CONTEXT DEPENDENCE IN THE INTERPRETATION OF QUESTIONS AND SUBJUNCTIVES

von

ELISABETH VILLALTA

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Hauptberichterstatter:	Prof. Dr. Sigrid Beck
Mitberichterstatter:	Prof. Dr. Arnim von Stechow
Mitberichterstatter:	Prof. Dr. Wolfgang Sternefeld
Mitberichterstatter:	Prof. Dr. Claudia Maienborn
Dekan:	Prof. Dr. Joachim Knape

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CHAPTER 1

INTRODUCTION

1.1 Context dependence in the interpretation of questions and subjunctives

Context is a crucial ingredient in the interpretation of any linguistic phenomenon. In semantics, it is an important task to make precise how exactly context interacts with the meaning contributed by the linguistic expressions of a sentence and the semantic composition rules. In this dissertation, my goal is to make precise what role context plays in the interpretation of two particular linguistic phenomena: *how many* questions in English and French, and subjunctives in Spanish.

That the interpretation of questions involves reference to context is a well-established fact in semantics, since Hamblin (1973) first proposed that the interpretation of a question corresponds to a set of propositions, namely the set of possible answers to the question. The novelty of the work presented in this dissertation is that it provides psycholinguistic evidence from experimental work for reference to context in the interpretation of questions.

For the interpretation of subjunctives, I argue that there is a parallelism with the interpretation of questions. I develop a proposal in which the interpretation of subjunctives also involves reference to a set of propositions, namely the set of contextually available alternatives to the proposition expressed by the subjunctive clause. The analysis that I propose for the interpretation of subjunctives uses the same semantic tools that are commonly adopted for questions (and other phenomena such as focus): the so called 'alternative semantics'(cf. Rooth 1985,1992). This new perspective on the interpretation of the subjunctive mood raises a number of so far undiscussed questions, and uncovers new empirical data that have never been linked to the subjunctive mood before.

To begin, I present the data and theoretical questions addressed in this dissertation, followed by an introduction to the theoretical framework and the tools that will be used.

1.2 Data and theoretical questions

1.2.1 English and French *How many* questions and quantifier scope

Sentences containing multiple quantifiers (elements of the kind *everybody, some musician*, *many pieces* etc.) are known to give rise to several interpretations. In chapter 2, I examine how this kind of ambiguity is resolved in the on-line process of constructing an interpretation for a sentence. I concentrate exclusively on the case of ambiguous *how many* questions that contain a universally quantified subject, *every N*.

A particular interpretation of a question is revealed by the answer it requires in a given context. *How many* questions that contain a universally quantified subject can receive at least two interpretations. Imagine the scenario described in (1).

(1) In the music department, three trumpet students had to pass an exam last week. Every student had to play six pieces. The only requirement they had was that among these there were two pieces that everybody had to play: 'Round Midnight' and 'The days of Wine and Roses'. For the rest, the students were free to choose what they preferred.

In the context of the situation described above, the question in (2) can be answered truthfully in two possible ways, namely, as in (2a) and in (2b).

(2) How many pieces did every student have to play at the exam?
Possible true answers a. Six pieces
b. Two pieces

The example presented in (2) is a case of scope interaction between *n-many pieces* and the subject quantifier *every student*. With a predicate logic, the two possible interpretations can be represented as in (3a) and (3b). These two representations differ only in the order of the two quantifiers (where the operator card(Y) returns the cardinality of the set Y).

(3) a. For which number n: ∀ x: student(x) ⇒ ∃Y: pieces(Y) & card(Y)=n & played(Y)(x)
Answer: Six pieces

b. For which number n: ∃Y: pieces(Y)& card(Y)=n & ∀ x student (x) ⇒ played(Y)(x)
Answer: Two pieces

French makes use of a corresponding split construction, in which only *combien* (‘*how many’*) is fronted. Crucially, this construction is *not* ambiguous. The question in (4) can only receive the ‘six pieces’ answer in the above scenario.

(4) Combien tous les étudiants ont-ils joué de pieces?
How many all the students have-they played of pieces?
‘How many pieces did every student play?*’*

Possible true answer: Six pieces.
Impossible answer: Two pieces

The French non-split counterpart, however, behaves like the English construction in that it is ambiguous and permits both answers, as illustrated in (5).

(5) Combien de pieces tous les étudiants ont-ils joués ?
How many of pieces all the students have-they played?
‘How many pieces did every student play?’

Possible true answers a. Six pieces
b. Two pieces

Quantifier scope ambiguities have traditionally been analyzed as syntactic ambiguity. Since May (1985), it is commonly assumed that quantifier scope involves the construction of several Logical Forms corresponding to the two interpretations outlined above. Under this view, a sentence processing model has to contain a mechanism that constructs the LF representations of an incoming surface representation

and chooses the LF that yields the preferred interpretation of the sentence. The research presented here offers experimental results that elucidate some aspects of this mechanism. The questions that will be addressed are the following:

During sentence processing, how does the parsing mechanism choose which LF representation is to be associated to the sentence (reflecting the preferred interpretation of the question)? At what point, during sentence processing is this choice made?

In experimental work, participants are presented with ambiguous *how many* questions that are necessarily preceded by a context-story (in order to elicit an answer to the question that reflects the preferred interpretation). Does this context affect how participants choose to answer the question? Can different types of contexts elicit a different preference from the participants? The results from one of the experiments presented here will give some insight into how context interacts with ambiguity resolution during the sentence processing of a question.

The research presented here contains experiments in English and in French. The case of French is particularly informative, since the split and non-split *how many* constructions differ in their possible interpretations. While the non-split construction does give rise to ambiguity, the split construction does not. Comparison of the two languages will thus help to shed more light on the processes involved in the resolution of quantifier scope ambiguity in questions.

1.2.2 The subjunctive mood in Spanish complement clauses

In Spanish, as in the other Romance languages, verb forms are morphologically marked for mood. Three morphological paradigms can be distinguished for each verb: the indicative mood, the subjunctive mood and the imperative mood. Even though mood is realized as a morpheme on the verb, it is standard to assume that mood expresses a property of the whole clause, similar to other verbal morphemes such as aspectual and temporal morphemes. It is thus common to say that the whole clause is in the indicative, subjunctive or imperative mood.

In chapters 3 and 4 of this dissertation, I will be concerned with the distribution of the subjunctive mood in Spanish complement clauses. This distribution is known to depend on various factors.[1] Here, I will only examine in detail one particular factor that determines the mood of the complement clause, namely the matrix predicate. In chapter

5, I will address the question how the analysis may also be extended to other factors that determine mood in complement clauses, such as under negation and in questions.

In Spanish, the indicative mood is selected by the predicate classes given in (6). For a more detailed list of the predicates in each class, see the appendix to chapter 1.

(6) Predicates that select the indicative mood in Spanish

- epistemic predicates	(e.g., *saber* 'know', *creer* 'believe')
- predicates of communication	(e.g., *decir* 'say', *informar* 'inform', *escribir* 'write', *anunciar* 'announce')
- predicates of certainty	(e.g., *estar seguro* 'be sure', *estar convencido* 'be convinced')
- commissives	(e.g., *prometer* 'promise')
- fiction verbs	(e.g., *soñar* 'dream', *imaginar* 'imagine')
- predicates of mental judgement	(e.g., *acordarse* 'remember', *adivinar* 'guess', *descubrir* 'discover', *comprender* 'understand', *concluir* 'conclude', *olvidar* 'forget', *darse cuenta* 'realize')
- predicates of perception	(e.g., *notar* 'notice', *ver* 'see', *oir* 'hear').

A few examples for predicates that select the indicative mood in their complement clause are presented in (7) through (10). Throughout this dissertation, under each example, I provide a word to word translation in English, as well as an English paraphrase in quotation marks. The word to word translation contains explicit information about the verbal inflection morphemes of the relevant verb in the complement clause (V:TENSE.MOOD.PERSON). Following the convention in generative grammar, when an example is preceded by a *, it is ungrammatical.

(7) Victoria cree que hará buen tiempo. TO BELIEVE
Victoria believes that PRO make:FUT.IND.3SG good weather.
'Victoria believes that the weather will be good.'

(8) Sofía sabe que se ha planeado un picnic. TO KNOW
Sofía knows that SE have:PAST.IND.3SG planned a picnic.
'Sofía knows that a picnic has been planned .'

(9) Marcela dice que quiere venir. TO SAY
Marcela says that PRO want:PRES.IND.3SG come.
'Marcela says that she wants to come.'

(10) Sofía ha prometido que traerá el postre. TO PROMISE
Sofía has promised that PRO bring:FUT.IND.3SG the dessert.
'Sofía has promised that she will bring the dessert.'

The subjunctive mood is selected by the predicate classes given in (11). Again, for a more detailed list of predicates for each class, see the appendix to chapter 1.

(11) Predicate classes that select the subjunctive mood in Spanish

- desire predicates	(e.g., *querer* 'want', *esperar* 'hope', *preferir* 'prefer', *temer* 'fear')
- modals	(e.g., *es posible* 'it is possible', *es probable* 'it is likely', *es necesario* 'it is necessary')
- predicates of doubt	(e.g., *dudar* 'doubt')
- emotive factive predicates	(e.g., *lamentarse* 'regret', *alegrarse* 'be glad', *estar contento* 'be happy', *sorprenderse* 'be surprised')
- directives	(e.g., *ordenar* 'order', *recomendar* 'advise', *sugerir* 'suggest', *prohibir* 'prohibit', *obligar* 'oblige')
- causatives	(e.g., *hacer* 'make', *conseguir* 'achieve', *evitar* 'prevent', *lograr* 'manage').

A few examples for predicates that select the subjunctive mood in their complement clause are presented in (12) through (15).

(12) Victoria quiere que Marcela venga al picnic. TO WANT
Victoria wants that Marcela come:PRES.SUBJ.3SG to-the picnic.
'Victoria wants Marcela to come to the picnic.'

(13) Sofía duda que Rafael pueda venir. TO DOUBT
Sofia doubts that Rafael can:PRES.SUBJ.3SG come.
'Sofía doubts that Rafael can come.'

(14) Marcela se alegra de que la hayan invitado. TO BE GLAD
Marcela SE glad of that PRO her have:PAST.SUBJ.3PL invited.
'Marcela is glad that they have invited her.'

(15) Victoria sugiere que salgan temprano. TO SUGGEST
Victoria suggests that PRO leave:PRES.SUBJ.3PL early.
'Victoria suggests that they leave early.'

It can be noted that, in both categories, we find factive as well as non-factive predicates. Sentences that contain factive predicates have the presupposition that the proposition expressed by the complement clause is true, contrary to sentences with non-factive predicates.[2] To give an example, in (14), with the factive predicate *alegrarse* ('be glad'), the speaker presupposes that they have invited Marcela. Contrary to this, in (13), with the non-factive predicate *dudar* ('doubt'), the speaker does not presuppose that Rafael can come. Among the predicates that select the indicative mood, we find factive predicates such as *saber* ('know'), *acordarse* ('remember') and *olvidarse* ('forget'), semifactives[3] such as *darse cuenta* ('realize') and *descubrir* ('find out'), as well as non-factives such as *creer* ('believe'), *prometer* ('promise'), *decir* ('say') and *soñar* ('dream'). Among the predicates that select the subjunctive mood, all emotive factive predicates are factive, as well as some of the predicates of mental judgment.

A number of predicates allow both the indicative and the subjunctive mood in their complement clause. Crucially, however, mood alternation then correlates with a meaning change in the predicate. Depending on the mood of the complement clause, the predicates fall under the corresponding predicate classes as described above. A few examples are presented below.

The predicate *sentir* can either be interpreted as an emotive factive predicate ('be sorry') and then selects the subjunctive mood, as in (16), or it can be interpreted as a predicate of perception ('sense') and then selects the indicative mood, as in (17).

(16) Siento que te hayan hecho daño.
PRO sorry that PRO you have:PAST.SUBJ.3PL done pain.
'I am sorry that they have hurt you.'

(17) Siento que va a haber un problema.
PRO sense that PRO go:FUT.IND.3SG to there-be a problem.
'I sense that there is going to be a problem.'

The predicate *decir* can either be interpreted as a predicate of communication ('tell') and then selects the indicative mood, as in (18), or it can be interpreted as a directive predicate ('order') and then selects the subjunctive mood, as in (19). Most of the predicates of communication are ambiguous in this sense.

(18) Te digo que acabaré a tiempo.
PRO you tell that PRO finish:FUT.IND.1SG on time.
'I tell you that I will finish on time.'

(19) Te dije que acabaras a tiempo.
PRO you told that PRO finish:PAST.SUBJ.2SG on time.
'I told you to finish on time.'

Thus, when a predicate can select both the indicative and the subjunctive mood, the alternation correlates with a meaning change of the predicate. Notice, crucially, that the meaning change does not always correlate with a factive/non-factive distinction.

There is a long history to the claim that the category of mood expresses the notion of modality. But, as pointed out in Palmer (1986) "there are, however, some problems concerning both the terminology and the nature of mood and the way it relates, or is seen to relate, to modality." (Palmer 1986, p.21). Many aspects of the relation between mood and modality remain to be made precise. One of the major goals of this dissertation is to make precise what exactly the relation between mood and modality is. In the following, I lay out a number of questions that a theory of mood in complement clauses has to address.

The contexts in which the subjunctive mood appears are known to be similar to the contexts in which typically modal elements can occur. In the literature, this has been one of the main reasons for establishing a connection between mood and the notion of modality. One may then raise the question whether it is plausible to assume that the subjunctive mood has the meaning of a modal element. Or, if it is not a modal element but only appears in contexts that already contain a modal, we need to know what role the subjunctive mood marker plays and why it requires such peculiar licensing conditions. To clarify these issues, one must first turn to an examination of the meaning properties of the predicates that select the subjunctive mood.

The general assumption in the literature has been that the subjunctive mood does not play the role of a modal element itself, but rather that it appears in modal contexts, i.e. in contexts that already contain a modal element. Under this assumption, we expect the matrix predicate to have modal properties. More specifically, we expect a parallelism in some aspects of the meaning between the predicates that select the subjunctive mood and the modal verbs such as *should* and *could*. We clearly need to investigate to what extent this parallelism may hold, given that there are many more predicates that select complement clauses than there are modal verbs. A first goal for a theory of the subjunctive mood is then to capture in formal terms the meaning properties shared by the predicates that select the subjunctive mood, and to provide an explicit semantics for these predicates. I address this issue in chapter 3.

There is a link between the meaning properties of the matrix predicate and the appearance of the subjunctive mood in the complement clause. However, how this link is instantiated in the grammar has rarely been addressed in the literature. The studies of mood in Romance languages mainly concentrate on determining what contexts license the selection of the subjunctive mood. Even if we determine a feature that unites these licensing contexts, we still do not know why the subjunctive mood is sensitive to this feature. As pointed out in Israel (1996), there is a similar phenomenon in the literature on polarity items. While solutions to the licensing problem for polarity items abound, only very few address the question of the sensitivity problem: why do polarity items require particular licensing contexts? Another important goal for a theory of the subjunctive mood is thus to determine what the contribution of the subjunctive mood to the meaning composition is. We want to derive the meaning of a sentence in a compositional fashion and understand how the contribution of the subjunctive mood in

the complement clause can interact with the meaning properties of the predicate in the matrix clause. A formal analysis of this connection will provide an answer to the question why the subjunctive mood appears where it appears. I turn to an investigation of this issue in chapter 4.

1.3 Framework and theoretical tools adopted in this dissertation

In this dissertation, I will assume the view of the syntax-semantics interface as adopted in recent developments of generative grammar, according to which the output of a syntactic derivation is a phrase structure tree known as Logical Form (LF). This LF is then compositionally interpreted and assigned a denotation by the semantic component. For the semantic component, I will follow the view adopted in recent developments of Montague Grammar, in particular the framework laid out in Heim & Kratzer (1998). Below, I provide a brief summary of this framework.

1.3.1 The syntactic component

The input to the semantic component are labeled phrase structure trees as provided by the syntactic component. The syntactic labels that I will use in this dissertation are the following:

(20)

Syntactic category	**Label**
Noun	N
Determiner	Det
Adjective	A
Verb	V
Inflectional elements	I
Mood morphology	Mood
Complementizer	C

I will make minimal use of the functional projections used in recent developments of generative grammar. I will only employ projections such as IP, CP and

MoodP and ignore the more fine-grained division into other projections such as AgrP, TP, and other projections, since they will not play any crucial role.

As is commonly assumed in generative grammar since May(1977), I will assume that quantificational expressions such as *everybody* and *some musician* may undergo the movements Q(uantifier) R(aising) or Q(uantifier) L(owering) at LF. Because these quantificational expressions may have different landing sites when undergoing QR or QL, sentences containing a quantificational expression may have more than one possible LF-representation.

1.3.2 The semantic component

Recent developments in semantics adopt the following assumptions. The meaning (or denotation) of a sentence corresponds to a set of worlds, namely the set of all those worlds in which the sentence is true. The lexicon provides the denotations of each lexical item. Following the Fregean Principle of Compositionality, the meaning of a sentence is then calculated in a compositional fashion from the meaning of its parts (the lexical items) and the composition rules.

The nodes of the phrase structure trees provided by the syntactic component are assigned an interpretation (or denotation) with the help of the interpretation function $[\![\ ]\!]$. Each denotation is relativized to a variable assignment g, where a variable assignment is a partial function from $\mathbb{N}$ into D. For any expression α, $[\![\alpha]\!]^g$ is then its denotation.

The set of semantic types that will be used in this dissertation are e (for individual), t (for truth value), s (for world) and d (for degree). From this set, we can form an enriched set of derived functional types:

(21) **Domains**

D_e = the set of all individuals

D_t = {0,1}, the set of truth values

D_s = the set of all worlds

D_d = the set of all degrees

If a and b are semantic types, then $D_{<a,b>}$ is the set of all functions from D_a to D_b

(Notational remark: '$x \in D_e$' is written as 'x_e').

Following Heim & Kratzer (1998), I will adopt the composition rules presented below:

(22) **Composition Rules**

a. Terminal Nodes (TN):
If α is a terminal node occupied by a lexical item, then ⟦α⟧ is specified in the lexicon.

b. Non-branching Nodes (NN):
If α is a non-branching node and β its daughter, then, for any assignment g, $⟦\alpha⟧^g = ⟦\beta⟧^g$.

c. Functional Application (FA):
If α is a branching node and {β,γ} the set of its daughters, then, for any assignment g: if $⟦\beta⟧^g$ is a function whose domain contains $⟦\gamma⟧^g$, then $⟦\alpha⟧^g = ⟦\beta⟧^g(⟦\gamma⟧^g)$.

d. Predicate Modification (PM):
If α is a branching node, {β,γ} is the set of α's daughters, and $⟦\beta⟧^g$ and $⟦\gamma⟧^g$ are both in $D_{<e,<s,t>>}$, then $⟦\alpha⟧^g = \lambda x_e.\lambda w_s.⟦\beta⟧^g(x)(w) = ⟦\gamma⟧^g(x)(w) = 1$.

e. Traces and Pronoun Rule:
If α is a pronoun or trace, g is a variable assignment, and $i \in dom(g)$, then $⟦\alpha_i⟧^g = g(i)$.

f. Predicate Abstraction Rule (PA):
Let α be a branching node with its daughters β and γ, where β dominates only a numerical index i. Then for any variable assignment g, $⟦\alpha⟧^g = \lambda x.⟦\gamma⟧^{g:x/i}$.

Below are a few sample lexical entries. The object language will be marked in italics. As metalanguage, I will use English enriched with operators such as ∃, ∀, λ, ι. I will assume familiarity with the λ-notation for functions (see Heim and Kratzer (1998),

p.34-40, for an introduction to the λ-notation). Throughout this dissertation, I will ignore the interpretation of tense and agreement.

(23) **Sample lexical entries**

$[\![\textit{Sofía}]\!]^g$ = Sofía

$[\![\textit{sleep}]\!]^g$ = $\lambda x_e.\lambda w_s$. x sleeps in w.

$[\![\textit{meet}]\!]^g$ = $\lambda x_e.\lambda y_e.\lambda w_s$. x meets y in w.

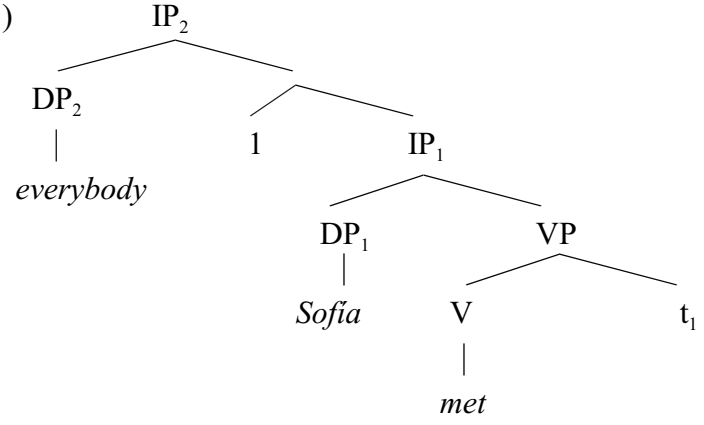
$[\![\textit{everybody}]\!]^g$ = $\lambda f_{<e,<s,t>>}.\lambda w_s$. $\forall x$[x is a person in w ⇒ f(x)(w)]

$[\![\textit{somebody}]\!]^g$ = $\lambda f_{<e,<s,t>>}.\lambda w_s$. $\exists x$[x is a person in w & f(x)(w)]

We now turn to some examples of semantic derivations. In chapter 2, I will be concerned with questions that contain quantificational elements. For this reason, I illustrate the semantic composition of a sentence containing a quantifier. As mentioned above, quantifiers undergo movement at LF. This movement operation leaves a trace and a coindexed variable binder. Following Heim & Kratzer (1998), I will assume the tree structure in (25) for a sentence such as (24):

(24) Sofia met everybody.

(25)



The bottom-up derivation of this tree is given in (26), where each step is done by applying the rule mentioned on the left hand side:

(26) $[\![t_1]\!]^g$ = g(1) by Traces Rule

$[\![\textit{met}]\!]^g$ = $\lambda x_e.\lambda y_e.\lambda w_s$.x met y in w Lexical Entry

$[\![V]\!]^g$ = $\lambda x_e.\lambda y_e.\lambda w_s$.x met y in w by NN

$[\![VP]\!]^g$ $= [\![V]\!]^g ([\![t_1]\!]^g) = \lambda y_e.\lambda w_s.$x met g(1) in w by FA

$[\![DP_1]\!]^g$ $= [\![Sofia]\!]^g =$ Sofia by NN

$[\![IP_1]\!]^g$ $= [\![VP]\!]^g ([\![DP_1]\!]^g) = \lambda w_s.$Sofia met g(1) in w by FA

$[\![1\ [IP_1]]\!]^g$ $= \lambda x_e.\lambda w_s.$Sofia met x in w by PA

$[\![DP_2]\!]^g$ $= [\![everybody]\!]^g =$

$= \lambda f_{<e,<s,t>>}.\lambda w'_s.\forall$x[x is a person in w' $\Rightarrow$ f(x)(w')] by NN

$[\![IP_2]\!]^g$ $= [\![DP_2]\!]^g ([\![1\ [IP_1]]\!]^g) =$

$= \lambda w'_s.\forall$x[x is a person in w' $\Rightarrow$ Sofia met x in w'] by FA

We now turn to the interpretation of questions, which will be relevant in chapter 2. Following Hamblin(1973) and Karttunen (1977), the denotation of a question is a set of propositions, namely the set of possible answers to the question. That is, in a context in which Victoria, Sofia and Marcela came, the question in (27) denotes the set in (28):

(27) Who came?

(28) {Victoria came, Sofia came, Marcela came}

Or, in other words, the semantic denotation of the question is as follows:

(29) $[\![$Who came?$]\!]^g = \lambda p_{<s,t>}.\lambda w_s.\exists$x[x is a person in w & p = $\lambda w'_s$ x came in w']

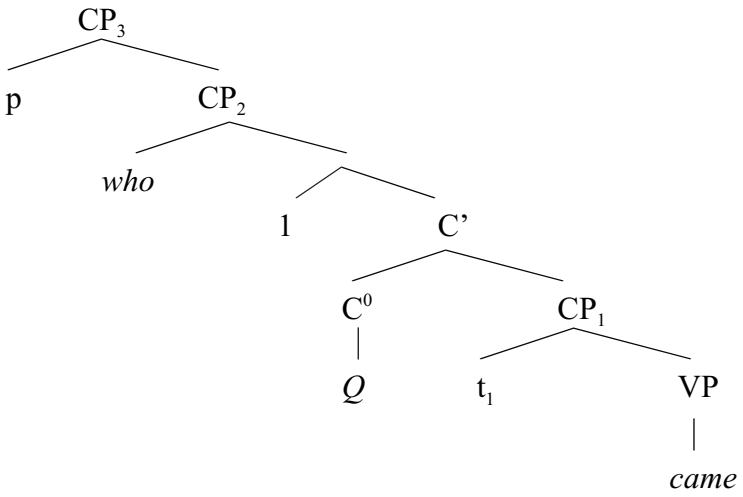
The assumption in recent literature[4] is that there is a question operator Q in C^0 which turns the sentence into a question denotation. The denotation of *who* corresponds to that of an indefinite that contains the existential quantifier:

(30) $[\![Q]\!]^g = \lambda q_{<s,t>}.\lambda p_{<s,t>.}\lambda w_s$[p = q]

(31) $[\![who]\!]^g = \lambda f_{<e,<<s,t>,<s,t>>>}.\lambda w_s.\ \exists$x[x is a person in w & f(x)(w)]

In order to obtain the appropriate question denotation, *who* has to move out of the scope of the question operator Q. The movement operation is interpreted as before:

(32)



The derivation of this tree is given below:

$[\![VP]\!]^g$	$= [\![came]\!]^g = \lambda x_e.\lambda w'_s$. x came in w'.	by Lexical Entry
$[\![t_1]\!]^g$	$= g(1)$	by Traces Rule
$[\![CP_1]\!]^g$	$= [\![VP]\!]^g ([\![t_1]\!]^g) = \lambda w'_s$. g(1) came in w'.	by FA
$[\![C^0]\!]^g$	$= [\![Q]\!]^g = \lambda q_{<s,t>}.\lambda p_{<s,t>.}\lambda w_s [p = q]$	by Lexical Entry
$[\![C]\!]^g$	$= [\![C^0]\!]^g ([\![CP_1]\!]^g) = \lambda p_{<s,t>.}\lambda w_s.[p = \lambda w'_s$. g(1) came in w']	by FA
$[\![1\ [CP_1\ ]]\!]^g$	$= \lambda x_e.\lambda p_{<s,t>.}\lambda w_s.[p = \lambda w'_s$.x came in w']	by PA
$[\![who]\!]^g$	$= \lambda f_{<e,<<s,t>,<s,t>>>}.\lambda w_s$. $\exists x$ [x is a person in w & f(x)(w)]	by Lexical Entry
$[\![CP_2]\!]^g$	$= [\![who]\!]^g ([\![1\ [CP_1\ ]]\!]^g)$	
	$= \lambda w_s.\exists x$ [x is a person in w & $p = \lambda w'_s$. x came in w']	by FA
$[\![CP_3]\!]^g$	$= \lambda p.\lambda w_s.\exists x$ [x is a person in w & $p = \lambda w'_s$. x came in w']	by PA

Throughout this dissertation, when providing semantic derivations, I will omit the assignment function g, except where relevant. To keep representations as simple as possible, I will also omit type specifications for arguments, when these are obvious.

Finally, I introduce the notion of 'alternative semantic denotations' following Rooth (1985,1992), which will be relevant in chapter 4.

Rooth (1985,1992) argues that the interpretation of sentences containing focused constituents involve so called 'focus semantic values': the focus semantic value of a sentence is the set of propositions obtainable from the ordinary semantic value by making a substitution in the position corresponding to the focused phrase. The focus

semantic value of a constituent α is represented as $[\![\alpha]\!]_{ALT}$, its ordinary semantic value as $[\![\alpha]\!]_o$.

The interpretation of a sentence such as (33) is claimed to involve two semantic objects: the ordinary semantic value of the sentence without *only* as in (34), and its focus semantic value (or alternative semantic value), as in (35). Capitals indicate that a constituent is focused:

(33) Mary only introduced BILL to Sue.

(34) $[\![\text{Mary introduced [Bill]}_F \text{ to Sue}]\!]_o$ = λw. Mary introduced Bill to Sue in w
(35) $[\![\text{Mary introduced [Bill]}_F \text{ to Sue}]\!]_{ALT}$ ={λw. Mary introduced x to Sue in w/x ∈ D}

Rooth (1985,1999) claims that the interpretation of (33) is the following: for all propositions in (35) the only true one is (34). The interpretation of a focus sensitive adverb such as *only* thus crucially refers to the focus semantic value of the proposition in its scope. More about the interpretation of focus sensitive adverbs such as *only* will be discussed in chapter 4.

To calculate the alternative semantic value of a sentence from the alternative semantic values of its constituents, it is necessary to define an 'alternative' functional application that can combine these alternative semantic values. This 'alternative' functional application will here be referred to as $(..)_{ALT}$. Following Rooth(1985), a definition of an alternative value $[\![..]\!]_{ALT}$ and compositional functional application rule $(..)_{ALT}$ can be stated as below.

(35) **Definition of an alternative functional application rule $(..)_{ALT}$:**
If α is a terminal node, $[\![\alpha]\!]_{ALT}$= {$[\![\alpha]\!]$}
If α is a non-branching node and β is its daughter node, then $[\![\alpha]\!]_{ALT}$= $[\![\beta]\!]_{ALT}$
If α is a branching node and {β,γ} its daughters, then
$[\![\alpha]\!]_{ALT}$= $[\![\beta]\!]_{ALT}$ $([\![\gamma]\!]_{ALT})_{ALT}$ = {a: ∃b∈ $[\![\beta]\!]_{ALT}$ ∃c∈ $[\![\gamma]\!]_{ALT}$: a = b(c)}

Rooth(1985,1992) uses alternative semantics to account for the phenomenon of focus. Other phenomena such as Negative Polarity Items, disjunctions and questions have also

been argued to involve such an alternative semantics.[5] In this dissertation, I will make use of alternative semantics in analyzing the subjunctive mood in Spanish.

1.4 Overview of the dissertation

In chapter 2, I investigate the on-line process of resolving quantifier scope in *how many* questions and its context dependence. The central results of the experimental work presented here are the following. First, quantifier scope preferences are shown to be problematic for the most straightforward extension of an economy-based model to the processing of meaning, as evidenced by questionnaire studies in English and in French. Then, a model is elaborated in which the attested scope preferences are determined by the interaction with context. The results from a self-paced reading study in English indicate that context plays a crucial role in the processing of scope ambiguity. Finally, while incremental context interactive models have been claimed to induce immediate resolution of structural ambiguity (Crain & Steedman (1985), Altmann & Steedman (1988) and others), it is argued here that the interaction with context can also delay such ambiguity resolution, as evidenced by the results of the English self-paced reading study. This chapter thus examines how exactly the interaction with context affects the on-line interpretation of a *how many* question.

In chapter 3, I investigate the semantic properties of predicates that select the subjunctive mood in Spanish, and argue for a new semantics of these predicates: a semantics based on the comparison of contextually relevant alternative propositions. In my proposal, the semantics of the predicates that select the subjunctive mood thus crucially involves reference to context. To begin, I adopt Heim's (1992) conditional semantics of desire predicates and propose that it can be extended to the whole class of predicates that select the subjunctive mood. I present various arguments that show that this semantics needs to be revised. The new semantics involves comparison of the embedded proposition to its contextual alternatives on a scale introduced by the matrix predicate. Then, I compare my proposal to other existing approaches to the semantics of propositional attitudes and show that it is superior in accounting for a variety of empirical phenomena such as practical inferences, entailment-relations, contexts with more than two alternatives and association with focus phenomena.

In chapter 4, I investigate two major consequences of the proposal for the semantics of the predicates that select the subjunctive mood in Spanish: their focus sensitivity and their gradable nature. These are two properties that follow directly from the proposal outlined here. First, I present evidence that the predicates that select the subjunctive mood are indeed focus sensitive. I then address the question of what exactly the contribution of the subjunctive mood to the meaning composition is. I propose that the subjunctive mood has the role of evaluating the contextual alternatives for the predicate. To the contrary, the indicative mood blocks evaluation of the contextual alternatives at the level of the embedded clause. Second, I present empirical evidence for a comparative semantics of the predicates that select the subjunctive mood. I discuss the distribution of various degree modifiers such as *mucho* ('much'), *bastante* ('quite'), *demasiado* ('too much'), *enormemente* ('enormously'), and the comparative construction with predicates that select the subjunctive/indicative mood and argue that the distribution of these degree modifiers provides further evidence for the proposal defended here. The chapter concludes with a revised proposal in which the predicates that select the subjunctive mood are analyzed as having an extra degree argument.

Chapter 5 concludes the dissertation with the questions that emerge from the work presented here. From chapter 2, the question arises what repercussions the psycholinguistic results have for semantic theory. From chapters 3 and 4, the question arises how the analysis may be extended to other contexts in which the subjunctive mood appears, and what may be said about crosslinguistic variation in mood selection under this theory.

NOTES

[1] Many grammars provide detailed descriptions of the distribution of the subjunctive mood in Spanish. Among them are Alarcos Llorach (1970), Bello (1847), Borrego et al. (1985), Gili Gaya (1961), King (1992), Manteca Alonso-Cortés (1981), Porto Dapena (1991), Real Academia Española (1973), Ridruejo (1999), Sastre (1997), Togeby (1953), and many more.

[2] This definition is somewhat simplified. In fact, sentences containing factive predicates do not always have the presupposition that the complement clause is true. Rather, in most cases, they have the presupposition that the subject believes the complement clause to be true (for discussion of this point, see, among others, Klein 1975 and Delacruz 1976). The factive/non-factive distinction was first introduced in Kiparsky and Kiparsky (1971). See Demonte (1977) and Lleó (1976) for a discussion of factive/non-factive predicate classes in Spanish.

[3] For a discussion of the properties of semifactive predicates see Karttunnen(1977).

[4] See Beck(1996) and references therein.

[5] For the use of an alternative semantics in other phenomena see Krifka (1995) and Lahiri (1998) for NPIs, and Beck (2006, to appear) for questions.

APPENDIX TO CHAPTER 1

List of predicates that select the subjunctive/indicative mood

The following is a non-exhaustive list of predicates that select the indicative/ subjunctive mood collected from Borrego et al.(1985) and Sastre (1997)**.** Translations are mine.

A. PREDICATES THAT SELECT THE INDICATIVE MOOD IN SPANISH

EPISTEMIC PREDICATES

Saber (‘know’), creer (‘believe’), pensar (‘think’)

PREDICATES OF COMMUNICATION

Aclarar (‘clarify’), advertir (‘warn’), afirmar (‘affirm’), añadir (‘add’), anunciar (‘announce’), asegurar (‘assure’), avisar (‘notify’), certificar (‘certify’), comunicar (‘communicate’), confesar (‘confess’), confirmar (‘confirm’), confiar (‘make a confidence’), contar (‘tell), contestar(‘respond’), comentar (‘comment’), declarar (‘declare’), defender (‘defend’),dejar claro (‘clarify’), decir (‘say’), demostrar (‘demonstrate’), denunciar (‘denounce’),divulgar (‘divulge’), enseñar (‘show’), escribir (‘write’), explicar (‘explain’), exponer (‘expose’), expresar (‘express’), gritar (‘shout’), indicar (‘indicate’), informar (‘inform’), jurar (‘swear’), leer (‘read’), mencionar (‘mention’), murmurar (‘mumble’), notificar (‘notify’), ocultar (‘hide’), precisar (‘precise’), prevenir (‘forewarn’), proclamar (‘proclame’), pronosticar (‘forcast’), replicar (‘reply’), repetir (‘repeat’), responder (‘respond’), revelar (‘reveal’), señalar (‘point to’)

PREDICATES OF CERTAINTY

estar convencido (‘be convinced’), estar seguro (‘be certain’), es cierto (‘it is a matter of fact’), es claro (‘it is clear’), es obvio (‘it is obvious’), es evidente (‘it is evident’), es indiscutible (‘it is indiscussable’), es indudable (‘it is undoubtable’), es incuestionable (‘it is unquestionable’)

COMMISSIVES

Prometer (‘promise’), ofrecer (offer), proponer (propose)

FICTION VERBS

soñar(‘dream’), imaginar (‘imagine’)

PREDICATES OF MENTAL JUDGMENT

Acordarse (‘remember’), adivinar(‘guess’), admitir (‘admit’), anticipar(‘anticipate’), aprender (‘learn’), averiguar (‘find out’), comprobar (‘verify’), comprender (‘understand’), concluir (‘conclude’), considerar (‘consider’), constatar (‘realize’), darse

cuenta (‘realize’), demostrar (‘demonstrate’), descubrir (‘discover’), deducir (‘deduce’), enterarse de (‘find out’), estar de acuerdo (‘agree’), intuir (‘have the intuition’), ignorar (ígnorar’), olvidar: (‘forget’), reconocer (‘acknowledge’), sospechar (‘suspect’), suponer (‘supose’), tener en cuenta (‘take into consideration’), verificar (‘verify’)

PREDICATES OF PERCEPTION

escuchar (‘listen’), notar (‘notice’), observar (‘observe’), sentir (‘feel’), ver (‘see’), entender (‘hear’), percibir (‘perceive’)

B. PREDICATES THAT SELECT THE SUBJUNCTIVE MOOD IN SPANISH

DESIRE PREDICATES

Anhelar (‘yearn’), ansiar (‘hanker’), aspirar a (‘aspire’), confiar en (‘be confident’), esperar (‘hope’), desear (‘desire’), preferir (‘prefer’), querer (‘want’), temer (‘fear’), tener miedo (fear), es deseable (‘it is desirable’), estar temeroso de(‘be fearful of’).

EMOTIVE FACTIVES

Admirar (‘admire’), aguantar (‘abide’), aplaudir (‘aplaude’), aburrirse (‘be bored’), agradar (‘be pleased’), alegrarse (‘be glad’), apenar (‘be sorry’), aceptar (‘accept’), arrepentirse de (‘repent’), avergonzarse de (‘be ashamed of’), cansarse de (‘be tired of’), celebrar (‘celebrate’), convenir (‘convene’), dar pena (‘be sorry’), deplorar (‘deplore’), desesperar (‘be desperate’), detestar (‘hate’), disgustar (‘displease’), divertir (‘amuse’), doler (‘hurt’), echar de menos (‘miss’), emocionar (‘be moved’), encanta (‘be excited’), enfada (‘be upset’), enfermar (‘sicken’), enloquecer (‘madden’), enojar (‘annoy’), entristecer (‘sadden’), entusiasmar (‘exciten’), extrañar (‘to consider strange’), fascinar (‘fascinate’), fastidiar (‘bother’), gustar (‘like’), horrorizar (‘horrify’), importar (‘care’), interesar (‘interest’), lamentarse de (‘regret’), maravillarse de (‘amaze’) , molestar (‘disturb’), preocuparse (‘worry’), quejarse de (‘complain’), sentir (‘be sorry’), sorprender (‘be surprised’) , soportar (‘stand’), tolerar (‘tolerate’)

Adjectives: es + adj. (it is + adj.)

adecuado (‘adequate’), admisible (‘admissible’), agradable (‘pleasant’), bueno (‘good’), comodo (‘comfortable’), comprensible (‘understandable’), conveniente (‘convenient’), desagradable (‘unpleasant’), difícil (‘difficult’), divertido (‘funny’), emocionante (‘moving’), estupendo (‘great’), estúpido (‘stupid’), extraordinario (‘extraordinary’) extraño(‘strange’), fabuloso (‘fabulous’), falso (‘wrong’), fántastico (‘fantastic’), horroroso (‘horrible’), importante (‘important’), inadmissible (‘inadmissible’), increíble (‘unbelievable’), indignante (‘revolting’), injusto (‘unfair’), interesante (‘interesting’), inútil (‘useless’), justo (‘fair’), lamentable (‘regrettable’), lógico (‘logic’), malo (‘bad’), molesto (‘annoying’), maravilloso (‘amazing’), mejor (‘better’), natural (‘natural’), normal (‘normal’), paradógico (‘paradoxal’), penoso (‘shameful’), peor (‘worse’), peligroso (‘dangerous’), raro (‘strange’), razonable (‘reasonable’), repugnante (‘disgusting’), ridículo (‘ridiculous’), sorprendente

(‘surprising’), sospechoso (‘suspicious’), triste (‘sad’), urgente (‘urgent’), útil (‘useful’), vergonzoso (‘shameful’)

adjectives : Estar +adj. + prep

cansado de (‘tired’), acostumbrado a (‘used to’), asustado de (‘scared’), contento de (‘happy’), encantado de (‘charmed’), extrañado de (‘estrange’), orgulloso de (‘proud’), satisfecho de (‘satisfied’), harto de (‘tired’)

VERBS OF DOUBT

Dudar (‘doubt’), es dudoso (‘doubtful’)

VERBS OF PROBABILITY, POSSIBILITY AND NECESSITY

es posible (‘it is possible’), es necesario (‘it is necessary’), es probable (‘it is probable’), necesitar (‘need’)

DIRECTIVE PREDICATES

autorizar (‘authorize’), aconsejar (‘advise’), animar a (‘encourage’), aprobar (‘approve’), decidir (‘decide’), dejar (‘let’), exigir (‘request’), forzar a (‘force’), invitar a (‘invite’), impedir (‘hinder’), imponer (‘impose’), mandar (‘order’), obligar (‘oblige’), ordenar (‘order’), oponerse a (‘be opposed’), pedir (‘ask’), permitir (‘allow’) , perdonar (‘forgive’), prohibir (‘forbid’), recomendar (‘recommend’), rogar (‘beg’), suplicar (‘plead’), solicitar (‘solicit’), sugerir (‘suggest’)

CAUSATIVES

Hacer (‘make’), conseguir (‘achieve’), lograr (‘accomplish’), evitar (‘avoid’), contribuir a que (‘contribute’), ayudar (‘help’), causar (‘cause’)

CHAPTER 2

HOW MANY QUESTIONS: PSYCHOLINGUISTIC EVIDENCE FOR CONTEXT DEPENDENCE

2.1 Introduction[1]

In this chapter, I present psycholinguistic evidence for the fact that the interpretation of questions involves reference to context. In particular, I present experimental results that show that reference to context is necessary in the process of resolving quantifier scope ambiguity in questions.

Sentences containing multiple quantifiers (elements of the kind *everybody, some musician*, *many pieces* etc.) are known to give rise to several interpretations. The specific question that I will address here is how this kind of ambiguity is resolved in the on-line process of constructing an interpretation for a sentence. I concentrate exclusively on interrogative sentences, and in particular on the case of ambiguous *how many* questions that contain a universally quantified subject, *every N*. An example is given in (1).

(1) How many pieces did every musician play?

Psycholinguistic work on the resolution of quantifier scope ambiguity has so far mainly focused on declarative sentences (e.g., Kurtzman & MacDonald 1993, Tunstall 1997, Anderson 2004, Filik et al. 2004). In questions, resolution of quantifier scope ambiguity arises when the interrogative constituent (i.e., *how many pieces*) interacts with another quantifier in the sentence (i.e., *every musician*). For example, the question illustrated in (1) can receive several interpretations (and thus receive different possible answers), depending on whether the quantifier encoded in the interrogative constituent *n-many pieces* is interpreted in the scope of the quantifier *every musician* or not. A more detailed presentation of the relevant ambiguity will be given in section 2.2.1.

Quantifier scope ambiguities have traditionally been analyzed as syntactic ambiguity. Since May (1985), it is commonly assumed that quantifier scope involves the construction of several LF representations. Under this view, a sentence processing model has to contain a mechanism that constructs the LF representations of an incoming surface representation and chooses the LF that yields the preferred interpretation of the sentence. The research presented here offers experimental results that elucidate some aspects of this mechanism.

The central results of the research presented here are the following. First, quantifier scope preferences in questions will be shown to be problematic for the most straightforward extension of a processing model based on Economy assumptions, namely a model in which quantifiers are integrated into the LF representations in the order in which they appear in surface structure. The results from questionnaire studies in English and French indicate that such a model does not make the correct predictions for *how many* questions. This, of course, raises a number of questions on how comprehenders associate an interpretation on-line to the sentences they perceive.

Second, the results from a self-paced reading study in English provide on-line evidence for a model in which scope ambiguity is resolved through the interaction with context. This is an important finding, since, in the psycholinguistic literature, it has not yet been demonstrated that the resolution of quantifier scope ambiguity is dependent on the context that precedes the sentence. The few psycholinguistic studies that have dealt with the resolution of quantifier scope ambiguity (cf. Kurtzman & MacDonald 1993, Tunstall 1997) have used sentences in isolation and thus have not examined the role of the preceding discourse context. Given the results of the present work, the elaboration of a more generalized theory of quantifier scope resolution will require that preceding context be taken into consideration and carefully controlled in experimental work.

Finally, the results from the self-paced reading study furthermore indicate that interaction with context can delay ambiguity resolution. This result contrasts with the important well known claim that incremental context-interactive models induce immediate resolution of structural ambiguity (Crain & Steedman (1985), Altmann & Steedman (1988), and others).

The empirical basis of this research consists of data from English and French *how many* questions. Along with the usual *how many* construction, French makes use of a split construction in which only *combien* (‘*how many*’) is fronted. The case of French

is particularly informative, since the split and non-split *how many* constructions differ in their possible scope configurations. While the non-split construction does give rise to scope ambiguity, the split construction does not. Comparison of the two languages will thus help to shed more light on the processes involved in the resolution of quantifier scope ambiguity.

The structure of this chapter is as follows. In section 2.2, the phenomenon of scope ambiguity in *how many* questions is presented and a first hypothesis for the on-line process of scope resolution in *how many* questions is proposed. This hypothesis is based on the assumption that the parser obeys certain economy principles when constructing an LF representation of a sentence. The section concludes with a questionnaire study in English that provides strong evidence against this hypothesis. In section 2.3, further evidence from French *how many* questions is presented. The results from a French questionnaire study further strengthen the conclusion from section 2.2. In section 2.4, the central proposal is developed. It is argued that scope resolution is determined by the interaction with context. Furthermore, evidence is provided which suggests that interaction with context does not necessarily accelerate ambiguity resolution. The results of a self-paced reading study in English indicate that, in certain cases, the interaction with context can also result in the delay of such ambiguity resolution.

2.2 Processing quantifier scope ambiguities in *How many* questions

2.2.1 The data

In this section, the empirical facts about quantifier scope ambiguity in *how many* questions are presented. Two possible readings of these questions are discussed, and their two underlying LF representations are formulated.

A particular interpretation of a question is revealed by the answer it requires in a given context. *How many* questions that contain a universally quantified subject can receive at least two interpretations. Imagine the scenario described in (2).

(2) In the music department, three trumpet students had to pass an exam last week. Every student had to play six pieces. The only requirement they had was that among these there were two pieces that everybody had to play: 'Round Midnight' and 'The days of Wine and Roses'. For the rest, the students were free to choose what they preferred.

In the context of the situation described above, the question in (3) can be truthfully answered in two possible ways, namely, as in (3a) and (3b).[2]

(3) How many pieces did every student have to play at the exam?
Possible true answers a. Six pieces
b. Two pieces

The example presented in (3) is a case of scope interaction between *n-many pieces* and the subject quantifier *every student*. The fact that *how many* questions are potentially ambiguous in scope was noted first in Longobardi (1987) and Kroch (1989) and later explored by many others (Cinque 1990, de Swart 1992, Szabolcsi & Zwarts 1993, Dobrovie-Sorin 1993, Rullmann 1995, Cresti 1995, Beck 1996, Honcoop 1998, and others). With a predicate logic, the two possible interpretations can be represented as in (4a) and (4b). These two representations differ only in the order of the two quantifiers.[3]

(4) a. For which number n:$\forall$ x student(x)$\Rightarrow$ $\exists$Y pieces(Y) & card(Y)=n & played(Y)(x)
Answer: Six pieces

b. For which number n: $\exists$Y pieces(Y) & card(Y)=n & $\forall$ x student(x)$\Rightarrow$played(Y)(x)
Answer: Two pieces

The LF representations for these two interpretations of a *how many* question are given in (5a) and (5b).

(5) a. LF '*n-many* low':
$[_{CP}$ How$_n$ $[_C$ *Q* $[_{IP}$ every student$_i$ $[[$ t$_n$-many pieces$]_j$ $[_{VP}$ t$_i$ played t$_j$]]]]]
Answer: Six pieces

b. LF '*n-many* high':

$[_{CP}$ How$_n$ $[_C$ *Q* $[$ $[$ t$_n$-many pieces$]_j$ $[_{IP}$ every student$_i$ $[_{VP}$ t$_i$ played t$_j$]]]]]

Answer: Two pieces

A few comments are in order to explain why these two LF representations are the adequate underlying syntactic representations that lead to the corresponding interpretations in (4a) and (4b). In the following section, I discuss the underlying semantic representations.

2.2.2 The semantic representations for *how many* questions

In what follows, I assume a semantics for questions along the lines of Hamblin (1971) and Karttunen (1977), where the denotation of a question is the set of propositions which constitute possible answers to that question. For instance, if it is the case that Jason, Joyce and Brian came to the rehearsal, the sentence *Who came to the rehearsal?* denotes the set {'Jason came to the rehearsal', 'Joyce came to the rehearsal', 'Brian came to the rehearsal'}. Hamblin and Karttunen adopt an approach in which the *wh*-phrase contains an existential quantifier ('*For which x'*), and a question operator *Q*, situated in an appropriate position in the structure, which turns the proposition 'x came to the rehearsal' into a set of propositions. In other words, the question *Who came to the rehearsal?* denotes a set of propositions that are identical to 'x came to the rehearsal' for some person x.

It has been noticed in the literature that *how many* phrases are semantically more complex than other *wh*-phrases in that they involve two independent scope bearing elements (cf. Cresti 1995, Rullmann 1995, Beck 1996, among others). A question of the kind *How many pieces did Jason play?* is interpreted as the set of propositions 'Jason played n pieces' for some number n. Appropriate representations for the possible interpretations can only be determined if *how many* phrases are decomposed into two quantificational elements, one encoding an existential quantifier over numbers n ('*For which n*') and a second encoding an existential quantifier over sets. The semantically interrogative part '*For which n*' has to be separated from the existential quantifier over sets, since the latter is required to be interpreted inside the scope of the question operator that turns the proposition into a set of propositions. If the existential quantifier

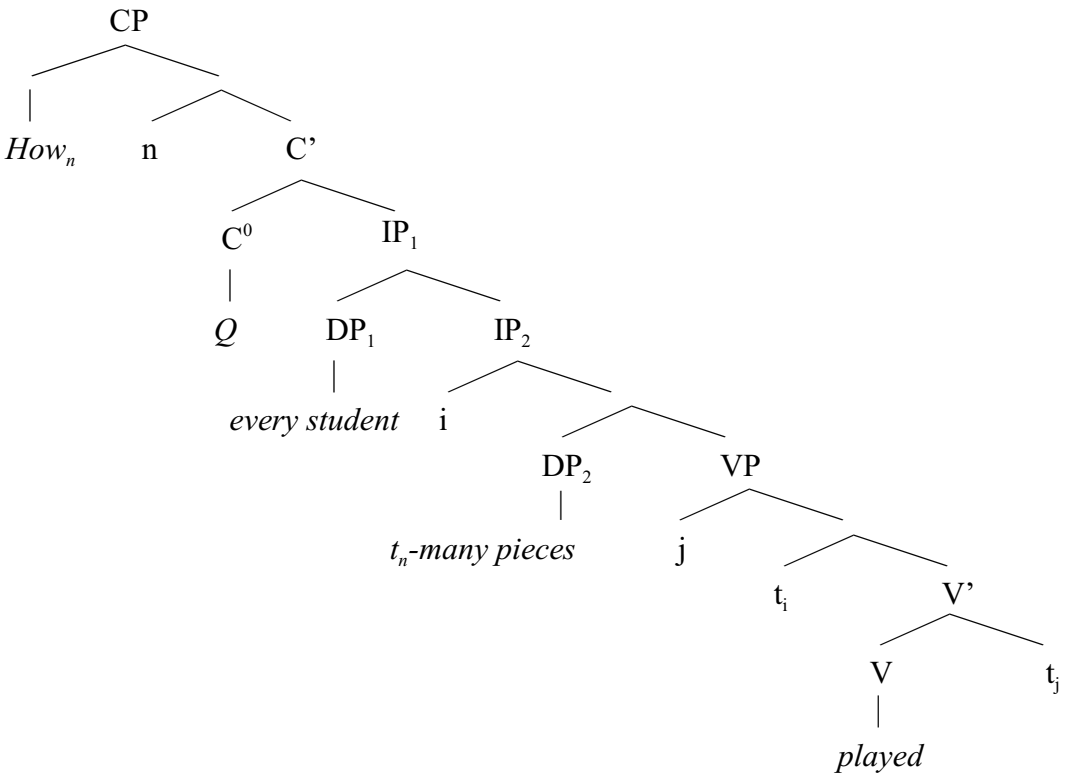
were to be interpreted, like the quantifier over numbers, outside the scope of the question operator, the resulting meaning of the question *How many pieces did Jason play?* would be a set of propositions of the kind 'Jason played X', where X are pieces and the set X has some cardinality n, for instance {'Jason played *Round Midnight, The days of Wine and Roses* and *So What*', 'Jason played *The days of Wine and Roses* and *So What*, etc.}. This clearly does not correspond to the appropriate set of possible answers to that question. Since the question operator is assumed to be interpreted in the Complementizer position C^0, the existential quantifier over sets necessarily has to be interpreted below that position, while the quantifier over numbers takes matrix scope. Below, I provide the two semantic representations in (6a) and (6b).

(6)a. semantic representation for LF '*n-many* low':
λp.λw.∃n[p=λw'.∀x: x is a student in w' ⇒ ∃Y:[Y is a set of pieces in w' & card(Y)(w') = n & x played Y in w']]

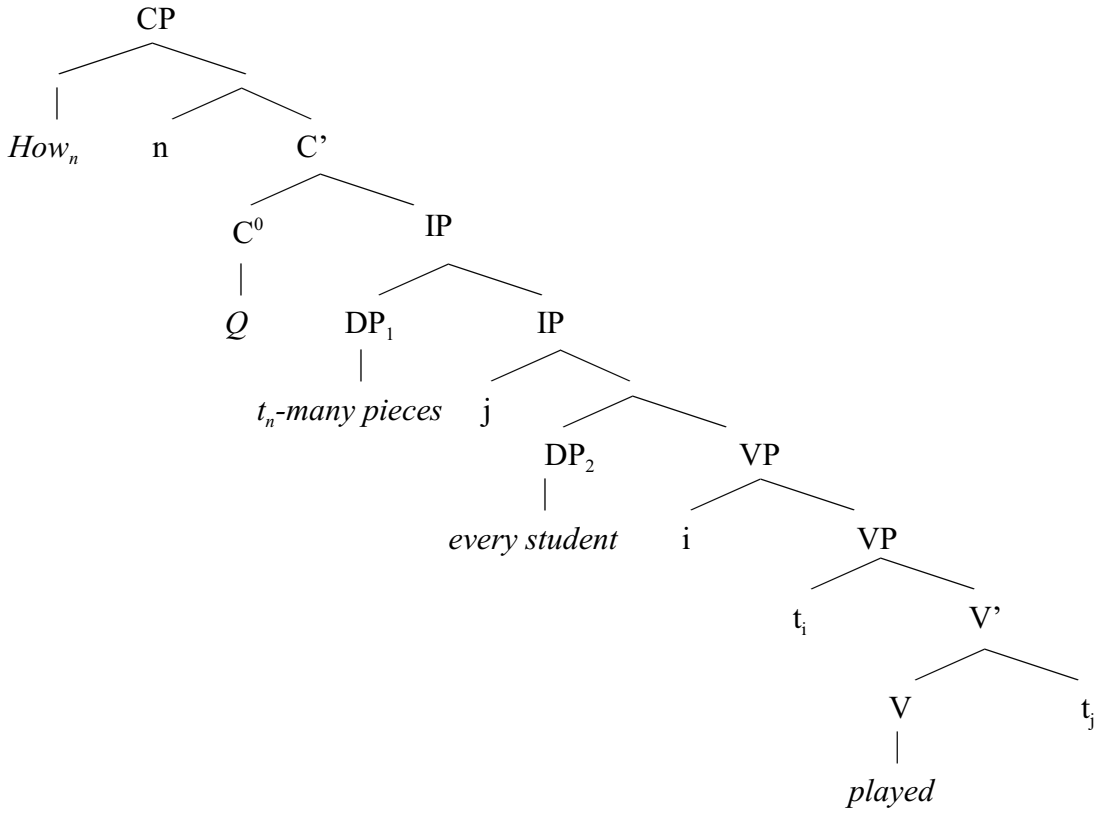
b. semantic representation for LF '*n-many* high':
λp λw∃n[p=λw'.∃Y: Y is a set of pieces in w' & card(Y)(w')= n & ∀ x:[x is a student in w' ⇒ x played Y in w']]

Following Cresti (1995), in the possible LF representations of a *how many* question, the quantifier over numbers is encoded in *how* and takes matrix scope as required by the question meaning, while the quantifier over sets is encoded in *n-many N* and lowered below the question operator in C^0. *n-many N* can be lowered into two possible landing sites which results in two Logical Forms. The corresponding tree structures are as follows:

(7) LF '*n-many* low':



(8) LF '*n-many* high':



The lexical entries for *how*, *n-many* and *Q* are given below.

(9) $[\![How]\!] = \lambda R_{<e,<s,t>>,<s,t>>} \lambda p.\lambda w. \exists n [R(n)(p)]$

(10) $[\![n\text{-}many]\!] = \lambda Q_{<e,<s,t>>} \lambda P_{<e,<s,t>>} \lambda w_{\cdot} \exists Y [P(Y)(w) \& card(Y)(w)=n \& Q(Y)]$

(11) $[\![Q]\!] = \lambda q.\lambda p.\lambda w.[p=q]$

For illustration, I provide the bottom-up composition for LF '*n-many* low' here.

(12)
$[\![VP_1]\!]^g$ = $\lambda w.$x played y in w.

$[\![IP_2]\!]^g = [\![DP_2]\!]^g(\lambda y.\lambda w.$x played y in w.)

$[\![n\text{-}many]\!]^g = \lambda Q_{<e,<s,t>>}.\lambda P_{<e,<s,t>>} \lambda w_{\cdot} \exists Y [P(Y)(w) \& card(Y)(w)=n \& Q(Y)(w)]$

$[\![IP_2]\!]^g = [\![n\text{-}many]\!]^g([\![pieces]\!]^g)(\lambda y.\lambda w.$x played y in w)

$[\![pieces]\!]^g = \lambda y_2.y_2$ is a set of pieces in w

$[\![IP_2]\!]^g = \lambda w_{\cdot} \exists Y$ [Y is a set of pieces in w & card(Y)(w)=n & x played Y in w]

$[\![every]\!]^g = \lambda Q_{<e,<s,t>>} \lambda P_{<e,<s,t>>} \lambda w[\forall x\ Q(x)(w) \rightarrow P(x)(w)]$

$[\![student]\!]^g = \lambda x_2.x_2$ is a student in w.

$[\![IP_1]\!]^g = [\![every]\!]^g([\![student]\!]^g)(\lambda x.\lambda w.\exists Y$ [Y is a set of pieces in w & card(Y)(w)=n & x played Y in w])

$[\![IP_1]\!]^g = \lambda w.\forall x$: x is a student in w $\rightarrow \exists Y$: [Y is a set of pieces in w & card(Y)(w)=n & x played Y in w]

$[\![Q]\!]^g = \lambda q.\lambda p.\lambda w[p=q]$

$[\![C']\!]^g = [\![Q]\!]^g([\![IP_1]\!]) =$

$= \lambda p.\lambda w$ [$p=\lambda w'. \forall x$: x is a student in w' $\rightarrow \exists Y$:[Y is a set of pieces in w' & card(Y)(w')=n & x played Y in w']]

$[\![how]\!]^g = \lambda R_{<e,<<st>,<st>>} \lambda p.\lambda w.\exists n [R(n)(p)]$

$[\![CP]\!]^g = [\![how]\!]^g(\lambda n.\lambda p.\lambda w[p=\lambda w'.\forall x$: x is a student in w' $\rightarrow \exists Y$[Y is a set of pieces in w' & card(Y)(w') =n & x played Y in w'])]) =

$= \lambda p.\lambda w.\exists n[p=\lambda w'.\forall x$: x is a student in w' $\rightarrow \exists Y$[Y is a set of pieces in w' & card(Y)(w')=n & x played Y in w']]

In what follows, I will mostly limit myself to the use of the corresponding syntactic representations LF '*n-many* low' and LF '*n-many* high' that lead to the representations discussed here.

Given the two interpretations of a *how many* question, the following question arises for sentence processing: how does the parsing mechanism determine which LF representation (with its corresponding semantic representation) is to be associated to the sentence? The representation that is chosen reflects the preferred interpretation of the question.

Before formulating a hypothesis concerning the resolution of scope ambiguity in *how many* questions, I turn to the underlying assumptions of the processing model adopted here.

2.2.3 The assumptions of the processing model

In this section, I lay out the basic assumptions for the parsing model that I adopt. In order to compute an interpretation resulting from a particular scope configuration, it is necessary that the parser build the corresponding LF representation. This implies that, when the quantificational elements are not in the appropriate configuration at surface structure, the parser has to build the structural representation that can feed semantic interpretation. The LF representation is computed along with the syntactic surface structure as the incoming words are perceived on-line.

In previous literature, it has been argued that scope ambiguity resolution requires a model of parallel evaluation. Kurtzman & MacDonald (1993) propose a model for the resolution of scope ambiguity in declarative sentences, where the different possible interpretations are initially considered in parallel. A set of scope principles then determines which representation (corresponding to the preferred interpretation) is ultimately selected. Crain & Steedman (1985) and Altmann & Steedman (1988), similarly, propose that the resolution of structural ambiguity in a context interactive model requires parallel evaluation of partial interpretations. They argue that the appropriate interpretation of an ambiguous sentence in a particular context can only be chosen through comparison of alternatives. In their view, a single interpretation cannot be rejected on grounds of implausibility, but only in comparison with some more plausible alternative. They therefore claim "that weakly interactive

processors must by definition propose syntactic alternatives for semantic and pragmatic adjudication *in parallel*." (Altmann & Steedman 1988, p. 208).

The main concern of these models is the mechanism that chooses among the possible interpretations of a sentence. How the actual disambiguated representations are constructed is however not made explicit. The model that I propose here focuses on the mechanism that actually constructs the disambiguated representations. Once such a mechanism is made explicit, it will be shown that, in the case of ambiguity resolution in *how many* questions, parallel evaluation of several partial interpretations becomes unnecessary. Specifically, I will argue that, in an on-line context interactive model, at the point of ambiguity, the context determines the construction of a single LF representation, without the need to compare different alternatives.

2.2.4 The Minimal Cost Hypothesis

In this section, I formulate a first hypothesis for the computation of LF representations of an ambiguous *how many* question.

A vast body of literature has argued for a parser that obeys economy principles when constructing surface representations (cf. the Minimal Attachment Principle, Frazier 1978, Simplicity, Gorrell 1995, the Minimal Chain Principle, De Vincenzi 1991, and many others). In this work, I adopt the hypothesis that the construction of LF representations is also governed by economy principles. Indeed, the few recent studies that have been explicit about how corresponding LF representations are associated to surface representations, argue that the parser first chooses to construct the LF that requires minimal changes from the surface representation (e.g., the Principle of Scope Interpretation by Tunstall 1997 and the Minimal Lowering Principle by Frazier 1999). Of particular interest is the proposal made by Tunstall (1997), which explicitly addresses the question of how LF representations for sentences with multiple quantifiers are constructed. Her Principle of Scope Interpretation states that the preferred interpretation of a sentence corresponds to the LF that differs minimally from the surface structure.

In a similar vein, I examine the hypothesis that the parser first chooses to construct the LF that has minimal cost. This notion can, of course, be defined in many different ways. Here, I investigate the case in which minimal cost mirrors Tunstall's

concept of minimal changes from the surface representation. To make such a proposal explicit, I define the following cost function: the cost of an LF corresponds to the number of permutations that are necessary to derive the order of the quantifiers from their surface order. Thus, an LF in which the quantifiers have been permuted with respect to surface order has higher cost than an LF where the order of such elements is preserved (e.g., cost(Q1Q2) = 0 < cost(Q2Q1) = 1). For clarification, I repeat the two LF representations in (13a) and (13b). In LF '*n-many* low', the quantifiers are reversed with respect to their surface order; in LF '*n-many* high', their order is preserved.

(13) a. LF '*n-many* low':

$[_{CP}$ How$_n$ $[_C$ *Q* $[_{IP}$ every student$_i$ $[[$ t$_n$ -many pieces$]_j$ $[_{VP}$ t$_i$ played t$_j$ $]]]]]$

b. LF '*n-many* high':

$[_{CP}$ How$_n$ $[_C$ *Q* $[_{IP}$ $[$ t$_n$-many pieces$]_j$ $[_{IP}$ every student$_i$ $[_{VP}$t$_i$ played t$_j$$]]]]]$

According to such a cost function, we expect the parser to construct the LF representation that respects the order of the quantificational elements in which they appear at Surface Structure. This leads to the formulation of the Minimal Cost Hypothesis as stated in (14).

(14) Minimal Cost Hypothesis

When processing a *how many* question, the parser first computes LF '*n-many* high', because it has less cost than LF '*n-many* low' (cost(LF '*n-many* high') < cost(LF '*n-many* low')).

In order to test the Minimal Cost Hypothesis, a questionnaire study was designed. The interpretation that perceivers choose for an ambiguous question can be determined rather straightforwardly. It is sufficient to ask them to answer the question after having read a story. In the questionnaire study, test-questions were thus preceded by short stories. These were set up in a way that both interpretations of the question were possible answers. This strategy not only determines directly which interpretation participants associate to the question, but has the further advantage that the context in which the question is processed can be controlled.

2.2.5 Experiment I

This experiment consisted of a questionnaire study that tested the prediction of the Minimal Cost Hypothesis laid out in (14). That is, it examined whether native English speakers do in fact prefer to associate an LF '*n-many* high' representation to a *how many* question. The questionnaires presented *how many* questions preceded by a short story that permitted both interpretations of the question. Each story described a scenario in which several individuals engaged in an activity. This activity involved manipulating sets of objects or entities, some of which were the same for all individuals mentioned. An example is given in (15).

(15) Three friends went to the last Film Festival in Montreal. Altogether, each of them saw ten movies. When comparing what they had seen at the end, they realized that there were four movies that they all had seen.

Question: How many movies did everybody see at the last Film Festival in Montreal?

The story in (15) presents information about the number of movies that each of the friends saw (LF '*n-many* low' answer) as well as the number of particular movies that were seen by everybody (LF '*n-many* high' answer). These two pieces of information were mentioned explicitly in all stories and we expected participants to choose one of the two corresponding answers. The stories were meant to be constructed as 'neutral' as possible by not presenting either of the two pieces of information as more salient or relevant; the verb was kept the same in the question and in both sentences that contained the relevant information. In order to make the information in the stories as unambiguous as possible, statements of the kind *everybody saw n movies* were avoided, and replaced, when possible, by less ambiguous statements (e.g., *each of them saw n movies* for the LF '*n-many* low' information, *there were n movies that were seen by everybody* for the LF '*n-many* high' information). This would ensure that we could correctly interpret participants' answers. Since the frames corresponding to LF '*n-many* low' and LF '*n-many* high' information were different from the frame used in the question, no bias was expected. Only in one story were the frames introducing LF '*n-*

many low' and LF '*n-many* high' information identical to the frame in the question. But, since here all three frames were the same, no bias was expected either.

Two factors were manipulated: the order in which the cardinality information was presented in the text, and the non-partitive/partitive nature of the wh-element (*how many N* versus *how many of the N*) .

The first factor was introduced to eliminate the possibility that participants would simply answer with the last information they recalled from the text. In the counterpart stories, the order of the cardinality information was presented in the reverse order, as below.

(16) Three friends went to the last Film Festival in Montreal. At the end, when comparing what they had seen, they realized that there were four movies that they all had seen. Altogether, each of them saw ten movies.

The second factor (partitive/non-partitive wh-phrases) was introduced for generality reasons. There is a possibility that the partitive/non-partitive nature of the *how many* phrase plays a determining role for its scope preferences. It is well known that non-interrogative partitive Noun Phrases do not have identical scope preferences to the corresponding non-partitive Noun Phrases. Initial intuitions, indeed, seemed to suggest that partitive *how many of the N* would disfavor more strongly an LF '*n-many* low' answer. If there was a difference, the Minimal Cost Hypothesis would not be able to capture it and would need reformulation. Comparison of partitive and non-partitive phrases would thus provide more relevant information about the parsing mechanism, and elucidate whether there is more than one principle at play in the construction of a LF representation.

The filler items were stories followed by *which* questions (e.g., *'Which pieces did every student play?*'). In these stories, instead of the information on the cardinality of the sets, the names of the manipulated objects/entities were provided. Ambiguous *which* questions can be answered either with a pair-list answer (e.g., *'Jason played Round Midnight and Autumn Leaves, Joyce played Round Midnight and Summertime, Rebecca played Round Midnight and The Rainbow People* '), or with a single answer (e.g., *'Round Midnight'*). These stories served as filler items, but they also permitted comparison between *how many* questions and *which* questions. Even though the

corresponding LF representations for the two questions are not the same, both the LF '*n-many* high' answer to a *how many* question and the single answer to a *which* question involve the intersection of all sets mentioned in the story.

2.2.5.1 Method

Subjects

Thirty two undergraduate students from the University of Massachusetts at Amherst completed the questionnaire as part of a half hour experiment (six short questionnaires from different studies were to be completed) and received extra course credit for it.

Materials

There were four versions of each story/*how many* question pair and two versions of each filler story/*which* question pair. All items are provided in appendix 1.

Procedure

Participants were presented with a two-page questionnaire. The top of the first page instructed them on the task, telling them that they should read through the stories and answer the questions with the first answer that came to mind. From the answer it was usually possible to infer the interpretation that was associated with the question. They were also asked to mention if there was more than one possible answer.

The questionnaires contained eight stories each followed by a *how many* question and four filler stories followed by a *which* question. Across the four forms of the questionnaire, the questions were counterbalanced with respect to the type of *how many* constituent (partitive versus non-partitive), and with respect to the order in which the relevant cardinality information appeared in the text (order 1 versus order 2). The filler stories were also counterbalanced with respect to the order of the information. The four questionnaires were randomized once only.

2.2.5.2 Results

Contrary to the predictions of the Minimal Cost Hypothesis, the *how many* questions were answered more often with an LF '*n-many* low' answer (58.3% of the times) than with an LF '*n-many* high' answer (37.8% of the times). The full data appear in Table 1. There was a significant preference for the LF '*n-many* low' answer over the LF '*n-many* high' answer (i.e., freq(LF '*n-many* low')-freq(LF '*n-many* high') > 0), by subject ($t_1(31) = 2.75$, $p < .007$) but not by item ($t_2(7)=1.59$, $p < .15$). However, seven out of the eight stories had a significant preference for the LF '*n-many* low' answer (sign test $p < .035$).

TABLE 1

English *how many* questions (number of answers)

Condition	LF '*n-many* low' answer	LF '*n-many* high' answer	Cumulative answer	Total
a. non-partitive/order1 [a]	39	22	3	64
b. non-partitive/order 2 [b]	35	24	4	63
c. partitive/order1 [a]	36	25	2	63
d. partitive/order2 [b]	38	25	1	64
Total	148(58.3%)	96 (37.8%)	10	254

[a] order 1= in the story, LF '*n-many* low'-information appears before LF 'n-many high'-information

[b] order 2 = in the story, LF '*n-many* high'-information appears before LF '*n-many* low'-information

There were also ten cumulative answers (answers that count the total number of objects in the story) and some second choice answers (as a second choice there were four LF '*n-many* low' answers, two LF '*n-many* high' answers and one cumulative answer). These answers were not included in the statistical analysis. Two answers were invalid since they didn't correspond to any possible answer and could thus not be interpreted.

As can be seen in Table 1, there was no overall difference between the two differently-ordered versions of each story. Hence, the preference for the LF '*n-many*

low' answer was independent from the order in which the information appeared in the text. Furthermore, there was almost no difference between partitive and non-partitive questions.

Concerning the filler items, there was a very strong preference to give a single answer to a *which* question ($t_1(31)=20.5$, $p < .0001$, $t_2(3) = 13.8$, $p < .0009$). Note that the single answer involves picking out the same set as would a corresponding LF '*n-many* high' answer. Even though subjects dispreferred an LF '*n-many* high' answer to a *how many* question, they did not disprefer the corresponding single answer to a *which* question. Here as well, the order in which the information appeared in the text had no effect. The results are presented in Table 2.

TABLE 2

English *which* questions (number of answers)

Condition	Single answer	Pair-list answer	Cumulative answer	Total
order 1	60	2	2	64
order 2	61	1	1	63
Total	121	3	3	127

2.2.5.3 Discussion

The results of this experiment indicate that participants preferred to choose an LF '*n-many* low' answer over an LF '*n-many* high' answer, when asked to respond to an ambiguous *how many* question. We can conclude that the Minimal Cost Hypothesis does not make the correct predictions. Perceivers seem to prefer to interpret *how many* questions with an LF '*n-many* low' interpretation. These results thus suggest that the parsing mechanism cannot be guided by the kind of Economy considerations expressed in the Minimal Cost Hypothesis. At least, these considerations are not sufficient to determine which LF is to be associated with a sentence.

What other considerations could play a role in the resolution of quantifier scope ambiguities? At first sight, one might speculate that the LF '*n-many* high' answer demands more cognitive computations than the LF '*n-many* low' answer, since it

requires determining the intersection set of all sets mentioned in the story. However, since the *which* questions showed a very strong preference for a single answer, such a proposal cannot be maintained. The single answer picks out exactly that intersection set. Since it could be claimed that pair-list answers might have been avoided out of 'laziness' (participants could be avoiding to write out the rather long answer), I constructed a similar follow up questionnaire in which 16 participants were given stories followed by a question and two possible paraphrases for the answer. They were asked to choose one of the two paraphrases. In this study, there was still a strong preference to respond to a *which* question with a single answer (50 single answers and only 14 pair-list answers). One can thus reject the hypothesis that the LF '*n-many* high' answers were avoided because computing the intersection set would be too demanding.

Interestingly, none of the scope principles used in the linguistic and psycholinguistic literature predict the preference for an LF '*n-many* low' answer to a *how many* question. For the case of declarative sentences, Kurtzman & MacDonald (1993) provide experimental evidence that a number of scope principles interact. They argue for a strong influence of two factors on scope preferences in declarative sentences. One of these favors either a linear left-to-right hierarchy or a structural high-to-low ordering (the *linear order principle*, Bunt 1985, Fodor 1982 and many others and the *c-command principle*, Reinhart 1983) . The other factor favors an ordering in terms of thematic hierarchy or a preference to give external arguments higher scope (the *surface subject principle*, Ioup (1975) and the *thematic hierarchy principle*, Grimshaw (1990), Jackendoff (1972)). Kurtzman & McDonald argue that in the case of active declarative sentences both factors predict a preference for the leftward quantified phrase to take wide scope, as evidenced by their experimental results. In the case of passive declarative sentences, the factors conflict since in a passive sentence the subject does not precede the object. Here, no clear preference is predicted, again as evidenced by their results.

If scope resolution in questions is to result from these same scope principles, these are yet to be defined in a way that they can capture all the possible scope construals of a question. In particular, the present scope principles do not capture the fact that wh-elements may contain more than one quantificational element, as is the case for *how many N* (*For which n + n-many N*), and that another quantificational element might take scope between these two elements, as in LF '*n-many* low' (order:

For which n, *every N*, *n-many N*). Putting aside this issue, one could propose that the scope principles ignore the interrogative quantifier *For which n* and only control the preference of order for *every N* and *n-many N*. Interestingly, the two factors presented above conflict in this case: the c-command principle and linear order principle predict a preference for the surface structure order, hence an LF '*n-many* high' representation, while the thematic hierarchy principle and surface subject principle predict a preference for the subject to take scope over the object, hence an LF '*n-many* low' representation. Following Kurtzman & MacDonald's proposal, in analogy to passive declarative sentences, we then expect no particular preference for one or the other interpretation of a *how many* question. This is contrary to what has been observed in experiment I.

Finally, the Principle of Scope Interpretation proposed by Tunstall (1997) does not make any predictions about this case since it says nothing about the cost of different landing sites of quantifiers in the LF representation of a question. The Principle of Scope Interpretation states that the parser chooses to construct the LF that requires the minimum of necessary grammatical operations, or in other words, the LF that only requires grammatically necessary movements. Notice that, contrary to the results presented here, we would expect a preference for the LF '*n-many* high' representation over the LF '*n-many* low' representation. Under this principle one would expect the lowering movement of the quantifier *n-many N* to be as short as possible: in order to construct an LF representation that is interpretable it is sufficient to lower the quantifier below the question operator and not farther. This results in an LF '*n-many* high' representation. Nevertheless, the results of experiment I have shown that an LF '*n-many* low' representation is in fact preferred.

Before proposing an analysis for the results of this experiment, I turn to the French data which present additional evidence against the Minimal Cost Hypothesis.

2.3 Further evidence from French *How many* questions

2.3.1 The data

After having discussed ambiguous *how many* questions in English in the previous section, I will now turn to a kind of *how many* construction in French that does not display this ambiguity. French makes use of a corresponding split construction, in

which only *combien* (‘*how many’*) is fronted. The important feature of this construction is that it can only be interpreted with an LF ‘*n-many* low’ interpretation and not with an LF ‘*n-many* high’ interpretation. For convenience, I repeat the scenario from section 2 in (17). The question in (18) can only receive the ‘six pieces’ answer in this scenario.

(17) In the music department, three trumpet students had to pass an exam last week. Every student had to play six pieces. The only requirement they had was that among these there were two that everybody had to play: ‘Round Midnight’ and ‘The days of Wine and Roses’. For the rest, they were free to choose what they preferred.

(18) Combien tous les étudiants ont-ils joué de pieces?
How many all the students have-they played of pieces?
‘How many pieces did every student play?*’*

a. Possible answer: Six pieces.
b. Impossible answer: Two pieces.

The French non-split counterpart, however, behaves like the English construction in that it is ambiguous and permits both answers, as illustrated in (19).

(19) Combien de pieces tous les étudiants ont-ils joués ?
How many of pieces all the students have-they played?
‘How many pieces did every student play?’

Possible answers: a. Six pieces
b. Two pieces

The underlying LF representations for the French non-split construction are assumed to be identical to the LF representations that have been proposed for English in section 2.2.1.

French thus presents the case where two different constructions can be used to express the same interpretation (the LF ‘*n-many* low’ interpretation). While the split

construction can only be used to express that particular reading, the non-split construction is ambiguous.

The Minimal Cost Hypothesis presented above predicts the preference for an LF '*n-many* high' representation of a *how many* question. In the following, I argue that there is independent reason to expect this preference for the non-split question in French.

2.3.2 The Blocking Hypothesis

Because French admits two constructions that differ with respect to their possible scope configurations, a particular version of the Blocking Principle (cf. Aronoff (1976)) can be argued to apply. The Blocking Principle states that the existence of a particular word blocks the existence of another word with identical semantics. Di Sciullo and Williams (1987) and Williams (1996,1997) propose that this principle can also be extended to other levels of the grammar, in particular to syntax. Williams (1997) interprets Aronoff's (1976) principle in the following way: "if two forms exist (in syntax or morphology), they must have different meanings"(p.578).

The question whether the effects of the Blocking Principle should extend beyond the area of morphology is still under debate. Note that the French configuration, in fact, disconfirms Williams' (1997) proposal. That proposal predicts that the non-split construction should not give rise to ambiguity at all. Williams (1997) claims that the Blocking Principle predicts the following two possibilities: "either one form is associated with the meaning, in which case the other form cannot have the meaning (blocking); or there is only one form which is ambiguous. If there are two forms, they must have different meanings; if there is only one form, it is permitted to be ambiguous." (p.585).

However, there exists a pragmatic version of the Blocking Principle which follows directly from the Gricean principles (cf. Grice 1975). The principle against obscurity requires that a question be phrased as unambiguously as possible. Consequently, in the case of French, we expect the non-split construction to be used to express an LF '*n-many* high' interpretation. If the questioner wanted to convey the LF '*n-many* low' reading of the question, the principle against obscurity would force her/him to chose an unambiguous construction instead of the ambiguous non-split

construction. The split construction should then be used whenever the LF '*n-many* low' interpretation is the intended interpretation of the question.

Under a Gricean version of the Blocking Principle, we thus expect the non-split construction to be used to express the LF '*n-many* high' interpretation rather than the LF '*n-many* low' interpretation. Consequently, the parser should prefer to assign the LF '*n-many* high' representation to the non-split construction. The hypothesis that makes this prediction is stated in (20).

(20) Blocking Hypothesis

In French, the split question is unambiguously used to express the LF '*n-many* low' interpretation. Assuming a Gricean version of the Blocking Principle, we expect the non split question to be used in production to express the LF '*n-many* high' interpretation, and correspondingly expect perceivers to favor that reading in comprehension.

Clearly then, for French, the Minimal Cost Hypothesis and the Blocking Hypothesis together strongly predict a preference to answer a non-split question with an LF '*n-many* high' answer. Experiment II tests these hypotheses.

2.3.3 Experiment II

This experiment consisted of a French questionnaire study that tested the predictions of both the Minimal Cost Hypothesis laid out in (14) and the Blocking Hypothesis in (20).

As in the previous study, in Experiment I, participants had to answer *how many* questions preceded by short stories. The stories were constructed exactly as in Experiment I (see experiment I for details).

Two factors were manipulated: the order in which the information about the number was presented in the text, and the split/non-split nature of the wh-element. As before, the first factor was introduced to eliminate the possibility that participants would simply answer with the last information from the text. The second factor was introduced to test the Blocking Hypothesis.

2.3.3.1 Method

Subjects

Sixty four undergraduate students from the Université Paris 8 completed the questionnaire as part of a homework assignment in an introductory course to Linguistics.

Materials

There were four versions of each story-question pair and two versions of each filler story-question pair. All items are provided in appendix 2.

Procedure

Participants were presented with a two-page questionnaire. The top of the first page instructed them on the task, telling them that they should read through the stories and answer the questions with the first answer that came to mind. They were also asked to mention if there was more than one possible answer. From the answer it was usually possible to infer the interpretation that was associated with the question.

The questionnaires contained eight stories, each followed by a *how many* question, and four filler stories followed by a *which* question. Across the four forms of the questionnaire, the questions were counterbalanced with respect to the type of *how many*-constituent (split versus non-split), and with respect to the order in which the relevant cardinality-information appeared in the text (order 1 versus order 2). The filler stories were also counterbalanced with respect to the order of the information. The four questionnaires were randomized once only.

2.3.3.2 Results

French *how many* questions were answered more often with an LF '*n-many* low' answer (80.7% of the times) than with an LF '*n-many* high' answer (7.4% of the times). The full data appear in Table 3. In the case of a non-split question, contrary to the predictions of the Minimal Cost Hypothesis and the Blocking Hypothesis, there was a highly significant preference for the LF '*n-many* low' answer over the LF '*n-many*

high' answer by subject ($t_1(63) = 16.32$, $p < .0001$) and by item ($t_2(7) = 12.71$, $p < .0001$).

TABLE 3

French *how many* questions (number of answers)

Condition	LF '*n-many* low' answer	LF '*n-many* high' answer	Cumulative answer	Total
split/order1[a]	103	8	15	126
split/order 2[b]	105	8	15	128
non-split/order1[a]	102	14	11	127
non-split/order2 [b]	100	8	19	127
Total	410 (80.7 %)	38 (7.4%)	60	508

[a] order 1: In the story, LF '*n-many* low'-information appears before LF '*n-many* high'-information

[b] order2: In the story, LF '*n-many* high'-information appears before LF '*n-many* low'-information

There were also sixty cumulative answers (answers that count the total number of objects) and several second choice answers (as a second choice there were two LF '*n-many* low' answers, nine LF '*n-many* high' answers and eighteen cumulative answers). These answers were not included in the statistical analysis. Four answers were invalid since they didn't correspond to any possible answer and could thus not be interpreted.

As can be seen in table 3, there was no overall difference between the two differently ordered versions of each story. The preference for the LF '*n-many* low' answer was independent from the order in which the cardinality information appeared in the text. Furthermore, contrary to the Blocking Hypothesis, there was almost no difference between split and non-split questions. The non-split questions received only a few more LF '*n-many* high' answers than the split questions.

Concerning the filler items, there was a very strong preference to give a single answer to a *which*-question, instead of a pair-list answer ($t_1(63)=6.82$, $p < .0001$, $t_2(3)=5$, $p < .02$). Here as well, the order in which the information appeared in the text had no effect. There were only a few more single answers for order 2. The results are presented in Table 4.

TABLE 4

French *which* questions (number of answers)

Condition	Single answer	Pair-list answer	Cumulative answer	Total
order 1	92	5	28	125
order 2	105	3	17	125
Total	197	8	45	250

2.3.3.3 Discussion

The French results provide additional evidence against the Minimal Cost Hypothesis and the Blocking Hypothesis. Contrary to the prediction of these hypotheses, there is a preference to answer a *how many* question with an LF '*n-many* low' answer rather than with an LF '*n-many* high' answer. The preference for an LF '*n-many* low' answer is in French even stronger than it is in English.[4]

The results from the *which* questions closely parallel the English results. A single answer is preferred over a pair-list answer. Again, this indicates that the LF '*n-many* high' answer cannot have been avoided because it would require more effort when computing the intersection set.

Contrary to the predictions of the Blocking Hypothesis, there was almost no difference between split and non-split questions in French. This suggests that other factors may have priority and appear to override this principle. We will see later how this result can be integrated into the proposal to be developed below.

To conclude, the results from experiments I and II provide strong evidence against the Blocking Hypothesis and the Minimal Cost Hypothesis. We can conclude that the process of quantifier scope resolution cannot solely be based on the kind of Economy principles that are encoded in the Minimal Cost Hypothesis. Additional factors must be at play when the parser constructs an interpretation for a syntactic structure.

In the following, I develop a proposal in which the attested preferences are derived under the assumption that context plays a determining role in the process of constructing an LF representation for a *how many* question.

2.4 On-line evidence for reference to context

In this section, I argue that the resolution of quantifier scope ambiguities requires an incremental context-interactive model. That is, the mechanism that interprets syntactic structures computes the meaning of a sentence piece by piece as the constituents are processed on-line. Furthermore, in this process, the mechanism crucially makes use of information provided by the context. An important feature of the mechanism proposed here is that early consultation of context does not necessarily trigger immediate interpretation of a constituent. I will argue that such interaction can in fact also delay interpretation.

That the semantic context plays a crucial role in the resolution of structural ambiguities is of course not a novel proposal. On-line context interactive approaches (Marslen-Wilson & Tyler 1980, Crain and Steedman 1985, Altmann & Steedman 1988, and many others) have argued that the semantic context necessarily affects structural ambiguity resolution. Altmann & Steedman(1988), for example, argue for "an architecture in which alternative analyses are initially offered in parallel, and are then discriminated among by immediate appeal to the comprehension process under a selective or 'weak' interaction" (p.191). In their model, the interpretation of an utterance is computed immediately and in an incremental fashion. Additionally, the processing of an utterance is claimed to always be conducted with immediate reference to the discourse context in which it occurs. Crain and Steedman (1985), for example, argue that "the primary responsibility for the resolution of local syntactic ambiguities in natural language rests not with structural mechanisms, but rather with immediate, almost word-by-word interaction with semantics and reference to the context." (p.321)

At first sight, the framework adopted in generative grammar seems incompatible with incremental semantic processing. In generative grammar, it is usually assumed that syntax is an autonomous module and that semantic interpretation takes place 'after' a syntactic structure has been constructed. This kind of model would seem to preclude incremental interpretation. Nevertheless, it is possible to show that this framework is compatible with a model in which interpretation is calculated incrementally. One of the basic principles of the semantic framework that has influenced most work in recent semantic research in generative grammar, namely Montague grammar, states that for each syntactic rule there exists a parallel semantic

rule and that semantic composition obeys compositionality. Semantic denotations are limited to functions and arguments that can be combined with a very limited set of rules. The combination of these elements necessarily mirrors the underlying syntactic structure. Crucially, each semantic lexical entry of a functor specifies the arguments that it combines with as well as the outcome of functional application. Hence, in such a model it is not problematic to conceive of a mechanism in which partial semantic representations are assigned to incomplete sentences: at each stage of the semantic derivation we have, in principle, the necessary information about what type of arguments are still needed/expected to construct a complete sentence meaning. We can then assume that when the parser constructs an LF representation, the semantic module immediately attempts to combine the semantic denotations of the constituents (as soon as they are processed) to construct a partial interpretation of the sentence.

Note, however, that under the assumption that semantic interpretation is calculated in an incremental and immediate fashion and that semantic composition mirrors the underlying syntactic structure, we expect perceivers to prefer an LF '*n-many* high' representation of a *how many* question. Following Altmann & Steedman (1988), in an interactive processor, each constituent is interpreted as soon as it is encountered. We thus expect the processing mechanism to attempt to incorporate constituents into the LF representation as soon as they are encountered and to combine the corresponding semantic denotations immediately. This assumption is in line with what is proposed in Crocker (1996), who argues that "we don't simply recover the semantic referents of each individual word, but we also rapidly assign grammatical structure to the input, as words are encountered, so that compositional semantic interpretation can take place immediately and incrementally" (p.4). It follows that, under the assumption of immediate interpretation, the LF '*n-many* high' representation should be the representation that is constructed for a *how many* question. The parser should commit to the LF '*n-many* high' representation (and to its corresponding interpretation) as soon as the *how many* constituent has been encountered, and the subject quantifier *every N* should be interpreted in the scope of *n-many N* as dictated by surface structure. Nevertheless, as we have seen, this does not correspond to the preferred reading of a *how many* question. For convenience, I repeat again the two LF representations in (21a) and (21b).

(21) a. LF '*n-many* low':

$[_{CP}$ How$_n$ $[Q$ $[_{IP}$ every student$_i$ $[[$ t$_n$ -many pieces$]_j$ $[_{VP}$ t$_i$ played t$_j$ $]]]]]$

Answer: Six pieces

b. LF '*n-many* high':

$[_{CP}$ How$_n$ $[Q$ $[_{IP}$ $[$ t$_n$-many pieces$]_j$ $[_{IP}$ every student$_i$ $[_{VP}$t$_i$ played t$_j]]]]]$

Answer: Two pieces

We can conclude that an incremental mechanism as described above, in which constituents are interpreted as soon as they are encountered and in which semantic composition mirrors the underlying syntactic structure, is incompatible with the results of the experiments presented previously. Experiments I and II showed that the LF '*n-many* low' representation was preferred, not the LF '*n-many* high' representation as would be expected.

2.4.1 The Context Dependence Hypothesis

In the following, I propose an incremental context-interactive model in which the interpretive mechanism is conceived in a slightly different way.

In this model, the parser can access information from the discourse context when constructing an LF representation and its corresponding interpretation. Such a discourse model should be viewed as a conversational record. Following Stalnaker (1979) and many others, sentences are used in communication to contribute to an already existing conversational record, which contains a set of common background assumptions built up among conversational participants. As proposed in Karttunen (1976) the conversational record can be described as a file that consists of records of all the individuals mentioned in the text, and for each individual of a record that contains its properties. More recently, formal discourse models have developed (cf., for example, Discourse Representation Theory, Kamp & Reyle 1993, and File Change Semantics, Heim 1982) in which the meaning of a sentence is seen as a process of updating the conversational record. Indefinites introduce new discourse referents into the representation, while definites and pronouns refer back to an antecedent introduced earlier into the discourse (and add properties to those).

In line with the theoretical work on discourse models discussed above, I argue that the construction of an LF representation and its corresponding semantic representation is guided by the context when the LF contains anaphoric constituents. Such constituents require an antecedent in the discourse context in order to receive an interpretation.

A key aspect of my proposal is that interrogative constituents (so called wh-elements), like pronouns, must find an antecedent in the context. As for pronouns, it is well known that they require an antecedent in the context in order to be interpreted. One can assume that processing a pronoun triggers a search for an antecedent in the discourse context. A parallelism between pronouns and wh-elements in their discourse properties can be established easily. In the case of wh-elements, the listener has to determine the corresponding antecedent in the context, in order to respond to the question. I thus propose that, similar to the case of pronouns, once a wh-element is perceived it triggers the search for an antecedent in the discourse context. For example, *What N* requires the listener to find an antecedent (of type *N*) in the context, and *How many N* requires the listener to find an antecedent-set (of elements of type *N*) in order to determine its cardinality. Hence, wh-elements differ from pronouns only in that the search for an antecedent is not done in order to update the context, but in order to retrieve information from it.

The attested scope preferences for *how many* questions in experiment I and II can now be derived from these anaphoric discourse properties of wh-elements in a rather straightforward manner. In a system in which meaning is calculated incrementally as described above, we expect the search for an antecedent of an anaphoric element to be done as soon as possible, that is, as soon as the constituent is encountered.[5] Interpreting the constituent *how many pieces* amounts to searching for a set of *pieces* in the discourse in order to determine its cardinality. Note, however, that the wh-phrase by itself does not necessarily have enough descriptive content to allow the parser to choose an appropriate set from the discourse. If there is more than one set of *pieces* available in the discourse, the parser cannot choose an antecedent immediately. Only if the context contains a unique antecedent is the search successful and an interpretation can be assigned immediately to the constituent. Thus, the constituent can only be interpreted successfully if appropriate discourse conditions are satisfied.

Given this, it seems reasonable to propose that the failure to find a unique discourse antecedent for the constituent *n-many N* triggers the parser to delay the incorporation of this element into the LF representation (and into the corresponding semantic representation). The parser does not have enough information in order to determine the appropriate antecedent. Under these circumstances, the constituent *n-many N* is kept in memory. Since immediate interpretation is not possible at that point, the structural incorporation of the element into the LF representation can only be determined later, when more information is available. This is stated in the Context Dependence hypothesis in (22).

(22) Context Dependence Hypothesis
How many N triggers the search for a set of Ns (= antecedent) in the discourse. A context that provides more than one possible antecedent for *n-many N* delays the incorporation of this constituent into the LF representation.

Under this hypothesis, immediate access to context does not commit the parser to immediate incorporation of the constituent into the LF representation. Immediate incorporation is only possible when there is one unique (salient) antecedent in the context. Interestingly, similar proposals have been developed for anaphora resolution in the case of pronouns. In the psycholinguistic literature, it has been claimed that early commitment to anaphora resolution is only possible when a pronoun uniquely identifies an antecedent in the context. In any other case, there is evidence for delayed resolution of the sentence (cf. Garrod & Sanford 1994 and references cited therein). Similarly, in the linguistic literature, it has been shown that the use of an anaphoric element is only acceptable, if it is clear which of the discourse referents in the discourse context it refers to (cf. Heim 1982, and Kadmon's 1987 general uniqueness condition on definite descriptions and pronouns).

Importantly, in the experiments presented above, questions were interpreted in contexts that contained more than one possible antecedent set. In these experiments, the scenarios were constructed in a way that neither the LF '*n-many* low' nor the LF '*n-many* high' information would be more salient. For these experiments, then, the Context Dependence Hypothesis does not predict an immediate commitment to the LF '*n-many* high' interpretation (the LF in which *n-many N* is integrated and interpreted as

soon as it is encountered). Rather, the Context Dependence Hypothesis predicts that the incorporation of the *n-many N* constituent into the LF representation should be delayed.

How can the attested preference for an LF '*n-many* low' interpretation be captured by the proposed model? We will see that this preference is captured under the assumption that two principles play a crucial role in the processing of a *how many* question: Immediate Interpretation and the Structure Preservation Principle.

Given the Principle of Immediate Interpretation, the parser attempts to combine the constituents that it encounters to form a partial semantic representation as soon as they are processed. Consider the parser at the stage after the decision to not integrate *n-many N* into the LF representation. Under the pressure toward immediate incremental analysis, the parser attempts to integrate the constituents that follow into the LF representation, even though the *n-many N* constituent is kept in memory for the moment. At this stage, the parser can thus construct the following structure.

(23) $[_{CP}$ How$_n$ $[_C$ *Q* $[_{IP}$ every student$_i$ ([t_n- many pieces] is kept in memory)

This procedure is in line with Crocker's (1996) Principle of Incremental Comprehension. Crocker argues that "the sentence processor operates in such a way as to maximize comprehension of the sentence at each stage of processing."(p.106). He claims that under Immediate Interpretation "any structure which can be built, must be." (p.107).

After processing the subject quantifier *every N,* the verb is encountered. At this point, a decision has to be taken as to what to do with the constituent *n-many N* that has been kept in memory so far. Incorporating the verb into the LF representation before incorporating the *n-many N* constituent would lead to an illicit semantic representation. In order for the LF representation to receive a licit interpretation, the quantifiers have to be in a structurally higher position than the Verb Phrase. Consequently, the constituent *n-many N* must be incorporated into the LF representation once the verb has been encountered. At that point, the parser thus has to decide about the order of the quantifiers in the LF representation. Crucially, however, the information given by the verb is not sufficient to disambiguate between the LF '*n-many* low' information and the LF '*n-many* high' information, since the question as a whole is ambiguous.

At this stage, the Structure Preservation Principle comes to play a crucial role for the decision whether to construct the LF '*n-many* low' or the LF '*n-many* high' representation. This principle requires that, when building LF representations, the parser should give up as little successfully built and interpreted structure as possible (cf. the Minimal Revision Principle by Frazier 1990 which requires that the parser, when making revisions, maintain as much of the already assigned structure and interpretation as possible). Since, at the point at which the parser has to decide about the order of the quantifiers, the subject quantifier has already been successfully integrated into the LF representation (cf. (23)), *n-many N* is integrated into the LF representation below the structure that has already been built, and thus ends up in a structurally lower position than the subject quantifier (i.e., in the scope of the subject quantifier), as in (24).

(24) $[_{CP}$ How$_n$ $[Q$ $[_{IP}$ every student$_i$ $[[$ t$_n$ -many pieces$]_j$

The resulting LF representation is as in (25), in which the Verb Phrase has been incorporated.

(25) LF '*n-many* low':
$[_{CP}$ How$_n$ $[Q$ $[_{IP}$ every student$_i$ $[[$ t$_n$ -many pieces$]_j$ $[_{VP}$ t$_i$ played t$_j$ $]]]]]$

Under the Context Dependence Hypothesis in interaction with Immediate Interpretation and Structure Preservation, we can thus derive the preference for an LF '*n-many* low' representation observed in experiments I and II.

Under what circumstances can we expect a preference for an LF '*n-many* high' interpretation? Contexts that contain a unique antecedent for *n-many N*, or at least a unique particularly *salient* antecedent, can lead to the construction of an LF '*n-many* high' representation. In such a context, the parser can immediately assign an interpretation to the constituent and integrate it into the LF representation because its antecedent can unambiguously be identified. Hence, a commitment to the LF '*n-many* high' representation results.

We now look at the semantic representations that can be associated with the incomplete syntactic structures. At each step of the derivation, partial semantic representations can be computed since, for each function, the information on the

'expected' argument is available. In order to compute a meaning, such arguments can be postulated. We begin with the syntactic representation in (26).

(26) $[_{CP}$ How$_n$ [*Q*

Combining the two semantic entries of *how* and *Q* leads to the following partial semantic representation: these two elements combined form a function that requires an argument P of type <s,t>. By postulating this 'expected' argument, we have a partial semantic representation of the sentence:

(27) ⟦*How*⟧(λn.⟦*Q*⟧)(P) = λp λw∃n[p= R(n)(P)]

Next, the parser attempts to integrate the *n-many N* constituent, as in (28).

(28) $[_{CP}$ How$_n$ [*Q*$[_{IP}$ [t$_n$ -many pieces]$_j$

This incomplete syntactic representation receives the partial semantic representation as in (29). These elements combined form a function that requires an argument R of type <<e,<s,t>>,<s,t>>. By postulating this argument we have the following semantic representation:

(29) ⟦*How*⟧(λn.⟦*Q*⟧)(⟦*n-many*⟧(⟦*pieces*⟧)(R) =
= λp.λw.∃n[p= λw'.∃Y[Y is a set of pieces in w' & card(Y)(w')= n & R(Y)]

This partial semantic representation says that the question is about a number n such that there is a set of pieces Y of cardinality n (and this set has an unknown property R). Integrating *n-many N* is only felicitous if the context provides a unique salient antecedent-set. Otherwise, *n-many N* is stored in memory. In this case, continuing to integrate the incoming elements into the syntactic representation leads to the representation in (30).

(30) a. $[_{CP}$ How$_n$ [*Q* $[_{IP}$ every student$_i$

This representation receives the partial semantic representation in (31).

(31) ⟦*How*⟧(λn.⟦*Q*⟧)(⟦*every*⟧(⟦*student*⟧)(R)=
= λp λw.∃n[p = λw'[∀x: x is a student in w' → R(x)]

Notice, that in this semantic representation we have vacuous quantification over the variable n. If no other argument is provided, the semantic representation will be illicit. The parser thus expects an argument that will provide the n-argument. Next, the *n-many N* constituent is integrated into the LF representation as in (32).

(32) $[_{CP}$ How$_n$ $[Q$ $[_{IP}$ every student$_i$ $[[$ t$_n$ -many pieces$]_j$

The corresponding partial semantic representation is given in (33).

(33) ⟦*How*⟧(λn.⟦*Q*⟧)(⟦*every*⟧(⟦*student*⟧)(⟦*n-many*⟧(⟦*pieces*⟧)(R) =
= λp.λw.∃n[p = [λw'.∀x: x is a student in w' →∃Y[Y is a set of pieces in w' & card(Y)(w')= n & R(Y)]

After incorporation of the verb, the final semantic representation of the LF '*n-many* low' interpretation is the following:

(34) ⟦*How*⟧(λn.⟦*Q*⟧)(⟦*every*⟧(⟦*student*⟧)(⟦*n-many*⟧(⟦*pieces*⟧)(⟦*played*⟧) =
= λp.λw.∃n[p = λw'.[∀x: x is a student in w' →∃Y[Y is a set of pieces in w' & card(Y)(w')= n & x played Y in w']

In order to test the Context Dependence Hypothesis I conducted a self-paced reading study in English that allowed me to measure reading times for individual regions of a question. The Context Dependence Hypothesis predicts that the type of context should influence the processing of a *how many* question. In particular, in contexts that contain no unique salient antecedent, we can expect a higher processing load, and thus longer reading times, at the point when *n-many N* is integrated into the LF representation (once the verb has been encountered). In this experiment, the contexts of the previous experiments were compared to contexts in which the

antecedent-set corresponding to the LF '*n-many* high' answer was made particularly salient.

2.4.2 Experiment III

The Context Dependence Hypothesis states that the processing of a *how many* question is dependent on the type of context that precedes the question. It predicts that contexts that do not provide a unique salient antecedent-set for *n-many N* have a higher processing cost once the verb has been encountered, at the point when the *n-many N* constituent is integrated into the LF representation. Experiment III was designed to test this hypothesis.

In order to measure this processing difficulty, the self-paced reading method was employed. Participants had to read story/*how many* question pairs on a computer screen, and were asked to choose one out of two possible answers presented on the screen (LF '*n-many* low' answer and LF '*n-many* high' answer).

The materials were taken from the English questionnaire study described in experiment I.

For each of the stories from experiment I, which were meant to support both interpretations equally, a minimally different version was constructed. This second version was meant to support more strongly the LF '*n-many* high' answer. The stories were modified in the following way. In order to increase the salience of the set corresponding to the LF '*n-many* high' interpretation, at the end of each story, one or two sentences were added that involved this set in one additional event. Furthermore, the salience of the information corresponding to the LF '*n-many* low' answer was reduced by omitting the actual cardinality of the corresponding set, or replacing it with a vague cardinality like *several, different* or *some*. It was expected that this would further increase the salience of the set corresponding to the LF '*n-many* high' answer. This is illustrated in example (36), the modified version of the original story in (35).

(35) Original story (supports both the LF answers equally)
In December, the chef distributed some of his recipes to his students.
There was one recipe that everybody received:
the "Chilled Terrine with Pistachios and Caper Mustard".
Altogether, each of them received four different recipes.

(36) Modified story (supports the LF '*n-many* high' answer)
In December, the chef distributed some of his recipes to his students.
There was one recipe that everybody received:
the "Chilled Terrine with Pistachios and Caper Mustard".
That was his special recipe.
He wanted to make sure that everybody would be able to try it out.

Both (35) and (36) were followed by the question in (37).

(37) How many recipes did every student receive from the chef in December?

The factor of context was manipulated in order to see whether the context would have an effect on the processing of the question. In Condition 1, the original stories from experiment I were used. I will call this condition the *Multiple Sets* Condition, because in the original stories the wh-element had multiple antecedent-sets. In Condition 2, the modified versions of these stories were used. I will call this condition the *Unique Salient Set* Condition, because in the modified stories the wh-element had one unique salient antecedent-set. Since it had been established before that differently ordered stories had the same preferences, this factor of order was not examined anymore. Half of the items were chosen with order 1 (LF '*n-many* low' information before LF '*n-many* high' information) and the other half with order 2 (LF '*n-many* high' information before LF '*n-many* low' information).

The self-paced reading method allowed me to measure the reading times associated with the different regions of a *how many* question. Higher reading times were expected for the regions that follow the verb in the *Multiple Set*s Condition than in the *Unique Salient Set* Condition. Only in the *Multiple Set*s Condition was an extra processing load expected after that region. At that point, the quantifier still has to be

integrated into the LF representation. This increase in processing load for the integration of the quantifier is only expected in the *Multiple Set*s Condition, since here the quantifier has to be processed and integrated into the LF representation in addition to the constituents that are encountered on-line (in the regions that follow the verb). To the contrary, in the *Unique Salient Set* Condition the quantifier is integrated into the LF representation immediately when encountered and no other constituents are processed at that time.

Additionally, more LF '*n-many* high' answers were expected in the *Unique Salient Set* Condition, since here the *n-many N* constituent can be interpreted immediately and we predict that the LF '*n-many* high' representation should be constructed.

2.4.2.1 Method

Subjects

44 undergraduate students from the University of Massachusetts participated in this self-paced reading study and received extra course credit for it.

Materials

There were two versions of each story-*how many* question pair. See appendix 3 for all items.

Procedure

Participants read twelve stories, each followed by a *how many* question, on a computer screen (together with fifty four stories from other studies). The self-paced reading method was employed. To complete the task participants used a response console that had a left and a right trigger. Either of the two triggers could be pulled to make a phrase appear on the screen. Participants were asked to pull a trigger as soon as they had read through the portion of text that had appeared on the screen. The stories were presented cumulatively, that is, each time when the trigger was pulled and new text appeared on the screen, the preceding portion of text did not disappear. The experiment was designed in this way to make sure that participants would read the presented information as a coherent story. They were told that, at the end of the story, they could

read through the whole text again, if necessary. At that point, when the trigger was pulled once again, the story disappeared from the screen and the question was presented. The question, on the contrary, was not presented cumulatively, that is, participants could only see one portion of text at a time by pulling a trigger.

The questions were presented in five separate regions: the *how many* phrase, the subject quantifier *every N*, the verb (optionally with a particle) and two modifiers (Prepositional Phrase or Noun Phrase). After all five regions had been presented, the question disappeared and two possible answers appeared to the right and the left of the screen. An answer could be chosen by pulling the corresponding right or left trigger. Participants had been asked to choose the answer that first came to mind. Half of the answers presented the LF '*n-many* low' answer to the left, the other half presented the LF '*n-many* low' answer to the right. For the *Unique Salient Set* contexts in which the LF '*n-many* low' information was not available (because a vague adjective had been used in the text), the proposed LF '*n-many* low' answer was *Don't know*.

The twelve items were counterbalanced for the type of context, constructed as described above (the *Multiple Set*s Condition versus the *Unique Salient Set* Condition). The items were randomized separately for each participant. Because the same experiment included a study in which stories in the future tense were followed by a continuation sentence (instead of a question), three filler stories in the future followed by *how many* questions were inserted. This was done in order to avoid the possibility that participants could predict from the tense of the story whether they would receive a question or a continuation sentence. These future-stories were not included in the statistical analysis.

2.4.2.2 Results

As predicted by the Context Dependence Hypothesis, in the last two regions (following the verb), participants were significantly slower in the *Multiple Sets* Condition than in the *Unique Salient Set* Condition. That is, they were slower when the question was presented in a context that supported both interpretations equally. The two regions following the verb, region 4 and 5, taken together had significantly longer reading times in the *Multiple Set*s Condition than in the Unique Salient Set Condition (significant by subject, $F_1(1,43)=5.01$, $p<.03$, and nearly significant by item, $F_2(1,11) =$

4.59, $p < .06$). The difference in reading times was only significant for the last two regions if taken together, not for each region individually (region 4: $F_1(1,43)= 4.25$, $p < .05$, $F_2(1,11)=3.12$, $p < .2$; region 5: $F_1(1,43)=2.53$, $p < .2$, $F_2(1,11)=3.99$, $p < .08$). None of the other regions showed a significant difference. Participants seemed to be slower in the second region, but not significantly so ($F_1(1,43)=3.06$, $p < .09$, $F_2(1,11)=1.42$, $p < .3$). The reading times are given in Table 5 and are represented with a graph in Figure 1.

TABLE 5

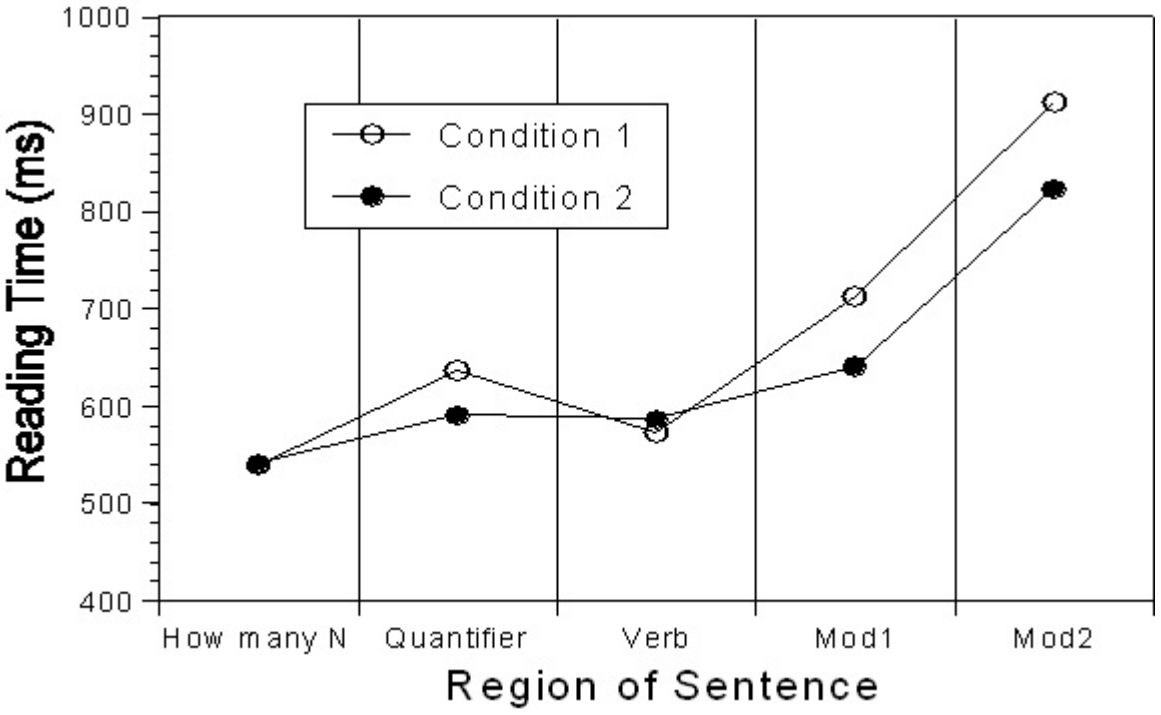
Reading times in ms for *how many* questions

Condition	Region 1 *How many* N	Region 2 Quantifier	Region 3 Verb(+Part.)	Region 4 Modifier	Region 5 Modifier
Multiple Sets[a]	539ms	636ms	572ms	713ms	912ms
Unique Salient_Set[b]	541ms	590ms	586ms	640ms	823ms

[a] *Multiple Sets* Cond.:context that supports both interpretations(with no salient antecedent for *n-manyN*)

[b] *Unique Salient Set* Cond.:context that support the LF '*n-many* high' interpretation (with a unique salient antecedent for *n-many N*)

Figure 1:Reading times in ms for *how many* questions



Furthermore, as expected, the *Multiple Sets* Condition received significantly more LF '*n-many* low' answers (66% LF '*n-many* low' answers) than the *Unique Salient Set* Condition (47% LF '*n-many* low' answers), ($F_1(1,43) = 10.13$, $p < .003$, $F_2(1,11) = 7.73$, $p < .02$).

2.4.2.3 Discussion

The results confirm the Context Dependence Hypothesis. In the last two regions of the question, reading times were higher in the *Multiple Sets* Condition than in the *Unique Salient Set* Condition, as reported in Table 5 and Figure 1. This is because in the *Multiple Sets* Condition, once the verb has been encountered, the quantifier (that is kept in memory) still has to be incorporated into the LF representation. No such operation is necessary in the *Unique Salient Set* Condition. One can thus explain the higher processing load in the *Multiple Sets* Condition in the regions following the verb.

As mentioned above, the results were significant only if the last two regions were taken together, not for each region individually. This is not an undesirable result, since the hypothesis does not make any claims about the exact region in which the decision is taken to integrate the quantifier into the LF representation. In some cases the parser might have waited for further information after the verb in order to disambiguate the two LF representations before integrating the *n-many N* constituent into the representation.

The fact that participants were also somewhat slower in the second region in the *Multiple Sets* Condition could be argued to support an alternative hypothesis, namely, that the contexts in the *Unique Salient Set* Condition induced a general lower processing load for the whole question. Since these contexts only supported the LF '*n-many* high' interpretation, and hence were less ambiguous, one could expect the question in the given context to have a general lower processing load. However, if some general difficulty of the context in the *Multiple Set*s Condition slowed reading in both region 2 and region 4 for certain items, then one would expect reading time differences between the *Multiple Sets* Condition and the *Unique Salient Set* Condition in region 2 to correlate across items with the corresponding differences in region 4. No correlation was found (Pearson $r = 0.079$). It can thus be concluded that contexts with a unique

salient antecedent did not induce a general lower processing load. Only the last two regions of the question (following the verb) were affected in a significant way.

Finally, the Context Dependence Hypothesis predicts that, in the *Unique Salient Set* Condition, the context 'guides' the parser to first attempt to construct the LF '*n-many* high' representation. As a consequence, more LF '*n-many* high' answers were expected in this condition. The results confirm this prediction. The frequency of LF '*n-many* high' answers was significantly higher in the *Unique Salient Set* Condition than in the *Multiple Sets* Condition (and also higher than what was found in Experiment I). These results should be interpreted with caution for the following reason. Since, in the *Unique Salient Set* Condition, the LF '*n-many* low' answer was *Don't know* (because the cardinality was not available in the text) it could also be that participants were simply avoiding such an answer. This, however, was not necessarily the case. In the questionnaire study, when answering with a cumulative answer, participants quite often responded explicitly that they didn't know the answer, because they did not have enough information to calculate it. This suggests that participants do not necessarily prefer to choose an unintended answer in order to avoid an answer of the kind *Don't know*. In that sense, the results do confirm the Context Dependence Hypothesis.

To summarize, the results reported in this experiment provide on-line evidence for the Context Dependence Hypothesis. Most importantly, the results indicate that the context that precedes a question plays a crucial role for the resolution of quantifier scope ambiguities. In particular, a context that does not contain a unique salient antecedent set for the wh-phrase delays the resolution of scope ambiguity.

Can the parallel constraint-satisfaction approach advocated in Kurtzman & MacDonald (1993) provide an alternative explanation for these results? As discussed before, in section 4, their principles conflict when applied to questions. In their framework, no preference for one or the other interpretation of the question is expected. Even if one assumed that their principles favoring the LF '*n-many* low' interpretation (the *linear order principle* and the *c-command principle*) were stronger and thus would win over those that favor the LF '*n-many* high' interpretation (*the surface subject principle* and the *thematic hierarchy principle*), it is not clear whether this model correctly predicts the outcome of Experiment III. In a constraint-satisfaction approach, the difference between the two conditions translates into a difference in competition between alternative interpretations. The *Unique Salient Set* Condition provides a single

clear antecedent for the quantifier, whereas the *Multiple Sets* Condition does not. This results in more competition between alternative interpretations in the *Multiple Sets* Condition than in the *Unique Salient Set* Condition. The constraint-satisfaction approach thus also predicts a delay in interpretation of the question for the *Multiple Set*s Condition, since more competition is involved. If the principles favoring LF '*n-many* low' are stronger than the principles favoring LF '*n-many* high', we expect the LF '*n-many* low' representation to win over the LF '*n-many* high' representation unless context favors the second. Crucially, the moment at which the parser determines that the context (dis)favors an LF '*n-many* high' representation should be quite early in the sentence, namely when the wh-constituent is encountered. The wh-constituent triggers a search for an antecedent set in the context. In the *Multiple Sets* Condition, at that point, the decision should be taken that the LF '*n-many* low' is favored. Hence, in a model in which alternatives compete, one expects the delay caused by the competition to appear immediately after the wh-element has been encountered. In such a model, there seems to be no principled reason to expect the delay much later in the sentence, as it was observed in Experiment III.

The results of this experiment also make a contribution to the debate about what it means for a discourse entity to be 'salient'. As is well known, diverse factors contribute in making a discourse entity 'salient' and it is a difficult task to develop a precise measure of 'salience'. In this experiment, I identified one factor that provides a measure for the 'salience' of a discourse entity: the number of events in which the discourse entity is involved. In the stories, the 'salient' set was involved in just one additional event.

Two important questions still need to be addressed. In the questionnaire studies, the results for the *how many* questions differed strongly from the *which* questions. Can the proposed model also account for scope ambiguity resolution in *which* questions? One possibility would be to assume that *which* and *how many* do not have the same anaphoric properties. Hence, the Context Dependence Hypothesis would not make any predictions for *which* phrases. Kluender (1998) indeed proposes that there are important differences between the two types of phrases. He proposes that *which* phrases are, like definite descriptions, low accessibility markers (following Ariel 1990). They refer to mental referents that are present but not currently active in the discourse model. Under this view, *which* phrases do not rely on the context immediately preceding the question.

The preference for a single answer can be understood if we assume that a *which* phrase does not require a unique salient antecedent in the context in order to be interpretable. Instead, a *which* phrase triggers the postulation of a discourse entity without need for evidence in the context.[6] Contrary to a *how many* phrase, a *which* phrase can thus be integrated immediately into the LF representation even without an appropriate antecedent in the context.

Finally, the questionnaire studies showed that, in French, split and non-split questions did not differ at all in their preference, contrary to the predictions of the Blocking Hypothesis. Can a context interactive model account for this fact? The Context Dependence Hypothesis predicts that a *how many* phrase will not be incorporated into the LF representation if there is not enough information to determine its antecedent set. Under the Context Dependence Hypothesis, split and non-split questions are, in fact, not expected to have different preferences. In the particular conditions of Experiment II, where contexts supported both interpretations alike, for split as well as for non-split questions, it was impossible to interpret the *how many* phrase immediately. In the case of split-questions, the full wh-phrase can only be interpreted when all constituents are encountered on surface. In the non-split case, the context delays interpretation of the *n-many N* phrase until after the verb. A self paced-reading study in French could reveal more about the processing of split and non-split questions. In particular, it could determine whether the moment in which the constituent is integrated into the LF representation differs for split and non- split questions. This will be left for future research.

2.5 Conclusion

The experimental results presented in this chapter confirm that there is a preference to interpret a how many question with an LF '*n-many* low' representation (in contexts that do not provide a unique salient antecedent set).

I have argued that this result is unexpected in a system in which the parser obeys economy by first attempting to construct the LF representation that minimally differs from the surface representation of a sentence. Furthermore, I have argued that this result is unexpected under current assumptions about incremental processing of meaning.

The existence of a preference for the LF '*n-many* low' interpretation is even more unexpected in the case of French. A pragmatic version of the Blocking principle leads to the expectation that the split and non-split constructions should give rise to different preferences. This is not what we have observed in Experiment II. Both constructions were preferably interpreted with an LF '*n-many* low' interpretation.

I have proposed a model in which the preference for the LF '*n-many* low' interpretation of a *how many* question derives from the interaction with context and the assumption that two important principles are at play: Immediate Interpretation and Structure Preservation. On the basis of the anaphoric properties of wh-phrases, I have argued that the interaction with context can be a reason to delay ambiguity resolution and integration of a constituent into the LF representation. Crucially, then, immediate access to context does not necessarily commit the parser to the LF '*n-many* high' interpretation of a *how many* question. Only contexts that provide a unique salient antecedent trigger immediate interpretation. Thus, in the proposed model, immediate access to context does not necessarily trigger immediate interpretation of a constituent. Under certain conditions, access to context can also delay the interpretation of a constituent (i.e. immediate interpretation is only possible under the appropriate discourse conditions). In this respect, my model crucially differs from previous on-line context interactive models. I have presented results from a self-paced reading study in English that support this model.

Finally, I have identified a measure for the 'salience' of discourse antecedents. It is well known that discourse 'salience' plays an important role in processing. However, it is difficult to develop a precise measure for this notion. The results of experiment III have allowed me to identify one factor that provides a measure for the 'salience' of a discourse entity: the number of events in which an entity is involved determine its salience in the discourse. We have thus made some first steps towards a better understanding of the notion of 'salience' in semantic processing.

NOTES

[1] The content of this chapter is based on Villalta(2003). The complete experimental materials have been reproduced here in the appendix (for reasons of space, Villalta(2003) only contained example items).

[2] Another possible answer in this context is a so-called *cumulative* answer in which the total number of pieces is counted (in this example *eighteen*). I will not discuss this interpretation here. A further possibility is the so called *pair-list* answer. This kind of answer provides a list with information about each individual (e.g., *Jason played six pieces, Joyce played three pieces and Brian played ten pieces*). In the context provided in (2), a *pair-list* answer is however infelicitous, since everybody played the same amount of pieces and no information about the individuals was given.

[3] Note that the two representations in (4a) and (4b) are in fact not logically independent. That is, with this formalization, in a given situation, every possible answer to (4b) is also a possible answer to (4a). This is so since, under this formalization, "six pieces", "five pieces", "four pieces", "three pieces", "two pieces" and "one piece" are correct answers to the question in (4a). In order to maintain two distinct representations for the two readings, we need to prevent the "two pieces" answer to be an appropriate answer to the representation of the question in (4a). To achieve this, I follow Beck & Rullmann (1999) who propose to adopt the notion of maximally informative answer. We thus require that a question be answered with a maximally informative answer. Then, only "six pieces" is an appropriate answer to (4a), not "two pieces".

[4] Dekydtspotter et al. (2001) ran a similar experiment with French native speakers and obtained results that closely parallel these. In their experiment, rather than providing an answer to a question, subjects had to judge whether the presented answer was a correct answer to a question in a particular context. 79.22 % LF '*n-many* low' answers to split questions were judged correct, and 68.83% LF '*n-many* low' answers to non split questions were judged correct. Only 11.69 % LF '*n-many* high' answers to split questions were judged correct, and 29 % LF '*n-many* high' answers to non split questions were judged correct. See Dekydtspotter et al. (2001) for details of their experiment.

[5] Experimental evidence for this claim in the case of pronouns is presented in Garrod (1994), who argues that pronouns can be integrated early in sentence interpretation because they depend heavily on context, and are typically used when the discourse entities they refer to are highly active in working memory. The author further suggests that any delay in the interpretation of a pronoun would require "holding an uninterpreted place marker" in working memory, since pronouns contain little lexical information to otherwise aid in their interpretation. This is associated with an added processing cost.

[6] In fact, such a proposal has been made in the literature before. Frazier & al. (1996) propose that *which* phrases trigger the parser to postulate a discourse entity. If later in the sentence it becomes clear that the which-phrase requires a bound variable interpretation, the parser has to retract the initial assumption and slower reading times result (as in *Which rumor about herself did the newspaper claim every actress made*

up?). These results can be interpreted in the following way: *which* phrases do not need to access context in order to be interpreted, since they trigger the parser to postulate a discourse entity (even in the absence of evidence for it).

APPENDIX TO CHAPTER 2

1. Materials of the English questionnaire study

a. *How many* question - story pairs

1. order 1: A group of German tourists spent two days in Manhattan. They were offered different tours which each included a visit to seven sights. All tours included the visit of three sights, the Statue of Liberty the Empire State Building and Central Park, but otherwise they were very different.

   order 2: A group of German tourists spent two days in Manhattan. They were offered different tours which all included the visit of three sights, the Statue of Liberty, the Empire State Building and Central Park. For the rest, they were very different. Each tour included a total of seven sights.

   How many (of the) sights in Manhattan did every tour include?

2. order 1: Three friends went to the last Film Festival in Montreal. Altogether, each of them saw ten movies. When comparing what they had seen at the end, they realized that there were four movies that they all had seen.

   order 2: Three friends went to the last Film Festival in Montreal. At the end, when comparing what they had seen, they realized that there were four movies that they all had seen. Altogether, each of them saw ten movies.

   How many (of the) movies did everybody see?

3. order 1: At the conference, Ann, Sarah and Caroline attended ten talks each. They were not interested in the same topics so they did not usually overlap in their choice of talks. There were only three talks that they attended together.

   order 2: At the conference, Ann, Sarah and Caroline attended different talks. They were not interested in the same topics so they did not usually overlap in their choice of talks. There were only three talks that they attended together. During the whole conference, each of them attended ten talks.

   How many (of the) talks did everybody attend?

4. order 1: A group of tourists arrived at the wine fair. Each of them tasted six different wines. The two wines that everybody tasted were the “Nouveau Beaujolais” and the “Bordeaux”, because they were praised for being the best wines of the season.

   order 2: A group of tourists arrived at the wine fair. The two wines that everybody tasted were the “Nouveau Beaujolais” and the “Bordeaux”, because they were praised for being the best wines of the season.Each of them got to taste six different wines.

   How many (of the) wines did every tourist taste?

5. order 1: The neighbors just came back from Disneyland. Their children were telling us that they had each been able to visit fifteen attractions. The two attractions that they all visited were “The mountain ride” and “The space shuttle”.

   order 2: The neighbors just came back from Disneyland. Their children were telling us that they had all visited the two attractions “The mountain ride” and “The space shuttle”. Altogether, they had each been able to visit fifteen attractions.

   How many (of the) attractions did every child visit?

6. order 1: Last week, a group of my students went to the Metropolitan Museum. Everybody had to visit five galleries and report on them. In particular, everybody had to visit two galleries, The Egyptian Gallery and the Greek Gallery. For the rest, they were free to choose what they wanted to see.

order 2: Last week, a group of my students went to the Metropolitan Museum. Everybody had to visit two galleries, The Egyptian Gallery and the Greek Gallery. For the rest, they were free to choose what they wanted to see. The only requirement was that they visit five galleries and report on them.

How many (of the) galleries did every student have to visit?

7. order 1: At the end of the year, the chief-cook distributed some of his recipes to his students. Everybody received four different recipes. There was one recipe that everybody received, the "Chilled Terrine with Pistachios and Caper Mustard".

order 2: At the end of the year, the chief-cook distributed some of his recipes to his students. There was one recipe that everybody received, the "Chilled Terrine with Pistachios and Caper Mustard". Altogether, each of them received four different recipes.

How many (of the) recipes did every student receive?

8. order 1: Mary, Lynn and Cynthia are looking for a new apartment. Among the apartments they visited, each of them only really liked three apartments. Unfortunately, there is one apartment that they all liked, so they will have to fight over it.

order 2: Mary, Lynn and Cynthia are looking for a new apartment. Unfortunately, among the apartments that they have seen, there is one apartment that they all liked. So they will have to fight over it. Altogether, each of them only really liked three apartments.

How many (of the) apartments did everybody like?

b. *Which* question-story pairs

1. order 1: Recently, Lesley, Gina and Mark realized that they had been on a Europe tour during the same summer. Gina went to London, while Lesley and Mark visited Barcelona. They had all been in the two cities, Paris and Rome, and almost at the same time.

order 2: Recently, Lesley, Gina and Mark realized that they had been on a Europe tour during the same summer. They had all been in the two cities, Paris and Rome. Gina also went to London, while Lesley and Mark visited Barcelona.

Which cities did everybody visit?

2. order 1: In the waiting room, Julie, Pat and Liz were reading some of the magazines that were displayed on the table. Julie read PC-complete, Pat the NewYorker and Liz read Emma. All of them read the Newsweek aswell.

order 2: In the waiting room, Julie, Pat and Liz were reading some of the magazines that were displayed on the table. They all read the Newsweek. Julie also read PC-complete, Pat the NewYorker and Liz read Emma.

Which magazines did everybody read?

3. order 1: Last spring, Sue's children were participating in a huge mural painting at school. The two children received different colours for the different tasks. Mark received brown and red, while Sam received yellow. Both of them also received blue and green, because an important part of the painting consisted of an ocean.

order 2: Last spring, Sue's children were participating in a huge mural painting at school. The two children received different colours for the different tasks. Both of them received blue and green, because an important part of the painting consisted of an ocean. Furthermore, Mark received brown and red, while Sam received the yellow colour.

Which colours did every child receive?

4. order 1: At the music department, three trumpet-students had to pass a make-up exam for which they had to play several pieces. Frank played 'My funny Valentine', Sarah played 'Footprints' and Joe played 'Autumn Leaves'. All of them also played 'Round Midnight' and 'The days of Wine and Roses'.

order 2: At the music department, three trumpet-students had to pass a make-up exam for which they had to play several pieces. All of them played 'Round Midnight' and 'The days of Wine and Roses'. Frank also played 'My funny Valentine', Sarah played 'Footprints' and Joe played 'Autumn Leaves'.

Which pieces did every student play?

2. Materials of the French questionnaire study

a. *how many* question-story pairs

1. order 1: Pour Noël, tous les enfants de la classe de Kevin ont eu cinq cadeaux. Les parents font sans doute leurs courses de Noël au même endroit car tous les enfants ont eu deux cadeaux identiques : une cassette de "Le Bossu de Notre Dame" et un chien virtuel.

order 2: Les parents des enfants de la classe de Kevin font sans doute leurs courses de Noël au même endroit car tous les enfants ont eu deux cadeaux identiques : une cassette de "Le Bossu de Notre Dame" et un chien virtuel. En tout, tous les enfants ont eu cinq cadeaux.

Combien de cadeaux tous les enfants ont-ils eu ?
Combien tous les enfants ont-ils eu de cadeaux ?

2. order 1: La semaine dernière, la classe de Matthias devait aller au Futuroscope. Ils ont passé toute la journée sur le site et, en tout, ils ont pu voir six cinémas. Comme il y avait plusieurs groupes, ils ont vu des choses différentes mais ils ont tous pu voir les trois mêmes cinémas: le dynamique, le tapis magique et celui à 3 dimensions.

order 2: La semaine dernière, la classe de Matthias est allée au Futuroscope. Il y avait plusieurs groupes qui ont vu des choses différentes. Mais ils ont tous pu voir les trois mêmes cinémas : le dynamique, le tapis magique et celui à 3 dimensions. Comme ils ont passé toute la journée sur le site, en tout, ils ont pu voir six cinémas chacun.

Combien de cinémas tous les enfants ont-ils pu voir ?
Combien tous les enfants ont-ils pu voir de cinémas ?

3. order 1: A la maternelle, les enfants préparaient la Fête des Mères. Ils devaient tous fabriquer cinq petits cadeaux différents pour leurs mamans. Sur les conseils de leur maîtresse avisée ils devaient tous fabriquer trois cadeaux identiques : un collier de nouilles, un dessous de plat en épingle à linge et un joli poème intitulé "Ma maman", et puis deux autres cadeaux à leur propre choix.

order 2: A la maternelle, les enfants préparaient la Fête des Mères. Ils devaient tous fabriquer trois cadeaux identiques sur les conseils de la maîtresse avisée : un collier de nouilles, un dessous de plat en épingle à linge et un joli poème intitulé "Ma maman", et puis deux autres cadeaux à leur propre choix. En tout, ils devaient donc chacun fabriquer cinq petits cadeaux pour leurs mamans.

Combien de cadeaux tous les enfants devaient-ils fabriquer ?
Combien tous les enfants devaient-ils fabriquer de cadeaux ?

4. order 1: Rémi, Elisabeth et Pascale prennent des leçons pour passer le code de la route. Hier, ils ont passé des tests pour simuler l'examen. Ils ont tous fait sept erreurs. Le moniteur leur a expliqué à chacun leurs fautes personnelles. En comparant leurs résultats, ils ont remarqué qu'ils ont tous fait quatre erreurs identiques. C'était sans doute la faute du moniteur...

order 2: Rémi, Elisabeth et Pascale prennent des leçons pour passer le code de la route. Hier, ils ont passé des tests pour simuler l'examen. En comparant leurs résultats, ils ont remarqué qu'ils ont tous fait quatre erreurs identiques. C'était sans doute la faute du moniteur...Le moniteur leur a expliqué à chacun leurs fautes personnelles. Hier, ils n'auraient pas été reçus, ils ont tous fait sept erreurs.

Combien d'erreurs tous les participants ont-ils fait ?
Combien tous les participants ont-ils fait d'erreurs ?

5.order 1: Les étudiants en journalisme doivent s'abonner à plusieurs quotidiens. En tout, chacun d'entre eux a choisi cinq quotidiens. Les choix ont été très diverses mais il y a deux quotidiens que tout le monde a choisi: "Le Monde" et "La Libération".

order 2: Les étudiants en journalisme doivent s'abonner à plusieurs quotidiens. Ils ont tous choisi les deux quotidiens "Le Monde" et "La Libération" mais pour le reste les choix ont été très divers. En tout, chacun d'entre eux a choisi cinq quotidiens.

Combien de quotidiens tous les étudiants ont-ils choisi ?
Combien tous les étudiants ont-ils choisi de quotidiens ?

6. order 1: Un groupe d'amis est parti faire un tour de dégustation à la foire aux vins de Bordeaux. Chacun a pu goûter six vins différents avant d'être "indisposé". Parmi tous les vins, il y en a trois que tout le monde a pu goûter: deux Haut-Médoc et un Graves.

order 2: Un groupe d'amis est parti faire un tour de dégustation à la foire aux vins de Bordeaux. Parmis tous les vins, il y en avait trois que tout le monde avait pu goûter : deux Haut-Médoc et un Graves. Chacun avait pu goûter six vins différents avant d'être "indisposé".

Combien de vins tous les amis ont-ils pu goûter ?
Combien tous les amis ont-ils pu goûter de vins ?

7. order 1: Louise, Clara et Aurélie ont chacune une collection de disques assez importante. En tout, elles possèdent une centaine de disques chacune. Elles ont des goûts très différents et cependant il y a une dizaine de disques qu'elles possèdent en commun, les disques de Elvis Presley.

order 2: Louise, Clara et Aurélie ont chacune une collection de disques assez importante. Elles ont des goûts très différents et cependant il y a une dizaine de disques qu'elles possèdent en commun, les disques de Elvis Presley. En tout, elles possèdent une centaine de disques chacune.

Combien de disques toutes les filles possèdent-elles ?
Combien toutes les filles possèdent-elles de disques ?

8. order 1: Un groupe de touristes allemands a passé trois jours à Paris. On leur proposait plusieurs tours différents qui comprenaient chacun la visite de sept monuments. Ils comprenaient tous les trois visites, de la Tour Eiffel, de l'Arc de Triomphe et de Beaubourg, mais pour le reste ils étaient bien différents.

order 2: Un groupe de touristes allemands a passé trois jours à Paris. On leur proposait plusieurs tours différents qui comprenaient tous les trois visites, de la Tour Eiffel, de l'Arc de Triomphe et de Beaubourg, mais pour le reste ils étaient bien différents. En tout, ils comprenaient chacun la visite de sept monuments.

Combien de visites tous les tours comprenaient-ils?
Combien tous les tours comprenaient-ils de visites ?

b. *Which* question - story pairs

1. order 1: Cette année, au cinéma de plein air, Marie, Fabienne et Sylvain ont vu différents films. Marie a pu voir "Le hussard sur le toit" et "La cité de la joie", Fabienne a vu "Les visiteurs" et "La cage aux folles" et Sylvain a été voir "Subway" et "Nikita". Et, finalement, il y a deux films qu'ils on tous pu voir ensemble: "Valmont" et "La vérité si je mens!

order 2: Cette année, au cinéma de plein air, Marie, Fabienne et Sylvain ont vu différents films. Il y a deux films qu'ils on tous vu: "Valmont" et "La vérité si je mens!" De plus, Marie a vu "Le hussard sur le toit"et "La cité de la joie", Fabienne a pu voir "Les visiteurs" et "La cage aux folles" et Sylvain a été voir "Subway" et "Nikita".

Quels films tous les amis ont-ils vu?

2. order 1: Lundi, dans la salle d'attente du docteur Laurent, il y avait trois patient s: Patrice, Bernard et Isabelle. En attendant, ils ont eu le temps de lire diverses magazines. Patrice a lu “Science et Vie”, Bernard a lu “A l’heure actuelle”, et Isabelle “PC-complete”.Et puis, tout le monde a eu le temps de lire les deux magazines “Géo” et “Elle”.

order 2: Lundi, dans la salle d'attente du docteur Laurent, il y avait trois patients : Patrice, Bernard et Isabelle. En attendant, ils ont tous eu le temps de lire les deux magazines “Géo” et “Elle”. De plus, Patrice a lu “Science et Vie”, Bernard a lu “A l’heure actuelle”, et Isabelle “PC-complete”.

Quels magazines tous les patients dans la salle d’attente ont-ils lu?

3.order 1: Le chef cuisinier a donné plusieurs recettes à ses trois apprentis. Jean a reçu celle du paté de légumes, Bernard celle des pavés royaux aux raisins secs, et Christine a reçu la recette des courgettes à la grecque. De plus, tout le monde a reçu sa recette de lapin aux pruneaux et celle des éclairs au cresson.

order 2: Le chef cuisinier a donné plusieurs recettes à ses trois apprentis. Tout le monde a reçu sa recette de lapin aux pruneaux et celle des éclairs au cresson. De plus, Jean a reçu celle du paté de légumes, Bernard celle des pavés royaux aux raisins secs, et Christine a reçu la recette des courgettes à la grecque.

Quelles recettes tous les apprentis ont-ils reçu ?

4. order1 : Pendant le printemps, les trois enfants de Béatrice devaient participer à la peinture d'une grande “fresque” à l’école. Ils avaient chacun différentes "tâches" à effectuer et pour cela tous les enfants avaient reçu quatre couleurs. Matthias avait reçu les couleurs rouge et jaune, Marie du marron et du noire et Dominique du blanc et du gris. De plus, comme une grande partie de l’image était un océan, il y a deux couleur que tous les enfants avaient reçu: du bleu et du vert.

order 2: Pendant le printemps, les trois enfants de Béatrice devaient participer à la peinture d'une grande “fresque” à l’école. Ils avaient chacun différentes "tâches" à effectuer et pour cela tous les enfants avaient reçu quatre couleurs. Comme une grande partie de l’image était un océan il y a deux couleur que tous les enfants avaient reçu: du bleu et du vert.Matthias avait aussi reçu les couleurs rouge et jaune, Marie du marron et du noire et Dominique du blanc et du gris.

Quels couleurs tous les enfants de Béatrice avaient-ils reçu ?

3. Materials of the English self-paced reading study

1. MS Cond.:A group of German tourists^spent two days in Manhattan.
They were offered different^tours which all included^a visit to three sights:
the Statue of Liberty,^the Empire State Building^and Central Park.
For the rest,^they were very different.
Each tour included^a total of seven sights.

How many sights^did every tour^include for^the two days^in Manhattan?^
Three sights Seven sights|

USS Cond.: A group of German tourists^spent two days in Manhattan.
They were offered different tours^which all included^a visit to three sights:
the Statue of Liberty,^the Empire State Building^and Central Park.
For the rest,^the tours were very different.
But that didn't matter so much.
Those were the main sights^that they wanted to see anyway.^

How many sights^did every tour^include for^the two days^in Manhattan?^
Three sights Don't know

2. MS Cond: Three friends^went to the last Music Festival^in Montreal.
Altogether,^each of them^saw ten movies.
At the end,^they compared^what they had seen.
They realized^that there were four movies^that they all had seen.

How many movies^did everybody^see at^the last Music Festival^in Montreal?
Ten movies Four movies

USS Cond: Three friends^went to the last Music Festival^in Montreal.
At the end,^they realized that^there were four movies^that everybody had seen.
That was great,^because now they could^discuss what they thought^about them.^

How many movies^did everybody^see at^the last Music Festival^in Montreal?^
Don't know Four movies

3. MS Cond: At the conference^last week,^Ann, Sarah and Caroline^attended different talks.
They were not interested^in the same topics.
So they did not usually overlap^in their choice of talks.
There were only three talks^that they attended together.
During the whole conference,^each of them attended ten talks.

How many talks^did everybody^attend at^the conference^last week?
Three talks Ten talks

USS Cond: At the conference,^last week,^Ann, Sarah and Caroline^attended different talks.
They were not interested ^in the same topics.
So they did not usually overlap^in their choice of talks.
There were only three talks^that they attended together.
Those were the talks^that they had been asked to report on later.
They decided^that they would do that together.

How many talks^did everybody^attend at^the conference^last week?
Three talks Dont' know

4. MS Cond: A group of tourists^arrived at the wine fair^this morning.
Each of them^tasted six different wines.
The two wines that everybody tasted^were the "Merlot"^and the "Bordeaux".
Those were praised^for being the best wines^of the season.

How many wines^did every tourist^taste at^the wine fair^this morning?
Six wines Two wines

USS Cond: A group of tourists^arrived at the wine fair,^this morning.
There were two wines^that everybody tasted:^The "Merlot"^and the "Bordeaux".
Those were praised^for being the best wines^of the season.
It seems that these two^were also the wines that people liked most.
They were sold out^after their visit.

How many wines^did every tourist^taste at^the wine fair^this morning?^
Dont' know Two wines

5. MS Cond: The neighbors^just came back^from Disneyland.
Their children were telling us^about their trip.
There were^two attractions^that everybody^had visited:
"The mountain ride"^and "The space shuttle".
They had each been able^to visit fifteen attractions^during the trip.

How many attractions^did every child^visit at^Disneyland^last time?
Two attractions Fifteen attractions

USS Cond: The neighbors^ just came back from Disneyland.
Their children were telling us^about their trip.
There were^two attractions^that everybody^had visited:
"The mountain ride"^and "The space shuttle".
They were proud^because none of their friends^had been able to visit these.^

How many attractions^did every child^visit at^Disneyland^last time?
Two attractions Don't know

6. MS Cond: Last week,^a group of my students^went to the Metropolitan Museum.
Everybody had to visit five galleries^and report on them.
In particular,^everybody had to visit two galleries:
The Egyptian Gallery^and the Greek Gallery.
For the rest,^they were free to choose^what they wanted to see.

How many galleries^did every student^have to visit^at the Met^last week?
Five galleries Two galleries

USS Cond: Last week,^a group of my students^went to the Metropolitan Museum.
The students had to report^on the galleries they visited.
There were two galleries^that everybody had to visit:
The Egyptian Gallery^and the Greek Gallery.
For the rest,^they were free to choose^what they wanted to visit.
These two were also the ones^that they had enjoyed most.

How many galleries^did every student^have to visit^at the Met^last week?
Don't know Two galleries

7. MS Cond: In December,^the chef distributed some of his recipes^to his students.
There was one recipe^that everybody received:
the "Chilled Terrine^with Pistachios and Caper Mustard".
Altogether,^each of them^received four different recipes.

How many recipes^did every student^receive from^the chef^in December?
One recipe Four recipes

USS Cond: In December,^the chef^distributed some of his recipes^to his students.
There was one recipe^that everybody received:
the "Chilled Terrine^with Pistachios and Caper Mustard".
That was his special recipe.
He wanted to make sure^that everybody would be able^to try it out.

How many recipes^did every student^receive from^the chef^in December?
One recipe Don't know

8. MS Cond: Mary, Lynn and Cynthia^are looking for a new apartment.
Each of them^only really liked three^of the apartments they saw.
Among the apartments they visited,^there is one apartment^that they all liked.

How many apartments^did everybody^like among^the ones^they visited?
Three apartments One apartment

USS Cond: Mary, Lynn and Cynthia^are looking for a new apartment.
Among the apartments they liked,^there is a particular one^they all liked.
So they will have^to fight over it.$^{1 8
How many apartments^did everybody^like among^the ones^they visited?
Don't know One apartment

9. MS Cond: Recently,^Lesley, Gina and Mark^talked about their summer vacations.
They realized^that they had all been on a Europe tour^this summer.

Everybody^visited five different cities.
Among these,^there were two cities^that they had all seen:^Paris and Rome.

How many cities^did everybody^visit on^the Europe tour^during the summer?
Two cities Five cities

USS Cond: Recently,^Lesley, Gina and Mark^talked about their summer vacation.
They realized^that they had all been on a Europe tour^this summer.
Among the cities they visited,^there were two^that everybody had seen:
Paris and Rome.
These^were also the cities^that everybody had enjoyed most.

How many cities^did everybody^visit on^the Europe tour^during the summer?
Two cities Don't know

10. MS Cond:In the waiting room,^some magazines^were displayed on the table.
Julie, Pat and Liz^were reading them^while they were waiting.
There was one magazine^that everybody read,^the Newsweek.
Each of them^read a total of four magazines.|

How many magazines^did everybody^read in^the waiting room^this morning?
One magazine Four magazines

USS Cond:In the waiting room,^some magazines^were displayed on the table.
Julie, Pat and Liz^were reading them^while they were waiting.
There was one magazine^that everybody read,^the Newsweek.
This was the only magazine^that had come out recently.$^{1 10

How many magazines^did everybody^read in^the waiting room^this morning?
One magazine Don't know

11. MS Cond:Last spring,^Sue's children were participating in a huge mural painting.
The two children^received six different colors^for the different tasks.
There were two colors^that both of them received,^the blue and the green.

How many colors^did every child^receive to^participate^in the painting?
Six colors Two colors

USS Cond: Last spring,^Sue's children were participating in a huge mural painting.
The two children^received different colors^for the different tasks.
There were two colors^that both of them received,^the blue and the green.
That was^because an important part of the painting^was an ocean.

How many colors^did every child^receive to^participate^in the painting?
Don't know Two colors
12. MS Cond:In the music department,^three trumpet students^had to pass a make-up exam.
All of them^had to play two songs:
'Round Midnight'^and 'The days of Wine and Roses'.
For the rest,^they were free to chose^what they preferred.
Each of them^had to play^a total of five pieces.

How many pieces^did every student^have to play^for the exam^last time?
Two pieces Five pieces

USS Cond: In the music department,^three trumpet students^had to pass a make-up exam.
Among the pieces they had to play,^there were two that everybody had to play:
'Round Midnight^and 'The days of Wine and Roses'.
These were^the most difficult ones
.How many pieces^did every student^have to play^for the exam^last time?
Two pieces Don't know

CHAPTER 3

THE SUBJUNCTIVE MOOD IN SPANISH: COMPARISON OF CONTEXTUAL ALTERNATIVES

3.1 Introduction[1]

In this chapter, the main goal is to formulate an explicit proposal for the semantics of the predicates that select the subjunctive mood. I will investigate what semantic properties are shared by the predicates that select the subjunctive mood.

The main claim developed in this chapter is the following: the predicates that select the subjunctive mood in Spanish require a semantics of comparison. I will argue that these predicates have the following common feature: they introduce an ordering relation, and the proposition expressed by the complement clause is compared to its contextual alternatives with respect to this ordering relation.

The approach adopted here essentially amounts to the claim that subjunctive clauses appear in scalar contexts. This view is similar to a recent view of Negative Polarity Items (NPIs). Negative Polarity Items such as *any N* have been claimed to appear in scalar contexts in which they are compared to their alternatives (cf. Fauconnier, 1975, 1979, 1980, Horn 2000, Krifka 1992,1995, Lahiri 1998, Lee & Horn 1994, Israel 1996). Given the strikingly similar distribution of NPIs and subjunctive clauses observed in the literature (cf. Giannakidou 1997, Nathan & Epro 1984), a common characterization of these phenomena is of course welcome.

The structure of this chapter is as follows. In section 3.2, I present previous approaches to the semantics of the subjunctive mood in complement clauses. In section 3.3, Heim's (1992) conditional semantics for propositional attitudes is presented. I propose that such a conditional semantics should also be adopted for the predicates that select the subjunctive mood in Spanish. In section 3.4, I provide two arguments that show that this conditional semantics requires some revisions. As a consequence, a new proposal for the semantics of these predicates is developed. A crucial feature of this semantics is that it uses comparison of contextually determined alternative propositions.

In section 3.5, the proposal is compared to other existing approaches to the semantics of the predicates under discussion.

3.2 Previous approaches to the subjunctive mood in Romance

There have been numerous proposals in the literature that attempt to characterize the predicates that select the subjunctive mood in Spanish, and more generally in the Romance languages. Here, I will only present some of the most important approaches as well as the most recent approaches in generative grammar.[2] While some studies have suggested that it is impossible to propose a unified semantics for the subjunctive mood in Spanish (see, for example, Bell 1980, Lozano 1972, 1975), many have attempted to derive the distribution from one single underlying feature. Among the most well known and influential proposals have been the 'Assertion/Non-assertion' approach (cf., Bolinger 1968, 1974, 1976, Hooper 1975, Klein 1974, Klein 1975, Lavandera 1983, Lunn 1989, 1995, Terrell and Hooper 1974), and the 'Realis/Irrealis' approach (cf., Alarcos Llorach 1970, Bergen 1978, Gili Gaya 1961, Givón 1994, Real Academia Española 1973). Recent approaches in generative grammar have proposed a more fine-grained characterization of the contexts in which the subjunctive mood may appear in Romance languages by using the tools provided by a possible world semantics (cf., Farkas 1985, 1992, Giannakidou 1997, 1998, 1999, Giorgi and Pianesi 1997, Portner 1992, 1997, 1999, and Quer 1998, 2001, Panzeri 2002, 2003). I now turn to a brief presentation of these approaches.

3.2.1 The assertion/non-assertion approach

The main proponents of the 'Assertion/Non-assertion' approach to mood in Spanish are Bolinger (1968, 1974, 1976), Hooper (1975) and Terrell & Hooper (1974). These authors propose that the predicates requiring the indicative mood in Spanish are assertive predicates, while the predicates requiring the subjunctive mood are non-assertive predicates.

The most comprehensive discussion of assertive predicates is given in Hooper (1975). She proposes that there is a syntactic criterion that distinguishes between assertive and non-assertive predicates: only assertive predicates permit their

complements to be 'preposed'. Complement preposing is defined as "an operation that fronts all or part of the complement clause" (Hooper 1975, p.94). Examples (39)- (41) illustrate assertive predicates that allow complement preposing, and examples (42)-(44) illustrate non-assertive predicates that do not allow complement preposing (Hooper 1975, p.94).

(1) Many of the applicants are women, it seems.
(2) He wants to hire a woman, he says.
(3) Factivity is important in other constructions as well, they supposed.
(4) *Many of the applicants are women, it's likely.
(5) *He wants to hire a woman, it's possible
(6) *Factivity is important in other constructions as well, it's probable.

Importantly, Hooper claims that this syntactic characterization of the class of assertive predicates correlates with a semantic characterization. She proposes that "the effect of complement preposing is to make the complement proposition the main assertion of the sentence while reducing the original main clause to parenthetical or secondary status." (Hooper 1975, p.93).[3] Following Urmson (1952), Hooper proposes that assertive predicates give rise to a parenthetical and a non-parenthetical reading even when the complement is not preposed. Urmson suggested that such predicates used parenthetically serve to inform the hearer of the speaker's attitude toward the asserted proposition expressed by the complement. Hooper then proposes that "they imply in one manner or another that the speaker or subject of the sentence has an affirmative opinion regarding the truth value of the complement proposition" (Hooper 1975, p.95). Under the parenthetical reading, the speaker/subject would thus assert the embedded clause 'in a hedged way'.

Bolinger (1968), Hooper (1975) and Terrell & Hooper (1974) argue that the class of assertive predicates coincides with the class of predicates that select the indicative mood in Spanish.[4] In particular, Bolinger (1968) provides numerous examples that support this generalization. He claims that the predicates that allow preposing in English coincide with those that select the indicative mood in Spanish. The semantic characterization of assertive predicates would thus provide us with a semantic criterion to distinguish the predicates that selects the indicative mood from

those that select the subjunctive mood in Spanish. A recent formal implementation of this proposal can be found in Panzeri (2002,2003), who investigates mood in Italian, but also more in general in Romance.

However, the semantic characterization behind the term 'assertive' is not completely transparent. Among the assertive predicates we also find semifactive predicates such as *discover, realize, find out*, etc. The class of semifactives presents the following problem to the definition of assertive predicates: for sentences that contain semifactive predicates, the speaker presupposes that their complement is true, as illustrated in (7). Nevertheless, these predicates also allow their complements to be preposed, as illustrated in (8) (from Hooper 1975, p.116).

(7) I found out that there are two kinds of factive predicates.

(8) There are two kinds of factive predicates, I found out.

In (7) as well as in (8), the speaker presupposes the complement to be true and it is thus difficult to understand how it could be asserted at the same time. The authors acknowledge this problem and refer to the need to define some weaker notion of presupposition, which would not be entirely incompatible with an assertion.

Note also that the class of fiction predicates seems problematic for this characterization, as pointed out in Farkas (1992). In a sentence with a predicate such as *dream*, the speaker/subject does not assert the complement clause, since what is dreamed can never be claimed to be true.

To conclude, the assertion/non-assertion approach makes the important contribution that it provides a syntactic test to distinguish the predicates that select the indicative mood from those that select the subjunctive mood in Spanish. It can thus be argued that there are indeed two natural classes of predicates. The semantic characterization of the two classes as assertive and non-assertive predicates still requires further refinements, however. In particular, among the predicates that select the indicative mood in Spanish there are a number of factive predicates that select the indicative mood such as *saber* ('know'), *acordarse* ('remember'), *olvidarse* ('forget'), *darse cuenta* ('realize') and *descubrir* ('discover'). Given that these predicates give rise to a factive interpretation, it remains unclear how the complement clause could be asserted at the same time.

3.2.2 The 'realis/irrealis' approach

The indicative and subjunctive moods have often been related to the notions of 'realis' and 'irrealis' respectively. According to the 'realis/irrealis' approach, the 'realis' mood, marked by the indicative, would indicate truth of the proposition in the actual world, contrary to the 'irrealis' mood, marked by the subjunctive. In theoretical terms, this would mean that a proposition in the indicative mood is necessarily true in the actual world, while a proposition in the subjunctive mood is not necessarily true in the actual world.

For Spanish, however, this 'extreme' version of the 'realis/irrealis' position has never been defended. Rather, the different approaches have adopted a less radical 'realis/irrealis' view[5], where this notion is usually related to the speaker's or subject's beliefs/doubts about the truth of the proposition in the actual world. Bergen (1978), for example, proposes the following version of the 'realis/irrealis' notion:

> "The single criterion for the use of mode is simply that, whereas the indicative denotes that the speaker (or the actor) of the higher clause regards the proposition expressed by the next lower clause as an objective fact, the subjunctive expresses reservation on the part of the speaker (or the actor) concerning the reality of that proposition." (Bergen 1978, p.221)

More recently, Givón (1994) also suggests that the contrast between 'realis' and 'irrealis' mood has nothing to do with 'real' and 'unreal' events but rather with the speaker's attitude. He defines an 'irrealis assertion' as follows.

> "Irrealis assertion: The proposition is weakly asserted as either possible, likely or uncertain (epistemic sub-modes), or necessary, desired or undesired (valuative-deontic sub-modes). But the speaker is not ready to back up the assertion with evidence or other strong grounds; and challenge from the hearer is readily entertained, expected, or even solicited." (Givón 1994, p.268).

It should be pointed out that the 'realis/irrealis' approach adopted in Givón(1994) cannot account for the full range of predicates that select the subjunctive mood in Spanish. His definition of 'irrealis assertion' captures the fact that the subjunctive mood is selected by directive predicates, desire predicates, modals and predicates of doubt. However, emotive factive predicates (*alegrarse* 'be glad', *lamentarse* 'regret', *sorprenderse* 'be surprised', etc.) cannot count either as the epistemic sub-mode of uncertainty, nor as any of the valuative-deontic sub-modes. Givón, in fact, acknowledges that emotive factive predicates in Spanish present a puzzle to the 'realis/irrealis' approach. Given that they presuppose the truth of the complement clause when they appear in an affirmative sentence, these predicates should count as 'realis'. Givón proposes that the category of 'irrealis' is really a more complex category. Emotive factive predicates would count as 'irrealis' because of their valuative character, even though the valuative attitudes in question (preference, aversion or surprise) are directed towards realized states or events. Givón suggests that the following correlation can explain why factive emotive predicates count as irrealis: "If an event is *epistemically* less expected, chances are that one's emotional *valuative* reaction to it - surprise, preference, aversion - is stronger" (Givon 1994 p. 307).

Nevertheless, this connection can at best hold for a small subclass of emotive factive predicates. Among the emotive factive predicates there are many predicates that do not imply that the subject considers the complement clause to be unexpected. To mention just a few, predicates such as *es interesante* ('it is interesting'), *es natural* ('it is natural'), *es aburrido* ('it is boring'), and *es fascinante* ('it is fascinating') do not imply that the proposition denoted by the complement clause is unexpected to the subject or the speaker.

To conclude, the 'realis/irrealis' approach attempts to provide a characterization of the contexts in which the subjunctive mood can appear. However, the class of emotive-factive predicates, which select the subjunctive mood in Spanish, is problematic for this approach. These predicates give rise to a factive interpretation and would thus classify as 'realis', contra the core distinction of this approach.

I now turn to recent developments in generative grammar on the semantics of mood in Romance languages. Several recent theoretical approaches have proposed to characterize the predicate classes that typically select the subjunctive mood in Romance languages by referring to the modal properties of the contexts that these predicates

trigger for their complement clauses. The proposals to be discussed below share the goal of characterizing the common properties of the contexts in which the subjunctive mood appears in formal semantic terms, by using recent developments in possible world semantics. I will pay particular attention to the way in which these approaches handle the Spanish data and what problems arise from this perspective.

3.2.3 Prototypically factive/non-factive modal contexts (Portner 1997)

I first turn to the proposal that stays closest to the 'realis/irrealis' view among the recent proposals to the semantics of mood, namely that of Portner (1997). His main goal is to provide an analysis of the mood system in English, but he also discusses how his analysis can be extended to a Romance language such as Italian. Even though the Romance data are not at the center of his proposal, it is useful to compare his analysis to the other accounts that are centered around data from the Romance languages.

In the following, I discuss Portner's approach with respect to the Italian data only. The special property of the Italian mood system is that, contrary to other Romance languages such as French, Romanian, Catalan and Spanish, the subjunctive mood is selected in the complement clause of predicates such as *credere* 'believe' and *pensare* 'think'. Portner suggests that in this language the factivity properties of the context play a crucial role for mood selection. He considers his own approach as "basically following the traditional view of indicative as realis mood, indicating truth in the actual world, with the subjunctive mood used when the indicative is inappropriate" (Portner 1999, p.7). Since someone's beliefs are not necessarily true in the actual world, under the 'realis/irrealis' view it is expected that predicates such as *credere* 'believe' and *pensare* 'think' select the subjunctive mood.

Portner notes, however, that the traditional view cannot account for many other predicates that select the indicative mood in Italian, among which are predicates of communication such as *dire* ('say') and predicates of certainty such as *essere sicuro* ('be sure'). These predicates, just like *credere* ('believe'), create a non-factive context, i.e. their complement clause is not necessarily true in the actual world. This is so since what someone says or is sure about is not necessarily true in the actual world. Portner thus suggests that the contexts for the indicative mood should not be characterized as "rigorously factive but merely prototypically factive. Consider for instance a report that

α says ψ. In many situations it is expected that reported claims are true. I would like to suggest that such situations are the ones considered as typical." (Portner 1997, p.199).

Portner (1997) then concludes that the indicative mood is used in prototypically factive modal contexts, and that the subjunctive is used whenever the indicative is inappropriate.

It should be pointed out, however, that there are many more predicates that select the indicative mood in Italian for which it is not so clear that they create a prototypically factive context. Among them are predicates such as *indovinare* ('guess') and *promettere* ('promise'): what is guessed or promised is not necessarily expected to be true. Also, predicates such as *essere d'accordo* ('agree') are known for their non-factive properties (cf. Beck and Rullmann 1999) and still select the indicative mood in Italian. Portner (1999) also notes that fiction verbs such as *dream* cannot be captured by this approach, given that they select the indicative mood: what is dreamed is not expected to be true in the actual world. He thus suggests that there is a certain amount of arbitrariness in the choice of predicates that may be considered as prototypically factive in a language.

Similar to the traditional 'realis/irrealis' approach, the 'prototypically factive/non-factive' approach cannot capture emotive factive predicates in a straightforward manner. Emotive factive predicates select the subjunctive mood in Italian as well as in Spanish. Nevertheless, these predicates create a modal context that is factive. Portner suggests that "it is not obvious whether such verbs denote propositional attitudes, as opposed to attitudes toward events" (Portner 1997, p.198). Portner derives the fact that emotive factive predicates do not select the indicative mood from their special selection properties: he proposes that they select propositions that denote a set of smaller situations rather than a set of worlds. The indicative would thus not be expected with these predicates, since it would not be possible to evaluate the truth of the embedded clause in the real world.

I now turn to Farkas (1985,1992), a proposal that has been very influential for recent studies on mood in Romance languages.

3.2.4 Strong versus weak intensional predicates (Farkas 1985, 1992)

Farkas (1985, 1992) points to the fact that the class of fiction verbs presents a major problem for the 'realis/irrealis' approach to mood selection in Romance languages. Fiction verbs such as *dream* are a clear counterexample to such a proposal, since one's dreams have little to do with the actual world or the speaker's beliefs about the actual world. Nevertheless, fiction verbs select the indicative mood in all Romance languages. Farkas concludes that truth in the actual world can thus not be a criterion for the selection of the indicative/subjunctive mood.

Farkas (1985, 1992) proposes that a classification into *weak* and *strong intensional* predicates is necessary to capture the distribution of the indicative and the subjunctive mood in Romance complement clauses. She argues that it is crucial to introduce the notion of truth of a proposition relativized to an individual. *Weak intensional* predicates, which correspond to the predicates that select the indicative mood, are characterized as requiring the subject to believe the embedded proposition to be true. On the contrary, *strong intensional* predicates do not require the subject to believe the embedded proposition to be true.

In a sense, Farkas' proposal is quite similar to certain versions of the 'realis/irrealis' approach discussed above in section 3.2.2 (cf. in particular Bergen 1978), since what is relevant for mood selection here is whether the subject *believes* that the proposition expressed by the complement clause is true. Predicates such as *believe* and *know* classify as *weak intensional*: the subject believes in the actual world that the proposition corresponding to the complement clause is true. Crucially, however, Farkas notes that for other *weak intensional* predicates, it is not the subject's beliefs in the *actual* world that matter. For fiction predicates such as *dream*, for example, it is the subject's beliefs in the *fiction* world corresponding to the dream that are relevant. Furthermore, for predicates of communication, it is the subject's beliefs in the world that models reality as far as the reported conversation is concerned that are relevant.

To summarize, Farkas proposes that sentences that contain *weak intensional* predicates require that the subject believe the embedded proposition to be true (whether it is truth in the worlds that are compatible with his beliefs in the actual world, in the fiction world or in a world representing the reported speech is irrelevant). These are

predicates that select the indicative mood in most Romance languages. *Strong intensional* predicates, which select the subjunctive mood, do not require the subject to believe the proposition expressed by the complement clause to be true.

The contrast established by *weak* and *strong intensional* predicates captures the intuition that a subject might have incompatible desires (desire predicates are *strong intensional*) but not incompatible beliefs (the predicate *believe* is *weak intensional*). Farkas illustrates this with the following example: "a person may want to spend the summer in Mexico and he may want to spend the summer in Greece without it being the case that that person has a contradictory wish. In other words, one cannot say that for *John wants p* to be true, p must be true in John's want-world or in all the worlds compatible with what John wants". (Farkas 1985, p.91). Someone's beliefs cannot be contradictory in this same way.

This contrast certainly captures an important difference between epistemic predicates and desire predicates. However, it is not clear whether other predicates that select the indicative mood do have this same property. A predicate such as *prometer* ('promise') selects the indicative mood in Spanish and in all other Romance languages, even though one may certainly make inconsistent or conflicting promises. Similarly predicates such as *adivinar* ('guess'), *sospechar* ('suspect'), *concluir* ('conclude') are like desire predicates since one may guess, suspect or conclude contradictory propositions. Nevertheless, these predicates consistently select the indicative mood across the Romance languages.

Finally, parallel to what was noted for the approaches presented previously, the emotive factive predicates in Spanish are problematic for the *weak/strong intensional* approach. This approach predicts that emotive factive predicates will be *weak intensional*. Emotive factive predicates presuppose the truth of the complement clause, and hence the subject believes the complement clause to be true in the actual world. For a language such as Romanian this is not a problem, given that in this language emotive factive predicates select the indicative mood. But, in Spanish, emotive factive predicates select the subjunctive mood.

Farkas suggests that the reason for the cross-linguistic variation in mood selection for these predicates is that their meaning has two components, a factive component and an emotive component. In Romanian, the relevant component for mood selection is the factive component, and emotive factive predicates are thus classified as

weak intensional. In other Romance languages, the relevant component for mood selection is the emotive component. Farkas proposes that emotive factive predicates require modal contexts ("They classify situations according to the reaction/emotion they produce, or according to some implicit set of criteria (what one considers good/just etc.)" Farkas 1992, p.101), and can thus be classified as strong intensional. More recently, in Farkas (2003), she adopts an optimality theoretic framework to account for the variation in mood selection across Romance languages, but I will not go into this analysis here.

There are two recent approaches that follow Farkas closely in categorizing predicates into *weak* and *strong intensionals*, namely Giannakidou (1997, 1998, 1999) and Quer (1998, 2001). These proposals formalize Farkas's main idea in a slightly different way. In the following section, I turn to the proposal made by Giannakidou.

3.2.5 Veridical/nonveridical contexts (Giannakidou 1997, 1998, 1999)

Giannakidou (1997, 1998, 1999) essentially follows Farkas in classifying predicates into *strong* and *weak intensional* predicates. What is new about her approach is that she proposes to subsume the notion of *strong/weak intensionality* under the more general notion of *(non)veridicality.* The notion of *(non)veridicality* is defined in Zwarts (1995) as follows.

(9) Definition of (Non)veridicality (Zwarts 1995, p.287)
A sentential operator O is *veridical* just in case $Op \Rightarrow p$ is logically valid. If *O is* not veridical, then *O* is *nonveridical*. A nonveridical operator *O* is called *averidical* iff $Op \Rightarrow \neg p$ is logically valid.

This notion of *(non)veridicality* captures the fact that expressions such as *it seems that, it is possible that* are *nonveridical* in the sense that the truth of the statements in (10) do not entail the truth of the propositions expressed by the subordinate clause (examples from Zwarts 1995, p.287).

(10) a. It seems that Jones has seen a unicorn.
b. It is possible that Smith will survive.

In Giannakidou (1997, 1998, 1999), the definition of *(non)veridicality* is extended so as to define *(non)veridical* predicates that select complement clauses. She follows Farkas in proposing that truth has to be relativized with respect to individuals. She then defines *veridical* predicates as predicates which require that the embedded proposition be true according to the subject in all the worlds of a relevant set of worlds (a 'model' in her terminology). Thus, for a predicate such as *believe*, the embedded proposition has to be true in all the worlds that are compatible with what the subject believes (the subject's belief-model), for a predicate such as *dream,* the embedded proposition has to be true in all the worlds that are compatible with what the subject dreams (the subject's dream-model), and for a predicate such as *say* the embedded proposition has to be true in the model of the reported communication. Propositional attitude predicates are claimed to be *nonveridical* if the embedded proposition is not necessarily true in all the worlds of the corresponding model.[6]

Following this definition, *weak intensional* predicates are *veridical*. Let us now examine *strong intensional* predicates and why they turn out to be *nonveridical*. Giannakidou suggests that a *strong intensional* verb such as *want* introduces "the subject's belief model which crucially includes worlds which represent future realizations of the actual world" (Giannakidou 1998, p.114). The embedded proposition is then only true in a subset of these worlds, since the subject believes that what s/he desires might not necessarily come out as true. The predicate *want* thus turns out to be *nonveridical* because the embedded proposition is not necessarily true in all the worlds that make up the relevant 'model'.

As noted in Portner (1999, 2003), this approach does not make any clear commitment as to which 'models' are introduced by *strong intensional* predicates. The definition captures the class of predicates that select the indicative mood but does not provide any independent principle for choosing 'models' corresponding to propositional attitude predicates. Portner (1999) notes that the choice of the 'model' used in the case of *want* seems arbitrary. If instead the verb *want* introduced a desire-'model', that is, the worlds that are compatible with what the subject wants, the predicate would classify as *weak intensional*: the proposition expressed by the complement clause would then be true in all the worlds that are compatible with what the subject wants.

Notice that Giannakidou's definition of *nonveridicality,* just like the notion of *strong intensionality,* cannot capture the fact that, in Spanish, emotive factive predicates select the subjunctive mood. At least, it is not straightforward to see what class of models would be introduced by these predicates such that the embedded proposition will necessarily not be true in all the worlds of that model. We need an independent criterion for the choice of these models. Since, for emotive factive predicates the subject believes the proposition to be true, the proposition is true in all the worlds compatible with the subjects belief-model.

I now turn to Quer (1998, 2001) who essentially adopts Giannakidou's definition for the classification of the predicates that select the subjunctive mood. He goes beyond her proposal in making an explicit attempt at providing a role for the subjunctive mood in the meaning composition of the sentence. As we will see below in more detail, he proposes that the subjunctive mood signals 'model shift'.

3.2.6 Mood as Model Shift (Quer 1998, 2001)

Quer (1998, 2001) follows Farkas (1985, 1992) and Giannakidou (1997, 1998, 1999) in classifying predicates into *weak* and *strong intensional.* The novelty of his approach is that he attributes a role to the subjunctive mood. In adopting Giannakidou's formalization of the class of *strong intensional* predicates, he proposes that the subjunctive mood in languages such as Catalan and Spanish marks 'model shift'.

In Quer (1998), following Giannakidou (1997, 1998, 1999), 'models' are defined as sets of worlds, the sets of worlds that constitute the context of evaluation of the proposition expressed by the complement clause. Quer then defines 'model shift' as a change in the context of evaluation. Adopting a dynamic semantics, he proposes that mood morphology is "the overt marking of a change in the model for the evaluation of the proposition or property expressed by the embedded clause. From this perspective, mood morphology conveys information about model flow in the discourse." (Quer 2001, p.81). Several factors may influence such changes in the context of evaluation and Quer proposes that mood morphology marks 'model shift' that may be caused by a variety of interpretive factors. In adopting this view he attempts to cover an impressive array of constructions in which the subjunctive mood may appear: complement clauses, purpose clauses, relative clauses, concessive conditionals and free relatives as well as

subjunctive mood under negation. I will concentrate here on his analysis of complement clauses.

Let us examine more in detail how 'model shift' works. Quer (1998, 2001) follows Giannakidou (1997, 1998, 1999) in proposing that propositional attitudes introduce sets of worlds, also called 'models'. Propositional attitudes then introduce a change in the context of evaluation (or 'model shift'): the context of evaluation of the complement clause is different from the context of evaluation of the matrix clause. Quer proposes that only *strong intensional* predicates trigger mood shift (a shift from the indicative to the subjunctive mood), contrary to *weak intensional* predicates. For both cases, there is a change in the context of evaluation, but only the former predicates trigger mood shift because 'the model for the evaluation of the proposition (or property) at hand has been shifted to another one of an essentially different type.' (Quer 2001, p.82). He claims that, in the case of a *strong intensional* predicates such as *want*, the change in context of evaluation is from the epistemic model of the speaker to the buletic model of the subject, and this gives rise to 'mood shift'. In the case of *weak intensional* predicates, Quer argues that there is no 'mood shift' because the change in the evaluation context is not to a model of an essentially different type: the change in the evaluation context is from the epistemic model of the speaker to the epistemic model of the subject. Quer however does not explain why this should be so. He does not provide an independent criterion to determine which kinds of model changes trigger mood shift.

Furthermore, in this approach, it is not made precise what characteristics about a model makes it essentially different from another. Quer (1998, 2001) does not spell out exactly what aspect of the model 'mood shift' is sensitive to. In comparing a predicate such as *want* to predicates that select the indicative mood, we need to understand precisely what is different about the context of evaluation of their complement clauses. Giannakidou claims that a verb such as *want* introduces 'the subject's belief model which crucially includes worlds which represent future realizations of the actual world' (Giannakidou 1998, p.114). We need to understand in what respect this model is different from the belief-model introduced by the predicate *believe.* Quer's criterion does not allow us to distinguish these two models and we cannot capture that only the predicate *want* gives rise to 'mood-shift'. There is then a clear confusion about which property of these predicates in fact triggers mood shift.

It can also be noted that a predicate such as *promise* should introduce a model that is quite similar to the one introduced by the predicate *want.* For a predicate such as *promise,* we would expect that the embedded proposition be evaluated in all the worlds that are compatible with what the subject believes about the future realizations of the actual world. Nevertheless, this predicate consistently selects the indicative mood across the Romance languages.

Under the 'model shift' approach, it thus remains unclear what exact property of a model triggers mood shift.

To conclude, Quer (1998, 2001) makes the novel contribution of an attempt to provide a role for the subjunctive mood in the discourse: he argues that the subjunctive mood signals a certain type of 'model shift': an essential change in the context of evaluation. However, the exact feature of the context of evaluation that the subjunctive mood is sensitive to is not yet made explicit. No independent criterion is provided to determine which kinds of models trigger mood shift and which don't.

In the following section, I turn to the proposal made by Giorgi and Pianesi (1997), who further elaborate on the characterization of the type of context in which the subjunctive mood is selected

3.2.7 Null/non-null ordering sources (Giorgi and Pianesi 1997)

Giorgi and Pianesi (1997) develop a theory that is meant to account for the cross-linguistic variation of mood selection in various Romance and Germanic languages. They propose that a number of factors contribute to making the context of evaluation of a clause more or less realistic. Possible contexts of evaluation can be represented on a scale where these range from non-realistic, weakly realistic, realistic to totally realistic contexts. The use of the indicative/subjunctive mood would allow us to divide this scale into two parts. The subjunctive would be used at the non-realistic end of the scale. Cross-linguistic variation would then derive from the fact that languages set this binary division at different points on the scale.

Giorgi and Pianesi propose that one crucial parameter that contributes to making a context non-realistic is the need for an *ordering source*. In using this terminology, they refer to the semantics that Kratzer (1977, 1981, 1991) proposes for modals.

In Kratzer's framework, modal verbs such as *should, would* and *must* require two contextual parameters for their evaluation: the *modal base* and the *ordering source.* The *modal base* is provided by the set of worlds that characterizes the background assumptions in which the proposition is evaluated. The *ordering source* is a second set of background assumptions that orders those worlds with respect to an ideal. Let me clarify these concepts with the help of the following two examples in (11) and (12), which contain the modal *must*.

(11) Marcela must be on vacation.
(12) Marcela must go to the doctor.

The sentence in (11) has in its most natural reading a so called 'epistemic' interpretation, which can be paraphrased as 'in view of the available evidence, it must be the case that Marcela is on vacation'. The sentence in (12) has a so called 'deontic' interpretation that can be paraphrased as 'in view of Marcela's health state, Marcela must go to the doctor.' Modals such as *must* thus may receive different interpretations depending on the presence of an implicit (or explicit) specification. Following Kratzer (1977, 1981, 1991), the interpretation of modals involves two different conversational backgrounds. The *modal base* is a set of worlds that is provided by the epistemic conversational background (which determines for every world the set of worlds which are accessible from it). The second conversational background, called the *ordering source* is different in each of the two examples above. In (11), this conversational background is a contextually determined set of propositions provided by 'the available evidence'. In (12), it is a contextually determined set of propositions provided by what is 'good for Marcela's health state'. For each world, the second conversational background induces an ordering on the sets of worlds accessible from that world. Interpreting the sentence in (11) then requires one to evaluate the truth of the proposition 'Marcela is on vacation' in all the worlds of the modal base that come closest to the ideal determined by the ordering source.

Giorgi and Pianesi (1997) argue that it is the semantics involved in the interpretation of modals - the interaction between two conversational backgrounds - that is relevant for the interpretation of subjunctive clauses. They propose that in languages such as Spanish, the subjunctive mood is selected when the proposition is

evaluated in a context that requires a non-null *ordering source*. They claim that this interaction between conversational background and *ordering source* gives rise to a non-realistic context of evaluation. What kind of *ordering sources* play a role in detemining the subjunctive mood? Giorgi and Pianesi propose that for desire predicates and directives, it is the subject's wishes and desires that provide the ordering source and establish a *bouletic* conversational background. For emotive factive predicates, they follow Farkas in assuming that the crucial property determining their behaviour is their emotional/evaluative character. They claim that predicates such as *be surprised, regret* and *be worried* involve causation: "The event described by the complement clause (or the related fact) causes the subject to be in a state of *astonishment, regret, worry,* and so on." (Giorgi and Pianesi 1997, p.219). They propose that these predicates should be analyzed with the semantics of counterfactuals, which they claim crucially involves a non-null ordering source.

To conclude, Giorgi and Pianesi (1997) propose that in adopting Kratzer's semantics for modals we can explain the appearance of the subjunctive mood in a language such as Spanish. The subjunctive mood is selected if the context of evaluation requires a non null *ordering source.* If this is indeed the correct generalization, we still need to make precise what the exact semantics of the matrix predicate is. Do all predicates that select the subjunctive mood have the same semantics as a modal such as *must* or *can*? Giorgi and Pianesi, do not provide an explicit semantics for the predicates that select the subjunctive mood, but limit themselves to a discussion of the possible contexts of evaluation of the complement clause.

Notice that, in this approach, we still do not have an answer to the question why the subjunctive mood is required in the described contexts. If we assume that the predicates that select the subjunctive mood have the semantics of a modal such as *must* or *can*, it is unclear what the subjunctive mood could contribute to the meaning of the whole sentence.

3.2.8 The Referential Approach (Schlenker 2005)

Schlenker (2005) proposes an analysis of the indicative/subjunctive mood for French. He argues that the subjunctive mood cannot be given a common semantics in all contexts, but rather that it functions as a default mood. He proposes then to

characterize the semantic contribution of the indicative mood rather than that of the subjunctive mood, with the help of his semantic framework 'the referential approach'. He captures the intuition "that the indicative marks some notion of commitment on somebody's part" (either the subject's or the speaker's). This proposal differs from the other recent approaches to mood in that it does not aim at characterizing the semantic contribution of the subjunctive mood, but considers it to be a default mood (it appears whenever there is no relevant presupposition that triggers the indicative mood).

Following Stalnaker (1975), Schlenker suggests that predicates that select the indicative mood trigger the presupposition that the embedded proposition is true in the *context set* of individual x' at time t' in world w'. Simplifying somewhat, since I will not go into the technical details of Schlenker's referential approach, the *context set* corresponds to the set of worlds in which the embedded proposition is evaluated. Schlenker proposes that the context set may vary depending on the verb. There are two types of context sets that are relevant for predicates that select the indicative mood: for predicates such as *believe*, the context set is the set of all worlds compatible with someone's beliefs (subject's or speaker's beliefs). Hence, this implies that the indicative is selected when the subject/speaker believes the proposition expressed by the embedded clause to be true. However, we know that this is not the case for all predicates that select the indicative mood. For predicates such as *say* or *lie,* Schlenker proposes that the context set contains the set of worlds compatible with one's *speech act*.

This approach can well account for the indicative mood with epistemic predicates and predicates of communication. Nevertheless, it is not immediately clear how it can account for the fact that fiction predicates and predicates of perception select the indicative mood as well. Clearly, for a predicate such as *dream* the subject neither believes nor asserts the embedded proposition. The same holds for certain predicates of perception such as *hear* and for certain predicates of mental judgement such as *forget* and *ignore.*

In Schlenker's proposal, the subjunctive mood is selected whenever there is no presupposition that the embedded proposition is true in the context set. As Schlenker notes himself, the emotive factive predicates, however present a challenge to this approach. In French, just like in Spanish, a verb such as *regret* presupposes that the subject believes the embedded proposition to be true. Schlenker proposes that these

predicates select the subjunctive mood because their lexical semantics involves counterfactual reasoning. As a consequence, he claims, the embedded clause is evaluated in worlds that are not, in general, in any salient individual's context set.

To conclude, I have provided a brief overview of the different major approaches to the semantics of the subjunctive mood. The main difficulty for the approaches reviewed above is the behavior of the class of emotive factive predicates. These select the subjunctive mood in Spanish even though they create a factive context. For the approaches inspired in the 'realis/irrealis' view these predicates present a major problem. Farkas (1992) suggests that for a language such as Spanish it is the evaluative or modal meaning component of these predicates that determines mood selection. Schlenker (2005) proposes that it is the fact that these predicates involve counterfactual reasoning. In Giorgi and Pianesi (1997) the fact that these predicates involve counterfactual reasoning translates into the requirement that these predicates create a context of evaluation with an *ordering source*. A more detailed investigation of the class of emotive factive predicates is thus necessary to understand what exactly they share with the other predicate classes that select the subjunctive mood. This will be the starting point for my investigation. In the following, I address the question of what meaning properties are shared by emotive factive predicates with the other predicate classes that select the subjunctive mood. Crucially, under the approach that I will develop, it is irrelevant whether the complement clause is evaluated in a 'realis' or 'irrealis' context, i.e. whether the proposition expressed by the complement clause is possibly true or not (or whether the subject considers it to be true or not).

3.3 A semantics for the predicates that select the subjunctive mood in Spanish

In this section, the goal is to develop a first proposal for a common semantics of the predicates that select the subjunctive mood in Spanish. The relevant predicate classes are desire predicates (e.g., *querer* 'want', *preferir* 'prefer'), modals (e.g., *es posible* 'it is possible', *es probable* 'it is likely'), predicates of doubt (e.g., *dudar* 'doubt'), emotive factive predicates (e.g., *lamentarse* 'regret', *alegrarse* 'be glad'), directives (e.g., *ordenar* 'order', *sugerir* 'suggest') and causatives (e.g., *hacer* 'make',

conseguir 'achieve', *contribuir* 'contribute'). See chapter 1 for examples, and the appendix to chapter 1 for a more complete list of predicates.

In the following, I first present Heim's (1992) proposal for desire predicates. Heim's (1992) analysis of desire predicates builds on Stalnaker's (1984) insight that every desire report contains a hidden conditional. "A little more explicitly, the leading intuition is that *John wants you to leave* means that John thinks that if you leave he will be in a more desirable world than if you don't." (Heim 1992, p.193). I then argue that such a conditional semantics should be extended to all predicates that select the subjunctive mood in Spanish.[7]

3.3.1 Heim's (1992) conditional semantics for desire predicates

We begin with the semantics for propositional attitude predicates first introduced by Hintikka (1969). The truth conditions for the verb *believe* are given in (13).

(13) 'α believes ϕ' is true in w iff: $\forall$ w'$\in$ Dox_{α}(w): ϕ is true in w'.
(Dox_{α}(w) contains all the worlds that are compatible with what α believes in the world w to be true, also called *doxastic alternatives of* α *in w*.)

The truth conditions in (13) say that 'α believes ϕ' is true in a world w if and only if ϕ is true in all worlds w' that are compatible with what α believes in w. The truth of the proposition ϕ has to be evaluated in a set of worlds, given that α's beliefs are never specific enough to characterize one single world: α's beliefs will always be compatible with more than one world. Thus, to take an example, *John believes that it is raining* is true in w iff it is raining in all the worlds w' that are compatible with what John believes in w.

Adopting the Hintikka-style analysis for a verb such as *want* results in the truth conditions given in (14). Here, the worlds compatible with α's beliefs in w, the doxastic alternatives, have simply been replaced with the worlds compatible with α's desires in w, the so-called 'buletic' alternatives.

(14) ‘α wants ϕ’ is true in w iff: ∀ w’∈ Bul_{α}(w): ϕ is true in w’.
(Bul_{α}(w) contains all the worlds that are compatible with what α desires in w, also called *buletic alternatives of* α *in w*.)

These truth conditions, however, cannot appropriately capture all the characteristics of the verb *want*. This becomes clear as soon as we look at an example more closely. The example in (15), from Heim (1992), illustrates that these truth conditions are problematic.

(15) I want to teach Tuesdays and Thursdays next semester.

Heim notes that the sentence in (15) can be true in a situation in which in fact I would rather prefer not to teach at all. In a situation like this the following holds: in all the worlds that are compatible with what I desire I do not teach. If we adopt the truth conditions in (14), however, the sentence comes out as false in this situation: the proposition is only evaluated in worlds that are compatible with my desires, which do not include worlds in which I teach Tuesdays and Thursdays next semester.

To remedy this problem, Heim (1992) develops a new proposal for *want* that captures Stalnaker’s insight that every desire report employs a hidden conditional: ‘to want something, is to prefer something to certain relevant alternatives, the relevant alternatives being those possibilities that the agent believes will be realizable if he doesn’t get what he wants.’ (Stalnaker 1984, p.89). The sentence (15) can thus be paraphrased as in (16).

(16) If I teach Tuesdays and Thursdays next semester, I will be in a more desirable world than if I teach on other days next semester.

Heim’s new proposal for the truth conditions of *want* is based on the semantics adopted for conditionals. Following Lewis (1973) and Stalnaker (1968), a conditional *if* ϕ, ψ is true in a world w iff ψ is true in all ϕ-worlds maximally similar to w (where a ϕ-world is a world in which ϕ is true). What this means is that, when we evaluate a conditional, we only verify whether the consequent is true in ϕ-worlds which are maximally similar to w. These worlds only differ from the actual world in what is

expressed by the antecedent ϕ.[8] Thus, in (16), the sentence is true if and only if the consequent is true in all those worlds in which I teach Tuesday and Thursdays next semester and which are otherwise just like the actual world. By adopting such a conditional semantics, Heim proposes that the verb *want* has the truth-conditions in (17).

(17) 'α wants ϕ' is true in w iff:
For every w'∈ Dox_{α}(w): Every ϕ-world maximally similar to w' is more desirable to α in w than any non-ϕ-world maximally similar to w'.
(Heim 1992, p.193)

In (17), for every belief-world w', the set of its closest ϕ-alternatives is compared to the set of its closest non-ϕ-alternatives. The assumption here is that when α wants p, Dox_{α}(w) contains p as well as non-p worlds, i.e. that α believes that both p and ¬ p are possible. As Heim points out, one of these two sets of alternatives is always the singleton-set containing w'. If ϕ is true in w', then the truth conditions say that w' is more desirable to α in w than each of its closest non-ϕ-alternatives. If ϕ is false in w', then the truth conditions says that each of the closest ϕ-alternatives to w' is more desirable to α in w than w'. The truth-conditions can thus also be stated as in (18).

(18) 'α wants ϕ' is true in w iff:
For every w' ∈ Dox_{α}(w):
Either ϕ is true in w' and w' is more desirable than its closest non-ϕ-alternatives, or else ϕ is false in w' and w' is less desirable than its closest ϕ-alternatives.
(Heim 1992, p.194)

We now apply this proposal to our previous example repeated here in (19).

(19) I want to teach Tuesdays and Thursdays next semester.

Under the truth conditions presented above, for this sentence to be true, the following has to hold: for each doxastic alternative w', if I teach Tuesdays and

Thursdays next semester in w', it is a more desirable world than maximally similar worlds in which I teach on other days. If I teach on other days in w', it is a less desirable world than maximally similar worlds in which I do teach on Tuesdays and Thursdays.

In Heim (1992), the truth conditions of this verb are stated in a context change semantics. Since in this dissertation I do not use this framework, I present the equivalent truth conditions in a non-dynamic semantics. Heim encodes the relation of comparative similarity among worlds with a family of selection functions as in (20): for each world w, there is a selection function Sim_w from propositions to propositions which maps each proposition p to the set of worlds maximally similar to w in which p is true (cf. Heim 1992, p.195).

(20) $Sim_w(p)=\{w' \in W: w' \in p$ and w' resembles w no less than any other world in p$\}$

Additionally, Heim uses an abbreviation for the ranking of possible worlds in terms of desirability. She introduces $>_{\alpha,w}$, a relation between worlds, that can also be employed in an extended sense as a relation between sets of worlds, as defined in (21) (see Heim 1992, p.197).[9]

(21) (a) For any w, w', w'' $\in$ W, w' $>_{\alpha,w}$ w'' iff w' is more desirable to α in w than w''

(b) For any w $\in$ W, X$\subseteq$W, Y$\subseteq$W, X $>_{\alpha,w}$Y iff w' $>_{\alpha,w}$ w'' for all w'$\in$ X, w''$\in$ Y.

The truth conditions of the verb *want* can now be stated as in (22).

(22) $[\![want]\!](p)(a)(w) = 1$ iff
$\forall$ w' $\in$ $Dox_a(w)$: $Sim_{w'}(p) >_{a,w} Sim_{w'}(\neg p)$

Heim then suggests that this conditional semantics can be extended to other predicates such as *wish* and *be glad*. She argues, however, that there is an important difference between these predicates: in the case of the predicate *want* all the desirability comparisons should be entirely among worlds that the subject believes possible, contrary to predicates such as *wish* and *be glad*.

Heim thus proposes to further restrict the truth conditions of *want.* The truth conditions in (22) only require that all p-worlds that are maximally similar to w' be more desirable than all ¬ p-worlds maximally similar to w'. Nothing is said about whether these maximally similar worlds have to be doxastic alternatives or not. In the new proposal in (23), all desirability comparisons are entirely among the subject's belief worlds, because the argument of the similarity function Sim applies to a subset of the doxastic alternatives. The function Sim now returns the set of worlds that are an element of $Dox_a(w) \cap p$ and $Dox_a(w) \cap \neg p$ respectively and which resemble w no less than any other world.

(23) **Conditional semantics for *want***

$[\![want]\!](p)(a)(w) = 1$ iff

$\forall w' \in Dox_a(w)$: $Sim_{w'}(Dox_a(w) \cap p) >_{a,w} Sim_{w'}(Dox_a(w) \cap \neg p)$

It is exactly in this aspect that the predicate *want* differs from a predicate such as *wish.* This is best illustrated with an example.

(24) John wishes he taught on Tuesdays and Thursdays.

This sentence can only be judged to be true in a situation in which John believes that he doesn't teach on Tuesdays and Thursdays. Hence, the worlds compatible with his beliefs only include worlds in which he doesn't teach on Tuesdays and Thursdays. Thus, we cannot adopt the same truth conditions as for *want*. If all desirability comparisons are entirely among the subject's belief worlds, the set on the left hand side of the comparison relation will always be empty. Heim proposes that, for the verb *wish*, the proposition p is evaluated with respect to a revision of the worlds compatible with his beliefs, a set that will also include some p-worlds. Heim proposes that this revised set of worlds results from $Dox_a(w)$ by suspending some of the assumptions in $Dox_a(w)$, as in the revision of a context necessary for the interpretation of counterfactuals. The definition proposed in Heim (1992) is stated in a context change semantics and is not suitable for the semantics adopted here. I will assume here that the revision of the doxastic alternatives with respect to a proposition p, which I call $rev_p(Dox_a(w))$, contains all the worlds in $Dox_a(w)$ as well as all the p-worlds most similar to w.

We can now adopt the truth conditions of the predicate *wish* given in (25). Here, in the first argument of the ordering relation $>_{a,w}$, the function Sim applies to worlds that are included in the revision of the doxastic alternatives.

(25) **Conditional semantics for *wish***

$[\![wish]\!](p)(a)(w) = 1$ iff

$\forall w' \in Dox_a(w)$: $Sim_{w'}(rev_p(Dox_a(w)) \cap p) >_{a,w} Sim_{w'}(Dox_a(w) \cap \neg p)$

Heim (1992) furthermore extends her proposal to the predicate *be glad*.

(26) John is glad that he teaches on Tuesdays and Thursdays.

The sentence in (26) has the presupposition that John believes in the truth of the complement, i.e. John believes that he teaches on Tuesdays and Thursdays. In this case, John's doxastic alternatives do not include worlds in which he doesn't teach on Tuesdays and Thursdays. Hence, for the predicate *be glad,* it is in the second argument of the ordering relation $>_{a,w}$, that the function Sim applies to worlds that are included in a revision of the doxastic alternatives. Here, the revision of the doxastic alternatives contains all the worlds in $Dox_a(w)$, as well as all the ¬p-worlds most similar to w. A paraphrase for (26) is then 'John thinks that because he teaches on Tuesdays and Thursdays he is in a more desirable world than he would be if he didn't teach on Tuesdays and Thursdays.' (cf. Heim 1992, p.205 for a parallel example). The truth conditions of the predicate *be glad* are given in (27).

(27) **Conditional semantics for *be glad***

$[\![be\ glad]\!](p)(a)(w) = 1$

$\forall w' \in Dox_a(w)$: $Sim_{w'}(Dox_a(w) \cap p) >_{a,w} Sim_{w'}(rev_{\neg p}(Dox_a(w)) \cap \neg p)$

To summarize, in Heim (1992), predicates such as *wish, want* and *be glad* share their core semantics, a conditional semantics. They have the common feature that for each doxastic alternative, two sets of worlds are compared. The only difference between these predicates lies in whether the relevant sets of worlds are included in the

doxastic alternatives of the subject or rather in a revision of the doxastic alternatives of the subject.

3.3.2 A conditional semantics for predicates that select the subjunctive mood

After this brief presentation of Heim's semantics for desire predicates, we now return to the class of predicates that select the subjunctive mood in Spanish. The predicates discussed by Heim (1992) all select the subjunctive mood in Spanish. The conditional semantics adopted so far can straightforwardly be extended to other predicate classes that select the subjunctive mood in Spanish, such as directives, predicates of doubt, modals and other emotive factive predicates. This account naturally accommodates the fact that among the predicates that select the subjunctive mood we find factive as well as non-factive predicates. The semantic property shared by these predicates is that they establish a comparison. Whether this comparison is between worlds that are among the doxastic alternatives of the subject or not is irrelevant for mood selection.

A common property of the predicates that select the subjunctive mood thus seems to emerge: they introduce an ordering relation. It is important to observe that the ordering relation expressed by the predicate is not a relation of desirability for all predicates. For instance, predicates such as *sorprenderse* 'be surprised' and *dudar* 'doubt' rather require an ordering relation of *likelihood.* Also, a number of emotive factive predicates cannot be based on the notion of desirability such as *es interesante* ('it is interesting'), *es divertido* ('it is amusing'), etc. I will assume that the ordering relation is contributed by the lexical meaning of each predicate. This is reminiscent of what has been said about the meaning of gradable adjectives in the literature. The scalar approaches to the semantics of gradable adjectives argue that the meaning of a gradable adjective such as *tall* directly contributes the dimension of the scale involved (in the case of *tall* the dimension is height).[10] In section 3.4.2, I will discuss more in detail the different possible ordering relations involved for each predicate class.

Below, I present a first attempt at a generalization for the subjunctive mood in Spanish, as stated in (28).

(28) **Preliminary generalization for the subjunctive mood in Spanish**
A proposition p that is the complement of the matrix predicate requires the subjunctive mood iff the matrix predicate introduces an ordering relation between propositions and compares p to non-p.

To conclude, I have provided a first characterization of the contexts in which the subjunctive mood appears. In the following, I present two arguments that call for a revision of the semantics proposed in Heim (1992). This will lead to a revised generalization and ultimately to a new proposal for the semantics of the predicates that select the subjunctive mood in Spanish.

3.4 A new proposal: comparison of contextual alternatives

In this section, I propose to revise the semantics for the predicates that select the subjunctive mood in Spanish. First, I argue that their semantics involves comparison of the embedded proposition p with contextually available alternatives, rather than simply with ¬p. This argument is based on evidence from contexts that contain more than two alternatives. Second, I argue that, in the truth conditions, reference to the subject's beliefs can be replaced with the set of contextually available alternatives. I then develop a new analysis for these predicates and restate the generalization for the predicates selecting the subjunctive mood in Spanish.

3.4.1 When more than two contextual alternatives are available

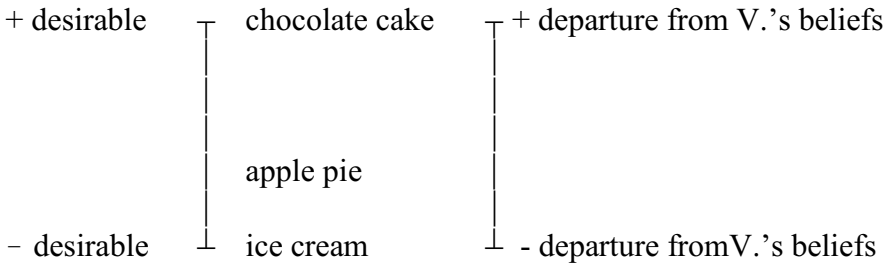
The central point to be made in this section is that the semantics of the predicates selecting the subjunctive mood requires comparison of contextual alternative propositions. In fact, the semantics adopted so far is based on a special case where the context only provides the alternatives p and ¬p. Contexts providing more than two alternatives illustrate this issue quite clearly. Consider the scenario in (29).

(29) Sofía has promised to bring a dessert to the picnic. There are three possibilities for what she may actually do. Sofía could bake a chocolate cake, she could buy an apple pie, or she could bring ice-cream. The worlds in which Sofía brings a

chocolate cake however require a very big departure from what is the case in Victoria's beliefs worlds. The worlds in which she brings an apple pie, require less a departure from what is the case in Victoria's belief worlds. Finally, the worlds in which she brings ice-cream are the closest to what is the case in Victoria's belief worlds, these require even less of a departure, if any at all. Victoria's preferences are the following: she prefers the chocolate cake to the apple pie, and the apple pie to the ice-cream.

The schematic figure in (30) represents the two scales involved in this scenario, desirability according to Victoria and distance with respect to the worlds compatible with Victoria's beliefs. That Sofía will bring the chocolate cake is the most desirable and most distant alternative; that she will bring the ice cream is the least desirable and closest alternative.

(30)



In this situation, the sentence in (31) is intuitively judged to be false.

(31) Victoria wishes Sofía would bring an apple pie.

Contrary to intuitions, Heim's conditional semantics for the verb *wish* predicts that this sentence should come out as true in this scenario. Under Heim's proposal, the sentence (31) is true iff for all worlds w' that are compatible with Victoria's beliefs, the worlds in which Sofía brings the apple pie are more desirable to Victoria than all the minimally different worlds in which she doesn't. This is true, since, in the given scenario, the closest worlds in which Sofía doesn't bring an apple pie are worlds in which she brings ice-cream. A conditional semantics thus does not make the correct predictions for this scenario.

Other predicates give rise to similar effects in contexts that make more than two alternatives available. Imagine that, in the continuation of the previous scenario, Sofía

does in fact bring the apple pie to the picnic. The sentence in (32) can then be true in that situation.

(32) Victoria is disappointed that Sofía brought an apple pie.

A conditional semantics for the predicate *be disappointed*, however, predicts (32) to be false in this scenario. Simplifying somewhat, I will assume that the only difference between the semantics of *be disappointed* and *be glad* is that the ordering relation of desirability is reversed. The truth conditions of *be disappointed* then predict that the worlds in which Sofía brought the apple pie are less desirable to Victoria than all the minimally different worlds in which she doesn't. This is false, since the closest worlds are all worlds in which she brings ice-cream. She considers these worlds as less desirable. Again, a conditional semantics does not make the correct predictions for a scenario as described above.

I conclude that the semantics of the predicates under discussion involves comparison of p with the set of its contextual alternatives rather than with just ¬p. I propose to adopt a new lexical entry for *want* as in (33). The difference with the previous lexical entry for *want* is that, here ¬p is replaced by the contextually given alternatives q.

(33) **Semantics of *want* based on comparison of alternatives**

$[\![want_C]\!]^g(p)(a)(w) = 1$ iff

$\forall\, q \in g(C)$: $Sim_{w'}(Dox_a(w) \cap p) >_{a,w} Sim_{w'}(Dox_a(w) \cap q)$

In the lexical entry in (33), the verb *want* carries an index C that stands for a variable anaphoric to a contextually determined set of propositions (it is an index of type <<s,t>,t>>). This variable receives its content from the variable assignment g. Variables of this kind have also been used before for similar purposes, such as for the domain of quantification of *only* in Rooth (1985, 1992) and the resource domain of adverbs of quantification in von Fintel (1994), as well as the contextual restriction of determiners in Westerståhl (1985) and many others.

To conclude, in this section, I have argued that comparison between p and ¬ p is a special case of comparison of p with its contextual alternatives. I now turn to one further revision of the semantics of these predicates.

3.4.2 Reference to the doxastic alternatives

In what follows, I argue that, in Heim's semantics for desire predicates, the desires of the subject are too tightly connected to his/her beliefs. I propose that reference to the doxastic alternatives should be replaced by the set of contextually relevant alternatives.

I present an example which shows that Heim's semantics predicts that for sentences containing desire predicates certain inferences should be possible, contrary to our intuitions. Imagine a situation in which my choices for my teaching schedule of the next semester depend on how much work I get done this semester. The conclusion in (34c) can nevertheless not be inferred.

(34) a) I want to teach Tuesdays and Thursdays next semester.
b) I believe that I will teach Tuesdays and Thursdays next semester if and only if I work hard now.

---

c) Invalid inference:
∴ I want to work hard now.

The conditional semantics for the predicate *want*, however, predicts that this inference should be valid. We will see later, in section 3.5.2.1, that the predicate *want* is in this respect different from the modal predicate *should*. For clarification, I repeat Heim's conditional semantics for the predicate *want.*

(35) **Conditional semantics for *want***

$[\![want]\!](p)(a)(w) = 1$ iff

$\forall w' \in Dox_a(w)$: $Sim_{w'}(Dox_a(w) \cap p) >_{a,w} Sim_{w'}(Dox_a(w) \cap \neg p)$

According to (35), from the truth of (34a) it follows that in $Dox_I(w)$ all the worlds in which I teach Tuesdays and Thursdays next semester are more desirable than maximally similar worlds in which I don't teach on Tuesdays and Thursdays next semester. From the truth of (34b) it follows that in $Dox_I(w)$ the worlds in which I teach Tuesdays and Thursdays next semester correspond exactly to those worlds in which I work hard this semester. Hence, from (34a) and (34b) it follows that in $Dox_I(w)$ all worlds in which I work hard this semester are more desirable than maximally similar worlds in which I don't work hard this semester. As a result, the inference is expected to be valid, and (34c) is expected to be true, contrary to what we observe.

The invalid inference illustrates that someone may believe that two propositions p and q are true in the exact same set of worlds, and at the same time want p without wanting q. Heim's semantics cannot capture this fact. As a consequence, I propose to eliminate the reference to the doxastic alternatives and simply replace it with the set of contextually relevant alternatives.

The proposal made in (33) can then be simplified accordingly, as in (36) along with a slight modification of the definition of $>_{\alpha,w}$:

(36) **Semantics of *want* based on comparison of alternatives**

$[\![want_C]\!]^g(p)(a)(w) = 1$ iff

$\forall q: q \neq p \ \& \ q \in g(C): p >_{DES\alpha,w} q$

where $>_{DES\alpha,w}$ is defined as follows

a) For any w, w', w'' $\in$ W, w' $>_{\alpha,w}$ w'' iff w' is more desirable to α in w than w''.

b) For any p$\subseteq$W, q$\subseteq$W, p $>_{DES\ \alpha,w}$ q iff $\forall$ w'' $\in$ q $\exists$ w'$\in$ p such that w'$>_{\alpha,w}$ w'', and it is not the case that $\forall$ w' $\in$ p $\exists$ w''$\in$ q such that w''$>_{\alpha,w}$ w'.

In (36), I propose to use the definition of 'better possibility' adopted in Kratzer (1991), since the ordering relation defined in Heim (1992) is not suitable for comparative desirability among propositions. This is so, since Heim's definition makes a requirement that is too strong. If we were to apply it to propositions we would run into the following problem. If p is more desirable than q, the definition requires that all worlds in p be more desirable than all worlds in q. However, some worlds in p may be

really bad worlds for other reasons, and may still not necessarily affect the desirability relation between p and q. Kratzer's definition of 'better possibility' solves this problem. According to this definition, p is more desirable than q, if for all worlds w'' in q there is at least one world w' in p that is more desirable than w'', and if it is not the case that for all worlds w' in p there is a more desirable world w'' in q (cf. Kratzer 1991, p. 644).

With the semantics proposed in (36), no inference is expected. The new semantics predicts that 'I teach Tuesdays and Thursdays' is more desirable than its contextually relevant alternatives (for example 'I teach Mondays, Wednesdays and Fridays'). However, from the fact that 'I teach Tuesdays and Thursdays next semester' and 'I work hard this semester' are true in the exact same set of worlds it does not follow that 'I want to work hard this semester'. This is so, since in both cases we are comparing a different set of alternatives. For example, the set of alternatives for 'I work had this semester' may be {'I don't work this semester', 'I work a little this semester'}. As a consequence, no inference is expected.

With the semantics proposed here, however, two new problems arise. First, we cannot account anymore for the fact that the subject's beliefs do sometimes play a role in determining the truth conditions of a *want*-sentence. Take the example in (37).

(37) John doesn't have to teach at all next semester but he thinks he does and he wants to teach Tuesdays and Thursdays.

In this sentence, the alternative "John doesn't teach at all next semester" is provided in the context, however, it cannot be part of the set of alternatives that is relevant for the comparison. If this were so, we would not predict the correct truth conditions. Hence, the subject's beliefs do play a role in determining which alternatives enter the comparison.

A second problem is that we cannot express the difference between *want*, *wish* and *be glad* anymore. As we saw before, these predicates precisely differ in terms of whether the subject believes that the proposition expressed by the complement clause is true or not. As a consequence, I propose to distinguish these predicates in terms of their definedness conditions.

Below, I adopt a semantics in which the predicate *want* has a definedness condition which requires that all contextual alternatives be included in the doxastic alternatives.

(38) **Semantics of *want* based on comparison of alternatives**

$[\![want_C]\!]^g(p)(a)(w)$ is defined iff $\forall q \in g(C)$: $Dox_a(w) \cap q \neq \varnothing$

if defined $[\![want_C]\!]^g(p)(a)(w) = 1$ iff

$\forall q$: $q \neq p$ & $q \in g(C)$: $p >_{DES\alpha,w} q$

Let me show that this new proposal still does not predict the practical inference discussed earlier to be valid. I repeat the practical inference here.

(39) a) I want to teach Tuesdays and Thursdays next semester.

b) I believe that I will teach Tuesdays and Thursdays next semester if and only if I work hard now.

---

c) Invalid inference:

∴ I want to work hard now.

According to (38), from the truth of (39a) it follows that 'I teach Tuesdays and Thursdays next semester' is more desirable to me than its contextual alternatives, for example 'I teach Mondays, Wednesdays and Fridays next semester'. From the truth of (39b) it follows that in $Dox_I(w)$ the worlds in which I teach Tuesdays and Thursdays next semester correspond exactly to those worlds in which I work hard this semester. From this, however, it does not follow that (39c) is true. (39c) says that 'I work hard now' is more desirable than its contextual alternatives, for instance {'I don't work at all', 'I work a little'}. Even if the propositions 'I teach Tuesdays and Thursdays next semester' and 'I work hard now' are true in the same set of worlds, their contextual alternatives are not necessarily the same.

I propose that the predicates *wish* and *be glad* will then have slightly different definedness conditions. The fact that the predicate *wish* requires that the proposition p should not be included in the subject's doxastic alternatives, whereas the predicate *be*

glad requires that the proposition p necessarily be true in the subject's doxastic alternatives can now be expressed in their definedness conditions.

(40) **Semantics of *wish* based on comparison of alternatives**

$[\![wish_C]\!]^g(p)(a)(w)$ is defined iff $p \cap Dox_a(w) = \varnothing$

If defined $[\![wish_C]\!]^g(p)(a)(w) = 1$ iff

$\forall q: q \neq p \ \& \ q \in g(C): p >_{DES\alpha,w} q$

(41) **Semantics of *be glad* based on comparison of alternatives**

$[\![be\ glad_C]\!]^g(p)(a)(w)$ is defined iff $Dox_a(w) \subseteq p$

If defined $[\![be\ glad_C]\!]^g(p)(a)(w) = 1$ iff

$\forall q: q \neq p \ \& \ q \in g(C): p >_{DES\alpha,w} q$

The lexical entries provided here are certainly a simplification, given that the precise definedness conditions of these predicates are a rather complex matter. Since my main aim is to show that these different predicates share a core semantics, I will not go into further discussion of the details of these definedness conditions here, but adopt a simplified semantics that is sufficient for the argumentation developed here.

I thus propose that the semantics based on comparison of contextual alternatives can be extended to all predicates that select the subjunctive mood in Spanish. I propose the following generalization for the subjunctive mood in Spanish complement clauses.

(42) **New generalization for the subjunctive mood in Spanish**

A proposition p that is the complement of the matrix predicate requires the subjunctive mood iff the matrix predicate introduces an ordering relation between propositions and compares p to its contextually available alternatives.

As noted previously, the dimension of the ordering relation may differ from predicate to predicate and should be contributed by the lexical meaning of the predicate. Desire predicates such as *querer* ('want'), *esperar* ('hope') and *preferir* ('prefer') contribute an ordering relation of *desirability.* For the class of emotive factive predicates there is more variation in terms of what dimension is contributed. Many emotive factive predicates contribute a relation of *desirability*, such as *alegrarse* ('be

glad'), *agradar* ('be pleased') and *estar contento* ('be happy'), or a reverse relation of *desirability,* such as *lamentarse* ('regret'), *enfadarse* ('be upset), or *disgustarse* ('dislike'). However, a number of other emotive factive predicates cannot be based on the notion of desirability such as *es interesante* ('it is interesting'), *es divertido* ('it is amusing'), *es aburrido* ('it is boring'), *es útil* ('it is useful'), *es natural* ('it is natural'), *es fascinante* ('it is fascinating') etc. I will assume that the ordering relation is contributed by the lexical meaning of each predicate. Just like in the scalar approaches to the semantics of gradable adjectives, I will propose that gradable predicates directly contribute the dimension of the scale involved. Predicates of doubt such as *dudar* ('doubt') introduce a reverse ordering relation of *likelihood.* Similarly, predicates such as *probable* ('likely') and *improbable* ('unlikely) also contribute an ordering relation of *likelihood* (in the case of *improbable* it is a reverse relation of likelihood).

In the case of causatives such as *hacer* ('make') and *lograr* ('achieve'), I will assume that the relevant comparison relation is one of *comparative similarity.* Causatives are usually analyzed with the semantics of counterfactual conditionals. In Lewis (1973), it is proposed that, in a counterfactual, all worlds in which the antecedent is true are ordered with respect to their similarity to the actual world. For a causative predicate this means that, all worlds in which the embedded proposition is true will be compared to the actual world with respect to their similarity. Contrary to the other predicate classes, here the relevant comparison is embedded more deeply within the meaning of the predicate. Predicates such as *hacer* ('make') and *lograr* ('achieve') contain the predicate *cause* as part of their meaning. Even though I will not go into the details of a semantics of causatives here, we can assume that they share with the other predicates that select the subjunctive mood the fact that they contribute an ordering relation.

In certain cases, the ordering relation may also be introduced by the context rather than by the predicate itself. This is the case for modals such as *necesario* ('necessary') and *posible* ('possible'), as well as for directive predicates such as *autorizar* ('authorize'), *exigir* ('request'), *obligar* ('oblige') and *ordenar* ('order'). This is so, since for these predicates, the criterion that determines what is the best alternative may vary from context to context. *Desirability* is not always the relevant ordering relation. In Kratzer (1977,1981,1999) modals are interpreted with respect to a contextually provided ordering source. This ordering source is a set of propositions. In

my proposal, it is the dimension of the ordering relation that is provided contextually. The idea that the dimension of the ordering relation may be provided in the context has already been proposed in Sloman (1970). He in fact already proposes an analysis equivalent to mine for sentences containing the predicate *ought*. In order to capture their various possible interpretations (modal *can, must* and directive interpretation), he develops an analysis in which alternatives are compared with respect to a contextually determined ordering relation. He proposes that the interpretation of *It ought to be the case that p* should be 'p is, or is a necessary condition for the best, relative to the basis B, of the possibilities in the class Z.' (Sloman 1970, p. 389). B here stands for basis of comparison (dimension of the ordering relation), which is contextually given when not specified explicitly. Z stands for the comparison class. Sloman claims that possible different meanings of *ought* fall out of differences in basis of comparison as well as differences in comparison class.

Finally, I will not go into the discussion of the various ways in which the relevant set of alternatives may be contextually restricted, because mood selection is not sensitive to this issue. As mentioned earlier, the crucial feature shared by the predicates that select the subjunctive mood is that they *compare* alternative propositions.Whether these alternatives are possible or impossible alternatives is irrelevant for mood selection. See Sloman (1970) for a discussion of the various ways in which the comparison class may be restricted in the case of the predicate *ought*. He proposes that the comparison class is rarely made explicit, since it can often be inferred from the context of discussion. It may be any arbitrary collection of propositions, but it may also just contain two propositions p and not-p. He suggests that the most common type of comparison class is one which contains propositions expressing possible developments of some particular situation.

To conclude, in this section, I have made a new proposal for the semantics of the predicates that select the subjunctive mood in Spanish. By revising Heim's (1992) proposal for desire predicates**,** I have developed a semantics of comparison for these predicates. The new semantics involves comparison of contextual alternatives to the proposition expressed by the complement clause.

3.4.3 Mood and polarity

The generalization proposed in the previous section is closely related to one of the generalizations that have been made for negative polarity items. In a number of proposals (cf. Fauconnier1975, 1979,1980, Horn 2000, Krifka 1992, 1995, Lahiri 1998, Lee & Horn 1994, Israel 1996, and others), negative polarity items such as *any N* have been claimed to appear in scalar contexts in which they are compared to their alternatives.

For example, Krifka (1992,1995) proposes that the NPIs themselves introduce alternatives into the semantics. These alternatives induce an ordering relation of semantic strength. In Krifka (1995), semantic strength '$\subseteq$'is defined in the following way.

(43) a. If α, β are of type t, the $\alpha \subseteq \beta$ iff $\alpha \rightarrow \beta$

b. If α, β are of type $<\sigma, t>$, then $\alpha \subseteq \beta$ iff for all γ of type σ: $\alpha(\gamma) \subseteq \beta(\gamma)$

(Krifka 1995, p. 219)

When $\alpha \subseteq \beta$, we also say that α is *stronger* than β. The NPI *anything* introduces the set of alternative properties that are stronger than the most general property 'thing'. This set contains every property that is more specific than 'thing'. *Anything* thus corresponds to the lowest endpoint on the scale of strength.

In Horn (2000), Lahiri (1998), Lee & Horn (1994) it is claimed that NPIs such as *any N* are indefinites that incorporate the meaning of *even* in them. They argue that given that *even* presupposes the existence of a pragmatic likelihood scale associated with the sentence, *any N* denotes an 'end of scale'- indefinite. Lahiri (1998) proposes that for an NPI such as *any* the contrasting set is any set of pragmatically identifiable properties that is a proper subset of *thing*.

In these approaches, the ordering is introduced with the NPI. In Krifka (1995) as well as in Lahiri (1998), an NPI denotes a set of properties that are ordered with respect to semantic strength. One important difference with my approach to the subjunctive mood is that, in my proposal, the ordering of the alternatives is introduced by the predicate rather than by the subjunctive clause itself.

The generalization that both NPIs and subjunctive clauses appear in scalar contexts is a welcome result, given that their strikingly similar distribution is well-known (cf. Giannakidou 1997, Nathan & Epro 1984). There is however one important difference between the distribution of NPIs and subjunctive clauses. Among the predicates that select the subjunctive mood in Spanish only a subset allow NPIs in their complement clause. As is well known since Fauconnier (1975, 1979, 1980), NPIs appear in contexts that can be characterized as scale reversing. Predicates that create scale reversing contexts and allow for NPIs in their complement clause are for example *sorprenderse* ('be surprised'), *lamentarse* ('regret'), *temer* ('fear'), etc. Thus, we can conclude that, while NPIs only appear in contexts in which scales are reversed, the subjunctive mood appears in both reversing and non-reversing scalar contexts.

3.5 Comparing the proposal to other approaches

In this section, I will compare my proposal to other existing proposals on the semantics of propositional attitude predicates.

Propositional attitude predicates have received a lot of interest in the semantic and philosophical literature independently of the issues of mood selection. Since Hintikka (1962, 1969), predicates such as *believe*, *know* and *want* have commonly been analyzed with a semantics of possible worlds, more specifically with a semantics of modal necessity: α *believes/knows/wants* ϕ is true in w iff ϕ is true in *all* the worlds that are compatible with α's beliefs/knowledge/desires in w. The question then is to what extent a Hintikka-style semantics could be extended to all kinds of propositional attitudes.[11] In a similar vein, recent approaches have proposed that propositional attitudes should be modeled after the semantics of modal expressions involving a semantics of *necessity* and *possibility* (cf., for example Kiefer 1987, von Fintel 1999, Giorgi and Piannesi 1997).

In this section, I explicitly compare my proposal to these approaches. As we have already seen in section 3.4, a Hintikka-style semantics has its problems when extended to desire predicates. I will show here that there are a number of characteristics of the predicates that select the subjunctive mood that are difficult to account for in this type of approach. We will see that, on the contrary, these characteristics follow straightforwardly from the proposal that I have adopted here.

I now turn to making explicit how the meaning common to the predicates that select the subjunctive mood can be expressed with a semantics of *modal necessity* or *modal possibility*, following von Fintel(1999). Since he makes use of the semantics proposed in Kratzer (1997, 1981, 1999) to capture the meaning properties of predicates such as *want, wish, be glad* and *be sorry,* I first present a brief overview of Kratzer's theory of modality.

3.5.1 A semantics of modal necessity/possibility

Kratzer (1977, 1981, 1991) develops a semantics in which modal expressions receive meanings that are dependent on two contextual parameters, a modal base and an ordering source. These two parameters are determined by two conversational backgrounds.

Kratzer points out that there are many different kinds of conversational backgrounds. A conversational background is the kind of entity denoted by expressions such as *what the law provides, what we know*, *what is normal, what is rational, what is desirable,* etc. What the law provides in a world is a set of propositions p such that the law provides that p in that world. The denotation of *what the law provides* is then the function that assigns to every possible world this set of propositions p. More generally, a conversational background is a function f which assigns sets of propositions to possible worlds.

The modal base is defined as a set of worlds determined by a conversational background f. The set of worlds in which all propositions of f(w) are true constitutes the modal base in w. The modal base thus determines the set of worlds accessible from each world.

The ordering source is a second conversational background g which assigns to every possible world a set of propositions. Ordering sources represent ideals, given that they can induce an ordering on the modal base (the worlds in the modal base may be closer or further away from *what the law provides*, *what is desirable, what is normal,* etc.).

More generally, a set of propositions A can induce an ordering $\leq_A$ on a set of worlds W in the following way (following Lewis 1981).

(44) The ordering $\leq_A$:

$\forall$ w , w' $\in$ W: w $\leq_A$ w' iff {p: p$\in$ A and w'$\in$ p} $\subseteq$ {p: p$\in$ A and w$\in$ p}

'A world w is at least as close to the ideal represented by A as a world w' iff all propositions of A which are true in w' are true in w as well.'

Thus, in (44), worlds are ordered with the help of an unordered set of propositions. A world w is at least as close to the ideal represented by A as a world w' iff it makes at least as many propositions true as w' does.

Sentences containing modals are then evaluated with respect to an ordered set of worlds. The ordering source is usually not expressed explicitly in the sentence but has to be recovered from the context. Consider the following example in (45).

(45) Sofía should bring a chocolate cake.

In the context of the scenario discussed previously in section 3.3.1, the modal base of this sentence is formed by the set of worlds that constitute Victoria's beliefs. The ordering source is bouletic and corresponds to the set of propositions determined by Victoria's desires. This set of propositions induces an ordering on the set of the modal base. The modal force of the modal *should* is *necessity.* The meaning of (45) can then be paraphrased as in (46).

(46) In view of what Victoria desires, it is necessary for Sofía to bring a chocolate cake.

We now turn to the implementation of a semantics based on *modal necessity* for predicates that select the subjunctive mood.

Giorgi and Pianesi (1997) propose that the contexts in which the subjunctive mood appear can be characterized with the semantics that Kratzer proposes for modal expressions. The generalization they propose is that in certain Romance languages such as Spanish and French, the subjunctive mood is selected when the context requires the interaction between a modal base and a non-null ordering source. This generalization still does not tell us what exactly the semantics should be for the predicates that select the subjunctive mood. Giorgi and Pianesi do not explicitly formalize a proposal for the

semantics of these predicates, but only illustrate the kind of semantics they want to use with the modal *must.* I will thus follow here instead von Fintel (1999), who proposes to adopt a semantics of *modal necessity* for propositional attitude predicates such as *want*, *wish*, *be glad* and *be sorry.*

Von Fintel's (1999) reasons for using a semantics of *modal necessity* are independent of the issue of mood selection in Romance languages. One major goal of his analysis is to capture the fact that predicates such as *want* and *be glad* do not allow NPIs in their context, while predicates such as *regret* and *surprise* do. To account for that, he argues that we need a semantics that makes the former upward entailing and the latter downward entailing. He points out that Heim's (1992) semantics for propositional attitudes cannot be used to capture these facts, since it is a non-monotonic analysis. A predicate such as *want* does not turn out to be upward monotonic in her analysis. Von Fintel (1999) instead proposes to adopt a Kratzer-style semantics expressing *modal necessity*. He defines the following concepts.

(47) (i) The 'modal base function' f is a function from pairs of an individual and a world to a set of worlds.
(ii) The 'ordering source function' is a function from pairs of an individual and a world to a set of propositions (in the case of *want* to a set of propositions forming the subject's preferences).
(von Fintel 1999, p.115)

Here, the subject's preferences form an unordered set of propositions that induce an ordering on the modal base. The best worlds are those that make most propositions true.This is stated in the following definition.

(48) For any set of propositions P, we define a strict partial order $<_p$:
$\forall w', w'': (w' <_p w'' \text{ iff } \forall p \in P\ (w'' \in p \rightarrow w' \in p) \ \&\ \exists p \in P\ (w' \in p\ \&\ w'' \notin p))$
(Von Fintel 1999, p. 115)

Von Fintel proposes to use the selection function max_p that selects the best worlds in any set X with respect to a partial order $<_p$, as defined in (49).

(49) For a given strict partial order $<_P$ on worlds, define the selection function max_P that selects the set of $<_P$-best worlds from any set X:
$\forall x \subseteq W: max_P(X) = \{w \in X: \neg\exists w' \in X : w' <_P w\}$
(von Fintel 1999, p.116)

The semantics of the verb *want* can then be stated as in (50), as proposed in von Fintel (1999).[12] The proposition is here evaluated in those worlds in the modal base f(α,w) that maximally satisfy the preferences given by the ordering source g(α,w). Thus, the ordering source is used to induce an ordering on the worlds in the modal base.

(50) **Semantics of modal necessity for *want***
$[\![want]\!]^{f,g}(p)(\alpha)(w) = \text{true}$ iff $\forall w' \in max_{g(\alpha,w)}(f(\alpha,w)) : w' \in p$.

'Among the worlds f(α,w), the ones that maximally correspond to α's preferences in w are all *p*-worlds' (von Fintel 1999, p.115)

Von Fintel proposes that the verb *want* requires the modal base f to be formed by the worlds that are compatible with the subject's beliefs. The ordering source g is formed by the set of the subject's desires. In other words, in (50), α *wants* ϕ is true in w iff among the worlds compatible with α's beliefs, the ones that maximally correspond to α's desires in w are all ϕ-worlds.

Thus, this semantics is identical to the semantics of the predicate *should*. The only difference is that, in the case of the modal *should* the ordering source is contextually determined, while in the lexical entry provided here for *want* the ordering source is explicitly introduced by the verb.

Such a semantics can easily be extended to the other propositional attitude predicates that select the subjunctive mood in Spanish. There are two types of parameters of variation that we expect. First, the modal base should differ from predicate to predicate: predicates such as *wish* and *be glad* require a modal base formed by the set of *revised* doxastic alternatives. Second, the ordering source also varies from predicate to predicate. For example, for predicates such as *want* and *wish* the ordering is determined by the desires of the subject, while for predicates such as *be surprised* and *doubt* the ordering is determined by what the subject considers likely.

Von Fintel's proposal is modeled after the semantics of modals that express necessity, such as *must* and *should*. In (50), it is required that the proposition expressed by the complement clause be necessarily true in *all* the worlds that maximally correspond to α's desires (the worlds selected by the function max_p). Let us now consider the option that some of the predicates under discussion may also be modeled after the semantics of modals that express possibility, such as *may* and *could.*

Kiefer (1987) proposes that the semantics of different kinds of propositional attitudes involves both *modal necessity* and *modal possibility*. One may then adopt the view that different propositional attitude predicates may encode different kinds of *modal strength.*

To adopt *modal possibility* for the semantics of a predicate, only a few simple modifications from the previous proposal are necessary. Following Kratzer (1991), a proposition p is a *possibility* in a world w with respect to a modal base f and an ordering source g iff ¬p is not a necessity in w with respect to f and g. (Kratzer 1991, p. 644). Hence, instead of requiring that the proposition p be true in all worlds selected by the max-function (the worlds that maximally correspond to the subject's preferences), we require that there is a world among those selected by the max-function such that p is true in that world.

I propose to illustrate this kind of semantics with the predicate *be disappointed,* for which I provide a lexical entry below.

(51) **Semantics of modal possibility for *be disappointed***

$[\![\textit{be disappointed}]\!]^{f,g}(p)(\alpha)(w) = \text{True iff } \exists\ w' \in \max_{g(\alpha,w)}(f(\alpha,w)) : w' \in p.$

In the case of the predicate *be disappointed*, the ordering source g is determined by what is considered undesirable by α in w. The modal base f is the set of worlds compatible with α's revised beliefs. (51) then says that α *is disappointed that p in w* is true iff among the worlds f(α,w) compatible with α's revised beliefs, there is a world w' in the set of worlds that maximally correspond to what α considers undesirable in w such that p is true in that world w'. For a predicate such as *be disappointed*, there are indeed situations in which α *is disappointed that p in w* is true even if p is not true in all worlds that maximally correspond to what α considers undesirable in w.[13]

To conclude, in this section I have presented a semantics for the predicates that select the subjunctive mood based on modal necessity and modal possibility that is identical to the semantics commonly adopted for the modals *must* and *can*. In the following, I investigate a few characteristics of the predicates that select the subjunctive mood in Spanish that present difficulties to such an approach. I will argue that my proposal based on comparison of contextual alternative propositions can accommodate these characteristics in a more straightforward way.

3.5.2 Comparing the predictions

In this section, I argue that there are some empirical differences between a semantics for the predicates selecting the subjunctive mood that is modeled after modal necessity/possibility and the semantics of comparison that I developed in section 3.3. In the following, I present several facts related to practical inferences, possible rankings of the alternatives, lack of entailment relations, and association with focus phenomena. I discuss the predictions of the different proposals concerning these phenomena. We will see that these phenomena can be straightforwardly accommodated within the semantics of comparison developed here.

3.5.2.1 Practical Inferences

With the help of practical inferences, I will argue that a semantics of modal necessity or possibility cannot straightforwardly capture an important property of the predicates that select the subjunctive mood.

Von Wright (1963) discusses a certain type of inference pattern that he calls 'practical inference'. I illustrate it here with one of his examples.

(52) a) *A* wants to make the hut habitable.
b) Unless *A* heats the hut, it will not become habitable.

---

c) ∴ (Therefore) A must heat the hut.
(Von Wright 1963, p.162)

In a practical inference, the first premise is a *want* statement. Von Wright calls what is wanted by the agent an 'end'. The second premise expresses a means to the end which is mentioned in the first premise. Of the conclusion, von Wright says that "it expresses a *practical necessity* namely the practical necessity of using the means mentioned in the second premise to attain the end mentioned in the first premise."(Von Wright 1963, p. 161).

Below, I present an example that shows that, in the conclusion of certain practical inferences, we cannot replace the modal verb (which expresses *necessity*) with the predicate *want*. Under the assumption that both predicates are analyzed with a semantics of modal necessity (i.e. that they essentially have the same semantics), we however expect that this should be possible. From the two premisses a) and b) we can infer c). Yet, we cannot infer d).

(53) a) Marcela wants to go to the picnic.
b) Marcela believes that she can only go to the picnic if she works extra hours.

---

c) ∴ Marcela should work extra hours.
d) Invalid inference:
∴ Marcela wants to work extra hours.

I now show that under the assumption that *want* receives a semantics of modal necessity, we predict that d) should be a valid inference, just like c). I repeat here von Fintel's proposal for the semantics of *want* discussed earlier.

(54) **Semantics of modal necessity for *want***
$[\![want]\!]^{f,g}(p)(\alpha)(w) = \text{True}$ iff $\forall w' \in \max_{g(\alpha,w)}(f(\alpha,w)) : w' \in p$.
'Among the worlds f(α,w), the ones that maximally correspond to α's preferences in w are all *p*-worlds' (von Fintel 1999, p.115)

By using the semantics for *want* as stated in (54), we predict the following for the example (53). From a) it follows that among the worlds compatible with Marcela's beliefs, the ones that maximally correspond to her desires in w are all worlds in which she goes to the picnic. From b) it follows that Marcela believes that all worlds in which

she goes to the picnic are worlds in which she works extra hours. We can thus infer that among the worlds compatible with Marcela's beliefs the ones that maximally correspond to her desires in w are all worlds in which she works extra hours, and we expect d) to be true. (54) thus predicts that d) should be a possible inference from a) and b), contrary to what is observed.

Among the predicates that select the subjunctive mood, there are a number of predicates that do not allow for such practical inferences, such are *preferir* (prefer), *temer* ('fear'), *esperar* ('hope'), *alegrarse* ('be glad'), *lamentarse* ('regret'), *sugerir* ('suggest'), *recomendar* ('advise'), *sorprenderse* ('be surprised') and *dudar* ('doubt').

A possible response to the argument may be that it only shows that the predicate *want* should not receive an identical semantics to the modal predicate *should*. In particular, it may be the case that the predicate *want* in fact requires a modal *strength* that is different from necessity. However, there are predicates that clearly require a semantics of necessity, such as for example *prefer,* that do not allow for practical inferences either. The predicate *prefer* requires that p be true in all worlds that match the subject's desires best. That the predicate *prefer* does not allow for practical inferences can be illustrated here.

(55) a) Marcela prefers to go to the picnic tommorrow (rather than to go to the office).
b) Marcela believes that she can only go to the picnic tommorrow if she works extra hours tonight.

---

c) ∴ Marcela should work extra hours tonight
d) Invalid inference:
∴ Marcela prefers to work extra hours tonight (rather than to go home).

Hence, we can observe that even some predicates that, in principle, should express necessity and thus receive the same kind of semantics as the modal *should* do not allow for practical inferences. We can then conclude that this kind of semantics cannot capture appropriately this characteristic of the predicates under discussion.

The proposal based on a semantics of comparison, on the contrary, does not predict that (55d) should be a valid inference. Below, the lexical entry for the predicate *prefer* is given.

(56) **Semantics based on comparison of contextual alternatives for *prefer***

$[\![prefer_C]\!]^g(p)(a)(w) = 1$ iff

$\forall q: q \neq p \ \& \ q \in g(C): p >_{DES\alpha,w} q$

Importantly, under this semantics, for (55a) and (55d) the set of relevant alternatives is not the same. For example, for (55a) this set could be {Marcela goes to the picnic, Marcela goes to the office, Marcela stays at home}, while for (55d) it could be {Marcela works extra hours, Marcela goes home and doesn't work extra hours.}. Thus, no valid inference is expected.

To conclude, practical inferences provide an argument against a semantics of modal necessity. To the contrary, a semantics based on comparison of contextual alternatives captures the phenomenon in a straightforward way.

3.5.2.2 Lack of entailment relations

An interesting characteristic of the predicates under discussion is that entailment relations between propositions do not survive when these propositions are embedded under the predicates, as has been previously observed in Katz (1991), Klein (1975), Kadmon and Landman (1993), Lee & Horn (1994), Linebarger (1987) von Fintel (1999), and others. Thus, when a proposition *p* entails a proposition *q*, this does not necessarily have the consequences that α *is glad that p* entails that α *is glad that q*.

The fact that entailment relations between propositions do not survive in this context is problematic for a semantics based on modal necessity. This can be shown with an example discussed in Kadmon & Landman (1993) and von Fintel (1999).

(57) He bought a Honda.

(58) He bought a car.

(59) I am glad he bought a Honda.

(60) I am glad he bought a car.

The proposition in (57) entails the proposition in (58), given that all the worlds in which he bought a Honda are worlds in which he bought a car. Nevertheless, when these propositions are embedded under the predicate *be glad*, we do not find an entailment relation: the proposition in (59) does not entail the proposition in (60). This is so, since all the worlds in which I am glad that he bought a Honda are not necessarily worlds in which I am glad that he bought a car. The sentence in (59) can very well be true in a situation in which I am not glad at all that he bought a car. I may in fact be upset about it and think that for environmental reasons it would have been much better for him to buy a bike. But given that he has bought a car, I am glad that he bought a Honda rather than another car. Maybe the Honda is not as polluting a choice as the other options would have been.

To show that a semantics of modal necessity cannot capture this lack of entailment relations, I repeat here the corresponding lexical entry for the predicate *be glad*.

(61) **Semantics of modal necessity for *be glad***

$[\![\textit{be glad}]\!]^{f,g}(p)(\alpha)(w) = \text{True}$ iff $\forall w' \in \max_{g(\alpha,w)}(f(\alpha,w)) : w' \in p$.

In the lexical entry for *be glad*, f stands for a modal base that contains all the worlds that are compatible with the subject's revised beliefs and g stands for an ordering source that is determined by the subject's desires. For the sentence pair in (59) and (60) then the following holds. If the sentence in (59) is true, we predict that among the worlds compatible with my revised beliefs, the ones that maximally correspond to my preferences in w are all worlds in which he bought a Honda. All the worlds in which he bought a Honda are also worlds in which he bought a car. Hence, we can conclude that among the worlds compatible with my revised beliefs, the ones that maximally correspond to my preferences in w are all worlds in which he bought a car. Thus, with the semantics in (61), whenever the sentence in (59) is true, the sentence in (60) is true as well. As a consequence, a semantics of modal necessity cannot capture the lack of entailment relations.[14]

The problematic aspect of a semantics based on modal necessity is that it requires to verify whether p is true in all the worlds that best fit α's desires. If in all those worlds it is true that he bought a Honda, automatically it is also true that in all

those worlds he bought a car. However, we have seen that the entailment does not necessarily hold: if I am glad that he bought a Honda it does not necessarily hold that I am also glad that he bought a car.

To remedy this problem, Kadmon and Landman (1993) suggest that for predicates such as *be glad* there is another contextually interpreted modal parameter involved, a so-called perspective. The perspective enters into the semantics of these predicates and affects the truth conditions of sentences containing it. This would explain why it is possible for me to be glad that he bought a Honda (because a Honda is a better choice than other cars), and at the same time not be glad that he bought a Honda (because I have something against buying cars), without contradicting myself. Kadmon and Landman (1993) claim that entailment relations are maintained unless the perspective changes. However, they do not present an explicit proposal as to how this perspective is to be incorporated into a semantics of predicates such as *be glad.* We will see that the proposal that I have developed here provides us with the means to make this notion more explicit. Under my proposal, a change in perspective simply corresponds to a change in the set of alternative propositions.

Von Fintel (1999) suggests that a semantics of modal necessity can still be maintained. He proposes that, for the two examples (59) and (60), there is a shift in which worlds are being considered, because they assume different contexts. For the example (59), only worlds in which he bought a car are compared. For different sentences, the modal base then would not always be the same, rather it would be contextually determined. Under this assumption, we do not expect there to be an entailment relation between the two sentences. He thus proposes that the phenomenon under discussion is explained by the fact that there may be a contextually signaled narrowing of the modal base relevant for the interpretation of the predicate. A semantics of modal necessity can thus be amended to capture the fact if we allow the modal base to change with the context.

One of my main goals has exactly been to show this last point, namely, that for different examples, different contextual alternatives are relevant. At the core of my proposal is the idea that contextual alternatives are an important ingredient of the semantics of these predicates. By employing a semantics of comparison of contextual alternatives for the predicate *be glad* we do not expect that an entailment relation should hold between the two examples (62) and (63), repeated from before.

(62) I am glad he bought a Honda.

(63) I am glad he bought a car.

In my proposal, no entailment relation is expected, since the set of contextual alternatives differs for both examples. In the example in (62), the set of alternatives could be {He bought a Honda, He bought a Toyota, He bought a Mercedes}, while in the example in (63), this set could be {He bought a car, He bought a bike, He didn't buy anything}. Thus, we do not expect that (62) entails (63).

Kadmon and Landman's notion of perspective can then be characterized with the help of the set of alternatives. A change in perspective corresponds to a change of the set of alternatives. Similarly, a change in the modal base in von Fintel's account, corresponds to a change in the set of alternatives.

There is another interesting kind of example presented in Klein (1975). Klein discusses predicates such as *be surprised*, *be annoyed, be glad, it is amazing, doubt, resent, be strange, be tragic* and shows that entailment relations of propositions do not survive when they are embedded under these predicates. One of the examples that he presents is the following.

Assuming that Maria belongs to the domain of the quantifier 'everyone', the example in (64) entails the example in (65).

(64) Everyone was late for the party.

(65) Maria was late for the party.

However, when these two propositions are embedded under the predicate *be glad* the entailment relation does not hold any more: (66) does not entail (67).

(66) I am glad that everyone was late for the party.

(67) I am glad that Maria was late for the party.

I may be glad that everyone was late for the party (because this may have given me more time to finish the preparations), and at the same time I may be upset about Maria being late for the party (since she promised to help with the preparations). Can this kind of example be explained within the semantics of modal necessity by

narrowing down the modal base because of shifting contexts, as suggested by von Fintel for the Honda-examples? To explain the absence of entailment relations, in the Honda-examples the modal base was reduced so as to only contain worlds in which he bought a car. Here, we would have to assume that in (66), the modal base does not contain worlds in which Maria was late to the party. Possibly, this could be induced by focus on *everyone*.

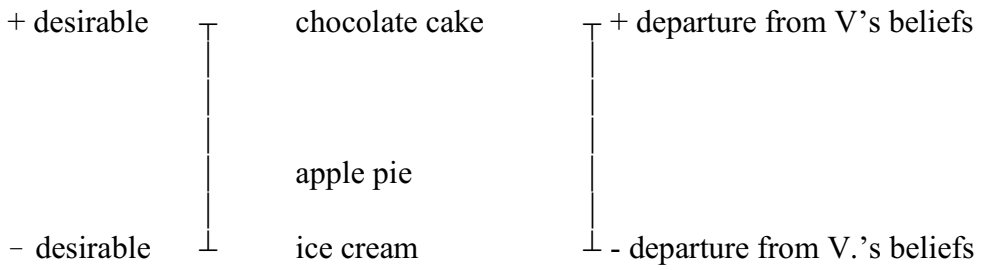
A semantics based on comparison of contextual alternatives can again capture the lack of entailment relations, since the set of alternatives are simply not the same in the two cases. For example for 'Everyone was late to the party' the alternatives may be {'Some people were late to the party', 'Nobody was late to the party'}. On the other hand, the alternatives to 'Maria was late to the party' may for example be {'Maria was not late to the party'}. Hence, no entailment relations are expected.

In this section, I have discussed a certain characteristic of the predicates under discussion: entailment relations between propositions do not survive when these propositions are embedded under the predicates. I have shown that a semantics based on modal necessity has difficulties to capture this phenomenon in a straightforward way. As we have seen, it is possible to amend such a semantics by proposing that the modal base changes with the context, as proposed in von Fintel (1999). The core idea of my proposal really fleshes out this idea: I have argued independently of the phenomenon discussed here that the semantics of these predicates has to involve the contextual alternatives to the proposition expressed by the complement clause. We have seen that my proposal, a semantics based on comparison of alternative propositions, captures the phenomenon in a straightforward way.

3.5.2.3 Possible rankings of the alternatives

Predicates such as *be glad*, *be disappointed* and *regret* illustrate that p is not always necessarily the best/worst alternative. In certain contexts, α *is glad that p* is true in w even if p is not true in the worlds that best match α's desires. We can illustrate this again with the previous scenario that has more than two alternatives. I repeat the schematic figure below.

(67)



Imagine, that Sofía in the end brought an apple pie. Then, the sentence in (68) can be true in this scenario:

(68) Victoria is glad that Sofía brought an apple pie.

Victoria may be glad that Sofia at least didn't bring ice cream, which she would have hated. Thus, the sentence in (68) is true in a scenario in which p is not the best alternative. It would have been much better for Victoria if Sofía had brought a chocolate cake.

By employing a semantics of modal necessity, we however predict that this sentence should be false in this scenario. A semantics of modal necessity for the predicate *be glad* is given in (69).

(69) **Semantics of modal necessity for *be glad***

$[\![be\ glad]\!]^{f,g}(p)(\alpha)(w) = \text{true}$ iff $\forall\ w' \in \max_{g(\alpha,w)}(f(\alpha,w)) : w' \in p$.

The lexical entry of *be glad* in (69) predicts that the example (68) should be false in this scenario. It requires that among the worlds compatible with Victoria's revised beliefs (the modal base f), the ones that maximally correspond to Victoria's preferences in w are all worlds in which Sofía brings an apple pie. But, in fact, Victoria would have preferred it if Sofía had brought a chocolate cake. Thus, in none of the worlds that best match Victoria's preferences it is the case that she brings an apple pie. Hence, a semantics of modal necessity makes the wrong prediction for predicates such as *be glad*.

Let us now see whether a semantics of modal possibility can better capture the truth conditions of the predicate *be glad*. The lexical entry of the predicate *be glad* is then as in (70).

(70) **Semantics of modal possibility for *be glad***

$[\![be\ glad]\!]^{f,g}(p)(\alpha)(w) = \text{true}$ iff $\exists\ w' \in \max_{g(\alpha,w)}(f(\alpha,w) : w' \in p$.

This semantics of the predicate *be glad* does not make the correct predictions for the above scenario either. The meaning of *be glad* expressed in (70) predicts that the example (68) should be false in the given scenario. The lexical entry requires that there is a world among the worlds that best match Victoria's desires such that Sofía brings an apple pie in that world. Nevertheless, we already saw before that this is false: since Victoria prefers the chocolate cake, all worlds that maximally correspond to her preferences are worlds in which Sofía doesn't bring an apple pie, but rather a chocolate cake.

Hence, we have seen that neither modal necessity nor modal possibility can capture the fact that, for certain predicates, p may not necessarily be the best alternative. The problem with this kind of semantics is that we only consider worlds that best match the subject's desires. But these may sometimes in fact be irrelevant.

To the contrary, the proposal that I have developed so far can capture the truth conditions of a predicate such as *be glad,* because it allows to express that p is not necessarily the best alternative. The predicates under discussion seem to vary with respect to this issue. Some predicates, such as *prefer,* for example, require p to be ranked highest among the alternatives, whereas other predicates such as *be glad* and *regret* don't. This information should then be encoded in the lexical entry of these predicates. The lexical entry for *be glad* could be formalized as in (71).

(71) **Semantics based on comparison of alternatives for *be glad***

$[\![be\ glad_C]\!]^{g}(p)(a)(w) = 1$ iff $\exists\ q: q \neq p \ \&\ q \in g(C): p >_{Desa,w} q$

This lexical entry for the predicate *be glad* does not require that p be the best alternative, but rather that there be an alternative q such that p is more desirable than q.[15] In this scenario, we predict the sentence *Victoria is glad that Sofía brought the apple pie* to come out as true: there is an alternative ('Sofía brings ice cream') such that the alternative 'Sofía brings an apple pie' is more desirable.

In Kratzer (1991), next to *modal possibility* and *necessity*, other modal strengths are also defined, among which the modal strength of *better possibility.* Let me now

show in what respect my proposal is different from Kratzer's proposal on comparative possibility, which is based on the interaction between a modal base and an ordering source. In Kratzer's analysis, an ordering source is an unordered set of propositions that induces an ordering on the relevant set of worlds. In my proposal, this is different: the set of propositions is not used to induce the ordering. Rather, in the scenario that I have used, the different propositions expressing the desires of Victoria are ranked with respect to an ordering relation. Thus, the crucial difference between the two approaches is that in one case the propositions that express the desires are unordered while they are ranked with respect to an ordering in the other. As pointed out to me by Barbara Partee, in the approach that uses ordering sources, one may express ranked desires by using a set of disjunctions as the relevant ordering source. For our scenario, we would need the set {'Sofía brings a chocolate cake', 'Sofía brings a chocolate cake or apple pie', 'Sofía brings a chocolate cake or apple pie or ice cream'}. Given such an ordering source, the best worlds are then the worlds in which Sofía brings the chocolate cake: these are the only worlds that make all three propositions true. If it seems plausible to use ordering sources of this kind, these two approaches may then be considered to be equivalent.

To conclude, we have seen that a semantics based on necessity or possibility cannot capture the fact that certain predicates such as *be glad* do not require the proposition expressed by the complement clause to be ranked highest. A semantics based on comparison of contextual alternatives leaves room for variation in this domain. Different kinds of constraints on how the proposition p stands with respect to the other alternatives can be implemented.

3.5.2.4 Association with focus phenomena

A final argument for the semantics of comparison proposed here comes from examples that involve Focus. As already pointed out in Dretske (1972), focused phrases embedded under certain propositional attitude predicates give rise to meaning differences. In the context of the previous picnic scenario, the sentence in (72) is felicitous, while the sentence in (73) is not (words in capital are focused).

(72) Victoria wants Sofia to bring A CHOCOLATE CAKE.

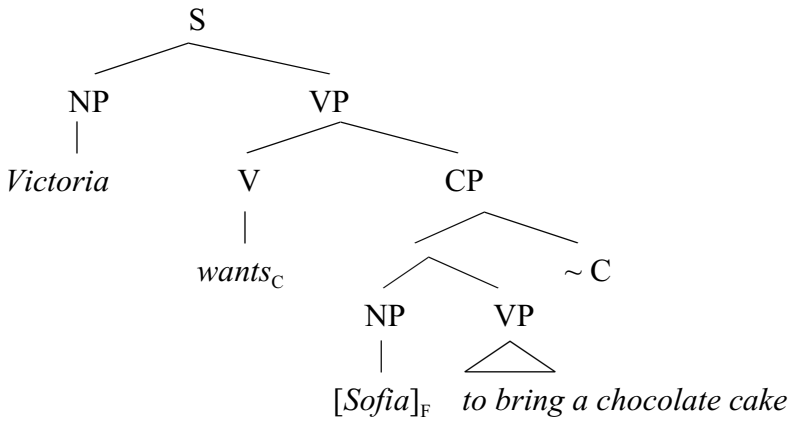
(73) Victoria wants SOFIA to bring a chocolate cake.

How could a semantics based on modal necessity or possibility account for the meaning differences between the sentences in (72) and (73)? No framework has yet been developed where the interaction of focus and the semantics of modals is made explicit. Von Fintel (1999) discusses this issue and pursues the idea that the focus on a constituent in the complement clause induces a presupposition about the context. Such a presupposition can then also narrow down the modal base so as to include only the worlds that are relevant. In the example in (72), the modal base would then only include worlds in which Sofía brings something or other, while in the example in (73), the modal base only includes worlds in which someone brings a chocolate cake (not necessarily Sofía).

The semantics based on comparison of contextual alternatives can provide a rather straightforward analysis of the meaning difference between examples (72) and (73). This theory makes explicit that for predicates such as *want* an analogy to focus sensitive operators such as *only* is expected. Both *want* and *only* make reference to a domain of quantification C of contextually determined alternatives. Rooth (1992) proposes that focus can constrain the set of alternatives that this variable C refers to.

If there is an analogy between a focusing adverb such as *only* and the predicates that we are discussing here, the constraint on the variable C should also apply for our examples. The predicate *want* has been defined as carrying an index C. Hence, in the example (71), the variable C is constrained to the set of propositions of the form 'Sofía brings x'. In the example in (72), C is constrained to a set of propositions of the form 'x brings a chocolate cake'. The scenario described before only makes available alternatives of the kind 'Sofía brings x'. In chapter 4, I will go into a more detailed discussion of the interaction between predicates that select the subjunctive mood and a focused constituent in the embedded clause. For now, I provide one illustration with the tree structure of the sentence (72) in (74). Following Rooth (1992), the focus introduces a variable C whose value is constrained to be a subset of the focus semantic value of the sister of ~C. Thus, in (74), the constraint is that $C \subseteq [\![[\text{Sofía}]_F \text{ brings a chocolate cake}]\!]_{ALT}$.

(74)



The semantics based on comparison of contextual alternatives then makes explicit the parallelism between association with focus phenomena of focus sensitive operators such as *only* and the propositional attitude predicates under discussion. Association with Focus phenomena thus provide further evidence for the proposal developed here. We will return to this issue more in detail in chapter 4.

To summarize, in this section, I have compared a semantics of necessity and possibility to a semantics of comparison of contextual alternatives. I have pointed to a number of problematic consequences for the semantics of necessity/possibility but have also discussed how the semantics can be amended to cope with these difficulties. Crucially, in most cases, these amendments involve taking into consideration the contextual alternatives to the proposition. That contextual alternatives are relevant for the meaning of sentences containing these predicates is at the core of my proposal. I have shown that a semantics of comparison of alternatives as developed here accommodates the challenges in a rather straightforward way.

3.6 Conclusion

In this chapter, I have argued for a new semantics of the predicates that select the subjunctive mood in Spanish: a semantics based on the comparison of contextually relevant alternative propositions.

I have proposed the following generalization for the subjunctive mood in Spanish complement clauses: A proposition p that is the complement of the matrix predicate requires the subjunctive mood iff the matrix predicate introduces an ordering relation between propositions and compares p to its contextually available alternatives.

Whether these alternatives are possible or counterfactual alternatives does not matter for the distribution of the subjunctive mood. Hence, this proposal characterizes the predicates that select the subjunctive mood independent from the characteristics of the evaluation context of the complement clause. In this respect, this approach differs from the proposals that were discussed in section 3.2.

First, I have discussed Heim's semantics of desire predicates and proposed that it can be extended to the whole class of predicates that select the subjunctive mood. Then, based on contexts that make more than two alternatives available, I have argued that this conditional semantics needs to be revised. The new semantics involves comparison of p with its contextual alternatives. In this proposal, then, subjunctive clauses require contexts in which ordered alternatives are made available.

Finally, I have presented a comparison of my proposal with an approach in which the predicates that select the subjunctive mood receive a semantics of modal necessity or possibility. I have shown that there are empirical differences between these two approaches when examining phenomena such as practical inferences, entailment-relations, and contexts with more than two alternatives. The proposal that I have developed here can straightforwardly accommodate the described facts. Furthermore, association with focus phenomena follow directly from this approach. In my proposal, the predicates that select the subjunctive mood carry a variable that refers to a contextually determined set of propositions, just like focus sensitive operators.

In this chapter, I have proposed a semantics for the predicates that select the subjunctive mood in Spanish without making explicit what the subjunctive mood contributes to the meaning composition. This is an important issue since it will provide some insight to the question why subjunctive clauses require special licensing conditions. In the following chapter, one of my main goals will be to address this question.

NOTES

[1] Previous versions of the proposal developed in this chapter have been presented in Villalta (2000a, 2000b, 2001).

[2] For a discussion and overview of proposals offered in traditional grammars and transformational grammars see, among others, Bell (1980), Bergen (1978), Castronovo (1990), Kleiman (1974) Klein, P.F. (1974), Lleó (1979), Manteca Alonso-Cortés (1981), and Navas Ruiz (1990). Extensive discussion of recent approaches to the semantics of mood is provided in Portner (1999,2003). For a cross-linguistic survey on mood and modality see Palmer (1986) and the collection of papers in Bybee and Fleischman (1995).

[3] This same distinction is also discussed in Bolinger (1968) and Terrell & Hooper (1974). Bolinger, however, calls these two classes 'representational' and 'non-representational'.

[4] This connection is in fact already made in the Spanish grammar by Lenz (1920). He calls the predicates that select the indicative mood in Spanish *juicios asertorios* ('assertive judgements').

[5] Different variants of the 'Realis/Irrealis' approach for mood selection in Spanish have been proposed by Alarcos Llorach (1970), Bergen (1978), Gili Gaya (1961), Givón (1994), and Real Academia Española (1973), among others.

[6] Giannakidou's formal definition of models and (non) veridicality are given in (i) and (ii) respectively:

(i) Definition of Models of individuals (Giannakidou 1999, p.386)
Let c= <cg(c), W(c), M,s,h, w_0,f,...> be a context
A model M(x) $\in$ M is a set of worlds in c associated with an individual x. x is called the individual anchor.

where *c* is a tuple consisting of a common ground (cg(c); the set of propositions the participants in the conversation mutually take to be true), a context set (W(c); the set of worlds in which all the propositions in the cg(c) are true, i.e., W(c) is the set of worlds compatible with what is believed to be true by the agents prior to any assertion), an assignment function f, and a number of Kaplanian parameters corresponding to the speaker s, the hearer h, the actual world w_0 and possibly other parameters. Models are construed as collections of worlds c, corresponding essentially to the accessibility functions we know from the treatment of attitudes in modal logic and possible world semantics.

(ii) Definition of relativized (non)veridicality (Giannakidou 1999 p.388)
Let c= <cg(c), W(c), M,s,h, w_0,f,...> be a context.
(i) A propositional operator O_p is *veridical* iff it holds that:
$[\![O_p\ p]\!]_c=1 \Rightarrow [\![p]\!]=1$ in some epistemic model M(x) $\in$ c; otherwise O_p is nonveridical.
(ii) A nonveridical operator O_p is antiveridical iff it holds that:
$[\![O_p\ p]\!]_c=1 \Rightarrow [\![p]\!]= 0$ in some epistemic model M(x) $\in$ c.

(iii) Epistemic models are: belief models $M_B(x)$, dream models $M_D(x)$, models of reported conversation $M_{RC}(x)$ and nothing else.

A belief model $M_B(x)$ is a set of worlds associated with an individual x, representing worlds compatible with what x believes, a dream model $M_D(x)$ is a set of worlds associated with an individual x, representing worlds compatible with what x dreams and a model of reported conversation $M_{RC}(x)$ is a set of worlds associated with an individual x, representing worlds compatible with what x takes the reported conversation to be (as defined in Def 7-9, Giannakidou 1999, p.386-387).

[7] Giannakidou (1998,1999), Portner (1999, 2003) and Quer (1998, 2001) also point out that the conditional semantics for these predicates proposed by Heim (1992) is relevant for mood selection. But they do not discuss the consequences of adopting such a semantics for the predicates that select the subjunctive mood.

[8] This can be illustrated with an example in (i) from Lewis (1973), who proposes to paraphrase it as in (ii):

(i) If kangaroos had no tails, they would topple over.

(ii) In any possible state of affairs in which kangaroos have no tails, and which resembles our actual state of affairs as much as kangaroos having no tails permits it to, the kangaroos topple over." (Lewis 1973, p.1)

[9] To express that X is more desirable than Y, I will use $X >_{\alpha,w} Y$ rather than $X <_{\alpha,w} Y$ as is originally done in Heim (1992). The definition is otherwise identical to the one in Heim(1992). Importantly, this definition only captures comparative desirability among sets of worlds, but not among propositions. This is so, since, under this definition, if X is more desirable than Y, it is required that each world in X be more desirable than each world in Y. This requirement is too strong when we compare the desirability of propositions. We will see later, in section 3.3.2, that it is necessary to adopt the definition proposed in Kratzer (1991) for 'better possibility' to capture comparative desirability between propositions.

[10] For approaches that adopt a scalar semantics for gradable adjectives see Bartsch and Venneman 1973, Bierwisch 1989, Cresswell 1976, Kamp 1975, Kennedy 1999, Klein E. 1980, 1991, Rullmann 1995, Schwarzschild & Wilkinson 1999, Seuren 1973, von Stechow 1984a,1984b, and many others.

[11] The literature on propositional attitudes mainly concentrates on the predicates *believe*, *know* and *want.* Other propositional attitudes have recently received more attention in Asher (1987), Bonevac (1984), von Fintel (1999), Heim (1992), and van Rooy (1999), among others.

[12] This is a somewhat simplified representation that is meant to illustrate a possible semantics of *want* based on modal necessity and ignores the definedness conditions of the predicate. See von Fintel (1999) for a detailed discussion of the definedness conditions of predicates such as *want, wish, be glad* and *be sorry*.

[13] One such situation was illustrated in 3.4.1, even though we will see later in section 3.5.2.2 that a semantics of modal possibility is still not sufficient to capture this particular scenario.

[14] For predicates such as *regret* and *be surprised* it is also the case that entailment relations do not hold. This is surprising given that these predicates allow for NPIs in their complement clause and are thus expected to be downward entailing (cf. von Fintel 1999, Klima 1964, Ladusaw 1979,1980, Lee & Horn 1994, Linebarger 1987, Kadmon and Landman 1993, Katz 1991 and many others). Downward entailing (DE) operators are defined by Ladusaw (1979) as follows.

(iii) O is a DE operator iff if A entails B then O(B) entails O(A)

This means that for a predicate such as *be surprised* the following should hold: when a proposition *p* entails a proposition *q*, it follows that α *is surprised that q* entails that α *is surprised that p.* However, this is not the case. While *He bought a Honda* entails *He bought a car* (since all the worlds in which he bought a Honda are also worlds in which he bought a car), *I am surprised he bought a car* does not entail *I am surprised he bought a Honda* (I may well be surprised about the fact that he bought a car without being surprised that he bought a Honda).

[15] This is certainly a simplification of the truth conditions of the predicate *be glad*. Judgements do not always seem to be so clear about how far away from the best the proposition may be for one to still be glad about it. The point that I want to make here is that we can express in this system that p does not necessarily have to be the best alternative.

CHAPTER 4

THE SUBJUNCTIVE MOOD: FOCUS SENSITIVITY AND GRADABILITY

4.1 Introduction

In the previous chapter, I have argued that the predicates that select the subjunctive mood in Spanish require a semantics that involves comparison of contextual alternatives. The main goal of the present chapter is to discuss two major consequences of this proposal: the focus sensitivity of these predicates, and their gradability. The focus sensitivity of these predicates follows directly from the fact that they are analyzed analogous to other focus sensitive operators such as *only*. We thus expect the meaning of these predicates to be affected by a focused constituent in the embedded clause. The gradability of these predicates follows from the fact that the relevant predicates, under this proposal, introduce a gradable property with respect to which the contextual alternatives are compared. We thus expect these predicates to be able to appear in certain degree constructions. The link between the subjunctive mood and these two important properties has, to my knowledge, never been established in the literature before.

In this chapter, I also address the following important question: what role does the subjunctive mood play in the semantic composition of the sentence? The literature on the semantics of mood rarely addresses this question. The main focus of the great majority of these studies has rather been to provide a characterization of the contexts in which the subjunctive mood appears. The investigation of what the subjunctive mood contributes to the meaning composition provides a first step towards a better understanding of why subjunctive verb forms require special semantic licensing conditions and why they are obligatory in certain contexts. I argue that the licensing conditions of subjunctive clauses can be explained in a system in which, next to the ordinary semantic value, we also compute an alternative semantic value of the sentence (cf. Rooth 1985). The view that the semantic component consists of two semantic values rather than just the ordinary semantic value has proven to be very fruitful in

various areas. In Rooth (1985) it was introduced to account for focus phenomena and focus sensitive operators such as *only*, but later also employed by Krifka (1995) for the licensing of negative polarity items. Most recently, Beck (2006, to appear) argues that this view can successfully be adopted for the analysis of a whole range of constructions and linguistic phenomena. I show here that this view is also fruitful for an explanation of the licensing conditions of the subjunctive mood.

The structure of this chapter is as follows. First, in section 4.2, I show that the predicates that select the subjunctive mood are focus sensitive (contrary to the predicates that select the indicative mood) as predicted by the proposal developed in chapter 3. I then investigate the contribution of the subjunctive mood to the meaning composition. I develop a proposal in which the subjunctive mood has the role of evaluating the contextual alternatives introduced by a focused constituent. The indicative mood, to the contrary, blocks evaluation of the contextual alternatives at the level of the embedded clause. Then, in section 4.3, I turn to the empirical evidence that shows that predicates that select the subjunctive mood are gradable. The semantics of comparison adopted here leads us to expect that predicates that select the subjunctive mood appear in certain types of degree constructions. This expectation is born out. Finally, I refine my proposal to account for the empirical facts: predicates that select the subjunctive mood are analyzed as having an additional degree argument.

4.2 The subjunctive mood and focus

In chapter 3, I developed an analysis in which predicates that select the subjunctive mood are analyzed analogous to focus sensitive operators such as *only.* I now turn to examining more in detail the focus sensitivity of these predicates.

To begin, I briefly summarize the semantic characterization of the predicate classes that select the subjunctive mood as developed in chapter 3.

4.2.1 The proposal so far

So far, I have argued that the predicates that select the subjunctive mood require a semantics of comparison. Developing a revised version of Heim's (1992) semantics, I have proposed that the predicates that select the subjunctive mood introduce an

ordering relation that compares the embedded proposition p to its contextually available alternative propositions. The denotation for the predicate *want* is repeated here in (1).

(1) $[\![want_C]\!]^g = \lambda p.\lambda x.\lambda w.\forall q: q \neq p \ \& \ q \in g(C): p >_{DES\ x,w} q$

where $>_{DES\alpha,w}$ is defined as follows

a) For any w, w', w'' $\in$ W, w' $>_{\alpha,w}$ w'' iff w' is more desirable to α in w than w''.

b) For any p$\subseteq$W, q$\subseteq$W, p $>_{DES\ \alpha,w}$ q iff $\forall$ w'' $\in$ q there is a w'$\in$ p such that w'$>_{\alpha,w}$ w'', and it is not the case that $\forall$ w' $\in$ p there is a w''$\in$ q such that w''$>_{\alpha,w}$ w'.

Following this definition of the lexical entry of the predicate *want*, 'α wants ϕ' is true in w if and only if ϕ is more desirable to α in w than its contextual alternatives. The contextual alternatives are made available by the variable C which receives its value from the context (a set of propositions) through the variable assignment g. In analogy to what is proposed in Rooth (1985,1992) for adverbs such as *only,* the predicate *want* is thus analyzed as a context sensitive operator. In Rooth (1985,1992) it is proposed that focus can constrain the set of alternatives that the variable C refers to. If the predicates discussed here are focus sensitive operators, they should be sensitive to meaning differences that arise when different constituents are focused in the embedded clause. We turn to this issue in the following section.

4.2.2 Association with focus in the embedded clause

Rooth (1985,1992) shows that Focus has a truth conditional effect in the context of the adverb *only.* He presents the following example: in a context in which Mary introduced Bill and Tom to Sue and there were no other introductions, (2) is true, but (3) is false. These two sentences only differ in terms of what constituent is focused (marked in capital letters).

(2) Mary only introduced Bill to SUE.

(3) Mary only introduced BILL to Sue.

In the proposal developed here, the predicates that select the subjunctive mood are analyzed in analogy to the focus sensitive operator *only*. We thus also expect differences in focus structure in the embedded clause to have a truth conditional effect.

Dretske (1972,1975) already points out that focused phrases embedded under certain propositional attitude predicates give rise to a meaning difference. Dretske argues that contrastive differences in the embedded clause play a very significant role in determining the meaning of the whole sentence. To illustrate this, I present here one of his examples, which is structured in form of a dialogue. This is a convenient way of imposing a particular focus structure on the relevant sentences. It will become clear that the interpretation of sentences containing the predicate *advise* depends on the focus structure of the embedded clause.

(4) Clyde: Alex, I need your advice. I have a 1927 Lincoln in my garage that is in mint condition. I haven't driven it for 35 years and it runs perfectly. Schultz, down the street, has expressed an interest in buying it and has offered me $30.000 for it.

Alex: So what is your problem?

Clyde: Well, I thought maybe if I held on to it longer it would become even more valuable.

Alex: That isn't very likely. Your car isn't going to appreciate in value much more no matter how long you keep it, and you may never again receive such a fine offer. I advise you to sell it to him.

Clyde takes Alex's advice and sells the car to Schultz. The check he receives from Schultz bounces and when he goes looking for Schultz he finds that he has left town. The car is gone and Clyde has nothing to show for it but a worthless check. The next time he meets Alex the conversation goes as follows.

Clyde: You sure gave me a piece of rotten advice. Schultz took off with my car and left me with a bad check.

Alex: That is too bad, but why are you blaming me?

Clyde: You are the one who advised me to sell it to him.

Alex: Now wait a minute. You simply asked me for advice on whether or not you should sell the car for $30,000. You didn't ask me, nor did I advise you about whom to sell the car to. I don't even know Schultz.

Clyde: If you didn't know Schultz, you shouldn't have given me the advice you did. When I asked you whether I should sell my car or not, you said (I remember the exact words), "I advise you to sell it to him". So stop trying to avoid responsibility.

Dretske(1975, p.415-416)

This example illustrates that whether or not we can say that Alex advised Clyde to do what is expressed by the statement 'Clyde sold his car to Schultz for $30.000' depends on the focus structure of this sentence. The advice must be understood in reference to the contrastive focus of the advice's content. Thus, in the scenario described above only (5) is true, not (6), where capital letters indicate what is in focus.

(5) Alex advised Clyde TO SELL HIS CAR to Schultz FOR $30 000.

(6) Alex advised Clyde to sell his car TO SCHULTZ for $30 000.

Notice that the predicate *advise* is a directive predicate and thus selects the subjunctive mood in Spanish. I will show here that the same kind of meaning difference (introduced by a focused constituent in the embedded clause) appears as well with the other predicate classes that select the subjunctive mood in Spanish.

We begin with the class of desire predicates. I illustrate their behavior with the predicate *want* and use some examples similar to the one discussed in Heim(1992). Consider the following context:

(7) In the linguistics department, at the faculty meeting, the teaching schedules of the different faculty members for the upcoming semester are discussed. There is only one syntactician in the department (John), one phonologist (Lisa), and two semanticists (Lara and Frank). John can only teach syntax. Lara can teach syntax and semantics. There is some controversy on which days John should teach his syntax classes. There are two options: he may teach syntax on Tuesdays and Thursdays, or he may teach syntax on Mo, We & Fri. Lisa's preferences are the

following: she would prefer it if Lara would teach syntax rather than John. But given that John has to teach syntax, she prefers it if he teaches on Tuesdays and Thursdays rather than on Mo, We & Fri (because she wants the teaching slot on Mo, We & Fri for her own phonology class, which cannot conflict with the syntax class).

In this scenario, consider the following utterances:

(8) Lisa wants John to teach syntax ON TUESDAYS AND THURSDAYS.
(9) Lisa wants JOHN to teach syntax on Tuesdays and Thursdays.

In the described scenario, the utterance in (8) is true. However, the utterance in (9) cannot be true (since Lisa would in fact prefer it if Lara would teach syntax, not John). The only difference between these two utterances is that a different constituent is focused in the embedded clause.

We can thus conclude that, in the presence of the predicate *want*, the focus structure of the embedded clause has a truth conditional effect. The same can be shown to hold for other predicates that select the subjunctive mood in Spanish. For the class of emotive factive predicates, I illustrate this with the predicate *be glad.*

In the context described above, assume that, at the end of the faculty meeting, it is decided that John is indeed going to teach syntax on Tuesdays and Thursdays. Consider now the following utterances.

(10) Lisa is glad that John teaches syntax ON TUESDAYS AND THURSDAYS.
(11) Lisa is glad that JOHN teaches syntax on Tuesdays and Thursdays.

Here again, (10) can be true in the described scenario, but not (11) (for the same reasons as before). The predicate *be glad* can thus be considered to be focus sensitive.

Boer(1978) illustrates that this same kind of focus sensitivity also appears in conditional sentences. He presents an example introduced by Dretske(1972) with the following scenario: Ted's father left a clause in his will stipulating that Ted can only receive his inheritance if he is married by a certain date. In this context (12) is true, but (13) is false:

(12) If Ted hadn't MARRIED Alice, he would have lost his inheritance.
(13) If Ted hadn't married ALICE, he would have lost his inheritance.

Similarly, the causative predicate *cause* and the directive predicate *demand*, which in Spanish select the subjunctive mood, show focus sensitivity. Modeling our examples after the conditional sentences, we can show that, in the same context, the examples (14) and (16) are true, while (15) and (17) are false:

(14) His father caused Ted to MARRY Alice.
(15) His father caused Ted to marry ALICE.

(16) His father demanded that Ted MARRY Alice.
(17) His father demanded that Ted marry ALICE.

To conclude, I have presented a number of examples from predicate classes that select the subjunctive mood (such as desire predicates, emotive factives, directives and causatives) that are sensitive to the focus-structure of the embedded clause. I expect all predicates that select the subjunctive mood to show such an effect.

In contrast, consider now some examples containing predicates that select the indicative mood in Spanish. The following examples contain the epistemic predicate *know*.

(18) Lisa knows that John teaches syntax ON TUESDAYS AND THURSDAYS.
(19) Lisa knows that JOHN teaches syntax on Tuesdays and Thursdays.

Contrary to the previous examples, here the matrix predicate does not seem to be sensitive to the focus structure of the embedded clause. These examples are both true under the same circumstances: all contexts that make one of them true make the other one true as well.[1] The same appears to be the case for a predicate of communication such as *say*:

(20) Lisa said that John teaches syntax ON TUESDAYS AND THURSDAYS
(21) Lisa said that JOHN teaches syntax on Tuesdays and Thursdays

In these examples, focus on a constituent in the embedded sentence creates alternatives that are not evaluated by the predicate of the matrix clause: the alternatives that are available for an example such as (20) are the alternatives to the whole clause, not the embedded clause: 'Lisa said that John teaches syntax on Tuesdays and Thursdays' and 'Lisa said that John teaches syntax on Mondays, Wednesdays and Fridays'. Similarly, in (21), the available alternatives are 'Lisa said that John teaches syntax on Tuesdays & Thursdays' and 'Lisa said that Lara teaches syntax on Tuesdays and Thursdays'.

It can easily be shown that the same holds for other predicate classes that select the indicative mood in Spanish: predicates of certainty (e.g. *estar convencido* 'be convinced', *estar seguro* 'be certain'), commissives (*prometer* 'promise'), and fiction predicates (e.g. *soñar* 'dream') have this same property.

In fact, in the literature, some examples have already been provided to show that focus does not always have the same effect in the context of all propositional attitude predicates. The following examples are from Boër (1979). He suggests that with predicates such as *know* and *believe* the meaning differences induced by focused constituents in the complement clause are much less perceptible.

(22) Tom knows that Bob HIT Alice.
(23) Tom knows that Bob hit ALICE.

(24) John believes that Bob HIT Alice.
(25) John believes that Bob hit ALICE.

Boër claims that it is very difficult to perceive the meaning difference between examples (22) and (23) (Boër 1979, p.275), and that 'there is no felt meaning-shift' for examples (24) and (25) (Boër 1979, p. 295). Also Dretske (1972) points out that predicates such as *believe* and *say* are not sensitive to the contrastive differences of the embedded clause (see footnote 16, p.435).

To conclude, the purpose of this section has been to argue that predicates that select the subjunctive mood are sensitive to the presence of a focused constituent in the embedded clause: when different constituents are focused, there is a truth conditional meaning difference. We thus have evidence for the claim that the predicates that select the subjunctive mood are focus sensitive operators.

In the following section, I turn to making precise what the semantic contribution of the subjunctive mood morpheme is.

4.2.3 The semantic contribution of the subjunctive mood

In this section, I develop a semantics for the subjunctive mood in Spanish. To begin, I introduce Rooth's (1985,1992) terminology for the semantics of sentences containing focused constituents and present his semantics for focus sensitive operators such as *only*.

4.2.3.1 Focus according to Rooth (1985,1992)

As mentioned in the previous section, Rooth (1985,1992) shows that focus has a truth conditional effect in the context of the adverb *only*. I now turn to Rooth's proposal for the meaning of sentences of the following kind:

(26) Mary only introduced Bill to SUE.
(27) Mary only introduced BILL to Sue.

In Rooth (1985,1992), next to the ordinary semantic value, an additional semantic value is used to express the contribution that focus makes to the meaning of a sentence. The focus semantic value of a constituent α is represented as $[\![\alpha]\!]_{ALT}$, its ordinary semantic value as $[\![\alpha]\!]_o$. The focus semantic value of a sentence is the set of propositions obtainable from the ordinary semantic value by making a substitution in the position corresponding to the focused phrase. I present here the ordinary and alternative semantic values for the sentences above without *only*. The ordinary semantic value for both examples is the same:

(28) $[\![$Mary introduced Bill to $[$Sue$]_F]\!]_o$ = λw.Mary introduced Bill to Sue in w
(29) $[\![$Mary introduced Bill to $[$Sue$]_F]\!]_{ALT}$ ={λw.Mary introduced Bill to x in w/x ∈ D}

(30) $[\![$Mary introduced $[$Bill$]_F$ to Sue$]\!]_o$ = λw.Mary introduced Bill to Sue in w
(31) $[\![$Mary introduced $[$Bill$]_F$ to Sue$]\!]_{ALT}$ ={λw.Mary introduced x to Sue/x ∈ D}

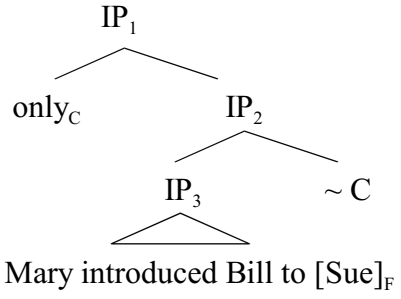
The denotation of *only* carries an index C which (through the variable assignment g) refers to a contextually determined set of propositions:

(32) $[\![\text{only}_C]\!]^g_o = \lambda p.\lambda w.\forall q: q \in g(C) \,\&\, q(w) \rightarrow p = q$

For a focus sensitive operator such as *only*, Rooth proposes that its domain of quantification C is constrained by the focus semantic value. Focus introduces a variable C which anaphorically constrains the domain of quantification of the focus sensitive operator. Rooth defines the ~-operator which is adjoined to the variable C and evaluates the alternatives introduced by the focused constituent. The sentence in (33) can be assumed to have the underlying representation in (34):

(33) Mary only introduced Bill to SUE.

(34)



There are two constraints on the variable C introduced by focus interpretation. The first is that $\phi \sim C$ presupposes that C is a subset of the focus semantic value for ϕ (and contains both the ordinary semantic value of ϕ and an element distinct from the ordinary semantic value of ϕ). The choice of antecedent for the variable C is free, but it is guided by the presuppositional constraint introduced by the ~-operator:

(35) $\| \phi \quad \sim C \|_o$ is defined only if $[\![C]\!]_o \subseteq [\![\phi]\!]_{ALT}$

If defined, $\| \phi \quad \sim C \|_o = [\![\phi]\!]_o$

The second constraint is that, in the expression $[\phi \sim C]$, focus has been interpreted, so the semantic effect of the foci in ϕ has to be neutralized:

(36) $\| \phi \quad \sim C \|_{ALT} = \{[\![\phi]\!]_o\}$

The meaning of the sentence in (33) containing the focus sensitive adverb *only* is then computed in the following way:

(37) $[\![CP_3]\!]^g_o$ = [Mary introduced Bill to [Sue]$_F$]^g_o =
= λw. Mary introduced Bill to Sue in w.
$[\![CP_3]\!]^g_{ALT}$ = [Mary introduced Bill to [Sue]$_F$]$^g_{ALT}$ =
= {λw.Mary introduced Bill to x in w/x ∈ D}
$[\![CP_2]\!]^g_o$ = [[Mary introduced Bill to [Sue]$_F$] ~ C]^g_o
is defined only if
g(C) ⊆ {λw.Mary introduced Bill to x in w/x ∈ D}
if defined $[\![CP_2]\!]^g_o$ = λw.Mary introduced Bill to Sue in w.
$[\![CP_2]\!]^g_{ALT}$ = [[Mary introduced Bill to [Sue]$_F$] ~ C]$^g_{ALT}$
= {λw.Mary introduced Bill to Sue in w}
$[\![only_C]\!]^g_o$ = λp.λw.∀q ∈ g(C) & q(w) → p = q
$[\![CP_1]\!]^g_o$ = [$only_C$]^g_o ([CP_2]^g_o) =
= λw.∀q: q ∈ {λw.Mary introduced Bill to x in w/x ∈ D}& q(w) →
q = λw. Mary introduced Bill to Sue in w.

The resulting meaning of the sentence can be paraphrased as follows: for all propositions in g(C) = {Mary introduced Bill to x in w/x ∈ D}, the single true one is 'Mary introduced Bill to Sue in w'.

Rooth's semantics can also be adopted for predicates such as *want*. Parallel to *only*, the predicate *want* has been defined here as carrying an index C that refers to a contextually available set of propositions. For convenience, I repeat my proposal for predicates such as *want* here:

(38) $[\![want_C]\!]^g$ = λp.λx.λw.∀ q: q ≠ p & q ∈ g(C): p >$_{DES\ x,w}$ q

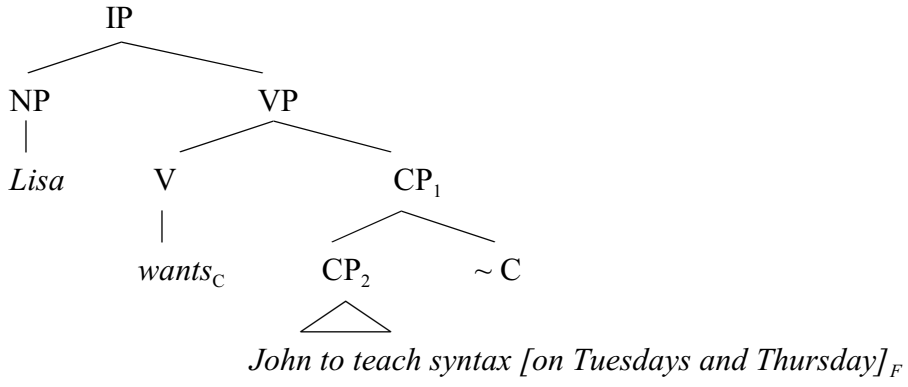
Just like in the case of *only*, the index C of the predicate *want* should be constrained by the focus semantic value of the embedded clause. The ~-operator, if

placed in the appropriate position in the tree, evaluates the alternatives for the predicate. I illustrate this here with an example from the previous section, with a focused constituent in the embedded clause:

(39) Lisa wants John to teach syntax ON TUESDAYS AND THURSDAYS.

I will assume again, as described in the scenario from the previous section, that there are two contextual alternatives: John may teach syntax on Tuesdays and Thursdays or John may teach on Mondays,Wednesdays and Fridays. The appropriate tree structure for the sentence in (39) is the one below, where ~C is attached at the level of the CP of the embedded clause.

(40)



The semantic derivation for (40) is then as follows:

(41) $[\![CP_2]\!]^g_o$ = λw.John teaches syntax on Tuesdays and Thursdays in w

$[\![CP_2]\!]^g_{ALT}$ = {λw.John teaches syntax on Tuesdays and Thursdays in w, λw.John teaches syntax on Mo,We,Fri in w}

$[\![CP_1]\!]^g_o$ = $[\![CP_2 \sim C]\!]^g_o$ is defined only if g(C) ⊆ {λw.John teaches syntax on Tuesdays and Thursdays in w, λw.John teaches syntax on Mo,We, Fri in w}

If defined $[\![CP_1]\!]^g_o$ = $[\![CP_2 \sim C]\!]^g_o$ = λw.John teaches syntax on Tuesdays and Thursdays in w.

$[\![CP_1]\!]^g_{ALT}$ = $[\![CP_2 \sim C]\!]^g_{ALT}$ = {$[\![CP_1]\!]^g_o$} = {λw. John teaches syntax on Tuesdays and Thursdays in w}.

$[\![want_C]\!]^g_o$ $= \lambda p.\lambda x.\lambda w'.\forall\ q: q \neq p \ \&\ q \in g(C): p >_{DES\ x,w'} q$

$[\![VP]\!]^g_o$ $= [\![want_C]\!]^g_o\ ([\![CP_1]\!]^g_o) = \lambda x.\lambda w'.\forall q: q \neq [\lambda w.$John teaches syntax on Tuesdays and Thursdays in w] & $q \in \{\lambda w.$ John teaches syntax on Tuesdays and Thursdays in w, $\lambda w.$John teaches syntax on Mo,We,Fri in w.$\}$: [$\lambda w.$ John teaches syntax on Tuesdays and Thursdays in w] $>_{DES\ x,w'}$ q.

$= \lambda x.\lambda w'.$ [$\lambda w.$John teaches syntax on Tuesdays and Thursdays in w] $>_{DES\ x,w'}$ [$\lambda w.$John teaches syntax on Mo,We,Fri in w].

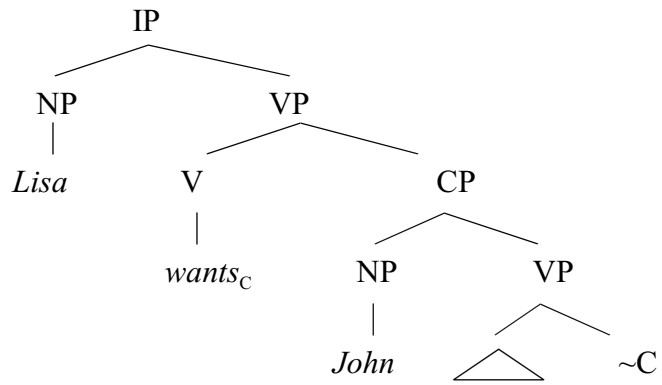
$[\![IP]\!]^g_o$ $= [\![VP]\!]^g_o\ ([\![NP]\!]^g_o) =$

$= \lambda w'.$ [$\lambda w.$John teaches syntax on Tuesdays and Thursdays in w] $>_{DES\ Lisa,w'}$ [$\lambda w.$John teaches syntax on Mo,We,Fri in w.]

The resulting meaning of the whole sentence can be paraphrased as follows: that John teaches syntax on Tuesdays and Thursdays is more desirable to Lisa than that John teaches syntax on Mondays, Wednesdays and Fridays.

We can thus conclude that Rooth's proposal for focus sensitive adverbs such as *only* can straightforwardly be carried over to the predicate *want.* Notice, however, that we have to ensure that the ~-operator is adjoined to the CP-level of the embedded clause. Other structures, in which the ~-operator is adjoined to other positions, have to be excluded. The following structure, for example, is uninterpretable because the elements in C are not of the right type (since ~C is adjoined at the VP level, the elements in C are of type <e,<s,t>>):

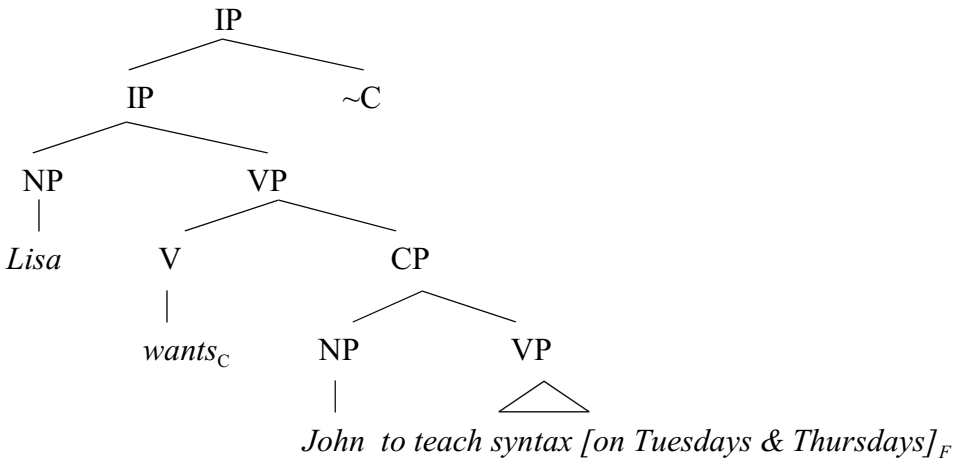
(42) *



to teach syntax [on Tuesdays and Thursdays]$_F$

A structure in which the index C is attached at the IP-level of the higher clause, such as in (43), leads to a nonsensical interpretation: even though the elements in C are of the right type, C does not correspond to a set of alternative propositions of *the embedded clause*. Here, C corresponds to the following set of alternative propositions: {'Lisa wants John to teach syntax on Tuesdays and Thursdays', 'Lisa wants John to teach syntax on Mondays, Wednesdays and Fridays}. These are not the appropriate alternatives that the predicate *want* requires.

(43)*



In the following section, I turn to the semantic contribution of the subjunctive mood morpheme. I propose that the role of the subjunctive mood is to ensure that C contains the appropriate set of alternatives, or in other words, that the evaluation of contextual alternatives happens in the right place of the tree, namely at the level of the embedded clause.

4.2.3.2 The subjunctive mood: evaluation of alternatives

In this section, I return to the Spanish data and examine what the semantic contribution of the subjunctive mood is.

I will assume that the subjunctive mood is realized in a projection above IP, presumably in MoodP.[2] I will argue that subjunctive mood is an operator that has the role of the ~-operator, namely to evaluate the alternatives for the matrix predicate. As a consequence, the evaluation of alternatives necessarily happens in MoodP. Subjunctive mood thus ensures that the evaluation of alternatives happens at the right place in the

tree. Indicative mood, to the contrary, will be argued to prevent evaluation of alternatives at the level of the embedded clause. I define the $SUBJ_C$-operator as follows:

(44) **Definition of $SUBJ_C$**:

a. $\| \overset{\frown}{SUBJ_C \ IP} \|^g_o$ is only defined if $g(C) \subseteq [\![IP]\!]^g_{ALT}$ & $Card(g(C)) > 1$

when defined $\| \overset{\frown}{SUBJ_C \ IP} \|^g_o = [\![IP]\!]^g_o$

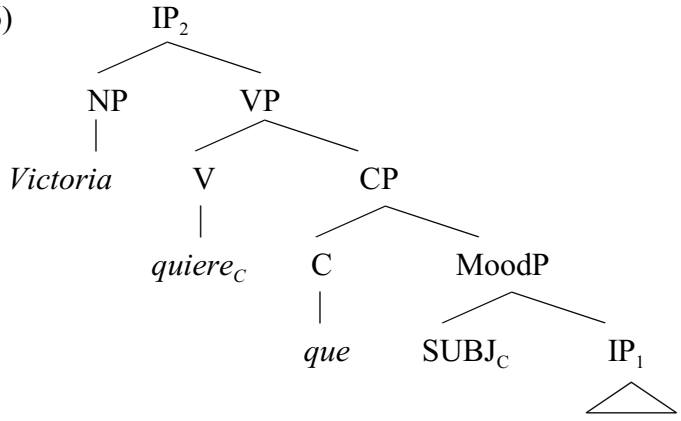
b. $\| \overset{\frown}{SUBJ_C \ IP} \|^g_{ALT} = \{[\![IP]\!]^g_o\}$

The semantic contribution of the subjunctive mood can best be illustrated with an example that contains a focused constituent in the embedded clause:

(45) Victoria quiere que Sofía traiga UNA TORTA DE CHOCOLATE.
Victoria wants that Sofía bring:PRES.SUBJ.3SG a cake of chocolate.
'Victoria wants Sofía to bring A CHOCOLATE CAKE.'

I will assume again that the relevant contextual alternatives are the following: 'Sofia brings a chocolate cake', 'Sofia brings ice cream', or 'Sofia brings an apple pie'. The relevant tree structure corresponding to (45) is given below.

(46)



Given the definition of the $SUBJ_C$-operator, the semantic derivation of (46) is as follows.

(47) $[\![IP_1]\!]^g_o$ = λw. Sofia brings a chocolate cake in w.

$[\![IP_1]\!]^g_{ALT}$ = {λw. Sofia brings a chocolate cake in w, λw. Sofia brings ice cream in w, λw. Sofia brings an apple pie in w}

$[\![MoodP]\!]^g_o$ = $[\![SUBJ_C \ IP_1]\!]^g_o$ is only defined if $g(C) \subseteq [\![IP_1]\!]^g_{ALT}$ = {λw. Sofia brings a chocolate cake in w, λw. Sofia brings an apple pie in w, λw. Sofia brings ice cream in w}

when defined

$[\![MoodP]\!]^g_o$ = λw. Sofia brings a chocolate cake in w

$[\![MoodP]\!]^g_{ALT}$ = {λw. Sofia brings a chocolate cake in w}

$[\![CP]\!]^g_o$ = $[\![MoodP]\!]^g_o$ = λw. Sofia brings a chocolate cake in w

$[\![CP]\!]^g_{ALT}$ = $[\![MoodP]\!]^g_{ALT}$ = {λw. Sofia brings a chocolate cake in w}

$[\![want_C]\!]^g_o$ = $\lambda p.\lambda x.\lambda w'.\forall q: q \neq p \ \& \ q \in g(C): p >_{DES\ x,w'} q$

$[\![VP]\!]^g_o$ = $[\![want_C]\!]^g_o$ ($[\![CP_2]\!]^g_o$) =

= $\lambda x.\lambda w'.\forall q: q \neq$ [λw. Sofia brings a chocolate cake in w] & $q \in$ {λw. Sofia brings a chocolate cake in w, λw. Sofia brings an apple pie in w, λw. Sofia brings ice cream in w}: [λw. Sofia brings a chocolate cake in w] $>_{DES\ x,w'} q$

$[\![IP_2]\!]^g_o$ = $[\![VP]\!]^g_o$ ($[\![NP]\!]^g_o$) =

=$\lambda w'.\forall q: q \neq$ [λw. Sofia brings a chocolate cake in w] & $q \in$ {λw. Sofia brings a chocolate cake in w, λw. Sofia brings an apple pie in w, λw. Sofia brings ice cream in w}: [λw. Sofia brings a chocolate cake in w] $>_{DES\ Victoria,w'} q$

The resulting meaning can be paraphrased as follows: among the relevant alternatives {'Sofia brings a chocolate cake', 'Sofia brings an apple pie', 'Sofia brings ice cream'} 'Sofia brings a chocolate cake' is the most desirable alternative to Victoria.

I thus propose that MoodP is responsible for the evaluation of contextual alternatives for the class of predicates that select the subjunctive mood. These predicates require the subjunctive mood in the embedded clause because they require the presence of a set of contextual alternatives to the embedded proposition. The $SUBJ_C$-operator evaluates this set of contextual alternatives for the matrix predicate. At the level of the embedded clause, subjunctive mood is thus the morphological realization of Rooth's ~-operator.[3]

Let us now examine what would happen if the embedded clause was in the indicative mood. I will propose that when the $SUBJ_C$-operator is replaced by the IND-operator, no evaluation of contextual alternatives takes place in MoodP. Rather, the ordinary and alternative semantic values of the IP are simply inherited. In other words, the IND-operator is essentially an identity function:

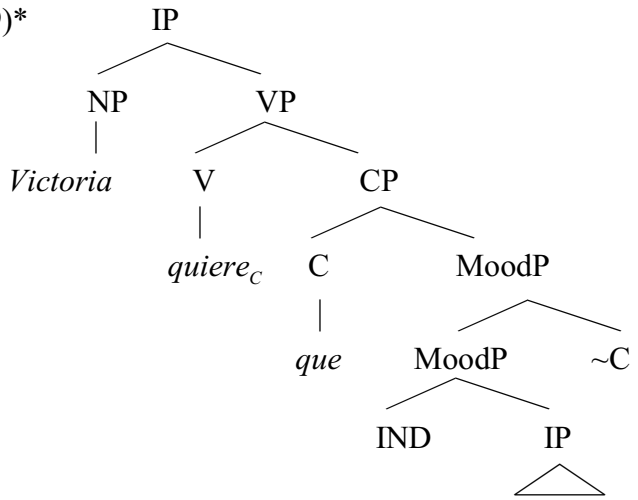
(48) **First definition of IND:**

a. $[\![IND]\!]_o$ is a function of type <<s,t>,<s,t>> and
$[\![IND]\!]_o([\![IP]\!]_o) = [\![IP]\!]_o$

b. $[\![IND]\!]_{ALT}([\![IP]\!]_{ALT}) = [\![IP]\!]_{ALT}$

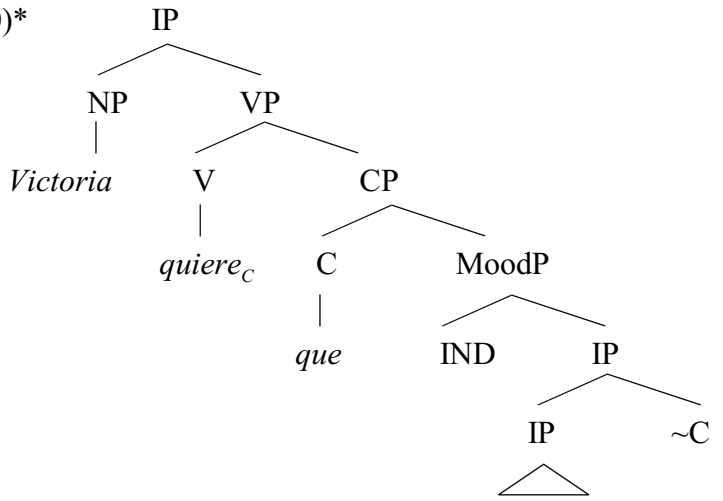
Is this definition of the IND-operator sufficient to exclude indicative clauses to appear under predicates such as *want*? The IND-operator does not evaluate alternatives that may be introduced by a focused constituent in the embedded clause, hence the combination of *want* with an indicative clause is, in principle, not interpretable (under the assumption that, just like in the case of *only*, C has to be constrained by focus and cannot be purely provided by context). However, we still have to exclude the possibility that the ~-operator could appear in an appropriate position in the structure and do the work that otherwise would be done by the $SUBJ_C$-operator. In other words, we have to exclude structures of the following kind:

(49)*



Sofía trae [una torta de chocolate]$_F$

(50)*



Sofía trae [una torta de chocolate]$_F$

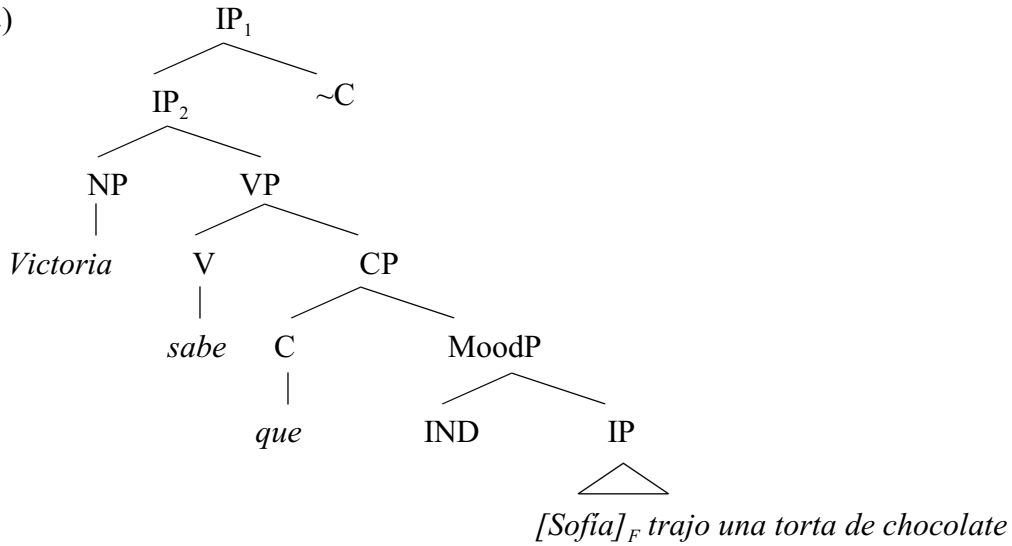
Hence, the IND-operator has to introduce some kind of constraint that prevents evaluation of alternatives at the level of the embedded clause. Notice that the ~-operator should still be able to appear in other positions in the tree. This is so since predicates that select the indicative mood also allow for focused constituents in the embedded clause:

(51) Victoria sabe que SOFIA trajo una torta de chocolate.
Victoria know that Sofia bring:PAST.IND.3SG a cake of chocolate.
'Victoria knows that SOFIA brought a chocolate cake.'

In this example, evaluation of contextual alternatives happens at the level of the whole clause. This is seen from the fact that (51) is felicitous in a context that provides

alternatives such as ‘Victoria knows that Marcel brought a chocolate cake’, ‘Victoria knows that Rafael brought a chocolate cake’. The corresponding tree structure is given in (52).

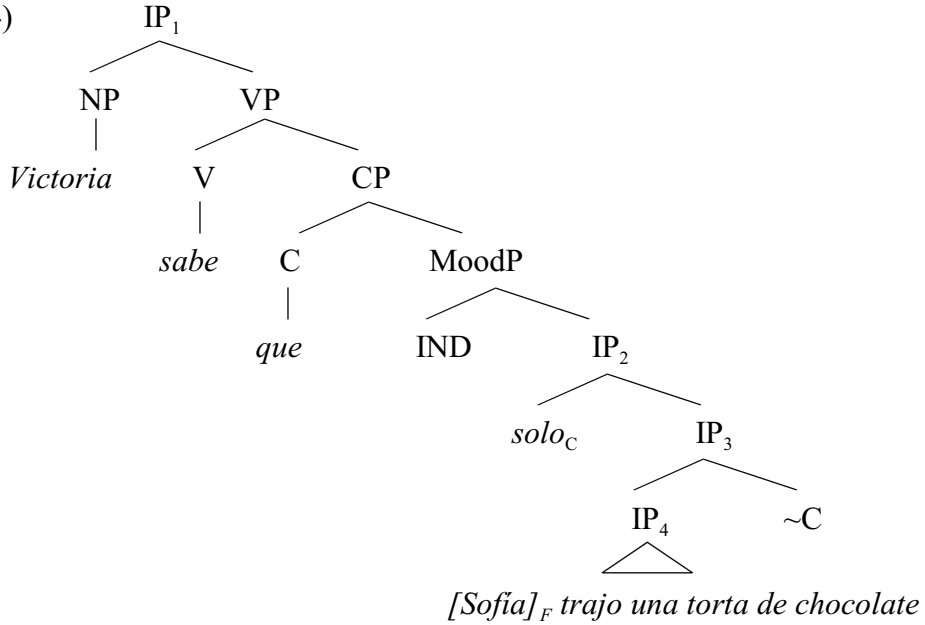
(52)



The following example illustrates that evaluation of contextual alternatives may also happen below the level of MoodP, for example in the presence of another focus sensitive operator such as *only:*

(53) Victoria sabe que solo SOFIA trajo una torta de chocolate.
Victoria knows that only Sofía bring:PAST.IND.3SG a cake of chocolate.
‘Victoria knows that only SOFIA brought a chocolate cake.’

(54)



In (54), at the level of MoodP, the alternatives have already been evaluated and are not available for another focus sensitive operator.

We can conclude that for predicates that select the indicative mood the following holds: evaluation of contextual alternatives is possible but not at the level of the embedded MoodP. I thus propose to revise the definition of the IND-operator, in order to block evaluation of alternatives at the level of MoodP:

(55) **Revised definition of IND**:

a. $\left\| \text{IND}_C \quad \text{IP} \right\|^g_o$ is only defined if

If there is a $g(C) \subseteq [\![\text{IP}]\!]^g_{ALT}$ then $g(C) = \{[\![\text{IP}]\!]^g_o\}$

when defined $\left\| \text{IND}_C \quad \text{IP} \right\|^g_o = [\![\text{IP}]\!]^g_o$

b. $\left\| \text{IND}_C \quad \text{IP} \right\|^g_{ALT} = [\![\text{IP}]\!]^g_{ALT}$

This new definition of the IND-operator introduces the presupposition that if there is a contextually available set of alternatives included in the alternative semantic value of the IP immediately below MoodP, it only contains one single element, namely the ordinary semantic value of that IP. This constraint prevents a predicate such as *want* to combine with an indicative clause: a contextually available singleton-set is not sufficient for the interpretation of *want.*

The definitions of SUBJ_C and IND_C capture the fact that predicates that select the subjunctive mood necessarily require the subjunctive mood in the embedded clause: SUBJ_C evaluates the contextual alternatives for the matrix predicate, IND_C prevents evaluation of the contextual alternatives for the matrix predicate. Finally, we need to ensure that the predicates that select the indicative mood also disallow the subjunctive mood in their complement clause. For the moment, nothing would prevent SUBJ_C to appear under a predicate that selects the indicative mood. To remedy for this, I propose that the following constraint holds for the operator SUBJ_C:

(56) **Constraint on SUBJc:**

$SUBJ_C$ can only be licensed if it appears in the scope of a focus sensitive operator.

$SUBJ_C$ is thus different from the ~-operator: ~C may appear in a sentence even in the absence of a focus sensitive operator. As it stands, this constraint on $SUBJ_C$ is a stipulation. However, it captures well the fact that subjunctive mood is essentially a phenomenon in embedded contexts. Furthermore, under certain circumstances, predicates that select the indicative mood do in fact allow for the subjunctive mood in the embedded clause as long as they are embedded under another operator such as negation or the question operator, as illustrated in the examples below.

(57) Lucho no dijo que la comida estuviera lista.
Lucho not said that the food be:PAST.SUBJ.3SG ready.
'Lucho didn't say that the food was ready.'

(58) Dijo Lucho que la comida estuviera lista?
Said Lucho that the food be:PAST.SUBJ.3S ready?
'Did Lucho say that the food was ready?'

$SUBJ_C$ thus can appear under predicates that select the indicative mood, as long as it is licensed by the presence of negation or the question operator. These are operators that are also known to be focus sensitive. In chapter 5, I will discuss such examples more in detail. The constraint captures the fact that the subjunctive mood can be licensed by other operators than the matrix predicate. My hope is that further investigation of the distribution of the subjunctive mood will provide additional support for the constraint in (56).[4]

To conclude, in this section, I have proposed that the semantic contribution of the subjunctive mood is to evaluate the contextual alternatives introduced in the embedded clause. To the contrary, the indicative mood blocks evaluation of contextual alternatives at the level of the embedded clause.

4.3 Consequences of a comparative semantics

The proposal defended here makes the following important claim: predicates that select the subjunctive mood introduce a gradable property (or ordering relation) with respect to which the contextual alternatives are compared. The ordering relation is contributed by the lexical meaning of each predicate. Under this assumption, we expect predicates that select the subjunctive mood, just like gradable adjectives, to appear in certain types of degree constructions. There is only one predicate class for which this expectation does not hold, namely the class of causative predicates. In chapter 3, I proposed for causative predicates such as *hacer* ('make') and *lograr* ('achieve') that the causative meaning is embedded within the meaning of the predicate. Causative predicates are thus not gradable predicates as a whole but rather contain a gradable meaning part. As a consequence, we do not expect them to behave like gradable predicates.

In the following, I first clarify which degree modifiers can give an indication as to whether a predicate is gradable or not. Then, I discuss the distribution of various degree modifiers such as *mucho* ('much'), *bastante* ('quite'), *demasiado* ('too much'), *enormemente* ('enormously'), and the comparative construction with predicates that select the subjunctive/indicative mood. The distribution of these degree modifiers provides further evidence for the proposal defended here: as predicted, predicates that select the subjunctive mood can appear in the relevant degree constructions. Finally, I refine my analysis to account for this possibility and propose that predicates that select the subjunctive mood have an extra degree argument.

4.3.1 Gradability in the adjectival/verbal domain

The literature on gradability concentrates mainly on adjectives.[5] The question whether predicates more in general can be classified as gradable or non-gradable is much less discussed in the literature.[6] We will see that the issue becomes more complex once we look at a wider range of predicates (adjectives as well as verbs).

I begin by defining what it means for a predicate to be gradable. Gradable predicates such as *tall* express properties that are ordering inducing: we can compare individuals according to whether they have the property of being tall to a greater or

lesser extent. Non gradable predicates such as *dead*, on the contrary, do not allow for such a comparison. Two individuals cannot differ in the extent to which they possess this property. Hence, the crucial difference between gradable and non gradable predicates is that the domains of gradable predicates can be partially ordered according to some gradient property, whereas the domains of non-gradable predicates cannot.

For adjectives, modifiers such as 'very' are an indicator of their gradable/non gradable nature: while gradable adjectives can combine with 'very', non gradable ones cannot. The sentence in (59) expresses that the victim is tall to a high degree, while the sentence in (60) cannot express that the victim is dead to a high degree:

(59) The victim is very tall.
(60) *The victim is very dead.

Another good test for the gradable/non gradable nature of an adjective is the comparative construction. Only gradable expressions can appear in comparative constructions:

(61) The victim is taller than his neighbor.
(62) *The victim is more dead than his neighbor.

When we turn to the verbal domain, the tests for gradability are less straightforward. Bolinger (1972) suggests that we can distinguish degree verbs from non degree verbs by their acceptance of lexical intensifiers such as *quite*, *rather*, *so,* etc. Thus, in the example (63), the acceptability of the modifier *quite* indicates that the predicate *exasperate* is a degree verb. The modifier *quite* expresses that there is a quite high degree of exasperation.

(63) He quite exasperates me. (Bolinger 1972)

However, Bolinger points out that such modifiers do not always signal degree modification. In fact, a number of these degree modifiers are ambiguous and do not necessarily modify the degree of the intensity of the property denoted by the predicate. For example, modifiers such as *much* and *so* can also be used to modify the

extensibility of a predicate. Bolinger (1972) notes that verbs are typically mass or plural-like and are fundamentally extensible, just like mass nouns. As a consequence, modification of extensibility is possible with a great majority of predicates, whether they are degree verbs or not. For example, in (64) and (65), modification with *much* and *so* does not express a modification of the intensity of the property, but rather a modification of the extensibility of the property. In these examples, the modifiers *much* and *so* indicate that the quantity of talking was high, not the intensity of talking.

(64) He talks too much.
(65) I wish she wouldn't talk so all the time ('do so much talking') (Bolinger 1972)

Similarly, in the comparative construction *more* indicates that his quantity of talking is higher than his neighbors', not that the intensity of his talking is higher:

(66) He talks more than his neighbor.

As a consequence, modifiers of this kind cannot be straightforwardly used to distinguish degree verbs from non degree verbs. In particular, in Spanish, a modifier such as *mucho* ('much') has been pointed out to be highly ambiguous. Rainer (1990) suggests that the interpretation of this modifier is context dependent and that, in a language such as German, it can be translated with up to four different modifiers. The following examples are taken from Rainer (1990).

(67) a. *querer mucho*:'sehr lieben' ('want intensely')
b. *viajar mucho*: 'viel reisen' ('travel a lot')
c. *convivir mucho*:'lange zusammenleben'('live together for a long time')
d. *abrir mucho* : 'weit aufmachen' ('open wide') (Rainer 1990, p.29)

When a predicate such as *reír* ('laugh') combines with *mucho*, Rainer claimes that it is at least three way ambiguous:

(68) *reír mucho*:'sehr/viel/lange lachen'('laugh intensely/a lot/for a long time.)
(Rainer 1990, p.30)

Hence, the modifier *mucho* ('much') may be used to express a high degree of the intensity of the property, but not necessarily so. It will thus not allow us to test whether predicates that select the subjunctive and the indicative mood can be classified as degree and non degree verbs respectively. We need to find a class of predicates that unambiguously modifies the degree of the intensity of a property.

Doetjes (1997) points out that there is one class of modifiers that is not ambiguous in this way, but has a much more restricted distribution: high degree adverbs such as *'enormously'* exclusively modify the degree of the intensity of a property. The examples illustrate that *enormously* can be used to express a very high degree of appreciation, but not to express a very high quantity of movie-going. High degree adverbs thus seem to be the best test to distinguish degree verbs from non degree verbs.

(69) John appreciated the movie enormously
(70) *Anne goes enormously to the movies. (Doetjes 1997, p.122)

In the following, I present the distribution of degree modifiers with predicates that select the subjunctive mood. We will see that, apart from certain directive and causative predicates, all predicates that select the subjunctive mood are gradable.[7]

4.3.2 The subjunctive mood and degree modification

We now turn to the distribution of degree modifiers with predicates that select the subjunctive mood. The conclusion of the previous section was that high degree adverbs are the best test for distinguishing degree verbs from non degree verbs. In order to show that a predicate is gradable, it is thus sufficient to test whether it allows for modification with *enormemente* ('enormously').

Indeed, a wide range of the predicates that select the subjunctive mood in Spanish allow for modification with *enormemente* ('enormously'). This holds for all desire predicates, most emotive factive predicates, all predicates of doubt, all predicates of probability and possibility and some of the directive and causative predicates. Below, I illustrate this with the desire predicate *desear* 'desire', the emotive factive predicate *alegrarse* ('be happy'), the predicate of doubt *dudar* ('doubt') and the

directive *sugerir* (‘suggest’). For a more complete list of predicates and their possible degree modifiers, see the appendix to chapter 4.

(71) Marcela desea enormemente que Rafael venga.
Marcela desires enormously that Rafael come:SUBJ.PRES.3SG.
‘Marcela enormously wants Rafael to come.’

(72) Sofía se alegra enormemente de que la vengan a visitar.
Sofía SE glad enormously of that PRO her come:PRES.SUBJ.3PL to visit.
‘Sofía is enormously glad that they will visit her.’

(73) Victoria duda enormemente que Rafael venga.
Victoria doubts enormemente that Rafael come:SUBJ.PRES.3SG.
‘Victoria enormously doubts that Rafael will come’

(74) Te sugiero enormemente que no salgas.
PRO you suggest enormously that PRO not leave:PRES.SUBJ.2SG.
‘I suggest enormously that you don’t leave’

However, among the emotive factive predicates, there are some predicates that cannot combine with high degree modifiers: certain predicates that express high extremes of scales such as *es estupendo* (‘it is great’), *es extraordinario* (‘it is extraordinary’), *es fabuloso* (‘it is fabulous’), as well as predicates that express a lower bound of a scale such as *aceptar* (‘accept’), *es admisible* (‘it is admissible’), and *es suficiente* (‘it is sufficient’). For predicates that express such extremes of scales it is not unexpected that they disallow high degree adverbs. High degree adverbs simply contribute redundant information in this case. Notice that all of these predicates allow for other degree modifiers such as *muy* (‘very’). Furthermore, as we will see below, they can also appear in comparative constructions.

There are also a few other emotive factive predicates that do not allow for high degree modifiers, such as *es lógico* (‘it is logic’), *es natural* (‘it is natural’), *es normal* (‘it is normal’), *es mejor* (‘it is better’) and *es peor* (‘it is worse’). For some reason, these predicates resist high degree modification. They do however allow for degree

modifiers such as *muy* (‘very’) and *mucho* (‘much’). Since all the above mentioned examples are adjectives, I will assume that the possibility of the modifier *muy* (‘very’) is sufficient a test to show that they denote gradable properties. Again, all of these predicates can also appear in comparative constructions.

Causative predicates such as *hacer* (‘make’), *conseguir* (‘achieve’), *lograr* (‘accomplish’), and *causar* (‘cause’) do not allow for degree modification. This is as expected: these predicates are not gradable as a whole but rather contain a causative meaning component that contributes a comparison relation (a relation of comparative similarity).

Finally, certain directive predicates also do not admit degree modification: *autorizar* (‘authorize’), *decidir* (‘decide’), *invitar a* (‘invite’), *mandar* (‘order’), *obligar* (‘obligar’), *ordenar* (‘order’), *prohibir* (‘forbid’), *permitir* (‘allow’), *solicitar* (‘ask’). One may assume that these predicates also contain a causative meaning component, and thus are not gradable as a whole, but rather contain a gradable meaning component. Under this assumption, we do not expect them to behave like gradable predicates.

As expected under the proposal, all predicates that select the subjunctive mood (with the exception of certain directive and causative predicates) allow for modification with a whole range of other degree modifiers such as *mucho* (‘much’), *bastante* (‘quite’), *tanto* (‘so much’), *demasiado* (‘too much’). Below, I illustrate this with the desire predicate *temer* (‘fear’), the emotive factive predicate *alegrarse* (‘be happy’), and the predicate of doubt *dudar* (‘doubt’). For a more complete list of predicates and their possible degree modifiers, see the appendix to chapter 4.

(75) Marcela teme mucho que Rafael venga.
Marcela fears much that Rafael come:SUBJ.PRES.3SG.
‘Marcela very much fears that Rafael will come.’

(76) Sofía se alegra tanto de que la vengan a visitar.
Sofía SE glad so of that PRO her come:PRES.SUBJ.3PL to visit.
‘Sofía is so glad that they will come to visit her.’

(77) Victoria duda bastante que Rafael venga.
Victoria doubts very much that Rafael come:SUBJ.PRES.3SG.
'Victoria very much doubts that Rafael will come.'

To conclude, in this section I have provided empirical evidence for the claim that predicates that select the subjunctive mood are gradable predicates. We now turn to the predicates that select the indicative mood.

4.3.3 The indicative mood and degree modification

The proposal defended here does not make any predictions with respect to the distribution of degree modifiers with predicates that select the indicative mood. The claim is simply that the semantics of these predicates does not involve comparison of contextual alternatives. Interestingly, we will see that the large majority of predicates that select the indicative mood are not gradable. Crucially, for the few cases in which degree modification *is* possible, I will show that the meaning of these predicates does not involve comparison of contextual alternatives, but rather some other type of comparison.

Notice that, with the exception of the class of predicates of certainty, none of the predicate classes that select the indicative mood allow for modification with high degree adverbs such as *enormemente* ('enormously'). The incompatibility with high degree adverbs is illustrated in the examples (78) to (81) with an epistemic predicate *saber* ('know'), a predicate of communication *decir* ('say'), a predicate of mental judgement *concluir* ('conclude'), and a predicate of perception *ver* ('see').

(78) *Sofia sabe enormemente que no puede venir.
Sofia knows enormously that PRO not can:PRES.IND.3SG come.
*'Sofia knows enormously that she cannot come.'

(79) *Alberto dijo enormemente que tenía hambre.
Alberto said enormously that PRO have:PAST.IND.3SG hungry.
* 'Alberto said enormously that he was hungry.'

(80) *Elena concluyó enormemente que se podía hacer algo.
Elena concluded enormously that PRO SE can:PAST.IND.3SG do something.'
*'Elena concluded enormously that something could be done.'

(81) *Victoria vió enormemente que hacía buen tiempo.
Victoria saw enormously that PRO make:PAST.IND.3SG good weather.
*'Victoria saw enormously that the weather was good.'

The predicate *creer* ('believe'), however, might be an exception. It marginally allows for modification with *enormemente* ('enormously'). In a web search, the following examples with the predicate *believe* were the only two examples of modification that I found:

(82) Leí en el internet acerca de la epidemia del dengue, y creí enormemente que nuestro centro podría ayudar.
'I read on the internet about the dengue-epidemy, and I believed enormously that our center could help.'

(83) Creemos enormemente que es una buena herramienta para compartir tu fe.
'We believe enormously that this is a good tool to share your faith.'

Similarly, predicates of certainty such as *estar seguro* ('be certain') and *estar convencido* ('be convinced') allow for modification with *enormemente* ('enormously'):

(84) Ana esta enormemente convencida de que esto es la mejor solución.
Ana is enormously convinced of that this is:PRES.IND.3SG the best solution.
'Ana is enormously convinced that this is the best solution.'

The fact that these predicates can combine with a high degree adverb seems to indicate that these predicates are gradable. Crucially, however, I will show that the semantics of these predicates does not involve comparison of contextual alternatives. Imagine again a context in which there are the following three possibilities: Sofia may bring a chocolate cake, she may bring an apple pie or she may bring ice cream. In this

scenario, the interpretation of a sentence containing the predicate *be certain* does not involve ranking the possible alternatives on a scale of *certainty*. For example, the sentence in (85) does not imply (86). Rather it implies (87):

(85) Victoria is certain that Sofia will bring chocolate cake.
(86) Victoria is less certain that Sofia will bring ice cream.
(87) Victoria is certain that Sofia will not bring ice cream.

Similarly, the sentence in (88) does not imply (89). Rather it implies (90):

(88) Victoria is very certain that Sofia will bring chocolate cake.
(89) Victoria is not so certain that Sofia will bring ice cream.
(90) Victoria is very certain that Sofia will not bring ice cream.

We have seen previously, in chapter 3, that for predicates such as *want* the contextual alternatives are ranked on a scale of desirability. Thus, if Victoria wants Sofia to bring chocolate cake, this implies that the other alternatives are ranked lower on the scale of Victorias desirability. As we have seen here, this is not the case for a predicate such as *be certain.* If Victoria is certain that Sofia will bring a chocolate cake, this does not imply that she is less certain about the other alternatives.

Predicates of communication and predicates of perception sometimes allow for modification with other degree adverbs such as *mucho* (‘much’), *bastante* (‘quite’), *tanto* (‘so much’) *demasiado* (‘too much’). Crucially, however, when these predicates are preceded by such modifiers, these can never express modification of the intensity of the property. Rather, when acceptable, they express modification of the ‘extensibility' of the predicate or repetition. Thus, in the example below, with the predicate of communication *decir* (‘say’), *demasiado* can only mean ‘too often' and not ‘too intensely'.

(91) Alberto dijo demasiado que tenía hambre.
Alberto said too-much that PRO have:PAST.IND.3SG hunger
‘Alberto said too often that he was hungry.

With epistemic predicates, commissives, fiction predicates and predicates of mental judgment these modifiers are inacceptable. Below, I provide examples with the epistemic predicate *saber* ('know'), the fiction predicate *soñar* ('dream'), the commissive predicate *prometer* ('promis') and the predicate of mental judgment *concluir* ('conclude').

(92) *Rafael sabe mucho que no tiene razón.
Rafael knows much that PRO not have:IND.PRES.3SG right.
'Rafael much knows that he is not right.'

(93) *Juan soñó demasiado que lo dejaban solo.
Juan dreamt too-much that PRO him leave:PAST.IND.3SG alone.
'*Juan dreamt too much that they left him alone.'

(94) *Rafael promete mucho que podrá venir.
Rafael promises much that PRO can:FUT.IND.3SG come.
'*Rafael promises much that he will be able to come.'

(95) *Ana concluye bastante que Rafael no ha venido.
Ana concludes quite that Rafael not have:PRES.IND.3SG come.
'*Ana quite concludes that Rafael has not come.'

Epistemic predicates, predicates of certainty and predicates of mental judgment can combine with the modifiers *muy bien* ('very well') and *completamente* ('completely'), as exemplified here with the epistemic predicate *saber* ('know'):

(96) Antonio sabe muy bien que no puede venir.
Antonio knows very well that PRO not can:IND.PRES.3SG come.
'Antonio knows very well that he cannot come.'

These types of modifiers do not modify the extensibility of the predicate. Crucially, however, the fact that these modifiers can combine with predicates that select the indicative mood is not an indication that these predicates have a semantics that

involves comparison of contextual alternatives. Kennedy & McNally (1999) argue that adverbs such as *well* and *completely* signal that the predicate they modify denotes a closed scale. Notice that the distinction to observe is that, in these cases, the scale involved ranks the complement clause p with respect to proper parts of it, rather than with respect to its contextual alternatives. 'To know p partially/completely' means to know some proper parts/all parts of p. Crucially, 'to know p' does not mean that the contextual alternatives to p a ranked lower on a scale of knowledge. Kennedy and McNally(1999) propose that predicates that allow such modifiers closely correspond to the class of verbs that introduce incremental themes.With these predicate classes it is possible to establish a homomorphic relationship between the events they denote and their incremental theme argument. A predicate such as *know* is thus not necessarily gradable even if it allows for this type of modification.[8]

4.3.4 The comparative construction

In this section, we will look at one further type of empirical evidence for the proposal, namely the kind of comparative construction illustrated in the example (97).

(97) It is more likely that Sofia will bring a chocolate cake than that she will bring an apple pie.

Notice that, in this example, overt comparison is established between two of the possible alternatives, namely 'that Sofia will bring a chocolate cake' and 'that Sofia will bring an apple pie'. This kind of comparative construction is thus a very straightforward test for the proposal developed here. As expected, apart from the class of directives and causatives, all predicate classes that select the subjunctive mood can appear in such comparative constructions. To the contrary, predicates that select the indicative mood cannot appear in comparative constructions of this kind.[9]

Below I provide some examples for the desire predicate *temer* ('fear'), the emotive factive predicate *preocuparse* ('worry'), the predicate of doubt *dudar* ('doubt'), and the verb of probability *es probable* ('it is probable').

(98) Sofia teme más que pueda perder su trabajo que no que tenga que trabajar demasiado.
'Sofia fears more that she could loose her job than that she may have to work too much.'

(99) A Marcela le preocupa más que Lucia se aburra en la fiesta que no que beba demasiado.
'Marcela is more worried that Lucia may get bored at the party than that she may drink too much.'

(100) Sofia duda más que Lucia venga a la fiesta que no que Rafael venga.
'Sofia doubts more that Lucia will come to the party than that Rafael will come.'

(101) Es más probable que Rafael venga a la fiesta que no que Lucia venga.
'It is more likely that Rafael will come to the party than that Lucia will come.'

This kind of comparative construction is impossible with predicates that select the indicative mood, as exemplified below:

(102) *Sofia sabe más que Lucia vendrá a la fiesta que no que Rafael vendrá.
*'Sofia knows more that Lucia will come to the party than that Rafael will come.'

(103) *Sofia comprendio más que tenía que trabajar demasiado que no que podía cambiar de trabajo.
'*Sofia understood more that she had to work too much than that she could change her job.'

With predicates of communication, the comparative construction sometimes *is* marginally possible. But, then, the comparison is not with respect to the intensity of the property denoted by the predicate but rather with respect to its extensibility. Thus, *more* then means 'more often':

(104) Rafael dijo más (a menudo) que quería volver a casa que no que quería ver a sus amigos.
'Rafael said more (often) that he wanted to come home than that he wanted to see his friends.'

With some predicates of mental judgement, the comparative construction is also marginally possible. But, here, the comparison is with respect to the part/whole structure of the predicate and *more* then means 'better'. Notice that examples with two embedded clauses are rather difficult to construct, and that the comparative is really only acceptable when two NPs are compared:

(105) Rafael se acuerda más de su bisabuela que de su abuela.
'Rafael remembers more his great grandmother than his grandmother.'

To conclude, in this section, I have presented further empirical evidence for the proposal developed here: predicates that select the subjunctive mood can combine with degree modifiers and can appear in a certain type of comparative construction. In the following section, I refine and extend my analysis to account for this fact.

4.3.5 Proposal: predicates that select the subjunctive mood have a degree argument

In the previous section, I concluded that predicates that select the subjunctive mood, just like gradable adjectives, allow for modification with certain degree modifiers and can appear in comparative constructions. In this section, I refine my proposal in order to accommodate these facts. In doing so, I will follow recent semantic literature that has adopted a scalar analysis[10] for the semantics of gradable adjectives.

In the scalar approach, gradable adjectives are analyzed as relations between individuals and degrees. In the literature, there are different variants as to what exactly the denotation of a gradable adjective should be. I will assume here that a predicate such as *tall* is a function of type <d,<e,<s,t>>> :

(106) ⟦*tall*⟧ = $\lambda d_d.\lambda x_e.\lambda w_s$. x is tall to a degree d in w.

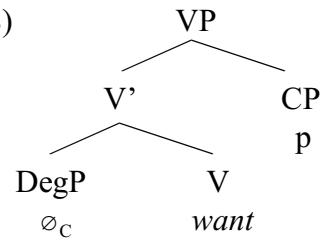
Similarly, I will assume that the predicate *want* is a function of type <d,<<s,t>,<e,<s,t>>>>:

(107) ⟦*want*⟧ = $\lambda d.\lambda p.\lambda x.\lambda w$. x wants p to a degree d in w.

The degree morphology then applies to this function and imposes some requirement on the degree. This requirement is different for each type of degree construction (absolute, comparative, superlative and equative constructions). For each different construction in which the predicate may appear, this degree morpheme introduces a different ordering relation. In absolute constructions, the ordering relation is contributed by an abstract ∅-morpheme. In comparative, superlative and equative constructions the overt morphemes *more, less, most* or *as* take the place of this abstract ∅-morpheme.

I will thus propose that, for predicates such as *want*, the comparison relation is introduced by an abstract ∅-morpheme. Notice that, in such an analysis, the ∅-morpheme has the meaning of a superlative morpheme, rather than an absolute morpheme (as is the case for adjectives). I will not make any commitments as to what exactly the syntax of the verbal projection should be (see, for example, Kennedy 1999 who proposes that adjectives have an extended projection DegP that hosts their degree morphology). For the sake of simplicity, I will assume that the degree morpheme is attached at the V'-level, in the same position in which we find other verbal modifiers. For the predicate *want*, this abstract ∅-morpheme carries the variable C (which refers to the set of contextual alternatives to p):

(108)



The denotation of the whole VP should be the following:

(109) $[\![VP]\!]^g =$ $\lambda x.\lambda w.\ \forall\ q: q \neq p\ \&\ q \in g(C)$:
$\max(\lambda d.$ x wants p to a degree d in w) > $\max(\lambda d'.$ x wants q to a degree d' in w)

where $\max(S) = \iota x: x \in S\ \&\ \forall y[y \in S \Rightarrow y \trianglelefteq x]$

We obtain this meaning from the two following parts:

(110) $[\![want]\!]^g$ = $\lambda d.\lambda p.\lambda x.\lambda w.$ x wants p to a degree d in w.

(111) $[\![\varnothing_C]\!]^g$ = $\lambda P_{<d,<st,<e,st>>>}.\lambda p.\lambda x.\lambda w.\ \forall q: q \neq p\ \&\ q \in g(C)$:
$\max(\lambda d.P(d)(p)(x)(w)) > \max(\lambda d'.P(d')(q')(x)(w))$

In fact, some clarification is in order to explain how this proposal for the meaning of the predicate *want* is related to the one developed previously in chapter 3, p.106. Based on the definition of the relation $>_{DES\alpha,w}$, we can express the meaning of a degree by defining an equivalence relation (following Cresswell1976).

(112) Definition of an Equivalence Relation $\approx$:
$p \approx q$ iff $\forall\ z: (p >_{DES\alpha,w} z$ iff $q >_{DES\alpha,w} z)\ \&\ (z >_{DES\alpha,w} p$ iff $z >_{DES\alpha,w} q)$

We can now define a relation $\succ_{>DES\alpha,w}$ between degrees based on the relation $>_{DES\alpha,w}$.. $\mathscr{F}(\succ_{>DES\alpha,w})$ ist the set of all $>_{DES\alpha,w}$ -equivalence classes ($\mathscr{F}$ stands for field of a relation: "the set of all things that are related in one direction or another to something else" Cresswell1976, p. 266, and $\underline{p}$ stands for the degree to which p is desirable):

(113) $\underline{p} \in \mathscr{F}(\succ_{>DES\alpha,w})$ iff $\exists p \in \mathscr{F}(>_{DES\alpha,w})$: $\underline{p} = \{z: z \approx p\}$

(114) $\underline{p} \succ_{>DES\alpha,w} \underline{q}$ iff $p >_{DES\alpha,w} q$

The meaning of the predicate *want* should thus be as follows:

(115) $[\![want]\!]^g$ = $\lambda d.\lambda p.\lambda x.\lambda w.$ x wants p to a degree d in w.
where $d \in \mathscr{F}(\succ_{>DESx,w})$

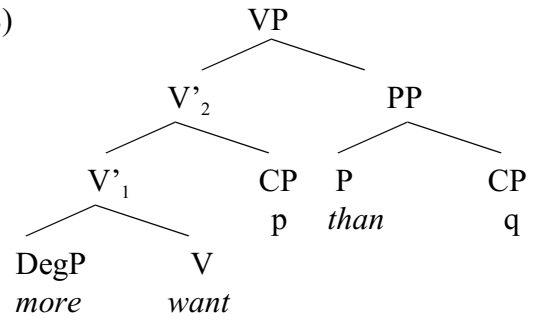
(116) $[\![\varnothing_C]\!]^g = \lambda P_{<d,<st,<e,st>>>}.\lambda p.\lambda x.\lambda w.\ \forall q: q \neq p \ \& \ q \in g(C)$:
$\max(\lambda d.P(d)(p)(x)(w)) \succ_{>DESx,w} \max(\lambda d'.P(d')(q')(x)(w))$
where $d \in \mathscr{F}(\succ_{>DESx,w})$
and $\max(S) = \iota x: x \in S \ \& \ \forall y[y \in S \Rightarrow y \trianglelefteq x]$

(117) $[\![VP]\!]^g =$ $\lambda x.\lambda w.\ \forall q: q \neq p \ \& \ q \in g(C)$: max(λd. x wants p to a degree d in w)
$\succ_{>DESx,w}$ max(λd'. x wants q to a degree d' in w)
where $d \in \mathscr{F}(\succ_{>DESx,w})$
and $\max(S) = \iota x: x \in S \ \& \ \forall y[y \in S \Rightarrow y \trianglelefteq x]$

The definition in (117) thus replaces the previous definition of the meaning of the predicate *want* (definition (36), chapter 3, p.106). Notice that this proposal amounts to analyzing the comparative as a phrasal comparative, following Heim(1985).

When an overt degree modifier is present, it replaces the ∅-morpheme. I illustrate this here for the comparative construction, in which the DegP hosts the comparative morpheme *more.* The relevant LF representation is given below.

(118)



The computation of the meaning of the whole VP is essentially the same as above. Simply, here, the ∅-morpheme has been replaced by the comparative morpheme *more* and the PP introduces the second alternative proposition. In the overt comparative, no variable C is introduced since the relevant alternatives to be compared are both mentioned explicitly in the construction.

The meaning of the comparative morpheme is as follows:

(119) $[\![more]\!] = \lambda P_{<d,<st,<e,st>>>}.\ \lambda p.\lambda q.\lambda x.\lambda w.\ \max(\lambda d.P(d)(p)(x)(w)) \succ_{>DESx,w}$
$\max(\lambda d'.P(d')(q')(x)(w))$

The comparative morpheme combines with the meaning of the verb to form the V':

(120) $[\![V'_1]\!]$ = $[\![more]\!]([\![want]\!])$ = $\lambda p.\lambda q.\lambda x.\lambda w.$ max($\lambda d.$ x wants p to a degree d in w) $\succ_{>DESx,w}$ max($\lambda d'$.x wants q to a degree d' in w)

$[\![V'_2]\!]$ = $[\![V'_1]\!]([\![CP]\!])$ = $\lambda q.\lambda x.\lambda w.$max($\lambda d.$ x wants p to a degree d in w) $\succ_{>DESx,w}$ max($\lambda d'.$ x wants q to a degree d' in w)

The V' combines with the PP that introduces the second proposition and results in the meaning of the VP:

(121) $[\![VP]\!]$ = $[\![V'_2]\!]([\![PP]\!])$ = $\lambda x.\lambda w.$max($\lambda d.$ x wants p to a degree d in w) $\succ_{>DESx,w}$ max($\lambda d'.$ x wants q to a degree d' in w)

To conclude, in this section, I have refined my proposal for the semantics of the predicates that select the subjunctive mood. Following the recent literature on the semantics of gradable predicates, I have proposed that these predicates have an additional degree argument. Furthermore, the meaning of the predicate is decomposed into two parts. The predicate introduces the dimension of the predicate (for the predicate *want* the dimension is desirability), and the ∅-morpheme introduces the comparative meaning component, as well as the variable C. When these predicates are modified by some degree modifier such as *mucho* ('much') or *enormemente* ('enormously'), or appear in a comparative construction, the ∅-morpheme in DegP is replaced by the corresponding degree morpheme.

4.4 Conclusion

In this chapter, two main aspects of my proposal have been developed further: the focus sensitivity of the predicates that select the subjunctive mood, and the gradable nature of these predicates.

First, I have presented evidence that allows us to argue that the predicates that select the subjunctive mood are indeed focus sensitive. We have seen that differences in focus structure in the embedded clause have a truth conditional effect. Then, I have addressed the question of what the role of the subjunctive mood in the meaning composition is. In the analysis developed in this chapter, the contextual alternatives are

introduced by the focused constituent in the embedded clause, and the subjunctive mood has the role of evaluating these contextual alternatives for the matrix predicate.

Second, I have presented empirical evidence for a comparative semantics of the predicates that select the subjunctive mood. The proposal defended here makes the claim that predicates that select the subjunctive mood introduce a gradable property with respect to which the contextual alternatives are compared. As a consequence, we expect predicates that select the subjunctive mood to combine with certain types of degree modifiers. I have discussed the distribution of various degree modifiers such as *mucho* ('much'), *bastante* ('quite'), *demasiado* ('too much'), *enormemente* ('enormously'), and the comparative construction with predicates that select the subjunctive/indicative mood. I have argued that the distribution of these degree modifiers provides further evidence for the proposal defended here. Finally, I have extended my analysis to account for the possibility of degree modifiers with the predicates that select the subjunctive mood. In the revised analysis, these predicates carry an extra degree argument.

NOTES

[1] The fact that the predicate *know* is not focus sensitive can best be illustrated with a dialogue. If speaker A says: "Lisa knows that John teaches syntax ON TUESDAYS AND THURSDAYS.", speaker B cannot reply "No, that's not true. Lisa knows that JOHN teaches syntax on Tuesdays and Thursdays." without contradicting himself. This is different for the predicate *want.* If speaker A says: "Lisa wants John to teach syntax ON TUESDAYS and THURSDAYS.", speaker B can than naturally reply "No , that's not true. Lisa wants JOHN to teach syntax on Tuesdays and Thursdays." without uttering a contradiction.

[2] See Bhatt & Yoon (1991) for arguments for the existence of the functional projection MoodP. In proposing that MoodP is between CP and IP, I follow Kempchinsky (1998) and references therein.

[3] My proposal makes the prediction that there should be an interaction when the subjunctive mood appears next to another focus sensitive operator in the sentence. When *only* is in the scope of the predicate *want* we predict that the alternatives generated by the focus in the scope of *only* are not accessible anymore. This seems to be indeed the case, as illustrated with the example in (1).

(1) Victoria quiere que Sofia solo traiga UNA TORTA DE CHOCOLATE
Victoria wants that Sofia only bring:PAST.SUBJ.3SG a cake of chocolate.
'Victoria wants Sofia to only bring A CHOCOLATE CAKE.'

In this example, the predicate *want* cannot associate with the embedded focus [a chocolate cake]$_F$. If this were so, the alternatives for comparison in this example would be: 'Sofia only brings a chocolate cake', 'Sofia only brings ice cream', 'Sofia only brings an apple pie'. Rather, the correct relevant alternatives are 'Sofia only brings a chocolate cake', 'Sofia also brings an ice cream', 'Sofia also brings an apple pie'. In other words, the predicate *want* associates with [only brings a chocolate cake]$_F$. The correct structure of the sentence thus contains two foci:

(2) Victoria wants Sofia [to only bring [a chocolate cake]$_F$]$_F$

We also expect interaction when the predicate *want* is in the scope of *only.* In the example below, *only* should not be able to associate with [a chocolate cake]$_F$

(3) Victoria solo quiere que Sofia traiga UNA TORTA DE CHOCOLATE.
Victoria only wants that Sofia bring:PRES.SUBJ.3SG a cake of chocolate.
'Victoria only wants Sofia to bring A CHOCOLATE CAKE.'

We expect the same to hold for other predicates that select the subjunctive mood such as *be glad,* but not for predicates that select the indicative mood such as *know:*

(4) Victoria solo se alegra de que Sofia trajera UNA TORTA DE CHOCOLATE
Victoria only SE glad of that Sofia bring:PAST.SUBJ.3SG a cake of chocolate.
'Victoria is only glad that Sofia brought A CHOCOLATE CAKE.'

(5) Victoria solo sabe que Sofia trajo UNA TORTA DE CHOCOLATE.
Victoria only knows that Sofia bring:PAST.IND.3SG a cake of chocolate.

'Victoria only knows that Sofia brought A CHOCOLATE CAKE.'

The interpretation of examples (3) to (5) is not very clear. My intuition is that, in the case of the predicate *know, only* can clearly associate with [a chocolate cake]$_F$, as expected under my proposal. My intuitions are however less clear for the other examples. Example (4) only seems to make sense if we put focus on the verb rather than on a constituent in the embedded clause.

[4] The constraint on SUBJc may also provide an explanation for the facts discussed in section 3.21. Hooper (1975) argued that predicates that select the indicative mood are 'assertive' predicates because they allow their complements to be preposed, contrary to predicates that select the subjunctive mood. I repeat the English examples here:

(6) Many of the applicants are women, it seems.
(7) He wants to hire a woman, he says.
(8) Factivity is important in other constructions as well, they supposed.

(9) *Many of the applicants are women, it's likely.
(10) *He wants to hire a woman, it's possible.
(11) *Factivity is important in other constructions as well, it's probable.

I will not try to give a semantic analysis of such sentences. But, if the preposing operation indeed moves the clause out of the semantic scope of the operator, the constraint on SUBJc derives the Spanish facts: a subjunctive clause needs to stay in the semantic scope of its licenser, in this case the matrix predicate.

[5] See Bartsch & Venneman(1973), Bierwisch(1989), Cresswell (1976), Heim (1985, 2000), Kennedy (1999,2001), Klein (1991), Rullmann (1995), Seuren (1973), von Stechow (1984a,b), and others.

[6] Important exceptions are Bolinger (1972) for English, Egea(1979) for Spanish and Doetjes(1997) for French. Bolinger distinguishes between degree and non degree verbs, Egea distinguishes between 'verbos intensificables por naturaleza' ('verbs that are intensifiable by nature') and 'verbos intensificables por extensión' ('verbs that are intensifiable by extension').

[7] Interestingly, Egea(1979) provides a classification of degree and non degree predicates in Spanish that is independent of whether they select the subjunctive or indicative mood. Crucially, predicates that select the indicative mood can only be found among what he calls *verbos intensificables por extensión* (non degree verbs) and not among what he calls *verbos intensificables por naturaleza* (degree verbs). The opposite holds for predicates that select the subjunctive mood.

[8] In the philosophical literature, there is also some discussion about the question whether *know* is gradable or not. See, for example, Dretske (1981) who says: "When talking about people, places and topics (*things* rather than facts), it makes sense to say that one person knows something *better than* another... But factual knowledge, the knowledge *that* something is so, does not admit of such comparisons. If we both know that today is Friday, it makes no sense to say that you know this better than I." (p.363).

See also the following footnote: “I know we sometimes say things that suggest a comparison of this sort (e.g., No one knows better than I that there are a lot of mosquitoes in the Northwest Territories), but I take such constructions to be describing not better knowledge, but more direct, more compelling kinds of knowledge.” (Footnote 1, p.363)

See also Stanley (2004) who provides various linguistic arguments to show that *know* is not gradable. The fact that modification with ‘very well’ is possible is not taken to be evidence against that. He claims that ‘very well’ is not a true semantic modifier, but rather a ‘pragmatic indicator’.

[9] Stanley (2004) provides some interesting examples for English. *Know* cannot appear in a comparative construction, but *regret*, and *it is possible* can:

(12) ??Hannah knows that Bush is president more than she knows that Clinton was president.
(13) Hannah regrets that she is unemployed more than she regrets that she is unpopular.
(14) It is more possible that Hannah will become a philosopher than it is that she will become a mathematician.

[10] See for example Bartsch & Venneman (1973), Bierwisch (1989), Cresswell (1976), Heim (1985, 2000), Kennedy (1999,2001), Kennedy & McNally (2005), Klein (1991), von Stechow (1984a,b). See Kennedy (1999) for an overview of scalar analyses of gradable adjectives.

APPENDIX TO CHAPTER 4

Predicates and their degree modifiers

In this appendix, I provide a (non-exhaustive) list of predicates collected from Sastre (1997) and Borrego et al. (1985) along with their possible degree modifiers.

A. PREDICATES THAT SELECT THE INDICATIVE MOOD

	enormemente	*mucho* or *muy* (intensity)	comparative construction (intensity)	*mucho* (extensibility)	comparative construction (not intensity)
EPISTEMIC PREDICATES					
saber ('know')					✔
creer ('believe')	✔	✔	✔		
pensar ('think')					
PREDICATES OF COMMUNICATION					
aclarar ('clarify')					✔
advertir ('warn')				✔	✔
afirmar ('affirm')				✔	✔
añadir ('add')					
anunciar ('announce')					✔
asegurar ('assure')				✔	✔
avisar ('notify')					✔
certificar ('certify')					
comunicar ('communicate')					✔

	enormemente	*mucho* or *muy* (intensity)	comparative construction (intensity)	*mucho* (extensibility)	comparative construction (not intensity)
confesar (confess')					
confirmar ('confirm')					
confiar ('make a confidence')					
contar ('tell')				✔	✔
contestar ('respond')					
comentar ('comment')					✔
declarar ('declare')					✔
defender ('defender')				✔	✔
decir ('say')				✔	✔
demostrar ('demonstrate')					✔
denunciar ('denounce')				✔	✔
divulgar ('divulge')				✔	✔
enseñar ('show'/'teach')					✔
escribir ('write')				✔	✔
explicar ('explain')				✔	✔
exponer (expose')					✔
expresar ('express')				✔	
gritar ('shout')				✔	✔

	enormemente	*mucho* or *muy* (intensity)	comparative construction (intensity)	*mucho* (extensibility)	comparative construction (not intensity)
indicar (‘indicate’)					
informar (‘inform’)					✔
jurar (‘swear’)					
leer (‘read’)				✔	✔
mencionar (‘mention’)				✔	✔
murmurar (‘mumble’)				✔	✔
notificar (‘notificar’)					
ocultar (‘hide’)				✔	✔
precisar (‘make precise’)				✔	✔
prevenir (‘forewarn’)				✔	✔
pronosticar (‘forecast’)					
replicar (‘reply’)					
repetir (‘repeat’)				✔	✔
responder (‘respond’)					
revelar (‘reveal’)					
señalar (‘point out’)					
PREDICATES OF CERTAINTY					
estar convencido (‘be convinced’)		✔	✔		

	enormemente	*mucho* or *muy* (intensity)	comparative construction (intensity)	*mucho* (extensibility)	comparative construction (not intensity)
estar seguro ('be certain')		✔	✔		
es cierto ('it is a matter of fact')		✔			
es claro ('it is clear')		✔	✔		
es obvio ('it is obvious')		✔	✔		
es evidente ('it is evident')		✔	✔		
COMMISSIVES					
prometer ('promise')				✔	✔
ofrecer ('offer')				✔	✔
proponer ('propose')				✔	✔
FICTION VERBS					
soñar ('dream')				✔	✔
imaginar ('imagine')				✔	
PREDICATES OF MENTAL JUDGEMENT					
acordarse ('remember')				✔	✔
adivinar ('guess')					
anticipar ('anticipate')					✔
aprender ('learn')					

	enormemente	*mucho* or *muy* (intensity)	comparative construction (intensity)	*mucho* (extensibility)	comparative construction (not intensity)
averiguar ('find out')					
comprobar ('verify')					✔
comprender ('understand')					✔
concluir ('conclude')					
considerar ('consider')					
constatar ('realize')					
darse cuenta ('realize')					
demostrar ('demonstrate')					✔
descubrir ('discover')					
deducir ('deduce')					
enterarse de ('find out')					✔
estar de acuerdo ('agree')		✔			
intuir ('intuir')					
ignorar ('ignore')					
olvidar ('forget')					✔
reconocer ('acknowledge')					
sospechar ('suspect')					

	enormemente	*mucho* or *muy* (intensity)	comparative construction (intensity)	*mucho* (extensibility)	comparative construction (not intensity)
suponer (‘suppose’)					
tener en cuenta (‘consider’)					✔
verificar (‘verify’)					✔
PREDICATES OF PERCEPTION					
escuchar (‘listen’)				✔	✔
notar (‘notice’)				✔	
observar (‘observe’)				✔	
sentir (‘feel’)					
ver (‘see’)					
entender (‘hear’)				✔	
percibir (‘perceive’)					

PREDICATES THAT SELECT THE SUBJUNCTIVE MOOD

	enormemente	*mucho* or *muy* (intensity)	comparative construction (intensity)	*mucho* (extensibility)	comparative construction (not intensity)
DESIRE PREDICATES					
anhelar (‘yearn’)	✔	✔	✔		
aspirar (‘aspire’)	✔	✔	✔		
confiar (‘be confident’)	✔	✔	✔		
esperar (‘hope’)	✔	✔	✔		
desear (‘desire’)	✔	✔	✔		
preferir (‘prefer’)	✔	✔	✔		
temer (‘fear’)	✔	✔	✔		
tener miedo (‘fear’)	✔	✔	✔		
EMOTIVE FACTIVE PREDICATES					
admirar (‘admire’)	✔	✔	✔		
aplaudir (‘aplaude’)	✔	✔	✔		
aburrir (‘be bored’)	✔	✔	✔		
agradar (‘be pleased’)	✔	✔	✔		
alegrar (‘be glad’)	✔	✔	✔		
apenar (‘be sorry’)	✔	✔	✔		
aceptar (‘accept’)			✔		

	enormemente	*mucho* or *muy* (intensity)	comparative construction (intensity)	*mucho* (extensibility)	comparative construction (not intensity)
arrepentir (‘repent’)	✔	✔	✔		
avergonzar (‘be ashamed’)	✔	✔	✔		
cansar (‘be tired’)	✔	✔	✔		
celebrar (‘celebrate’)	✔	✔	✔		
convenir (‘it is convenient’)	✔	✔	✔		
dar pena (‘be sorry’)	✔	✔	✔		
deplorar (‘deplore’)	✔	✔	✔		
desesperar (‘be desperate’)	✔	✔	✔		
detestar (‘hate’)	✔	✔	✔		
disgustar (‘displease’)	✔	✔	✔		
divertir (‘amuse’)	✔	✔	✔		
doler (‘hurt’)	✔	✔	✔		
echar de menos (‘miss’)	✔	✔	✔		
emocionar (‘be moved’)	✔	✔	✔		
encantar (‘be excited’)	✔	✔	✔		
enfadar (‘it is upsetting’)	✔	✔	✔		
enojar (‘it is annoying’)	✔	✔	✔		
entristecer (‘it is saddening’)	✔	✔	✔		

	enormemente	*mucho* or *muy* (intensity)	comparative construction (intensity)	*mucho* (extensibility)	comparative construction (not intensity)
entusiasmar ('it is exciting')	✔	✔	✔		
fascinar ('it is fascinating')	✔	✔	✔		
fastidiar ('it is bothering')	✔	✔	✔		
gustar ('like')	✔	✔	✔		
horrorizar ('it is horrifying')	✔	✔	✔		
importar ('care')	✔	✔	✔		
interesar ('it is interesting')	✔	✔	✔		
lamentar ('regret')	✔	✔	✔		
maravillar ('be amazed')	✔	✔	✔		
molestar ('be disturbed')	✔	✔	✔		
preocupar ('be worried')	✔	✔	✔		
quejar ('complain')	✔	✔	✔		
sentir ('be sorry')	✔	✔	✔		
sorprender ('be surprised')	✔	✔	✔		
soportar ('stand')	✔	✔	✔		
tolerar ('tolerate')	✔	✔	✔		

	enormemente	*mucho* or *muy* (intensity)	comparative construction (intensity)	*mucho* (extensibility)	comparative construction (not intensity)
Adjectives					
es adecuado ('it is adequate')		✔	✔		
es admisible ('it is admissible')		✔	✔		
es agradable ('it is pleasant')	✔	✔	✔		
es bueno ('it is good')	✔	✔	✔		
es comodo ('it is comfortable')	✔	✔	✔		
es comprensible ('it is understandable')	✔	✔	✔		
es conveniente ('it is convenient')	✔	✔	✔		
es dificil ('it is difficult')	✔	✔	✔		
es divertido ('it is funny')	✔	✔	✔		
es estupendo ('it is great')			✔		
es estúpido ('it is stupid')	✔	✔	✔		
es extraordinario ('it is extraordinary')		✔	✔		
es extraño ('it is strange')	✔	✔	✔		
es fabuloso ('it is fabulous')			✔		

	enormemente	*mucho* or *muy* (intensity)	comparative construction (intensity)	*mucho* (extensibility)	comparative construction (not intensity)
es fantástico ('it is fantastic')		✔	✔		
es horroroso ('it is horrible')	✔	✔	✔		
es importante ('it is important')	✔	✔	✔		
es indignante ('it is revolting')	✔	✔	✔		
es interesante ('it is interesting')	✔	✔	✔		
es justo ('it is fair')		✔	✔		
es lamentable ('it is regrettable')	✔	✔	✔		
es lógico ('it is logic')		✔	✔		
es malo ('it is bad')		✔	✔		
es molesto ('it is annoying')	✔	✔	✔		
es maravilloso ('it is amazing')		✔	✔		
es mejor ('it is better')		✔	✔		
es natural ('it is natural')		✔	✔		
es normal ('it is normal')		✔	✔		
es penoso ('it is shameful')	✔	✔	✔		
es peligroso ('it is dangerous')	✔	✔	✔		

	enormemente	*mucho* or *muy* (intensity)	comparative construction (intensity)	*mucho* (extensibility)	comparative construction (not intensity)
es raro ('it is strange')	✔	✔	✔		
es razonable ('it is reasonable')	✔	✔	✔		
es repugnante ('it is disgusting')	✔	✔	✔		
es ridículo ('it is ridiculous')	✔	✔	✔		
es sorprendente ('it is surprising')	✔	✔	✔		
es sospechoso ('it is suspicious')	✔	✔	✔		
es triste ('it is sad')	✔	✔	✔		
es urgente ('it is urgent')	✔	✔	✔		
es útil ('it is useful')	✔	✔	✔		
es vergonzoso ('it is shameful')	✔	✔	✔		
estar acostumbrado a ('be used to')	✔	✔	✔		
estar asustado de ('be scared')	✔	✔	✔		
estar cansado de ('be tired')	✔	✔	✔		
estar contento de ('be happy')	✔	✔	✔		
estar encantado de ('be charmed')	✔	✔	✔		

	enormemente	*mucho* or *muy* (intensity)	comparative construction (intensity)	*mucho* (extensibility)	comparative construction (not intensity)
estar extrañado de ('be estranged')	✔	✔	✔		
estar harto de ('be tired')	✔	✔	✔		
estar orgulloso de ('be proud of')	✔	✔	✔		
estar satisfecho de ('be satisfied')	✔	✔	✔		
PREDICATES OF DOUBT					
dudar ('dudar')	✔	✔	✔		
es dudoso ('it is doubtful')	✔	✔	✔		
PREDICATES OF PROBABILITY, POSSIBILITY AND NECESSITY					
es posible ('it is possible')		✔	✔		
es necesario ('it is necessary')	✔	✔	✔		
es probable ('it is likely')	✔	✔	✔		
necesitar ('need')	✔		✔		
DIRECTIVE PREDICATES					
autorizar ('authorize')					
aconsejar ('advise')	✔	✔	✔		
animar ('encourage')	✔	✔	✔		

	enormemente	*mucho* or *muy* (intensity)	comparative construction (intensity)	*mucho* (extensibility)	comparative construction (not intensity)
aprobar (‘approve’)			✔		
decidir (‘decide’)					
dejar (‘let’)			✔		
exigir (‘request’)			✔		
forzar (‘force’)	✔	✔	✔		
invitar (‘invite’)					
impedir (‘hinder’)			✔		
imponer (‘impose’)			✔		
mandar (‘order’)					✔
obligar (‘oblige’)					
ordenar (‘order’)					✔
pedir (‘ask’)					✔
permitir (‘allow’)					✔
prohibir (‘disallow’)					✔
recomendar (‘recommend’)	✔	✔	✔		
rogar (‘beg’)			✔		
suplicar (‘solicit’)			✔		
sugerir (‘suggest’)	✔	✔	✔		
CAUSATIVES					
hacer (‘make’)					
conseguir (‘achieve’)					

	enormemente	*mucho* or *muy* (intensity)	comparative construction (intensity)	*mucho* (extensibility)	comparative construction (not intensity)
lograr (‘accomplish’)					
evitar (‘avoid’)	✔		✔		
contribuir a (‘contribute’)	✔	✔	✔		
ayudar a (‘help’)	✔	✔	✔		
causar (‘cause’)					

CHAPTER 5

CONCLUSION

In this dissertation, the context dependence of two specific phenomena have been examined: *how many* questions in English and French, and the subjunctive mood in Spanish. In the first case, I have provided psycholinguistic evidence that the semantic processing of a *how many* question necessarily involves reference to context. In the second case, I have argued that the interpretation of the subjunctive mood involves reference to the set of available contextual alternatives. In this final chapter, I will look at the consequences and open questions that these two studies have brought up for semantic theory.

5.1 The experimental results for *How many* questions: consequences for semantic theory

In chapter 2, I have argued that reference to context is a crucial aspect of the on-line processing of *how many* questions. I have examined *how many* questions that display a scope ambiguity and tested which interpretation is preferred when participants are presented a question preceded by a context that allows for both possibilities. The results from experiments I and II indicate that a system in which the parser first attempts to construct the LF representation that minimally differs from the surface representation of a sentence cannot account for the facts. We have seen that these results are also unexpected under current assumptions about incremental processing of meaning: incremental interpretation should lead to the construction of the LF that is closest to the surface interpretation of the sentence, in which the quantifiers appear in their surface order.

I have proposed a model in which the preference for the LF *'n-many* low' interpretation of a *how many* question derives from the interaction with context. On the basis of the anaphoric properties of wh-phrases, I have argued that the interaction with context can be a reason to delay ambiguity resolution and integration of a constituent

into the LF representation. Thus, in the proposed model, immediate access to context does not necessarily trigger immediate interpretation of a constituent. In this respect, my model crucially differs from previous on-line context interactive models. The results from experiment III support this model.

The experimental work presented here also has some repercussions for semantic theory. At least two important questions arise from the proposal: the claim that *wh*-constituents are anaphoric raises a question about the specifics of the semantic representation of a *how many* question. The proposal that on-line interpretation is immediate and incremental addresses a more general question to semantic theory about the interpretation of partial semantic representations. In what follows, I discuss these two questions.

The context dependence hypothesis presented in chapter 2 may lead us to revise the semantic representation of *how many* questions. For convenience, the hypothesis is repeated here.

(1) **Context Dependence Hypothesis**
How many N triggers the search for a set of Ns (= antecedent) in the discourse. A context that provides more than one possible antecedent for *n-many N* delays the incorporation of this constituent into the LF representation.

The semantic denotation of *how many* questions, as proposed in section 2.2.2, represents *n-many N* as an indefinite rather than as a pronoun, since it contains an existential quantifer. The fact that the context dependence hypothesis was verified by experiment III suggests that the semantic representation of a *how many* question may have to be revised. One possibility would be to represent *n-many N* as a definite expression rather than an existential quantifier. The semantic denotation for *n-many* would then be as follows:

(2) $[[n\text{-}many]] = \lambda Q_{<e,<s,t>>}.\lambda P_{<e,<s,t>>}.\lambda w.\ card(max(\lambda x.P(x)(w) \,\&\, Q(x)(w))) = n$

where $max(S) = \iota x.\ x \in S \,\&\, \forall y\,[y \in S \Rightarrow y \leq x]$

With this denotation for *n-many*, we obtain the two following representations for a *how many* question that contains a universally quantified subject:

(3) a. semantic representation for LF *'n-many* low':
λp.λw.∃n[p = λw'.[∀ x: x is a student in w' ⇒ card(max(λY.Y is a set of pieces in w' & x played Y in w'))= n]]

b. semantic representation for LF *'n-many* high':
λp.λw.∃n[p=λw.card(max(λY.Y is a set of pieces in w' & [∀ x: x is a student in w' ⇒ x played Y in w'))= n]]

Alternatively, the denotation of *n-many* could simply contain a variable. This variable receives its value through the variable assignment g:

(4) $[[n\text{-}many]]^g = \lambda Q_{<e,<s,t>>}.\lambda P_{<e,<s,t>>}.\lambda w.[P(g(Y))(w) \& Q(g(Y))(w) \& card(g(Y))(w)=n]$

The two semantic representations that we then obtain are as follows:

(5) a. semantic representation for LF *'n-many* low':
λp.λw.∃n[p=λw'.[∀ x: x is a student in w' ⇒ g(Y) is a set of pieces in w' & card(g(Y))(w') = n & x played g(Y) in w']]

b. semantic representation for LF '*n-many* high':
λp.λw.∃n[p=λw'.g(Y) is a set of pieces in w'& card(g(Y))(w')= n & [∀ x: x is a student in w' ⇒ x played g(Y) in w']]

The experimental results presented here thus have repercussions for the semantic representation of *how many* questions. Which of these two alternatives is the most appropriate semantic representation is still open to further investigation.

The second question that arises for semantic theory is whether the Principle of Immediate Interpretation conflicts with any of the current assumptions in semantics.

Psycholinguistic studies have argued that on-line semantic processing not only involves reference to context, but that the interpretation of an utterance is computed immediately and in an incremental fashion (Marslen-Wilson & Tyler 1980, Crain and Steedman 1985, Altmann & Steedman 1988, and many others). Crocker (1996) argues that "we don't simply recover the semantic referents of each individual word, but we also rapidly assign grammatical structure to the input, as words are encountered, so that compositional semantic interpretation can take place immediately and incrementally" (p.4). Incremental interpretation thus involves assigning partial semantic interpretations to incomplete sentences.

Currently, the semantic framework adopted in this dissertation only allows for the computation of complete sentences. In chapter 2, I have suggested, that it is conceivable to develop a semantic framework in which partial interpretations may be assigned to incomplete sentences. This is so since at each stage of the semantic derivation we have, in principle, the necessary information about what type of arguments are still needed/expected to construct a complete sentence meaning. Of course, the full details of such a framework still need to be worked out. In particular, variable binding in a structure may pose various problems for immediate interpretation. What is the status of a partial interpretation with an unbound variable? What problems are encountered when we try to project the missing structure of a partial semantic representation? How do we distinguish possible from impossible partial semantic representations? Given that there is psycholinguistic evidence for the claim that the meaning of a sentence is computed incrementally, these are some of the questions that need to be investigated further.

5.2 A theory of the subjunctive mood: consequences and extensions

In chapters 3 and 4, I have argued for a new semantics of the predicates that select the subjunctive mood in Spanish: a semantics based on the comparison of contextually relevant alternative propositions.

An interesting consequence of this hypothesis is that it is irrelevant for the distribution of the subjunctive mood whether these alternatives are possible or counterfactual alternatives. In this sense, this proposal clearly departs from those

approaches that attempt to characterize the distribution of the subjunctive mood with a 'realis/irrealis' approach.

I have argued that the licensing conditions of subjunctive clauses can be explained in a system in which, next to the ordinary semantic value, we also compute an alternative semantic value of the sentence (cf. Rooth 1985). The view that the semantic component consists of two semantic values rather than just the ordinary semantic value has proven to be very fruitful in various areas. Most recently, Beck (2006, to appear) argues that this view can successfully be adopted for the analysis of a whole range of linguistic phenomena and other constructions. We have seen that the subjunctive mood is yet another linguistic phenomenon that reveals the need for the use of alternative semantics.

In this dissertation, I have limited myself to examining the cases in which the subjunctive mood is licensed by the matrix predicate. As is well known, other factors may also trigger the subjunctive mood in the complement clause, such as negation and interrogation. The obvious question that remains is whether the proposal presented in this dissertation can be extended to these environments as well. A detailed analysis of the rather complex facts will have to be left for future research. I will not try to go into the complexities of the semantics of negative and interrogative sentences here, but I will merely show that extending the proposal to these cases is a reasonable enterprise.

We begin with the case of negative sentences. The predicate classes that usually select the indicative mood in Spanish may also select the subjunctive mood when they are negated. For example, the predicate of communication *decir* ('say'), which usually necessarily selects the indicative mood, when negated, may either select the indicative or the subjunctive mood. (cf.(6) and (7) respectively).

(6) Lucho no dijo que la comida estaba lista.
Lucho not said that the food be:PAST.IND.3SG ready.
'Lucho didn't say that the food was ready.'

(7) Lucho no dijo que la comida estuviera lista.
Lucho not said that the food be:PAST.SUBJ.3SG ready.
'Lucho didn't say that the food was ready.'

Many grammars and studies point out that there is a meaning difference depending on whether the subjunctive or the indicative mood is selected. It is generally assumed that the meaning difference created by the indicative/subjunctive alternation should be stated in terms of a presupposition (e.g., Bell 1980, Borrego et. al. 1985, Bosque 1990, Quer 1998, Rivero 1971, Terrell & Hooper 1974, Sastre 1997). The claim is that when the indicative mood is selected in the complement clause, the speaker presupposes that the proposition expressed by the complement clause is true, but not when the subjunctive mood is selected. I will call these two readings factive and non-factive interpretations respectively. Thus, in (6), with the indicative mood, the speaker presupposes that the food was ready (factive interpretation). In (7), where the subjunctive mood is selected, the speaker doesn't know whether the food was ready or not (non-factive interpretation).

This 'factivity-effect' appears consistently throughout all predicate classes that select the subjunctive mood when negated. Some examples from the literature are given below.

(8) No notó que la sopa tenía /tuviera sal.
PRO not noticed that the soup has:PAST.IND.3SG/has:PAST.SUBJ.3SG salt.
'(S)he didn't notice that the soup had salt' (Sastre 1997)

(9) Juan no vió que venían /vinieran los aviones.
Juan not saw that PRO come:PAST.IND.3PL/come:PAST.SUBJ.3PL the airplanes.
'Juan didn't see that the planes were arriving.' (Borrego et al. 1985)

(10) Juan no sabía que era /fuera fiesta.
Juan not knew that PRO be:PAST.IND.3SG/be:PAST.SUBJ.3SG holiday.
'Juan didn't know that it was a holiday.' (Borrego et al. 1985)

The questions that need to be addressed are the following: why are both the subjunctive and the indicative possible in negative sentences? Where does this meaning difference come from? What triggers the presence of the subjunctive mood in this context?

First, I will show that the indicative mood can only be selected if the complement clause is not in the scope of negation. When the complement clause is in the scope of negation, the subjunctive mood is in fact obligatory. I expect the meaning difference to follow from this fact.

Notice that the same meaning ambiguity has been shown to arise in English, without the difference in mood selection. Hooper (1975), for example, provides the following two examples, which can be either interpreted with a factive reading or a non-factive reading.

(11) He didn't see that the door was locked.
(12) He didn't find out that the flight had been postponed.

Similarly, Berman (1991), following Gazdar (1979), points out that non-factive predicates when negated tend to be understood as presupposing their complement. This is illustrated in the example from Gazdar (1979) given in (13), which has a factive interpretation. Notice that this example contains a Positive Polarity Item *too*, which indicates that the embedded clause is not interpreted in the scope of negation.

(13) The repairman didn't tell me that my camera was suitable for color, too.

Berman (1991) notices that many predicates when negated really give rise to an ambiguity. The non-factive interpretation is most salient when the complement clause contains a Negative Polarity Item (henceforth NPI). The example in (14) contains the NPI 'any problems'. The presence of an NPI indicates that, here, the embedded clause is *in* the scope of negation.

(14) The repairman didn't tell me that my camera had any problems.

Similarly, the distribution of NPIs and PPIs in Spanish provides evidence that only subjunctive complement clauses stay in the scope of negation. To illustrate this we look at the distribution of Spanish N-words (e.g., *nada* 'anything'*, nadie* 'anybody'*, nunca* 'ever') which are a subclass of Spanish NPIs. It has been noticed in the literature that N-words can only appear in the complement clause of a negative matrix clause if

the complement clause is in the subjunctive mood (cf. Bosque 1990, Brugger & D'Angelo 1995, Giannakidou & Quer 1995,1997, Laka 1990, Quer 1998, Rivero 1971, Sastre 1997, Uribe-Etxebarría 1994, and many others). This is illustrated below with examples from the literature for epistemic predicates, predicates of mental judgement, and predicates of communication.

(15) Juan no creía que María hubiese /*había dicho **nada.**
Juan not believed that María have:PRES.SUBJ.3SG/*PRES.IND.3SG said anything.
'Juan didn't believe that María had said anything.' (Uribe-Etxebarría 1994)

(16) Juan no se acuerda de que conozcas /*conoces
Juan not SE remember of that PRO know:PRES.SUBJ.3SG/*know:PRES.IND.3SG
a **ningún artista**.
A any artist.
'Juan doesn't remember that you know any artist.' (Piñar 1996)

(17) No dije /noté que Pepe supiera /*sabía
PRO not said/noticed that Pepe know:PAST.SUBJ.3SG/*know:PAST.IND.3SG
nada del asunto.
anything of-the matter.
'I didn't say/notice that Pepe knew anything about the matter.'(Bosque 1980)

Several studies have argued that this distribution can be explained if one assumes that the indicative complement clause moves out of the scope of negation at the level of LF (cf. Brugger & d'Angelo 1995, Uribe-Etxebarría 1995, Borgonovo 2003 and others). Under the assumption that the relevant level of representation for NPI-licensing is LF, N-words that appear in an indicative complement clause then cannot be licensed.

Similary, the distribution of PPIs shows that the subjunctive mood is only possible if the embedded clause remains in the scope of negation. Examples of Spanish PPIs are *alguien* 'someone', *un poco* 'a bit', *bastante* 'plenty', *yá* 'already', *también* 'too', *prácticamente* 'practically' (cf. Bosque 1980). These elements cannot be interpreted in the scope of negation as illustrated below. The examples either only allow

for an interpretation in which the PPI has wide scope over negation (I indicate this with #) or are simply ungrammatical.

(18) #Los niños no comieron **un poco**.
The children not ate a bit.
#'The children didn't eat a little bit.'

(19) *Alfonso no vino **también**.
Alfonso not came too.
*'Alfonso didn't come too.'

(20) *Ana no está **prácticamente** lista.
Ana not is practically finished.
*'Ana isn't practically finished.'

Crucially, when PPIs are embedded in the complement clause of a negated sentence, they are only acceptable if the indicative mood is selected, not when the subjunctive mood is selected:

(21)La madre no notó que los niños comieron /*comieran **un poco**.
The mother not noticed that the children eat:PAST.IND.3SG /*PAST.SUBJ.3SG a bit.
'The mother didn't notice that the children ate a little bit'.

(22) Ana no dijo que estaba /*estuviera **prácticamente** lista.
Ana not said that PRO be:PAST.IND.3SG /*PAST.SUBJ.3SG practically finished.
'Ana didn't say that she was practically done.'

We can summarize the facts in the following generalization.

(23) **Generalization for mood selection under negation**
a) An indicative clause is necessarily interpreted outside the scope of negation: PPIs are possible, NPIs are impossible. This results in a factive interpretation.

b) A subjunctive clause is necessarily interpreted in the scope of negation: PPIs are impossible, NPIs are possible. This results in a non-factive interpretation.

I will not go into the details of how the factive interpretation arises, but simply assume that it is due to the fact that the indicative clause is not interpreted in the scope of negation. What is of interest here is to explain how the subjunctive mood can be licensed by negation. The data presented above show that, when the complement clause is in the scope of negation, the subjunctive mood is obligatory. Can the proposal developed in chapters 3 and 4 be extended to account for this fact?

It has been widely assumed in the literature that negation is a focus-sensitive operator (cf. Buering 1997,1999, Borgonovo 2003, Erteshik-Shir 1997, Herburger 2000, Horn 1989, Jakobs 1982, 1983, 1991, Partee 1991, 1993, 1995, 1999, among others). I will claim that, here as well, the subjunctive mood has the role of evaluating the contextual alternatives for the negative operator. Below, I illustrate the role of the subjunctive mood in a negative sentence with an example that contains a focused constituent in the embedded clause:

(24) Lucho no dijo que LA COMIDA estuviera lista.
Lucho not said that the food be:PAST.SUBJ.3SG ready.
'Lucho didn't say that THE FOOD was ready.'

We can propose the following LF-structure for this example:

(25) $[_{CP}$ Lucho NO_C dijo $[_{MoodP}$ $SUBJ_C$ que $[\text{la comida}]_F$ estuviera lista]

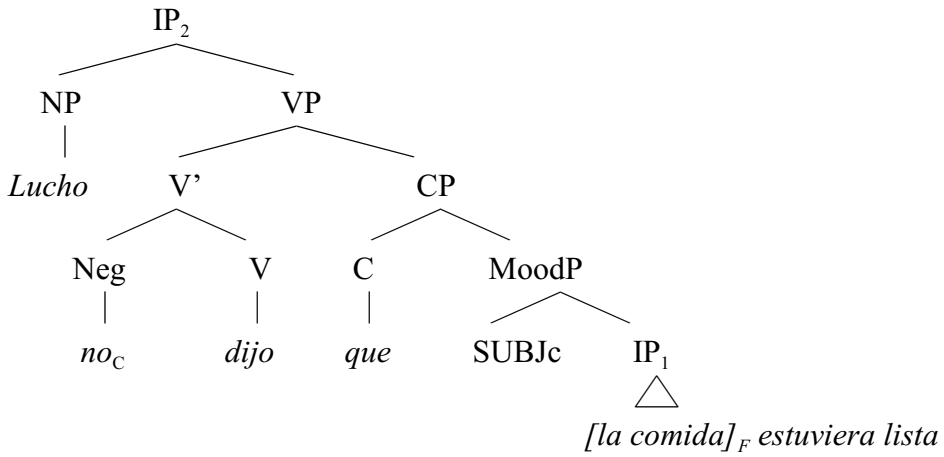
The meaning of this sentence can be paraphrased as follows: among the set of alternatives {that x was ready/ $x \in D$}, 'that the food was ready' is not what Lucho said.

I propose to analyze negation as a focus sensitive operator that carries a variable C. For the example above, we may assume the following denotation for negation:

(26) $[\![NO_C]\!]^g = \lambda R_{<<s,t><e,<s,t>>>} \lambda p \lambda x \lambda w\ [\forall\ q \in g(C): R(q)(x)(w) \Rightarrow q \neq p]$

In a negative sentence, SUBJc hence evaluates the alternatives for the negation operator. In this case, the operator is not immediately adjacent to SUBJc, but present higher up in the tree. Below, I propose a tree structure and a semantic computation for (24).

(27)



(28) $[\![IP_1]\!]^g_o$ = λw .the food was ready in w

$[\![IP_1]\!]^g_{ALT}$ ={λw. the food was ready in w, λw. the dessert was ready in w, λw. the coffee was ready in w}

$[\![MoodP]\!]^g_o$ = $[\![SUBJ_C\ \ IP]\!]^g_o$ is only defined if g(C) ⊆ $[\![IP]\!]^g_{ALT}$ = {λw. the food was ready in w, λw. the dessert was ready in w, λw. the coffee was ready in w}

when defined

$[\![MoodP]\!]^g_o$ = λw. the food was ready in w

$[\![MoodP]\!]^g_{ALT}$ = {λw. the food was ready in w}

$[\![CP_2]\!]^g_o$ =$[\![MoodP]\!]^g_o$ = λw.the food was ready in w

$[\![CP_2]\!]^g_{ALT}$ =$[\![MoodP]\!]^g_{ALT}$ = {λw.the food was ready in w}

$[\![V]\!]^g_o$ = $[\![dijo]\!]^g_o$ = λp.λx.λw'.x said p in w'.

$[\![V]\!]^g_{ALT}$ = {λp.λx.λw'.x said p in w'}

$[\![Neg]\!]^g_o$ = $[\![no_C]\!]^g_o$= $\lambda R_{<<s,t>,<e,<s,t>>>}\lambda p.\lambda x.\lambda w'.\ \forall q \in g(C)$: R(q)(x)(w') ⇒ q≠p

$[\![V']\!]^g_o$ $= [\![no_C]\!]^g_o([\![dijo]\!]^g_o) =$

$= \lambda p.\lambda x.\lambda w'.\ \forall\ q \in g(C)$: x said q in w' $\Rightarrow q \neq p =$

$= \lambda p.\lambda x.\lambda w'.$ [$\forall\ q \in$ {λw. the food was ready in w, λw. the dessert was ready in w, λw. the coffee was ready in w}: x said q in w' $\Rightarrow$ $q \neq p$]

$[\![VP]\!]^g_o$ $= [\![V']\!]^g_o([\![CP]\!]^g_o) =$

$= \lambda x.\lambda w'.\ \forall\ q \in$ {λw. the food was ready in w, λw. the dessert was ready in w, λw. the coffee was ready in w}: x said q in w' $\Rightarrow q \neq$ [λw the food is ready in w]

$[\![IP_2]\!]^g_o$ $= [\![VP]\!]^g_o([\![NP]\!]^g_o)$

$= \lambda w'$ [$\forall\ q \in$ {λw. the food was ready in w, λw. the dessert was ready in w, λw. the coffee was ready in w}: Lucho said q in w $\Rightarrow$ [$q \neq$ λw the food was ready in w]

To conclude, in negative sentences, the subjunctive mood can be analyzed as having the same role as before: it evaluates the contextual alternatives for a focus sensitive operator in the sentence.

We now turn to the case in which the subjunctive mood is licensed in an interrogative sentence. In a question, a predicate of communication such as *decir* (*'say'*) may either select the indicative or the subjunctive mood as illustrated in (29) and (30).

(29) Dijo Lucho que la comida estaba lista?
Said Lucho that the food be:PAST.IND.3S ready?
'Did Lucho say that the food was ready?'

(30) Dijo Lucho que la comida estuviera lista?
Said Lucho that the food be:PAST.SUBJ.3S ready?
'Did Lucho say that the food was ready?'

It is important to notice that subjunctive mood is not acceptable in all types of questions. It is only acceptable in Yes-No questions, not in wh-questions, as illustrated in the examples below.

(31) Quien dijo que la comida estaba /*estuviera lista?
Who said that the food be:PAST.IND.3SG/*be:PAST.SUBJ.3SG ready?
'Who said that the food was ready?'

(32) Cuando dijeron que la comida estaba /*estuviera lista?
When PRO said that the food be:PRES.IND.3SG/*be:PRES.SUBJ.3SG ready?
'When did they say that the food was ready?'

In the case of questions, the meaning difference for the indicative/subjunctive alternation is less discussed in the literature. Different studies agree (e.g., Borrego et al. 1985, Sastre 1997, Wasa 1999) that the difference between the indicative and the subjunctive mood reflects the fact that the speaker is requesting a different type of information. Intuitively, in (29), with the indicative mood, the speaker is trying to find out whether Lucho said or not that the food was ready. In (30), with the subjunctive mood, the speaker is rather interested in finding out whether the food was ready or not. I propose that the set of possible answers, and thus the denotation of the question, is different in both cases:

(33) Set of possible answers when the indicative mood is selected:
{Lucho said that the food was ready, Lucho didn't say that the food was ready}

(33) Set of possible answers when the subjunctive mood is selected:
{Lucho said that the food was ready, Lucho said that the food was not ready}

Notice that, when the subjunctive mood is selected, constructing the set of possible answers involves using the alternative propositions to the embedded clause.

The denotation of a question usually involves a question operator Q that turns the proposition into a set of propositions. Recently, Beck(to appear) proposes that this question operator Q has the function to access the alternative semantic value of the

proposition, and thus turns the sentence into a question denotation: the alternative semantic value of the sentence:

(34) $[\![Q\ \phi]\!]_o = [\![\phi]\!]_{ALT}$

It is possible, and probably desirable, to analyze this question operator Q as a focus sensitive operator. Hence, I propose that this question operator should be analyzed as carrying a variable C: the set of propositions that constitute a possible answer to the question is contextually determined and restricted by the focus structure of the sentence. We may then assume again that the role of the subjunctive mood is to evaluate the alternatives for this question operator. The presence of the subjunctive mood in the embedded clause indicates that constructing the set of possible answers involves using the set of alternative propositions to the embedded clause. The denotation of the question should be as follows:

(35) $[\![\ [Q_C\ [\text{Dijo Lucho}\ [_{MoodP}\ SUBJ_C\ \text{que la comida estuviera lista?}]]]\ ]\!]^g_o =$
$=\{p= \lambda w.\ \text{Lucho said that q in w/ q} \in g(C)\}$

I will leave the details of the semantics of such a focus sensitive question operator for future research. In this chapter, my goal has simply been to show that the theory that I have developed for the subjunctive mood licensed by a matrix predicate can be meaningfully extended to other contexts such as negative and interrogative sentences.

The proposal developed in chapters 3 and 4 is not only a proposal for the semantics of the predicates that select the subjunctive mood in Spanish. We can reasonably assume that it can also be extended to other languages. For the predicates in question, this new theory has uncovered a variety of properties relating to practical inferences, lack of entailment-relations, focus sensitivity and gradability. These are properties that these predicates also share in other languages such as English. The proposal is thus expected to have a certain crosslinguistic validity.

What can be said about crosslinguistic variation in mood selection under the perspective presented here? I would like to suggest that the semantics of a certain

predicate varies with the variation in mood. That is, if a predicate such as *believe* selects the indicative mood in one language and the subjunctive mood in another language, the semantics for the predicate is different in each language. The expectation then is that, in the language in which the subjunctive mood is selected, the predicate has the properties predicted under this proposal (focus sensitivity and gradability). The hypothesis presented here can thus be empirically tested.

Which are the predicate classes that show crosslinguistic variation in mood selection? It should be noted that, in fact, the majority of predicate classes do *not* exhibit crosslinguistic variation. As reported in Giorgi and Pianesi (1977), desire predicates, directive predicates, predicates of doubt and modals consistently select the subjunctive mood across the Romance languages (among which are Italian, Romanian, Spanish, French, Catalan and Portuguese). Furthermore, predicates of communication, fiction verbs and the majority of predicates of mental judgement consistently select the indicative mood across the Romance languages.

There are two well known cases of crosslinguistic variation: epistemic predicates and emotive factive predicates. I will briefly comment on these here.

Contrary to most Romance languages, in Italian, the nonfactive epistemic predicates *credere* ('believe') and *pensare* ('think') select the subjunctive mood. Furthermore, predicates such as *sospettare* ('suspect') and *supporre* ('suppose') pattern with these predicates in that there is a strong preference to select the subjunctive mood. Notice, however, that many nonfactive predicates select the indicative mood in Italian, such as *concludere* ('conclude'), *capire* ('understand'), *indovinare* ('guess'), *essere d'accordo* ('agree'), *promettere* ('promise'). I propose that, in Italian, predicates such as *credere* ('believe') and *pensare* ('think') have a different semantics from the equivalent predicates in other Romance languages, namely a comparative semantics. Under the proposal developed here, these predicates are then expected to be focus sensitive and gradable in Italian.

Another important class of predicates that exhibits crosslinguistic variation in mood selection is the class of emotive factive predicates. In languages such as French, Italian, Spanish and Catalan these predicates select the subjunctive mood, whereas in Romanian these predicates select the indicative mood.

Given that emotive factive predicates have been at the core of my argumentation, the Romanian mood choice for these predicates seems at first sight

rather unexpected under this approach. Nevertheless, it is possible that there is a constraint in Romanian that prevents the subjunctive mood from being used whenever there are counterfactual propositions among the contextual alternatives. The subjunctive mood would then only be used to signal non-counterfactual alternatives.

Interestingly, mood selection for emotive factive predicates in Romanian does in fact depend on the mood choice in the matrix clause. As pointed out in Farkas (1992), when the matrix predicate is in the conditional, the subjunctive mood in the complement clause in fact becomes possible. The examples from Farkas (1992) are given below. They illustrate the emotive factive predicate *be a pity.* In (36), the indicative mood is selected in the complement clause, while in (37), where the matrix predicate is in the conditional mood, the subjunctive mood is selected in the complement clause (cf. Farkas 1992, p.102).

(36) E păcat că Ana a plecat deja.
Be:PRES.IND.3SG pity that Ana have:PRES.IND.3SG left already.
'It is a pity that Ana has left already.'

(37) Ar fi păcat să pierdem sansa asta.
COND3SG be pity SUBJ lose chance this.
'It would be a pity to lose this chance'.

Notice that, in the example in (37), the set of contextual alternatives to the proposition expressed by the complement clause only contains non-counterfactual alternatives, contrary to (36) . It is possible that the subjunctive morpheme has a certain future-meaning component in Romanian and is thus restricted to contexts in which non-counterfactual alternatives are made available. Under the approach developed here, in Romanian, the definition of SUBJc would include a constraint on the variable C that excludes counterfactual propositions from the set of contextual alternatives.

Even though an in depth study of crosslinguistic variation will have to be left for future research, it seems reasonable to assume that my proposal for the semantics of the subjunctive mood in Spanish can be extended to the other Romance languages as well.

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