in a *tough*-construction results in ungrammaticality.⁶

- (11) Questi problemi sono impossibili (*per gli studenti) da capire.
 These problems are impossible for the students to understand
 ‘These problems are impossible (*for the students) to understand.’
 (Hartman 2012a: 123)

These observations seem to speak against the possibility of adapting the analysis we have proposed for the non-local reading of English modal adjectives to Italian *possibile*. Specifically, if a *for*-subject parse is not available in *tough*-constructions in Italian, then the same kind of LF that we have posited for the English non-local readings cannot work here.

A possible natural solution pops up to mind, but it brings an unwelcome consequence and, therefore, must be rejected. The idea is to simply assume that a pronominal PRO is the subject of the embedded infinitive. Assuming this PRO is coindexed with the subject of the matrix clause, one could extend our analysis of NCA in modification structures to cases where the matrix subject and the PRO are coindexed. A non-local reading like the one in English would be predicted to arise. Simplifying the LF, we would have:

- (12) Maria_m ha incontrato tutti i candidati [_{AP} wh_i possibili [_{IP} PRO_m da incontrare t_i]]

‘It is about to rain.’

⁶Keine and Poole claim that, in Italian, since a *for*-DP sequence can never be the subject of an infinitive, the ungrammaticality of (11) is due to the fact that the *for*-DP sequence is a PP that functions as an intervener.

However, if we take coindexation as an option, we end up overgenerating non-local readings; Italian *tough*-adjectives should all be able to express non-local meanings via the same parse, contrary to fact. For example, none of the variants below express a non-local interpretation. The adjective's meaning is either underspecified – the informants ask “difficult or easy in what respect?” –, in which case only the context can provide a plausible specification, or receives a subjective interpretation (e.g., *interesting* implies in this context that the individuals met by Maria are interesting as candidates).

- (13) Maria ha incontrato tutti i candidati $\left\{ \begin{array}{c} \text{difficili} \\ \text{facili} \\ \text{interessanti} \end{array} \right\}$.

At this point, while we think we should leave these observations open to further investigation, we would like to conclude our discussion by pointing out that the data concerning the *per*-DP sequence in a *tough*-construction are not as straightforward as presented by Hartman, Keine and Poole. First, Hartman's example in (11) is not ungrammatical for my Italian informants. Crosslinguistically, this type of judgment is not isolated, as the following Brazilian Portuguese *tough*-construction is judged to be grammatical.^{7,8}

Note also that, in both Italian and Brazilian Portuguese, the presence of a *for*-DP sequence in reduced relatives such as (3) above is tolerated.

- (14) Este livro é $\left\{ \begin{array}{c} \text{difícil} \\ \text{fácil} \\ \text{impossível} \end{array} \right\}$ para as crianças lerem.
 This book is $\left\{ \begin{array}{c} \text{difficult} \\ \text{easy} \\ \text{impossible} \end{array} \right\}$ for the children read.INF
 ‘This book is {difficult, easy, impossible} for the children to read.’

Second, as Hartman (2011: 143, fn. 1) acknowledges, languages such as Italian, French and also Greek (but not Spanish) allow for a *for*-DP to occur in a *tough*-construction, when the DP is a dative pronoun. The following example is from Canadian French, where the contrast between full DP and ‘weak’ pronouns is reported to be clear:⁹

- (15) Le candidat était possible pour {*Mary/elle} d'évaluer.
 The candidate was possible for {Mary/her} to-evaluate.INF

⁷Thanks to Erica Brandao to provide examples and judgments. She reports that the facts about Italian *possibile* reported here are the same in Brazilian Portuguese.

⁸Other Romance languages such as Spanish and French, even in its Canadian variety, do not allow for a *for*-DP in a *tough*-construction, but see next point.

⁹Thanks to Maya Taylor for providing this example.

‘The candidate was possible for { *Mary/her } to evaluate.’

Why a language should allow for a full DP or just a pronoun to surface in a *for*-DP sequence in a *tough*-construction is something that, at present, has not received an explanation. In the lack of clear evidence concerning the grammatical role of these *for*-phrases in languages other than English, it is difficult to establish the presence (/absence) of a correlation with non-local readings, as we did for English. We hope that future research may shed light on this aspect.

Bibliography

- Abels, K. (2012). *Phases: An essay on cyclicity in syntax*. Cambridge University Press.
- Alexiadou, A., Haegeman, L., and Stavrou, M. (2007). *Noun Phrase in the Generative Perspective*. Mouton de Gruyter, Berlin.
- Beck, S. and Rullmann, H. (1999). A flexible approach to exhaustivity in questions. *Natural Language Semantics*, 7(3):249–298.
- Bhatt, R. (1999). *The Syntax of Infinitival Relatives*. PhD thesis, M.I.T, Cambridge, MA.
- Carlson, G. N. (1977). Amount relatives. *Language*, 53(3):520–42.
- Chomsky, N. (1965). *Aspects of the Theory of Syntax*, volume 11. MIT Press, Cambridge, MA.
- Chomsky, N. (1973). Conditions on transformations. In Anderson, S. and Kiparsky, P., editors, *A Festschrift for Morris Halle*. Holt, Reinhardt and Winston, New York.
- Chomsky, N. (1977). On *wh*-movement. In Culicover, P., e. a., editor, *Formal Syntax*. Academic Press, New York.
- Cinque, G. (2010). *The Syntax of Adjectives: A Comparative Study*. MIT Press, Cambridge, MA.
- Condoravdi, C. (2002). Temporal interpretation of modals. In Beaver, D. I., Martínez, L. D. C., Clark, B. Z., and Kaufmann, S., editors, *The Construction of Meaning*. CSLI.
- Crnič, L. and Fox, D. (2019). Equatives and maximality. In Altshuler, D. and Rett, J., editors, *The Semantics of Plurals, Focus, Degrees, and Times: Essays in honor of Roger Schwarzschild*, pages 163–184. Springer.
- Currie, G. and Ichino, A. (2013). Imagination and make-believe. In Gaut, B., editor, *The Routledge Companion to Aesthetics*. 3rd edn., pages 320–330. Routledge.
- Faraci, R. (1974). *Aspects of the Grammar of Infinitives and for-phrases*. PhD thesis, MIT, Cambridge, MA.
- Fiengo, R. and May, R. (1994). *Indices and Identity*. MIT Press, Cambridge, MA.

- Fox, D. (2002). Antecedent-contained deletion and the copy theory of movement. *Linguistic Inquiry*, 33(1):63–96.
- Gajewski, J. (2002). L-analyticity and natural language. *Manuscript, MIT*.
- Grimshaw, J. (1979). Complement selection and the lexicon. *Linguistic inquiry*, 10(2):279–326.
- Grosu, A. and Landman, F. (1998). Strange relatives of the third kind. *Natural Language Semantics*, 6:125–170.
- Hackl, M. (2000). *Comparative Quantifiers*. PhD thesis, Massachusetts Institute of Technology.
- Hankamer, J. and Sag, I. (1976). Deep and surface anaphora. *Linguistic inquiry*, 7:391–428.
- Harris, J. A. (2012). On the semantics of domain adjectives in english. In Arnett, N. and Bennett, R., editors, *Proceedings of the 30th West Coast Conference on Formal Linguistics*, pages 162–172, Somerville, MA. Cascadilla Proceedings Project.
- Hartman, J. (2011). Intervention in tough-constructions. In Suzi Lima, K. M. and Smith, B., editors, *Proceedings of the 39th Meeting of the North East Linguistic Society (NELS 39)*, pages 387–397, Amherst, MA. GLSA.
- Hartman, J. (2012a). (Non-)intervention in a-movement: Some cross-constructional and cross-linguistic consequences. *Linguistic Variation*, 11:121–148.
- Hartman, J. (2012b). *Varieties of Clausal Complementation*. PhD thesis, MIT, Cambridge, MA.
- Heim, I. (1987). Where does the definiteness restriction apply? In Reuland, E. and ter Meulen, A., editors, *The Representation of (In)definiteness*, pages 21–42. MIT Press.
- Heim, I. and Kratzer, A. (1998). *Semantics in Generative Grammar*. Blackwell, Oxford.
- Hicks, G. (2009). Tough-constructions and their derivations. *Linguistic Inquiry*, 40(4):535–566.
- Hirsch, A. (2017). *An Inflexible Semantics for Cross-categorical Operators*. PhD thesis, MIT.
- Huddleston, R. and Pullum, G. K. (2002). *The Cambridge Grammar of the English Language*. Cambridge University Press.
- Jacobson, P. (1992). The lexical entailment theory of control and the *tough*-construction. In Sag, I. and Szabolcsi, A., editors, *Lexical Matters*, pages 269–300. CSLI Publications.
- Jacobson, P. (1998). Antecedent Contained Deletion and pied-piping: Evidence for a variable-free semantics. In Strolovitch, D. and Lawson, A., editors, *Proceedings from*

- the Eighth Conference on Semantics and Linguistic Theory (SALT), Cornell: Cornell Working Papers in Linguistic*, pages 74–91.
- Jacobson, P. (2014). *Compositional Semantics*. Oxford University Press.
- Keine, S. and Poole, E. (2017). Intervention in *tough*-constructions revisited. *The Linguistic Review*, 34(2):295–330.
- Kennedy, C. (1997). Antecedent-Contained Deletion and the syntax of quantification. *Linguistic Inquiry*, 28(4):662–688.
- Kennedy, C. (1998). Local dependencies in comparative deletion. In K. Shahin, S. B. and Kim, E., editors, *Proceedings of the 17th West Coast Conference on Formal Linguistics*, Stanford. CSLI.
- Kratzer, A. (1998). More structural analogies between pronouns and tenses. In *Semantics and linguistic theory*, volume 8, pages 92–110.
- Kratzer, A. (2012). *Modals and Conditionals*. Oxford University Press.
- Kuznetsova, A., Brockhoff, P. B., and Christensen, R. H. B. . (2013). lmerTest: Tests for random and fixed effects for linear mixed effect models (lmer objects of lme4 package). R package version, pages 2025.
- Larson, R. K. (2000). ACD in AP? unpublished manuscript (presented at *West Coast Conference in Formal Linguistics* 19).
- Lees, R. B. (1960). *The Grammar of English Nominalizations*. Indiana University Press.
- Leffel, T. J. (2014). *The Semantics of Modification: Adjectives, Nouns, and Order*. PhD thesis, NYU.
- Link, G. (1983). The logical analysis of plurals and mass terms: A lattice-theoretical approach. In Bäuerle, R., Schwarze, C., and von Stechow, A., editors, *Meaning, Use, and the Interpretation of Language*, pages 302—323. de Gruyter, Berlin.
- May, R. (1985). *Logical Form: Its Structure and Derivation*. MIT Press.
- Milsark, G. (1974). *Existential Sentences in English*. PhD thesis, Massachusetts Institute of Technology.
- Milsark, G. L. (1977). Toward an explanation of certain peculiarities of the existential construction in English. *Linguistic Analysis*, 3:1–29.
- Morzycki, M. (2015). *Modification*. Cambridge University Press, Cambridge.
- Morzycki, M. (2016). Toward a general theory of nonlocal readings of adjectives. In Bade, N., Polina, B., and Scholle, A., editors, *Proceedings of Sinn und Bedeutung 20*, pages 512–32.

- Moulton, K. (2009). *Natural Selection and the Syntax of Clausal Complementation*. PhD thesis, University of Massachusetts, Amherst, MA.
- Nissenbaum, J. and Schwarz, B. (2008). Infinitivals with *too*: Degree operator scope and parasitic gaps. In Friedman, T. and Ito, S., editors, *Proceedings of SALT XVIII*.
- Partee, B. (1984). Temporal and nominal anaphora. *Linguistics and Philosophy*, 7(3):243–286.
- Partee, B. H. (1974). Some structural analogies between tenses and pronouns in english. *The Journal of Philosophy*, 70(18):601–609.
- Portner, P. (2009). *Modality*. Oxford University Press.
- Pustejovsky, J. (1995). *The generative lexicon*. MIT Press, Cambridge MA.
- Romero, M. (2013). Modal superlatives: A compositional analysis. *Natural Language Semantics*, 21(1):79–110.
- Ross, J. R. (1967). *Constraints on Variables in Syntax*. PhD thesis, Massachusetts Institute of Technology.
- Rullmann, H. (1995). *Maximality in the semantics of wh-constructions*. PhD thesis, University of Massachusetts Amherst.
- Sag, I. A. (1976). *Deletion and Logical Form*. PhD thesis, Massachusetts Institute of Technology.
- Sauerland, U. (1998). *The meaning of chains*. PhD thesis, Massachusetts Institute of Technology.
- Sauerland, U. (2003). Unpronounced heads in relative clauses. *The interfaces: Deriving and interpreting omitted structures*, 61:205–226.
- Schwarz, B. (2005). Modal superlatives. In Georgala, E. and Howell, J., editors, *Proceedings of Semantics and Linguistic Theory 15*, volume 15, pages 187–204, Ithaca, NY. CLC Publications.
- Schwarz, B. (2006). Attributive *wrong*. In Baumer, D., Montero, D., and Scanlon, M., editors, *Proceedings of the West Coast Conference on Formal Linguistics (WCCFL)*, volume 25, pages 362–370.
- Schwarz, B. (2017). *The wrong number: Non-local adjectival modification*. ms. mcgill university.
- Schwarz, B., Oshima, D. Y., and Simonenko, S. (2019). Factive islands from necessary blocking. In *Proceedings of SALT 29*, pages 529–548.
- Schwarz, F. (2009). *Two types of definites in natural language*. PhD thesis, University of Massachusetts Amherst.

- Schwarz, F. (2012). Situation pronouns in determiner phrases. *Natural Language Semantics*, 20:431–475.
- Sharvy, R. (1980). A more general theory of definite descriptions. *The Philosophical Review*, pages 607–624.
- Snider, T. N. (2017). *Anaphoric Reference to Propositions*. PhD thesis, Cornell University.
- von Fintel, K. and Heim, I. *Intensional Semantics*, mit.
- Williams, E. S. (1977). Discourse and Logical Form. *Linguistic Inquiry*, 8(1):101–139.

Appendix A

Stimuli

Below are reported the stimuli used in the experiment presented in Chapter 3.

1.

Context: John has put on some weight. He and his friend Mary are in a store. John asks Mary whether he should try on a pair of jeans he likes. Mary says:

- | | | |
|----|--|---------|
| a. | Those jeans are difficult for you to wear. | TOUGH |
| b. | Those jeans are possible for you to wear. | NLOC |
| c. | Those jeans are impatient for you to wear. | CONTROL |

2.

Context: The Senate is about to vote on a bill. In an article appeared in a financial newspaper, a journalist expresses her view about the bill:

- | | | |
|----|---|---------|
| a. | The bill is difficult for the Senate to pass. | TOUGH |
| b. | The bill is possible for the Senate to pass. | NLOC |
| c. | The bill is impatient for the Senate to pass. | CONTROL |

3.

Context: During a war between the Kingdom of Wicelanna and the Kingdom of Voremas, the general of the army of Wicelanna is discussing with his king whether to invade the other kingdom:

- | | | |
|----|--|---------|
| a. | The Kingdom of Voremas is difficult for our army to conquer. | TOUGH |
| b. | The Kingdom of Voremas is possible for our army to conquer. | NLOC |
| c. | The Kingdom of Voremas is impatient for our army to conquer. | CONTROL |

4.

Context: You are participating in a public discussion on the impact of fossil fuel consumption on the planet. A participant in the discussion utters the following statement:

- a. Fossil fuel consumption is easy for developing countries to reduce. TOUGH
- b. Fossil fuel consumption is conceivable for developing countries to reduce. NLOC
- c. Fossil fuel consumption is willing for developing countries to reduce. CONTROL

5.

Context: Bill is considering which things he should eliminate, since he needs to follow a strict diet. He thinks that:

- a. Wine is easy for him to give up. TOUGH
- b. Wine is conceivable for him to give up. NLOC
- c. Wine is willing for him to give up. CONTROL

6.

Context: Ann is a professional climber, who just recovered from an injury. Her coach is wondering whether she can climb a certain potentially challenging mountain:

- a. This mountain is easy for her to climb. TOUGH
- b. This mountain is conceivable for her to climb. NLOC
- c. This mountain is willing for her to climb. CONTROL

7.

Context: The government in charge is considering whether a new policy should be put into effect. A journalist writes about the policy as follows:

- a. This policy is hard for our government to undertake. TOUGH
- b. This policy is imaginable for our government to undertake. NLOC
- c. This policy is eager for our government to undertake. CONTROL

8.

Context: The House of Commons is debating an amendment to a bill. A journalist writes about the situation in the following terms:

- a. This amendment is hard for the House of Common to pass. TOUGH
- b. This amendment is imaginable for the House of Common to pass. NLOC
- c. This amendment is eager for the House of Common to pass. CONTROL

9.

Context: A street riot has just begun. A TV journalist is covering the breaking news. Here's what he says:

- | | | |
|----|---|---------|
| a. | The situation is hard for the police to take under control. | TOUGH |
| b. | The situation is imaginable for the police to take under control. | NLOC |
| c. | The situation is eager for the police to take under control. | CONTROL |

Appendix B

Statistical model

Linear mixed-effects model's formula

```
m1 <- lmer(response ~ condition +  
(1 + condition | participant) +  
(1 + condition | item),  
data = scores_frame )
```

Model output

```
> summary(m1)  
Linear mixed model fit by REML. t-tests use Satterthwaite's method ['lmerModLmerTest']  
Formula: response ~ condition + (1 + condition | participant) + (1 + condition | item)  
Data: scores_frame  
  
REML criterion at convergence: 2036.1  
  
Scaled residuals:  
    Min       1Q   Median       3Q      Max  
-3.1510 -0.5304 -0.1069  0.5964  3.9247  
  
Random effects:  
Groups      Name      Variance Std.Dev. Corr  
participant (Intercept) 0.6380   0.7987  
            condition2 1.1962   1.0937  -0.17  
            condition3 0.4932   0.7023  -0.74  0.46  
item        (Intercept) 0.3375   0.5809  
            condition2 0.4175   0.6461  -0.42  
            condition3 0.1128   0.3359  -0.70 -0.35  
Residual    2.0993   1.4489  
Number of obs: 540, groups: participant, 20; item, 9  
  
Fixed effects:  
              Estimate Std. Error    df t value Pr(>|t|)  
(Intercept)   6.4000    0.2847 16.4814  22.479 8.47e-14 ***  
condition2   -1.6167    0.3599 17.5657  -4.492 0.000298 ***  
condition3   -4.5500    0.2460 16.2770 -18.495 2.35e-12 ***  
---  
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
  
Correlation of Fixed Effects:  
      (Intr) cndtn2  
condition2 -0.353  
condition3 -0.682  0.235
```